Environmental Impact Statement for the Proposed Development of 6012 Ottawa Street Area

Draft Report

January 14, 2020

Submitted To:

Michelle Taggart
Tamarack Homes
3187 Albion Road South
Ottawa ON
K1V 8Y3

KILGOUR & ASSOCIATES LTD.
www.kilgourassociates.com

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List of Acronyms and Abbreviations

ELC – Ecological Land Classification
EIS – Environmental Impact Statement
ESA – *Endangered Species Act*
HDFA – Headwater Drainage Features Assessment
KAL – Kilgour & Associates Ltd.
MBCA – *Migratory Birds Convention Act*
MECP – Ministry of Environment, Conservation and Parks
MNRF – Ministry of Natural Resources and Forestry
OSAP – Ontario Stream Assessment Protocol
RVCA – Rideau Valley Conservation Authority
SAR – Species at risk
SARA – *Species at Risk Act*
TCR - Tree Conservation Report

1.0 INTRODUCTION

Kilgour and Associates Ltd. (KAL) was retained by HP Urban Inc. on behalf of Tamarack Homes to provide an Environmental Impact Statement (EIS) in support of the proposed development of 6012 Ottawa Street and several adjacent parcels in the Village of Richmond (hereafter referred to as "the Site"; Figure 1). As per Section 4.7.8 of the Official Plan (City of Ottawa, 2003) this EIS was triggered because the proposed development is planned to occur within and/or near significant or potentially sensitive natural heritage features, including habitat potentially used by species at risk (SAR). Consequently, the purposes of this EIS are to 1) identify all natural heritage features on or adjacent to the Site, 2) identify potential impacts of the proposed development to those features, and 3) identify mitigation measures to minimize or eliminate those impacts. This EIS also includes descriptions of headwater drainage features and trees on Site following the relevant guidelines, and as such, this report also acts as a Headwater Drainage Features Assessment (HDFA) report and Tree Conservation Report (TCR), respectively.

1.1 Property Information and General Existing Conditions

The Site is composed of several parcels:

- A parcel located at the corner of Ottawa Street and Eagleson Road (unknown civic address; PIN: 039340036;
- 5970 Ottawa Street (PIN: 039340031);
- 5966 Ottawa Street (PIN: 039340032);
- 5900 Ottawa Street (PIN: 039340029);
- 5994 Ottawa Street (PIN: 039340028);
- 6012 Ottawa Street (PIN: 039340121);
- 6038 Ottawa Street (PIN: 039340022); and
- Two parcels located west of the above parcel (unknown civic addresses; PIN: 039340023 and 039340018).

The Site is approximately 67 ha and is zoned as General Industrial and is therefore intended for light industrial development. The Site is bordered to the north by Ottawa Street, a Development Reserve Zone, a Rural General Industrial Zone, agricultural fields, and the floodplain of the Jock River. The eastern edge of the Site is bordered by Eagleson Road, and beyond that are agricultural fields. Agricultural fields are also to the south of the Site, along with rural countryside. West of the Site is a Development Reserve Zone, Rural General Industrial Zones, McBean Street, and Village Residential Zones. The Smiths Falls rail line lies along the northwestern edge of the Site. Marlborough Creek, a tributary of the Jock River, and its associated floodplain also lie within the western to northwestern edge of the Site.

At the time of writing this report, the Site predominantly consisted of open agricultural fields in the eastern half of the Site and scattered young tree cover over the western half of the Site, which was historically used for agriculture. Based on available imagery from geoOttawa, it appears most of the western half of the Site was naturally revegetated sometime between 1976 and 1991. Some trees in the western half of the Site, such as the two linear hedgerows and the small woodlot in the southwestern corner of Site, existed prior to 1976 and thus are over 40 years old. The small woodlot, including the portion of it that extends beyond the

Site, is approximately 1.8 ha. Aerial photos from Natural Resource Canada's air photo library in Ottawa show that this woodlot existed in 1963 and is thus is likely over 60 years old.

No natural heritage elements are specifically named or described on or adjacent to the Site or are identified as potentially present under Schedule L2 of the City's Official Plan. There are no significant valleylands, significant woodlands, or Life Science Areas of Natural and Scientific Interest nearby. The closest Provincially Significant Wetland, the Richmond Fen, is ~2 km south to southwest of the Site.

The Site and adjacent lands lie within the Jock River subwatershed, which drains a total area of 556 km^2 (Rideau Valley Conservation Authority (RVCA), 2016). Within the Jock River subwatershed, the Site lies within the Jock River-Richmond Catchment which has a drainage area of 31 km^2 (RVCA, 2016). The main channel of the Jock River is ~515 m west of the Site. As previously mentioned, the Site contains a tributary of the Jock River and associated floodplain, along with several other small headwater features.

As of 2014, the Jock River-Richmond Catchment land cover type is predominantly crop and pasture (47%), followed by woodland (16%), wetland (15%), settlement (14%), transportation (5%), meadow-thicket (2%), and water (1%; RVCA, 2016). Considerable changes in land cover in the catchment from 2008 to 2014 include a loss of woodland and meadow-thicket (-42 ha each) and an increase in crop and pasture (+63 ha) and settlement (+24 ha; RVCA, 2016). Per City's guideline under the current Significant Woodlands Policy, the broader Jock River Rural Planning area in which the Site is included, is deemed to have 36.7% forest cover.

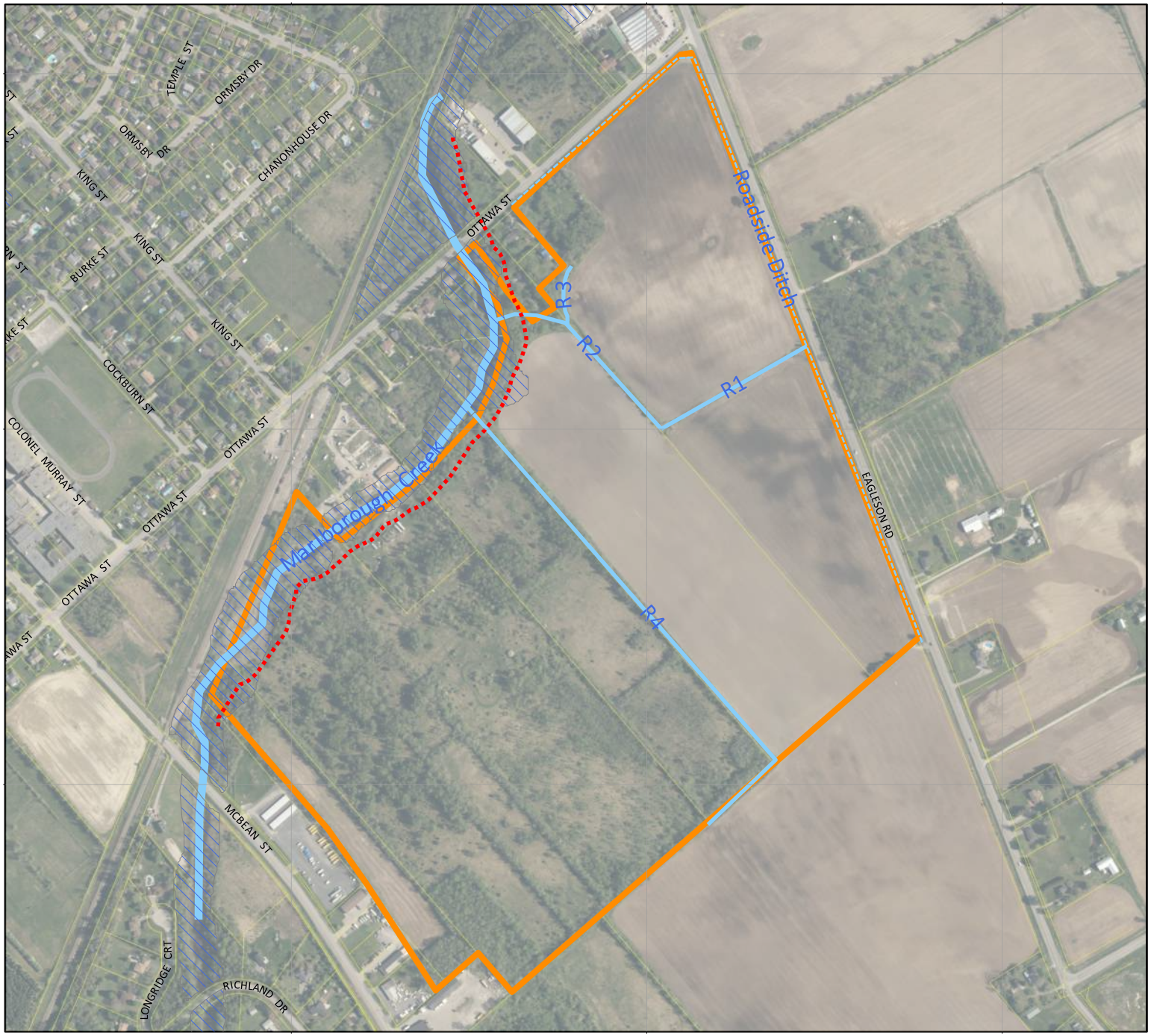

Figure 1 Map showing a general site overview

Legend

- Project Area
- Floodplain
- 30 m Setback

N

0 200 m

Project: TAGG 786 V2
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MTM Zone 9
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2.0 METHODS

2.1 Review of Existing Information

Colour digital aerial photographs from geoOttawa were used to initially identify natural environment features in the area through a desktop review (as with the general descriptions above). Additional background information in this report was obtained from a combination of studies and reports performed within the general area of the Site (cited throughout) to review relevant information and to guide field studies (below). The review of existing information also included a desktop assessment of species listed under the federal *Species at Risk Act* (2002) and the provincial *Endangered Species Act* (2007) having some potential to occur in the broader area (i.e., within 2 km of the Site). Existing information was obtained from online sources, which include but are not limited to:

- Natural Heritage Information Centre (Ministry of Natural Resources and Forestry (MNRF), 2016);
- Species at Risk Public Registry (Government of Canada, 2019);
- Ontario Species at Risk List (Ministry of the Environment, Conservation and Parks (MECP), 2019a);
- The Jock River-Richmond Catchment Report (RVCA, 2016);
- Ontario Breeding Bird Atlas (Ontario Nature, 2019);
- Bat Conservation International Species Profiles (BCI, 2016); and
- *Soils, capability and land use in the Ottawa Urban Fringe* (Report No. 47, Ontario Soil Survey; Marshall *et al.,* 1979).

In addition, an information request was submitted to the Kemptville District MNRF office on June 19, 2018 to obtain a review of all existing SAR records and other rare or uncommon species known to occur in the broader vicinity of the Site.

2.2 Field Studies

Detailed field studies were performed throughout the spring and early summer of 2019 to document the existing ecological conditions of the Site. These field studies included core surveys of flora and fauna. Standard and accepted methods were employed for all surveys (described in detail below). A summary of the field visits is outlined in Table 1.

Table 1 Summary of field visits to the Site, 2019

Date	Purpose	Personnel	Weather conditions
2019/04/12	HDFA part 1	Katherine Black and Robert Hallett	10°C, light rain, 75-100% cloud cover, low wind
2019/04/16	Turtle survey #1	Anthony Francis and Katherine Black	14°C, sunny, 0-25% cloud cover, low wind
2019/04/16	Frog survey #1	Anthony Francis and Katherine Black	6-7°C, 0-25% cloud cover, no wind
2019/05/06	Turtle survey #2	Clare Kilgour	11°C, sunny, 0-25% cloud cover, low wind
2019/05/07	Turtle survey #3	Anthony Francis and Heather Lindsay	17°C, sunny, 25-50% cloud cover, low wind
2019/05/08	Turtle survey #4	Heather Lindsay	12°C, sunny, 0-25% cloud cover, low wind
2019/05/21	Turtle survey #5	Heather Lindsay	13°C, sunny, 50-75% cloud cover, low wind
2019/05/27	Frog survey #2	Anthony Francis and Clare Kilgour	11°C, 25-50% cloud cover, low wind
2019/05/31	Bird survey #1 and vegetation survey	Robert Hallett	12°C, sunny, 0-25% cloud cover, low wind
2019/06/11	HDFA part 2	Clare Kilgour and Heather Lindsay	15°C, partly sunny, 75-100% cloud cover, moderate wind
2019/06/12	Nightjar survey #1	Anthony Francis	15°C, <10% cloud cover, low wind, moon clearly visible above the horizon with 79.9% illumination
2019/06/13	Install bat monitors	Heather Lindsay	N/A
2019/06/14	Nightjar survey #2	Anthony Francis	18°C, <10% cloud cover, no wind, moon clearly visible above the horizon with 94.5% illumination
2019/06/18	Frog survey #3	Heather Lindsay and Clare Kilgour	19°C, 0-25% cloud cover, low wind
2019/06/19	Bird survey #2	Ken Allison	13°C, sunny, 25-50% cloud cover, low wind
2019/06/25	Remove bat monitors	Robert Hallett	N/A
2019/06/26	Re-install bat monitors	Robert Hallett	N/A
2019/07/04	Remove bat monitors and HDFA part 3	Heather Lindsay	N/A
2019/07/11	Bird survey #3	Katherine Black	22°C, 100% cloud cover, no wind

Table Notes: HDFA – Headwater Drainage Features Assessment

2.2.1 Headwater Drainage Features Assessment

A full Headwater Drainage Features Assessment (HDFA) was performed for the Site. The HDFA provides a detailed description of water features on and directly adjacent to the Site following the field methods identified within *Evaluation, Classification and Management of Headwater Drainage Features Guidelines* written by Credit Valley Conservation Authority and Toronto Region Conservation Authority (2014), hereafter referred to as "the HDF Guidelines". Assessment and evaluation of the Site's water features will be conducted by RVCA based on descriptions provided in the HDFA.

The HDFA identifies and describes all water features occurring on and directly adjacent to the Site and evaluates roadside ditches and a total of five reaches on Site, including Marlborough Creek. A brief visual

inspection of the Site was performed on April 12, 2019 to document existing conditions of water features (feature types, physical characteristics of features, and riparian conditions) at their maximal extent under spring freshet conditions. Observations from this initial visit suggested that potentially two of the five reaches were fish habitat and perennially flowing, and that most other reaches on Site would likely be dry in the summer. During our second and third Site visits to characterize surface water features on June 11 and July 4, 2019, respectively, all reaches were dry or only contained shallow standing water except for Reach 4 and Marlborough Creek (see Section 3.2.1 for more details on all reaches), which were the only HDFs with defined channel forms.

Marlborough Creek was the only surface water feature with perennial flow whereas Reach 4 only contained standing water by July 4, 2019. Given the presence of a feature with perennial flow (Marlborough Creek), the HDF Guidelines would call for a detailed "Diagnostic" level survey type for this reach. However, since Marlborough Creek is already well-documented by RVCA and not to be altered under the proposed development, Diagnostic surveys were not performed for this reach. Accordingly, "Standard" level surveys as per the HDF Guidelines were performed for the five reaches associated with the Site as most reaches were expected, upon the initial site visit, to be dry or only containing puddles of standing water in the summer.

The Standard level of survey used in this HDFA follows the requirements of the HDF Guidelines, which are outlined in Table 2.

Table 2 Data requirements for the Standard survey type as per the HDF Guidelines

Survey Type	Sensitivity, Feature Form, and Flow	Mandatory Data Requirements		Additional Data Requirements for HDF Alterations	
		Flow Condition	Riparian	Fish and Fish Habitat	Terrestrial Assessment
Standard	Sensitive species/habitat possible and/or ill-defined form, intermittent flow likely	OSAP S4.M10 (Headwaters)	OSAP S4.M10 (Headwaters)	OSAP S3.M1	Marsh Monitoring Protocol for Amphibians; Ecological Land Classification; Ontario Wetland Evaluation System (OWES; for wetlands ≥ 0.5 ha)

Table Notes: Adapted from pg. 10 of the HDF Guidelines

Following the headwaters sampling protocol (OSAP S4.M10), a brief assessment was performed on April 12, 2019 to characterize the amount of water and sediment transport and storage capacity within the HDFs on Site as well as their riparian and feature vegetation. An assessment of fish and fish habitat using OSAP S3.M1 (electrofishing techniques) was performed on June 11, 2019 for Reach 4 only as all other surface water features (except Marlborough Creek) did not contain enough water (i.e., depth was less than 10 cm) to support a fish community. In Reach 4, the deepest, most unobstructed sections were electrofished. Accordingly, two stretches of 20-30 m were electrofished in this reach. Since a comprehensive fish list already exists for Marlborough Creek (RVCA, 2016), the creek was not assessed using electrofishing techniques. All reaches on Site were briefly re-visited on July 4, 2019 to qualitatively assess summer water levels. An assessment of amphibian breeding and presence following the Marsh Monitoring Protocol (Bird Studies Canada, 2008) was performed on April 16, May 27, and June 18, 2019 (more details in Section 2.2.3 below). The only wetland feature observed on Site is a narrow band of graminoid mineral meadow marsh

along a small portion of Marlborough Creek (riparian area of the creek) near the northwestern edge of the Site. No other wetlands were observed on or directly adjacent to the Site so OWES methods were not employed.

2.2.2 Ecological Land Classification and Vegetation Inventory

Natural vegetation communities on the Site were inventoried on May 31, 2019. Each community was identified and mapped in the field using the standard Ecological Land Classification (ELC) methods for Ontario (Lee et al., 1998). This method results in a standardized description of each vegetation community, giving information on vegetation type and soils. Where possible, communities were mapped to the most detailed level of 'vegetation type'. In some cases, where a suitable vegetation type did not exist, or mapping to this level did not provide a great deal of additional information, communities are described using the higher level of 'ecosite' type.

Treed areas anticipated to be impacted by the proposed development were also surveyed on May 31, 2019. Typically, all trees with DBH greater than 10 cm would be individually recorded and mapped as per the City's TCR Guidelines (2014). However, hedgerows and clusters of trees on Site contained too many trees to practically list every individual over 10 cm DBH. Instead, only trees of note (e.g., those with a diameter at breast height (DBH) greater than 40cm, standalone specimen trees, "wildlife" trees, etc.) were specifically mapped and their DBH measured. Butternut trees (*Juglans cinerea*; listed as Endangered under ESA and SARA) and any potential wildlife trees (e.g., those with cavities, dead leaf clusters, and/or snags ideal for bat roosting) of any size were specifically looked for.

Incidental wildlife observations were recorded while conducting vegetation work on Site.

2.2.3 Amphibians

Frog surveys were performed following the Marsh Monitoring Program (Bird Studies Canada, 2008). This protocol calls for multiple survey stations at a site to capture spatial and habitat variability. Accordingly, frog surveys were performed at six stations throughout variable habitats on Site (Figure 2). The Marsh Monitoring Program advises that each station be visited a minimum of three times at night, no less than 15 days apart, during the spring and early summer.

Following this protocol, the timing of the three frog surveys is based on nighttime air temperature:

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

Three rounds of frog surveys were performed on April 16, May 27, and June 18, 2019. Note that frog surveys are not typically performed over such a large temporal scale over the breeding season, but colder than average spring conditions delayed the mid-season and late-season breeding surveys. Survey dates still corresponded with temperature requirements for each breeding period (early, mid-, and late season) as demonstrated in Table 1.

Frog surveys began one half hour after sunset and ended before 1:00 am on evenings with appropriate temperatures and light winds. Note that under the Marsh Monitoring Program, stations typically cover a 180° semi-circle with a 100m radius. Surveys here were performed by pairs of observers standing back to back at each of the six stations covering 360° to simultaneously capture all potential surrounding habitat and to increase the efficiency of surveys (i.e., stations are paired as F1/2, F3/4, and F5/6 in Figure 2, with odd numbers facing eastward and even numbers facing westward).

Additional observations of amphibians were made throughout the spring and summer during other visits. Rocks, fallen wood, and other debris on Site were turned over to check for salamanders throughout the field campaign.

2.2.4 Turtles

Due to the presence of surface water on the property and a recent observation of a Blanding's Turtle within 2 km of the Site (personal communications with a local resident and the Kemptville District of the MNRF), turtle surveys were performed to assess the potential presence of at-risk turtles on and in the vicinity of the Site. Visual encounter surveys were completed following MNRF's Survey Protocol for Blanding's Turtle in Ontario (2015a). Although this protocol is intended primarily for Blanding's Turtle, all turtle species generally occurring in the area would be detectable under this protocol.

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

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

Turtle surveys were completed via foot along all surface water features that were considered, at a minimum, marginal turtle habitat and/or travel corridors (T-A through T-E on Figure 2). During turtle surveys, surveyors stopped and scanned areas of interest with binoculars from a distance of ~50 m to prevent any turtles from being startled before being observed. Specific dates and weather conditions of turtle surveys are shown in Table 1.

Rocks, fallen wood, and other debris on Site were turned over to check for snakes throughout the field campaign. Potential basking sites for snakes were also investigated.

2.2.5 Birds

Daytime Bird Surveys

Breeding bird surveys were performed via point count surveys following the Ontario Breeding Bird Atlas Guide for Participants (2001). Breeding bird surveys are to be completed from survey stations that, combined, provide suitable viewing of all habitats on Site on calm weather days with light wind (less than 3 on the Beaufort scale) and no precipitation. Six breeding bird survey stations (B1 through B6 on Figure 2) were established in representative habitats across the Site (Figure 2).

As per the Ontario Breeding Bird Atlas, surveys must take place between sunrise and five hours after sunrise between May 24 and July 10, with a minimum of 15 days between survey dates. This protocol calls for two surveys per year during the breeding bird window. However, an additional (third) bird survey is required under MNRF protocols for at-risk birds that use field habitats. Since we believed the Site had some potential for SAR birds that use field habitats (i.e., Barn Swallow), KAL biologists conducted three rounds of breeding bird surveys. Specific dates and weather conditions for daytime bird surveys are shown in Table 1. Note that the second and final bird survey was performed on July 11, 2019, which falls just outside of the recommended survey window, but this is justified under the delayed spring of 2019. All incidental observations were recorded while moving between survey points as well as during other Site visits. Birds were identified by song and/or direct visual observation.

The designation of regionally rare bird species was based on an analysis of data from the Atlas of Breeding Birds of Ontario (Cadman *et al*., 1987) based on Hill's Site Regions, now Ecoregions.

Nighttime Bird Surveys

Nighttime bird surveys to confirm the presence/absence of nightjars (Eastern Whip-poor-will and Common Nighthawk) and their potential breeding territories were conducted following the Draft Survey Protocol for Eastern Whip-poor-will in Ontario (OMNRF, 2014a). This protocol calls for three separate nighttime surveys between May 18 and June 30 that are timed based on moon conditions. Eastern Whip-poor-will usually forage in the semi-darkness of early morning and dusk, but on nights when the moon is more than half full, they are likely to forage all night long under the brighter conditions. Their broods are timed such that the young hatch approximately 10 days before the full moon when the parents have more time (and moonlight) to catch food for them (The Cornell Lab of Ornithology, 2017; Kaufman, 2019). As such, this species is more detectable during a full moon period. Common Nighthawks, if present, are generally observable following the same protocol (Knight, 2016). Neither species was anticipated to occur on the Site given existing observation records for the vicinity but nightjar surveys were completed to confidently rule out their potential presence.

The draft protocol recommends three surveys be completed during the breeding season, with two ideally occurring in late May or the first week of June during a week preceding or just after a full moon, and a third survey in the next available full moon period (middle/end of June). However, rather than having two surveys in late May/early June during the first moon cycle and one in the middle/end of June in the next moon cycle, we completed two nightjar surveys on June 12 and 14, 2019 as outlined in Table 1. Performing the two surveys during the second moon cycle of the breeding survey is not ideal as per the protocol, but was necessary to effectively determine any potential breeding territories of Eastern Whip-poor-will on Site based on the early first moon and late (i.e., colder than average) spring of 2019 (i.e., Eastern Whip-poor-will were unlikely to have established breeding territories by the late May/early June moon cycle in 2019). Based on our nightjar surveys at other properties in the Ottawa area, Eastern Whip-poor-wills were only observed in

the region at the very end of the standard late May/early June survey window and had not yet established identifiable nesting sites prior to the closing of the first survey window. The late May/early June survey for this Site was thus limited to noting potential nightjar presence during the evening frog surveys performed on May 27, 2019 (none were noted). Subsequently, two formal nightjar surveys were completed on June 12 and 14, 2019.

As per the draft protocol, the two nightjar surveys were completed within a week of the second full moon while the moon was visible above the horizon (greater than 50% illuminated) and started at least 30 minutes after sunset and ended while the moon was still visible (both surveys were completed between 23:30 hr and 00:00 hr). Surveys were conducted under field conditions with no precipitation, little or no wind, clear skies, temperature of 10°C or above, and good visibility (low cloud cover). Eastern Whip-poor-will can be heard calling from over 400 m away. Two survey stations (W1 and W2 on Figure 2) were established just outside the Site boundaries such that all wooded areas of the Site were with within 400 m of a station.

2.2.6 Bats and Other Mammals

The potential presence of bats was assessed during the tree survey required for the TCR with special attention paid towards trees with cavities and snags ideal for bat roosting. Detailed bat monitoring was also implemented following acoustic surveys under the MNRF's Survey Protocol for Species at Risk Bats within Treed Habitats (2017). This is currently the recommended protocol for confirming the presence/absence of Little Brown Myotis, Northern Myotis, and Tri-coloured Bat, where it is determined that potentially suitable habitat for the establishment of maternity roosts is present. Information obtained from our ELC assessment and tree surveys indicated potential areas of roosting (e.g., treed) and foraging (e.g., open) habitat.

All species of bats in a given area are detectable under this protocol if ultrasonic acoustic monitors are used and the signal to noise ratio can be analyzed from oscillogram displays to identify bat calls to species level. Under the protocol, acoustic monitors are to be installed for a minimum of 10 nights between June 1 and June 30, with recordings commencing after dusk and continuing for five hours. We installed two acoustic monitors (Song Meter SM3, Wildlife Acoustics) on June 13, 2019: one on a tree located on the edge of the woodlot in the southwestern corner of the Site, and one on a tree along the hedgerow towards the centre of the Site that bisects the agricultural fields and treed areas (Bat1 and Bat2 on Figure 2, respectively). Acoustic monitors were mounted on trees that face open areas immediately adjacent to more heavily treed areas. In both instances, the acoustic monitors were positioned to capture the best potential bat habitat on Site (potential foraging habitat in open areas) and to increase the likelihood of detecting bats based on their echolocating behavior. Bats use echolocation more frequently in cluttered environments (Falk et al., 2014), so installing monitors along the edges of the forest blocks or hedgerows rather than in the middle of open areas likely increased bat detectability. The monitors, however, are placed just outside of the cluttered environment as the distinguishability of calls among species diminishes within such locations (National Park Service, 2016).

Monitors were removed on June 25 and reinstalled on June 26, 2019 for a second round of bat monitoring due to technical issues encountered during the first round of monitoring (June 13-25, 2019). Microphone sensitivity during the first round of monitoring was so high that background noise triggered a single long recording each night instead of discrete samples associated with single bat fly-bys. These files are so massive (5 GB + each) that they cannot be analyzed. The second round of bat monitoring via acoustic monitors took

place between June 26 and July 4, 2019, and the microphone sensitivity issue was corrected. Note that the second round of acoustic monitoring was less than 10 days and extended slightly beyond the recommended monitoring window, but the timing was limited due to the previously described issues. During the second round of recording, the monitor at Bat2 suffered damage and failed to record anything. Therefore, only recordings from Bat1 were used in acoustic analyses.

Incidental observations of other mammals present in the study area were collected during all Site visits. Mammal observations were limited to sightings of scat, tracks, and in some cases, direct observations.

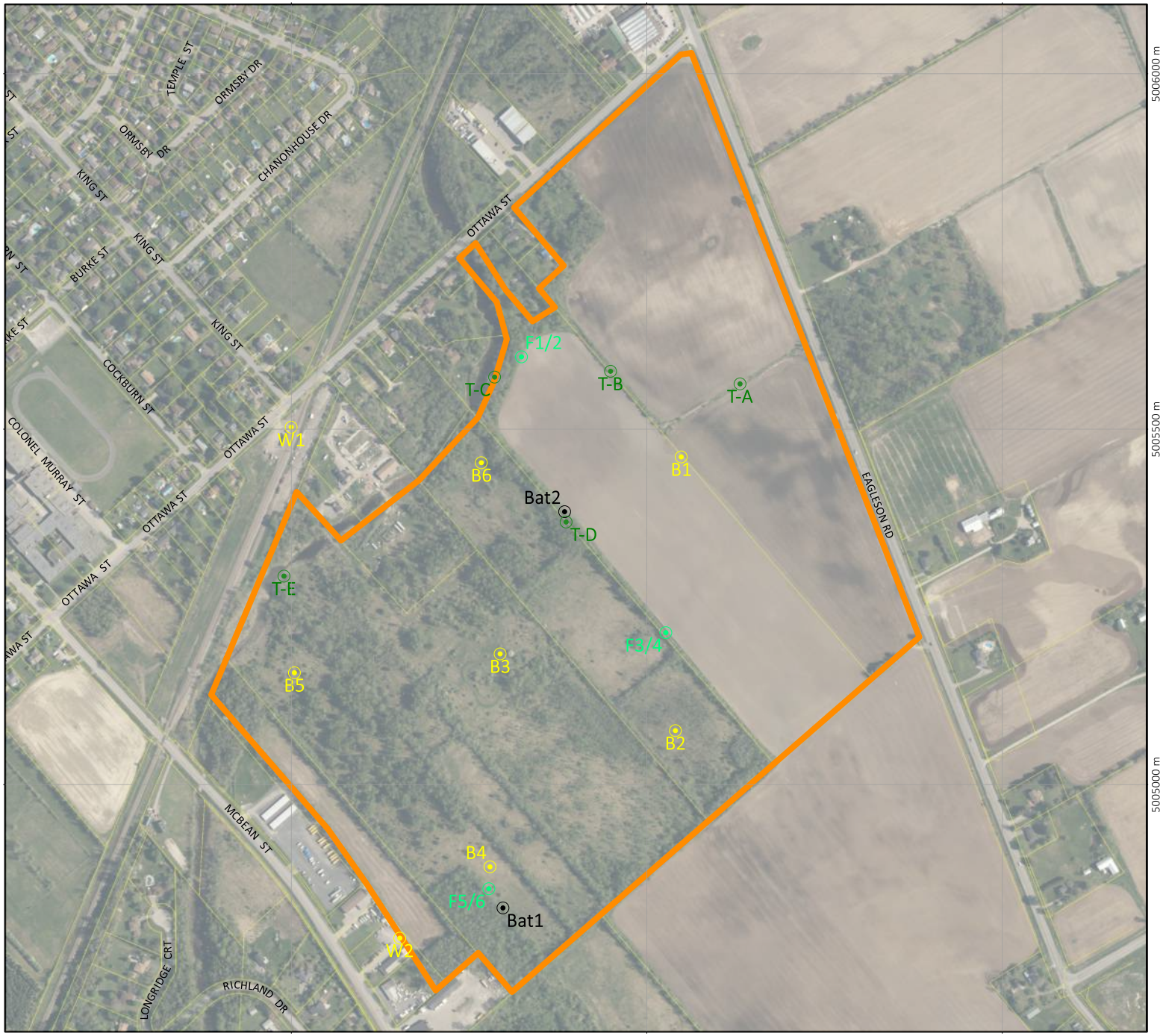

Figure 2 Map showing the locations of amphibian, turtle, and bird surveys and the locations of bat acoustic monitors for the Site in 2019

Legend

Project Area

Field Surveys

- Bat Stations
- Bird Stations
- Frog Stations
- Turtle Stations

N

0 200 m

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2.2.7 Species at Risk

The potential for SAR to occur on Site was assessed based on the sources of information identified in Section 2.1. This included a review of existing information such as range maps and documented occurrences of SAR. Field visits and ELC further informed the potential for SAR to occur on Site based on availability of suitable habitat.

3.0 RESULTS

3.1 Geology and Soils

The Jock River-Richmond Catchment resides within an extensive physiographic region known as the Ottawa Valley Clay Plain (RVCA, 2016). This part of the clay plain ranges from being very thin to ~8-10m deep. In this catchment the clay and sand plains are underlain by dolostone of the Oxford Formation and sandstone with shale and limestone from the Rockcliffe Formation. In addition, a geologic fault may pass through the catchment (RVCA, 2016).

The property is mostly flat with very gently sloping topography, with slopes between 0 and 2%. Based on soils maps from Report No. 47 of an Ontario Soil Survey (Marshall *et al.*, 1987), the Site more specifically is underlain by the following soil/land type units: NG2-CH3/1-2 (dominant unit for the Site), G5/S1.2, G4/S2.3°, and ER. These soil units are described in more detail in Table 3 and are shown in Figure 3. Note that the soil units described in Table 3 represent the parent material of the Site. The surface material has been worked over throughout several decades of ongoing agriculture and thus the Site likely contains very little of its original soil.

There are no rocky outcrops on the Site and no Earth Science Areas or Areas of Natural and Scientific Interest as designated by the Ministry of Natural Resources identified in OP Schedule K (Ottawa, 2014). However, this property does fall under a Wellheadd Protection Area with a score of 6.

Table 3 Description of the soil landscape/land type units on Site as per Marshall *et al.* (1987)

Soil Landscape or Land Type Unit	Soil Association or Land Type	Soil Material or Land Type Description	Main Surface Description	Drainage		Notes
				Dominant (>40%)	Significant (20-40%)	
CH3	Chateauguay	40-100 cm of neutral silt loam, clay loam, silty clay loam, or silty clay marine material, over glacial till material.	Silt loam, loam, or clay loam.	Imperfect	N/A	Underlain by Grenville material.
ER	Eroded channels	Eroded gullies, steep valley walls, and narrow creek beds with slopes greater than 15%.	N/A	N/A	N/A	
G4	Grenville	Alkaline stony sandy loam, fine sandy loam, loam, or silt loam glacial till material.	Sandy loam, loam, or silt loam.	Good	Imperfect	
G5	Grenville	Alkaline stony sandy loam, fine sandy loam, loam, or silt loam glacial till material.	Sandy loam, loam, or silt loam.	Imperfect	Poor	
NG2	North Gower	Neutral to alkaline silty clay loam or clay loam marine material, over silty clay or clay marine material at a depth greater than 1 m.	Silt loam, loam, silty clay loam, or clay loam.	Poor	N/A	

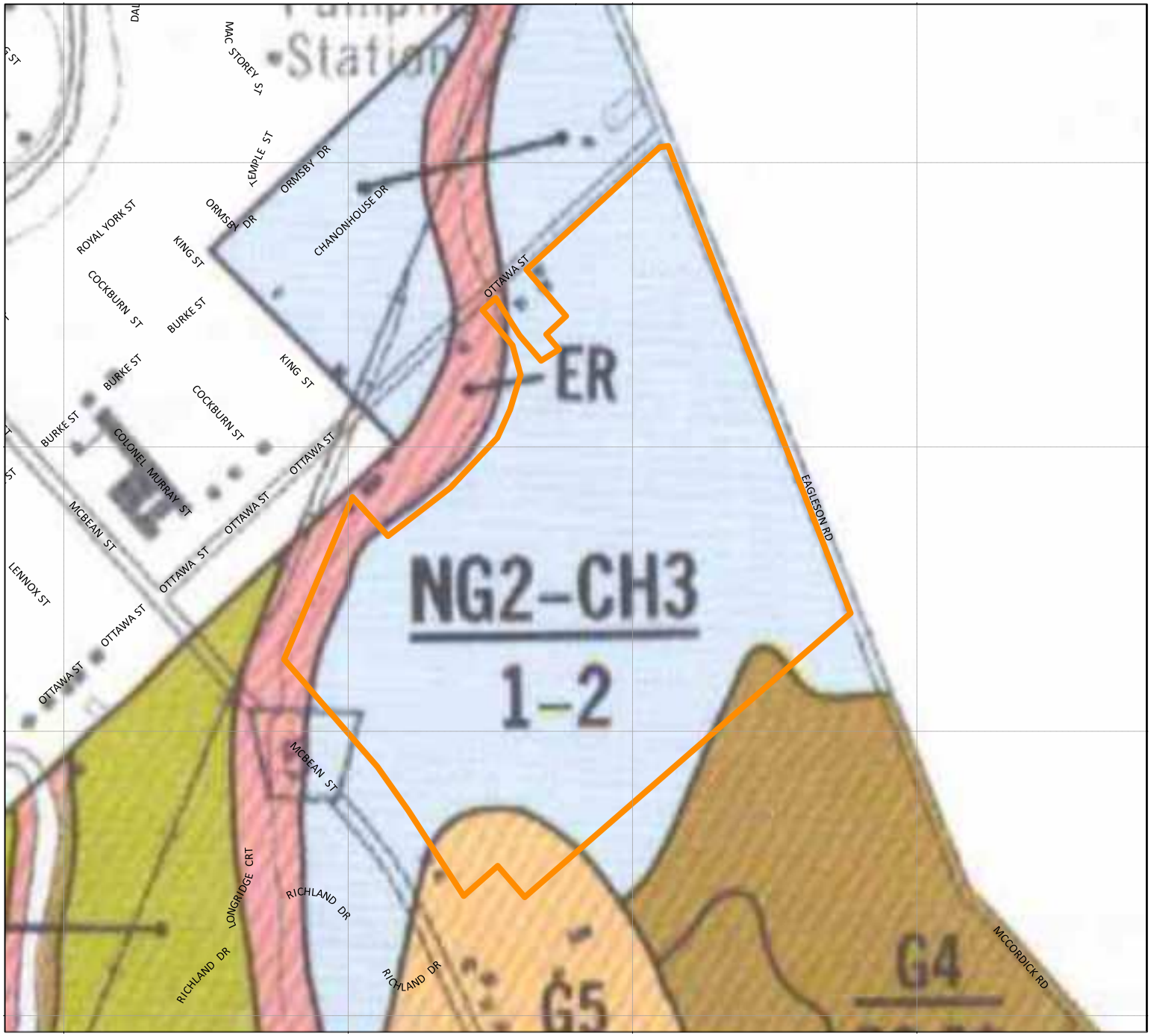

Figure 3 Soil map adapted from Schut and Wilson (1987) indicating soil landscape and land type units at the Site

Legend

Project Area

Refer to Table 3 for soil codes.

N

0 200 m

Project: TAGG 786 V2
Created By: AF
MTM Zone 9
(NAD 83)
Printed on: 2019-08-08

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3.2 Headwater Drainage Features Assessment

3.2.1 General Reach Descriptions

Dimensions of the headwater drainage features (HDFs) evaluated in this report are shown in **Error! Reference source not found.** and photos of each HDF are shown in-text below. Mean bankfull width, mean wetted width, and mean depth were estimated in the field on April 9, 2019. Approximate feature length was estimated using desktop mapping tools (geoOttawa, 2019; Manifold GIS).

Table 4 Dimensions of headwater drainage features on Site on April 12, 2019 (during spring freshet)

Headwater Drainage Feature	Length (m)	Mean Bankfull Width (cm)	Mean Wetted Width (cm)	Mean Depth (cm)
Roadside Ditches	1219	280	Mostly dry but 60cm along limited wet sections	2 (where wet)
Reach 1	232	440	220	10
Reach 2	305	580	200	10
Reach 3	86	550	65	8
Reach 4	795	410	130	18
Marlborough Creek[1]	935	2950	950	Not checked; centre of channel is too deep to feasibly measure and likely varies throughout the creek.

Table Notes: [1]Length of portion of Marlborough Creek occurring on Site. Channel widths for Marlborough Creek were estimated from geoOttawa mapping software.

Roadside Ditches

A roadside ditch system stretches along Eagleson Road surrounding the corn field on Site and along Ottawa Street at the northeast corner of the Site. When originally assessed in the spring, there was no flow through most of the ditch length along the property. The water found along most of the ditches consisted of small, disconnected puddles; by late spring they had dried up completely. Only the portion nearest to Reach 1 (see below) held some standing water (i.e., the ditch was presumably draining into Reach 1, but with no detectable flow). The substrate consisted primarily of silt and sand, while the banks had grass along the shoulder of the road. Submergent vegetation was not present. No frogs or turtles were observed in the roadside ditches, but American Toads (*Anaxyrus americanus*), Spring Peepers (*Pseudacris crucifer*), and Green Frogs (*Rana clamitans*) could be heard calling from Marlborough Creek westward from the north end of the ditch down Ottawa Street (i.e., frogs were detected audibly from this ditch but were not observed directly in the ditch).

Figure 4 Photo showing the roadside ditch along Eagleson Road taken on April 12, 2019

Reach 1

Reach 1 runs 232 m from northeast to southwest of the Site between corn fields, starting at a culvert along the side of Eagleson Road, to a 90° bend northward into Reach 2. There was limited flow here in the initial visits in the early spring, and by mid-spring the area was dry. The feature has corn fields on either side and a few small trees along the banks. The substrate was mostly organic matter and cattails were found in the channel. Instream vegetation is otherwise limited, likely due to the buildup of organic matter. There is grass on either side of the banks, and cropped land (corn) at the edge of the grass. No frogs or turtles were observed in or along this feature.

Figure 5 Photo showing Reach 1 on Site taken on April 12, 2019

Reach 2

Reach 2 runs 305 m southeast to northwest from the turn at the end of Reach 1 to Marlborough Creek on the northwestern side. The downstream-most end of the channel passes through the wooded riparian corridor of Marlborough Creek but most of the channel is situated between two corn fields. This reach appears to have been constructed as a drainage feature for the adjacent agricultural fields. Early spring flows in Reach 2 were somewhat more evident than in Reach 1, though grass and woody debris maintained pooled areas where flow was not apparent. The substrate consists of mostly organic matter. Like Reach 1, the banks of this feature are lined with grass, but some trees are present and the banks are much more defined. The trees and shrubs adjacent to Reach 2 include Common Buckthorn (*Rhamnus cathartica)*, American Elm (*Ulmus americana*), Ash (*Fraxinus*), Willow (*Salix*), Raspberry (*Rubus*), Red Maple (*Acer rubrum*), Cedar (*Thuja*), and Red Osier Dogwood (*Cornus sericea*). This reach still held standing water in late spring (likely retained by minor debris jams) but it was generally very shallow (<5 cm) and there were no fish observed or caught in the channel. It was dry by early summer. No frogs or turtles were observed in this feature.

Figure 6 Photo showing Reach 2 on Site taken on April 12, 2019

Reach 3

Reach 3 is an 86 m channel along the northwestern edge of the eastern agricultural field. It conveys spring meltwater from the field to Reach 2 but runs dry after that. Consequently, no fish, frogs, or turtles were observed in this reach. There were a few frogs heard calling nearby during evening amphibian surveys, closer to Marlborough Creek. The substrate consisted mainly of organic matter and silt. The banks of this feature are grassy with trees present. These include Poplar (*Populus)*, Pine (*Pinus)*, and Ash (*Fraxinus*) trees.

Figure 7 Photo showing Reach 3 on Site taken on April 12, 2019

Reach 4

Reach 4 is a linear, U-shaped channel with very well-defined banks and swift springtime flows that extend along the centre of the property, wrapping around to the southern and eastern sides of areas of successional regrowth towards the centre of the southern border of the property. This entire reach spans a distance of 795 m along the edge of active agricultural lands from a tile drain input and into Marlborough Creek. Older air photos suggest this feature previously received surface flows from a swale over the farm fields to the south, but that swale is no longer apparent. The tile drain is the main source of water in this reach. The presence of the tile drain resulted in steady flows through Reach 4 in late spring, and some standing water was still present in early summer. Given the substantial decrease of water depth by early July, and the lack of any apparent seeps, the feature was dry by late summer. This drainage ditch has a layer of cobble/gravel on the substrate. The west bank is lined with trees and continues up into a sparsely wooded area. There are some trees along the east bank, but the edge of the feature is generally contiguous with the adjacent corn/winter wheat fields. The steep banks and heavy flowing water in the spring did not make ideal habitat for turtles directly in the feature and none were noted here, but two Painted Turtles (*Chrysemys picta)* were observed in Marlborough Creek just beyond the end of Reach 4. There were no frogs observed in the area during any of the three evening frog surveys.

Figure 8 Photo showing Reach 4 on Site taken on April 12, 2019

Marlborough Creek

Marlborough Creek, an important tributary of the Jock River with the confluence located immediately downstream of Eagleson Road, flows along the northern edge of the property. The permanent creek has fast and heavy spring flows and maintains a wetted width often over 15 m, even in mid-summer. According to the most recent Jock River Subwatershed Report by RVCA (2016), there were minimal anthropogenic alterations observed along the system, and 80% of Marlborough Creek remains "unaltered" with no anthropogenic alterations. The remaining 20% of Marlborough Creek was classified as natural with minor anthropogenic changes.

Average dissolved oxygen levels within Marlborough Creek in the Richmond catchment were found to be 7.68 mg/L, which is within the recommended levels for warm and cool water biota; the average conductivity was 964.41 µs/cm (RVCA 2016). These levels would be considered higher than most systems in the Jock River watershed (based on measurements taken by the RVCA).

Marlborough Creek is dominated by invasive species. Sixty nine percent of the sections surveyed along the Jock River Richmond reach had invasive species, while 100% of Marlborough Creek had invasive species (RVCA, 2016). The invasive species observed in Marlborough Creek were European Frog-bit (*Hydrocharis morsus-ranae*), European/Black Alder (*Alnus glutinosa*), Purple Loosestrife (*Lythrum salicaria*), Poison/Wild Parsnip (*Pastinaca sativa*), Common/Glossy Buckthorn (*Rhamnus frangula*), Banded Mystery Snail (*Viviparus georgianus*), Garlic Mustard (*Alliaria petiolate*) and Manitoba Maple (*Acer negundo*). Along Marlborough Creek, 93% of the surrounding areas were characterized by forest, scrubland, meadow and wetland. Wetland was the most dominant habitat found along the creek at 44% relative cover. The remaining land use is made up of active agriculture, residential area, infrastructure, and industrial/commercial areas (RVCA, 2016). This creek generally had no undercut banks, except for a few sections in the upper reach with low to moderate levels. Marlborough Creek has high levels of stream shading along much of the system. The shading is assessed as the total coverage area in each section that is shaded by overhanging trees/grasses and tree canopy greater than 1m above the water surface (RVCA 2016). This contributes to the health of the stream by moderating its temperature, contributing to organic matter and aquatic forage, and helping with nutrient reduction.

The relative community structure in surveyed sections of the creek is as follows, based on plant form: 100% algae, 93% narrow-leaved emergent, 60% free-floating, 68% broad-leaved emergent, 78% submerged plants, 80% floating plants, and 50% robust emergents (RVCA, 2016).

Herptile surveys throughout the season noted two only Painted Turtles in the creek towards the western end of the Site, and small numbers (12 or fewer) of three different species of amphibians (American Toad, Spring Peeper, and Green Frog) along the length of the channel on Site.

More details regarding observations of amphibians and turtles are provided in Sections 3.4 and 3.5, respectively.

Figure 9 Photo showing Marlborough Creek on Site taken on April 12, 2019

3.2.2 Classification of Headwater Drainage Features

The purpose of this section of the report is to apply the appropriate classifications to the water features being assessed and identify the functions provided by these features. The individual/segmented classifications (hydrology, riparian, fish and fish habitat, terrestrial habitat) for each reach are outlined in the following tables.

Table 5 Hydrology classifications of reaches on Site in 2019

Headwater Drainage Feature	Hydrology Classification				
	Assessment Period	Flow Conditions	Flow Classification	Comments/Modifiers	Hydrological Function
Roadside Ditches	-April 12 -June 11 -July 4	-Standing water -Dry -Dry	Ephemeral	In April, the ditches were mostly dry but with occasional disconnected puddles. The ~100 m closest to Reach 1 held standing water contiguous with water in that reach. After April, the reach was dry.	**Limited Function**
Reach 1	-April 12 -June 11 -July 4	-Surface flow -Dry -Dry	Ephemeral	Barely detectable flow in April.	**Contributing Functions**
Reach 2	-April 12 -June 11 -July 4	-Surface flow -Standing water -Dry	Intermittent	The reach continued to hold some shallow standing water along most of its length in late spring, likely held back by small blockages in the channel. It was fully dry by early summer.	**Valued Functions**
Reach 3	-April 12 -June 11 -July 4	-Standing water -Dry -Dry	Ephemeral	Small channel that conveys spring meltwater from the corn field to the east into Reach 2 but runs dry after that.	**Contributing Functions**
Reach 4	-April 12 -June 11 -July 4	-Surface flow -Surface flow -Standing water	Intermittent	This feature conveys flows from a substantial tile drain input at its origin. Drain inputs were no longer evident though by early summer. With no seeps evident, the remaining standing water likely dries or drains away in early July.	**Valued Functions**
Marlborough Creek	-April 12 -June 11 -July 4	-Surface flow -Surface flow -Surface flow	Permanent	Perennially flowing creek (a tributary of the Jock River); well-documented by RVCA (2016).	**Important Functions**

Table 6 Riparian classification of reaches on Site in 2019

Headwater Drainage Feature	Riparian Classification			
	OSAP Descriptions	OSAP Riparian Codes	ELC Codes	Riparian Conditions
Roadside Ditches	RUB – Road LUB – Cropped	RUB – 1 LUB – 3	OAG OAG	**Limited Functions**
Reach 1	RUB – Cropped LUB – Cropped	RUB – 3 LUB – 3	OAG OAG	**Limited Functions**
Reach 2	RUB – Cropped LUB – Cropped	RUB – 3 LUB – 3	OAG OAG	**Limited Functions**
Reach 3	RUB – Cropped LUB – Forest	RUB – 3 LUB – 6	OAG FOD	**Limited Functions**[1]
Reach 4	RUB – Forest LUB – Cropped	RUB – 6 LUB – 3	FOD OAG	**Important Functions**
Marlborough Creek	RUB - Forest LUB - Forest	RUB – 6 LUB – 6	FOD FOD	**Important Functions**

Table Notes: OSAP – Ontario Stream Assessment Protocol
ELC – Ecological Land Classification
RUB – Right upstream bank
LUB – Left upstream bank
[1]While the left upstream bank of Reach 3 is wooded, that wooded area forms the riparian buffer directly adjacent to Marlborough Creek (to which Reach 3 is parallel). That wooded area is considered very important to the creek and is to be preserved accordingly. For the purposes of this study, its value directly to Reach 3, however, is considered limited, given that Reach 3 is adjacent to a farm field and dries immediately following the spring freshet.

Table 7 Fish and fish habitat classification of reaches on Site in 2019

Headwater Drainage Feature	Riparian Classification		
	Fish Observation • **Fishing effort**	**Fish & Fish Habitat Designation***	**Comments/Modifiers**
Roadside Ditches	No fish present, no SAR present. • Dry; no fishing effort.	**Contributing Functions**	No fish observed. The roadside ditches likely convey some water and allochthonous material to Reach 1 during the spring freshet.
Reach 1	No fish present, no SAR present. • Dry; no fishing effort.	**Contributing Functions**	No fish observed. Conveys water and allochthonous material to Reach 2 during the spring freshet. This reach may be accessible to fish during the spring freshet (e.g., may receive overflow from Marlborough Creek via Reach 2 and/or 3) but is dry by late spring.
Reach 2	No fish present, no SAR present. • Dry; no fishing effort.	**Contributing Functions**	No fish observed. Conveys water and allochthonous material to Marlborough Creek during the spring freshet. This reach may be accessible to fish during the spring freshet (e.g., may receive overflow from Marlborough Creek) but only holds shallow standing water by late spring.
Reach 3	No fish present, no SAR present. • Dry; no fishing effort.	**Contributing Functions**	No fish observed. Conveys water and allochthonous material to Marlborough Creek during the spring freshet. That wooded banks of Reach 3 further contribute to fish habitat in Marlborough Creek by moderating water temperature via shading. Reach 3 may be accessible to fish during the spring freshet (e.g., may receive overflow from Marlborough Creek) but dries immediately after the spring freshet.
Reach 4	No fish present, no SAR present. • Electrofished along two 20-30 m transects (shocking seconds: 141.8 for first reach, 182.9 for second reach).	**Contributing Functions**	No fish observed despite fishing efforts. Leeches observed during shocking. Conveys water and allochthonous material to downstream fish habitat in Marlborough Creek throughout the spring and intermittently throughout the summer. Fish may be present in Reach 4 during the spring when water is still flowing (water is standing by summer). The wooded right upstream bank of Reach 4 further contributes to fish habitat in Marlborough Creek by moderating water temperature via shading.
Marlborough Creek	Fish present, no SAR present. • Not electrofished due to readily available species lists compiled by RVCA (2016).	**Valued Functions**	This creek provides suitable habitat for spawning/rearing, feeding, cover, refuge, and migration for several not-at-risk fish species and contributes to downstream habitat in the Jock River. Fish species presence is based on RVCA (2016) records for the creek from nearby sampling locations. **Observed upstream of Site:** Blacknose Dace, Creek Chub, Fathead Minnow **Observed downstream of Site:** Banded Killifish, Blackchin Shiner, Blacknose Shiner, Bluntnose Minnow, Central Mudminnow, Hybrid Minnow, Rock Bass **Observed both up and downstream of the Site:** Bluegill, Brook Stickleback, Brown Bullhead, Common Shiner, Golden Shiner, Northern Pike, Northern Redbelly Dace, Pumpkinseed, White Sucker

Table 8 Terrestrial habitat classification of reaches on Site in 2019

Headwater Drainage Feature	Description	Herpetofauna Observations	Terrestrial Classification
Roadside Ditches	No adjacent wetland areas. With adjacent roadway and no adjacent vegetation, this feature would not provide corridor functionality.	No amphibians or reptiles were observed.	**Limited Functions**
Reach 1	No adjacent wetland areas. This feature potentially connects a very small woodlot across Eagleson Rd to the Jock River corridor via Reach 2, but is not treed and has a maximum width of 6 m. As such, its potential as a wildlife corridor is very limited.	No amphibians or reptiles were observed.	**Limited Functions**
Reach 2	No adjacent wetland areas. This feature connects only Reach 1 to the Jock River. Its potential as a wildlife corridor is very limited.	No amphibians or reptiles were observed.	**Limited Functions**
Reach 3	No adjacent wetland areas. This feature is a depression situated along the outer edge of (running parallel to) the riparian/forest corridor of Marlborough Creek. That forest habitat is significant to Marlborough Creek directly. Its relationship to this limited feature is not relevant from a herpetofauna perspective given that Reach 3 itself is adjacent to a farm field and dries immediately following the spring freshet.	No amphibians or reptiles were observed.	**Limited Functions**
Reach 4	No adjacent wetland areas. This reach is on the edge of farm fields, adjacent to a dense hedgerow and re-naturalizing old fields with secondary tree growth. The west bank riparian zone may provide some potential corridor functionality.	No amphibians or reptiles were observed.	**Contributing Functions**
Marlborough Creek	The creek corridor does have some small areas of minor development along its north bank but is generally surrounded by a heavily treed riparian area 30 m or more in width.	Painted Turtles, Green Frogs, Spring Peepers, and American Toads were all noted in or adjacent to the creek, though only ever in small numbers.	**Important Functions**

The classification categories in the preceding tables in this section are subsequently used to provide the management recommendations outlined in Table 9 on the next page. The following flowchart (Figure 10) combines and translates the classification results in Tables 5-8 into management recommendations outlined in Table 9.

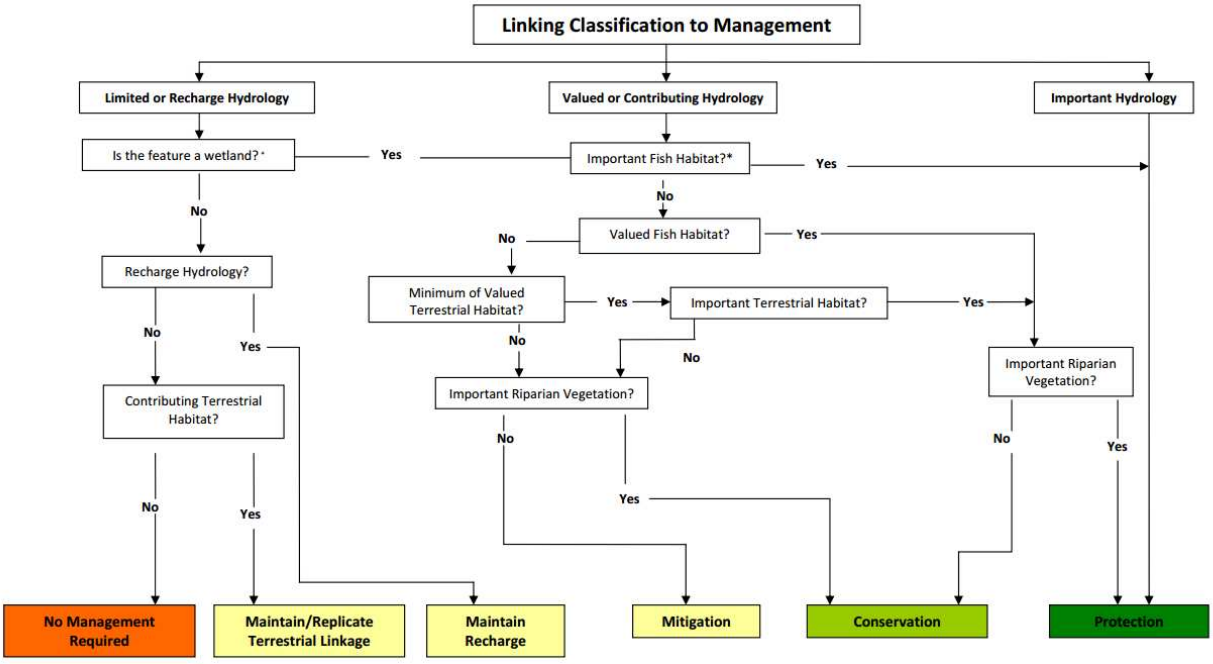

Figure 10 Flow chart providing direction on management options based on reach classifications (adapted from pg. 20 of the HDF Guidelines)

Table 9 Management recommendations for reaches on Site in 2019

Headwater Drainage Feature	Management Recommendation	Notes
Drainage Ditches	No Management Required	The drainage ditches around the Site are not specifically required to be maintained in their current form or to be protected as habitat. Regardless, neither the Eagleson Rd. nor Ottawa St. ditches are likely to be moved under planned development for the subject Site, though some minor modifications may be required. Any modifications or alterations to the road drainage system there must not lead to impacts to downstream receivers (e.g., increased total suspended solids or turbidity) and should not redirect any existing water-flow patterns towards other catchments.
Reach 1 Reach 2 Reach 3	Mitigation	These features are not required to be maintained per se, but their functionality must be replicated or enhanced. The use of vegetated swales (herbaceous, shrub and tree material) to mimic online wet vegetation pockets or constructed wetland features are both appropriate options as replacement features. The stormwater plan for Site development must replicate or regenerate outlet flows to downstream features and catchment areas.
Reach 4	Conservation	The feature may be maintained, or if necessary, relocated using natural channel design techniques to maintain or enhance overall productivity of the reach. Note that the current feature does not provide direct habitat for fish, frogs or turtles.
Marlborough Creek	Protection	This reach may be maintained and/or enhanced but cannot be relocated. The feature should be protected and its riparian zone enhanced where feasible. The hydro-period must be maintained. Use natural channel design techniques or wetland design to restore and enhance existing habitat features if and where needed. Stormwater management systems must be designed to avoid impacts (i.e., changes in sediment, temperature) to this headwater channel. Per the Jock River Reach 2 & Mud Creek Subwatershed Study (MMM 2007), setback requirements for Marlborough Creek are consistent with the normal guidelines of the City's Official Plan and are to be set at the greatest of: • the regulatory floodline (established and posted by the City); • stable slope lines (not established for this feature); • natural meander belts (not established for this feature); and • setback of 30 m from the normal high water mark or 15 m from the top of the bank, whichever is greater. (In this instance, the top-of-bank would generally match the NHWM and so the 30 m setback applies). The setback for this feature is thus generally 30 m except for a short portion near the eastern end where the regulatory floodline extends slightly beyond the 30 m setback (see Figure 1).

3.3 Vegetation

3.3.1 Ecological Land Classification

The following section is split up based on Ecological Land Classification (ELC) vegetation types/ecosites found on Site. A total of eight distinct (i.e., mappable) ELC units (ecosites/vegetation types) were delineated on Site (Figure 11). All eight units have terrestrial classifications. Each ELC unit and the dominant vegetation therein (if appropriate) is described below. The ELC designations below were used in subsequent analyses in Section 3.8 to identify potential habitat that may be used by species of interest (e.g., SAR) occurring or potentially occurring on Site.

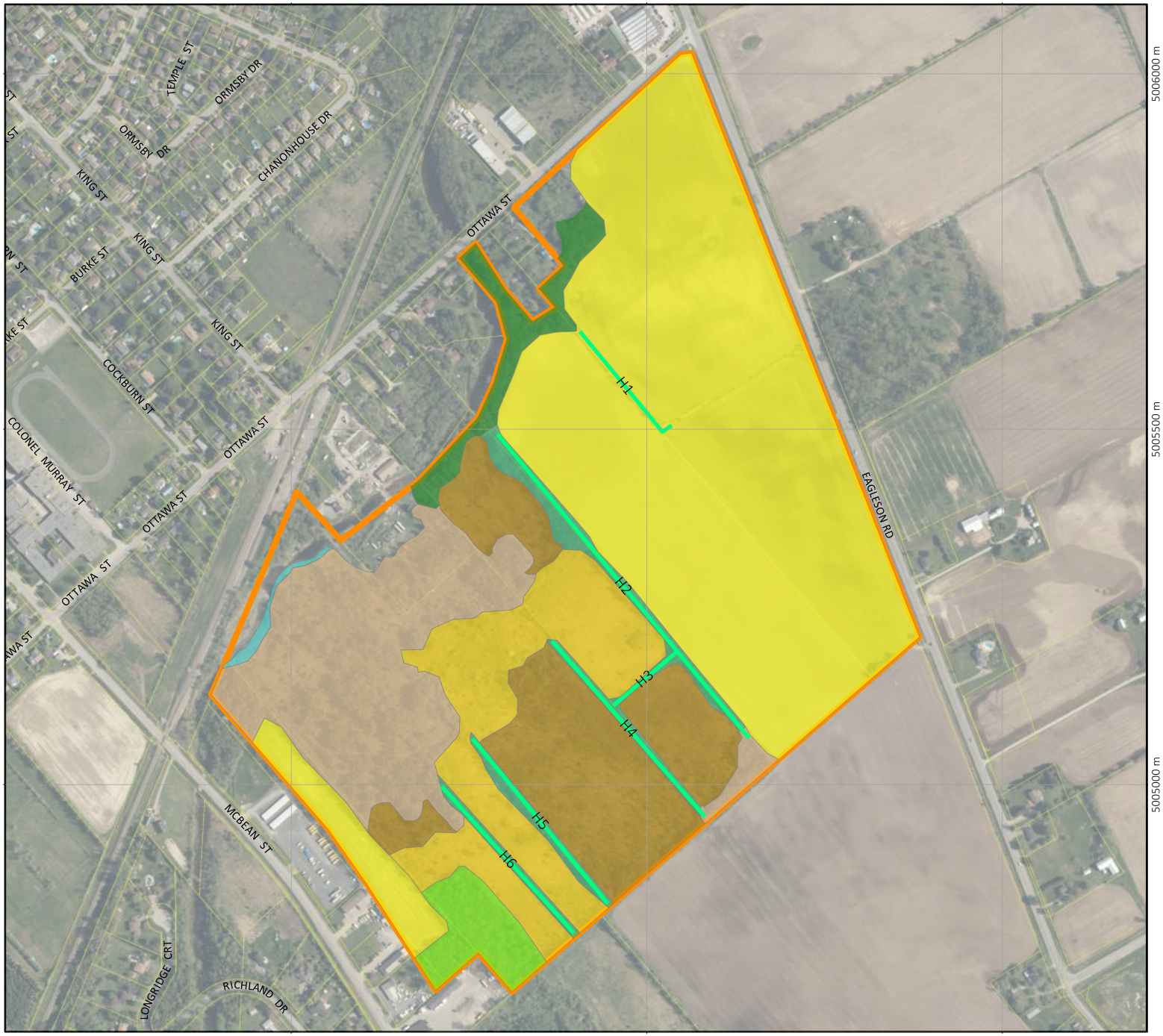

Figure 11 Map showing Ecological Land Classification units for the Site in 2019

Legend

- **Project Area**

ELC

- FODM11
- FODM4-7
- FODM7-2
- MAMM1
- MEG
- OAG
- WODM4-2
- WODM5-1

- **Hedgerows**

N

0 200 m

Project: TAGG 786 V2
Created By: AF
MTM Zone 9
(NAD 83)
Printed on: 2020-01-13

KILGOUR & Associates

Annual Row Crops Ecosite (OAGM1)

This ecosite is the most dominant on Site. It consists of the agricultural fields that make up most of the eastern portion of the Site. These fields were planted with corn and winter wheat during the 2019 growing season. This ecosite contains a single continuous hedgerow (H1 on Figure 11) that spans the length of Reach 2 on Site. This hedgerow is dominated by Common Buckthorn, Green Ash, and American Elm, and contains Willow shrubs, Raspberry shrubs, Red Maple, Manitoba Maple, White Cedar, and Red Osier Dogwood. All trees here are ≤ 20 cm DBH.

Graminoid Meadow Ecosite (MEG)

The Graminoid Meadow Ecosite makes up several areas within the more naturalized portion of the Site (western half of the Site). These are mainly open areas that are dominated by graminoids that have naturally regenerated since the western portion of the Site was last used for agriculture (sometime prior to 1976; geoOttawa). Based on available imagery, it appears the areas that make up the Graminoid Meadow Ecosite were left to naturalize prior to other areas in the western half of the Site (i.e., the surrounding areas in the western portion of the Site were more recently used for agriculture). This ecosite also contains patchy cover of tall shrubs, mainly Common Buckthorn.

Green Ash Deciduous Woodland Type (WODM4-2)

This vegetation type is also distributed throughout the western portion of the Site and is a result of natural regeneration since farming operations in this portion of the Site. It is dominated by Green Ash, most of which is dead or dying. The understory is predominantly young Green Ash and Common Buckthorn. The ground cover is dominated by knee-height graminoids and *Aster* spp. This vegetation type includes some scattered Red Maples.

Fresh-Moist Poplar Deciduous Woodland Type (WODM5-1)

Similar to the two ELC units described above, this vegetation type is distributed throughout the western portion of the Site and is undergoing natural regeneration. It contains relatively mature trees in dense stands compared to the rest of the western portion of the Site. It is dominated by Trembling Aspen (*Populus tremuloides*) and Red Maple. It also includes a fairly high cover of Green Ash trees, but most are in poor health. The understory is mainly Common Buckthorn and Hawthorn (*Crataegus*) while the ground cover is dominated by graminoids. There are some depressions throughout this vegetation type that held water during spring freshet that are likely a result of tire tracks from ATVs and historically used farm equipment. Some of these wet depressions contain patches of White Cedar.

Fresh - Moist Green Ash - Hardwood Lowland Deciduous Forest Type (FODM7-2)

This vegetation type is located along the riparian edge of Marlborough Creek, where the tree composition is similar to that of the adjacent WODM4-2. It has a significant presence of Green Ash and some Red Maple, but canopy cover is sufficiently dense to constitute forest cover.

Dry - Fresh Red Maple Deciduous Forest Type (FODM4-7)

The woodland in the southwestern corner of the Site is similar in tree composition to the nearby WODM5-1 ecosites, being almost fully dominated by Red Maple and Trembling Aspen, but the trees here are more densely arranged and in somewhat better health (given the lack of ash tree presence). There is minimal ground cover here given the dense canopy overhead. This woodland is older than the rest of the trees that fall within the WODM5-1 type as it existed sometime before 1963 (based on Natural Resource Canada's air photo library). This vegetation type, however, is common as successional regrowth to former agricultural lands, suggesting some previous history of significant clearing prior to that time. While trees here are slightly more mature than the other areas, they are not noticeably large with the maximum DBH being less than 40 cm (generally under 35 cm).

Graminoid Mineral Meadow Marsh Ecosite (MAMM1)

The south bank of Marlborough Creek in the northwest corner of the Site is covered with a band of medium-height grasses. It is flooded in the early spring but generally dries through the season as water levels in the creek lower.

Naturalized Deciduous Hedgerow Ecosite (FODM11)

Old hedgerows between the former farm fields of the southwestern portion of the Site (i.e., H2 – H6 on Figure 11) provide denser lines of trees within the regenerating woodland cover (WOD ecosites) found there. Trees along these lines are of the same species as the WODM5-1 type: Trembling Aspen and Red Maple with some Green Ash (though most ash trees along here are in poor condition). Trees in these lines are older and larger (average 35-40 cm DBH) than the surrounding WOD types.

3.3.2 Trees

The Site does not contain any significant or otherwise notable trees that warrant individual mapping and enumeration; there are no trees with DBH greater than 40 cm or standalone specimen trees. There are, however, many trees throughout the western portion of the Site that are potential wildlife trees. Most of these trees are dead or dying Green Ash with peeling bark and snags that may be suitable for bat roosting. No Butternuts were observed on or directly adjacent to the Site.

Some trees in the western half of the Site, such as the two linear hedgerows and the small woodland in the southwestern corner of Site (described above under the WODM5-1 type), existed prior to 1976 and thus are over 40 years old. The small woodland, including the portion of it that extends beyond the Site, is approximately 1.8 ha. Aerial photos from Natural Resource Canada's (NRCan) air photo library in Ottawa show that this woodland existed in 1963 and is thus likely over 60 years old (older imagery is not available through NRCan or geoOttawa so the exact age could not be determined). Even though this woodland is greater than 60 years old and is ~1.8 ha, it is not considered a significant woodland for several reasons. The Site falls outside of the Urban Boundary and is located within the Village of Richmond and the Jock River Rural Planning Area. Total forest cover as of 2011 for this Rural Planning Area was estimated to be 36.7% (Table 2 in Significant Woodlands: Guidelines for Identification, Evaluation, and Impact Assessment (draft guidelines prepared by the City of Ottawa)). Based on percent forest cover of the Jock River Rural Planning Area (30-60%) and the criteria and values in Table 3 of the previously referenced draft guidelines, the woodland on

Site is not considered significant as it does not meet any of the criteria or size thresholds in column five of Table 3 in the draft guidlines. If the Site did fall within the Urban Boundary where woodlands are considered significant if they are 40 years old and 0.8 ha or larger, the woodland on Site would still not be considered significant as it is already slated for development as per the Village of Richmond Community Design Plan (see Schedule A: Land Use on p. 83 of the Village of Richmond Community Design Plan, 2010). As such, no areas on Site contain significant woodland.

3.4 Amphibians

A summary of observations made during evening amphibian surveys is outlined in Table 10. Amphibians were observed at four of the six stations during evening surveys. Only three species in total were observed: Spring Peeper, American Toad, and Green Frog. No amphibians were observed during the first survey conducted on April 16, 2019, despite suitable breeding conditions for early breeding species. Stations F1 and F2 were located along the northern edge of the corn field directly south of Marlborough Creek, at which Spring Peepers, American Toads, and Green Frogs were observed at different periods throughout the survey window. Stations F3 and F4 were located where the corn field meets the wooded area towards the centre of the property (i.e., along Reach 4). A chorus of American Toads was observed from Station F3 on June 17, 2019. No amphibians were observed at Station F3 during the other two survey dates. No amphibians were observed at Stations F4 or F5 during any of the amphibian surveys. Stations F5 and F6 were located along the eastern edge of the woodland in the southwestern corner of the Site. Spring Peepers and American Toads were observed from Station F6 on May 27 and June 17, 2019, respectively.

Table 10 Summarized results of evening amphibian surveys performed on Site in 2019

Date	Time	Air Temperature	Cloud Cover	Wind	Species Observed[1]
2019/04/16	21:15-22:05	6-7°C	10%	No wind	No amphibians observed
2019-05-27	21:40-22:20	11°C	~30%	Light breeze	Station F1: AMTO (3), SPPE (3)[2] Station F2: SPPE (3) Station F3: No amphibians observed Station F4: No amphibians observed Station F5: No amphibians observed Station F6: SPPE (3)[3]
2019-06-17	21:50-22:27	19°C	15%	Light breeze	Station F1: AMTO (chorus), GRFR (2) Station F2: GRFR (2) Station F3: AMTO (chorus)[4] Station F4: No amphibians observed Station F5: No amphibians observed Station F6: AMTO (chorus)[3]

Table Notes: AMTO – American Toad, SPPE – Spring Peeper, GRFR – Green Frog
[1]Numbers in parenthesis indicate the number of individuals heard calling at a station. "Chorus" indicates a full chorus where calls are continuous and overlapping and the number of individuals cannot be reliably estimated.
[2] Frogs observed from Station F1 were heard calling from the banks of Marlborough Creek.
[3] Frogs observed from Station F6 were faintly heard calling from a distance of > 200 m. Frog populations heard from this station were thus well beyond the property boundary. No frogs were observed calling from the small woodlot in the southwest corner of the Site.
[4] Frogs observed from Station F3 were faintly heard from a distance of > 200 m, i.e. from the other side of Eagleson Rd. No frogs were noted to be calling from the farm fields of the Site.

In each case where larger numbers of a species of amphibian was heard calling, the calls came from areas off Site, other than directly from along the banks of Marlborough Creek towards the eastern end of the property (i.e., even though choruses were heard at stations F3 and F4 on June 17, 2019, the calls were coming from off-Site areas). Nowhere on Site constitutes Significant Amphibian Breeding Habitat as per Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (MNRF, 2015b), including Marlborough Creek and adjacent areas

3.5 Turtles

A summary of observations made during basking turtle surveys is available in Table 11. Only one species of turtle was observed on Site, Painted Turtle (*Chrysemys picta marginata*). Painted Turtles were observed during three of the five surveys at stations T-C and T-E along Marlborough Creek. No SAR turtles were observed on Site or on adjacent lands during the 2019 field campaign.

Table 11 Summarized results of basking turtle surveys performed on Site in 2019

Date	Time	Air Temperature	Cloud Cover	General Weather Conditions	Species observed
2019/04/16	13:20-14:50	14°C	5-10%	Low wind, sunny	None observed at any stations
2019/05/06	13:00-14:45	11°C	50-90%	Low wind, sunny	Station A: No turtles Station B: No turtles Station C: No turtles Station D: No turtles Station E: 2 Painted Turtles
2019/05/07	15:20-16:21	17°C	30%	Low wind, sunny	None observed at any stations
2019/05/08	13:00-14:24	12°C	5%	Low wind, sunny	Station A: No turtles Station B: No turtles Station C:1 Painted Turtle Station D: No turtles Station E: No turtles
2019/05/21	12:05-12:55	13°C	50-60%	Low wind, partly cloudy	Station A: No turtles Station B: No turtles Station C: 2 Painted Turtles Station D: No turtles Station E: No turtles

3.6 Birds

A total of 46 bird species were observed on Site during the three rounds of daytime surveys (wk (*Accipiter striatus*), and Wood Duck (*Aix sponsa*).

Neither Eastern Whip-poor-will nor Common Nighthawk were ever observed on Site.

). All the birds observed are common in the Ottawa region. Two listed species, Wood Thrush (*Hylocichla mustelina*) and Eastern Wood-pewee (*Contopus virens*), were observed. Wood Thrush was observed from station B4 on May 31 and B2 on July 11, 2019 (see Figure 2). In each instance, a single Wood Thrush was noted to be present along the central-south edge of the Site. A single Eastern Wood-pewee was observed once on May 31, 2019 from B5. This Eastern Wood-pewee was heard calling from near Marlborough Creek. Both Wood Thrush and Eastern Wood-pewee are designated as species of Special Concern under the ESA (2007). Consequently, these species are not afforded any specific legal protections of individuals or habitat area as SAR under the ESA, though individuals and active nests are protected under the federal SARA and the *Migratory Birds Convention Act* (MBCA; Government of Canada, 1994).

Song Sparrow (*Melospiza melodia*) was the most abundant species on Site followed by Common Yellowthroat (*Geothlypis trichas*) and American Goldfinch (*Spinus tristis*). No regionally rare bird species (Cadman *et al.*, 1987) were observed. Other species that were incidentally observed while on Site but not during breeding bird surveys include Canada Goose (*Branta canadensis*), Hairy Woodpecker (*Leuconotopicus villosus*), Mallard (*Anas platyrhynchos*), Sharp-shinned Hawk (*Accipiter striatus*), and Wood Duck (*Aix sponsa*).

Neither Eastern Whip-poor-will nor Common Nighthawk were ever observed on Site.

Table 12 Bird species observed during the three rounds of daytime breeding bird surveys conducted on Site in 2019

Common Name	Scientific Name	Common Name	Scientific Name
Alder Flycatcher	*Empidonax alnorum*	Gray Catbird	*Dumetella carolinensis*
American Crow	*Corvus brachyrhynchos*	Hairy Woodpecker	*Leuconotopicus villosus*
American Goldfinch	*Spinus tristis*	House Wren	*Troglodytes aedon*
American Redstart	*Setophaga ruticilla*	Killdeer	*Charadrius vociferus*
American Robin	*Turdus migratorius*	Mallard	*Anas platyrhynchos*
Baltimore Oriole	*Icterus galbula*	Mourning Dove	*Zenaida macroura*
Black-and-White Warbler	*Mniotilta varia*	Nashville Warbler	*Leiothlypis ruficapilla*
Black-capped Chickadee	*Poecile atricapillus*	Northern Cardinal	*Cardinalis cardinalis*
Brown-headed Cowbird	*Molothrus ater*	Northern Flicker	*Colaptes auratus*
Blue-headed Vireo	*Vireo solitarius*	Ovenbird	*Seiurus aurocapilla*
Blue Jay	*Cyanocitta cristata*	Rose-breasted Grosbeak	*Pheucticus ludovicianus*
Brown Thrasher	*Toxostoma rufum*	Ring-billed Gull	*Larus delawarensis*
Blue-winged Warbler	*Vermivora cyanoptera*	Red-eyed Vireo	*Vireo olivaceus*
Cedar Waxwing	*Bombycilla cedrorum*	Red-winged Blackbird	*Agelaius phoeniceus*
Common Grackle	*Quiscalus quiscula*	Scarlet Tanager	*Piranga olivacea*
Common Yellowthroat	*Geothlypis trichas*	Song Sparrow	*Melospiza melodia*
Chestnut-sided Warbler	*Setophaga pensylvanica*	Savannah Sparrow	*Passerculus sandwichensis*
Eastern Phoebe	*Sayornis phoebe*	Swamp Sparrow	*Melospiza georgiana*
European Starling	*Sturnus vulgaris*	Veery	*Catharus fuscescens*
Eastern Wood-Pewee	*Contopus virens*	Warbling Vireo	*Vireo gilvus*
Great Blue Heron	*Ardea herodias*	White-breasted Nuthatch	*Sitta carolinensis*
Great Crested Flycatcher	*Myiarchus crinitus*	Wild Turkey	*Meleagris gallopavo*
Gray Catbird	*Dumetella carolinensis*	Wood Thrush	*Hylocichla mustelina*
Hairy Woodpecker	*Leuconotopicus villosus*	Yellow Warbler	*Setophaga petechia*

3.7 Bats and Other Mammals

During the seven nights of data collection via acoustic monitoring (June 26 to July 4, 2019), five species of bats were recorded on the acoustic monitor installed near the southwestern corner of the Site (Bat1; Table 13). Most survey nights were warm (average nightly temperature >12°C) with low wind and no precipitation.

Importantly, the number of recordings obtained is not directly equivalent to the number of bats present in an area. A single bat may pass the monitor many times during an evening, triggering multiple recordings, while other bats foraging just beyond the monitor range may never trigger recordings. Very generally, however, the number of recordings per species can be indicative of relative abundances. In all cases here, the number of bat calls recorded per evening was small, suggesting the presence of relatively few bats in the area, which is unsurprising given the generally small DBH of trees on the Site.

The total number of bat recordings was low. The majority of recorded bat echolocations were made by Big Brown Bats (*Eptesicus fuscus;* 307 recordings total) or Hoary Bats (*Lasiurus cinereus;* 161 recordings total), which are both still relatively common in Ottawa. Silver-haired Bats (*Lasionycteris noctivagans;* 96 recordings total) and Eastern Red Bats (*Lasiurus borealis*; 26 recordings) were also observed. On five evenings, bat calls were auto-identified as those of Little Brown Myotis, though there were never more than two calls in an evening.

Little Brown Myotis is a colonial species; during the spring and summer, areas of suitable habitat tend to support maternity colonies of several hundred bats (Burnett & August, 1981). The very small number of Little Brown Myotis detected on Site suggests that the area does not provide a suitable roosting area. The detection of only one or two calls during five of the seven acoustic monitoring evenings could reflect either the presence of the occasional transient bat (individuals can travel over 3 km from summer roosts while feeding (Environment Canada, 2015)) or, more likely, could be misinterpretations of other bats. All other bat species detected in the area are larger and tend to call in the 18 to 35 kHz range. Little Brown Myotis, being a much smaller species, calls above 45 kHz. Larger bats, however, will call in this range as they close in on prey. The 45 kHz+ calls were most likely recordings of such activity in large bats that do occur in the area. As such, based on the acoustic monitoring data, Little Brown Myotis is considered to have at most, transient presence on site, though they are most likely entirely absent.

Table 13 Number of bat recordings from acoustic monitoring performed on Site June 26-July 4, 2019

Date	Big Brown Bat	Eastern Red Bat	Hoary Bat	Silver-haired Bat	Little Brown Bat
Station	**Bat 1**	**Bat 1**	**Bat 1**	**Bat 1**	**Bat 1**
2019-06-26	17	0	5	14	0
2019-06-27	42	1	14	12	0
2019-06-28	41	0	25	15	1
2019-06-29	33	1	8	9	2
2019-06-30	10	1	9	7	0
2019-07-01	46	7	30	8	1
2019-07-02	85	16	11	6	2
2019-07-03	51	5	22	18	2
2019-07-04	23	2	37	7	0
Total	**307**	**26**	**161**	**96**	**7**

In addition to the bat species noted above, the following mammals and/or signs of them were observed on and/or within the vicinity of the Site: Horse (*Equus caballus*), Raccoon (*Procyon lotor*), Red Fox (*Vulpes vulpes*), and White-tailed Deer (*Odocoileus virginianus*).

3.8 Species at Risk

The potential for SAR to occur on Site, based on our review of existing information, field surveys, and the information request to the MNRF, is indicated in Table 14.

Table 14 Species at risk potential for the Site, 2019

Species Name	Provincial (ESA) Status	Habitat Requirement	Habitat on Site	Project Concerns Associated with Habitat on Site
Birds				
Bald Eagle (*Haliaeetus leucocephalus)*	Special Concern	Variety of habitats and forest types, almost always near a major lake or river. Usually nest in large trees such as pine and poplar.	No habitat directly on Site. May be present along the Jock River ~850 m northwest of the Site. Not observed during the 2019 field campaign.	Low potential for transient occurrence. Not a concern for this project.
Bank Swallow (*Riparia riparia*)	Threatened	Nest in banks or earthen walls cut by meandering streams and rivers, but artificial banks created by mining may also be used. Foraging occurs over fields, streams, wetlands, farmlands, and still water.	Open areas in the eastern half of the Site may provide suitable foraging habitat. No available nesting habitat nearby, except for along the banks of the Jock River. The Site falls outside of the typical foraging range for Bank Swallow if they are present along the stretch of the Jock River closest to the Site. Not observed during the 2019 field campaign.	Negligible potential for presence. Not a concern for this project.
Barn Swallow (*Hirundo rustica*)	Threatened	Terrestrial open and anthropogenic structures for nesting; near open areas for feeding.	There are records of Barn Swallow occurrences within 1 km of the Site (MNRF, 2016). Open areas in the eastern half of the Site may provide suitable foraging habitat, but there are no suitable nesting structures directly on Site and no individuals were observed during the 2019 field campaign.	The open fields that make up the eastern portion of the Site may provide suitable foraging habitat and would warrant protection under the ESA if there were a nest located within 200 m. As no nesting structures are present on the Site, and no individuals were observed on or near to the Site, the species is not a concern for this project.
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 Site. Not near tall trees.	There are records of Bobolink occurrences within 2 km of the Site (MNRF, 2016). However, no typical habitat currently exists on Site. Bobolink are not typically found in active row crop monocultures like those on Site (the fields were planted with corn in 2019). The Graminoid Meadow Ecosite (MEG) in the western portion of the Site may be considered potential Bobolink habitat if it were continuous open habitat. However, the MEG areas are patches divided by	Low potential for occurrence if agricultural fields on and off-Site continue to be predominantly used for row crops. If fields on and/or adjacent to the Site are rotated for hay prior to project works, there is a higher potential for occurrence since Bobolink is known to occur in the area. If the fields on Site are rotated for hay, no project works should occur within the agricultural fields on Site between April and August inclusive without first ensuring the absence of grassland bird

Species Name	Provincial (ESA) Status	Habitat Requirement	Habitat on Site	Project Concerns Associated with Habitat on Site
			treed hedgerows that result in patches of MEG areas that are considered too small and interrupted for Bobolink. Not observed during the 2019 field campaign.	nests during that period. Otherwise, this species is not a concern for this project.
Canada Warbler (*Cardellina canadensis*)	Special Concern	Breeds in a range of deciduous and coniferous forests (usually wet) with a well-developed, dense shrub layer. Nests are usually located on the forest ground on mossy logs or roots, along streambanks, or on hummocks.	None of the wooded areas on Site contain typical habitat (no well-developed understories or forest floors). The only potentially suitable habitat in the area would likely be along mature, unaltered, and continuous wooded areas along the Jock River. Not observed during the 2019 field campaign.	Negligible potential for presence. Not a concern for this project.
Chimney Swift (*Chaetura pelagica*)	Threatened	Nests in open chimneys and, very rarely, in tree hollows (tree > 60 cm DBH). Tend to forage close to water as this is where the flying insects they eat congregate.	No nesting habitat on Site. Chimneys of buildings in the vicinity of the Site may be suitable nesting habitat if they are not used during the breeding season. Open areas along the Jock River and Marlborough Creek may provide foraging habitat if nests are present in the area. Not observed during the 2019 field campaign.	Low potential for transient occurrence. Not a concern for this project.
Common Nighthawk (*Chordeiles minor*)	Special Concern	Nests in wide variety of open sites, including beaches, fields, and gravel rooftops.	No suitable habitat on Site. If present in the general area, they may nest on the roof of South Carleton High School northwest of the Site. Not observed during the 2019 field campaign.	Low potential for transient occurrence. Not a concern for this project.
Eastern Meadowlark (*Sturnella magna*)	Threatened	Periodically mown, dry meadow for nesting. Habitat (meadow) should be > 10 ha, and preferably > 30 ha before meadowlark are attracted to Site. Not near tall trees.	There are recent records of Eastern Meadowlark occurrences within 2 km of the Site (MNRF, 2016). However, no typical habitat currently exists on Site. Eastern Meadowlark are not typically found in active row crop monocultures like those on Site (the fields were planted with corn in 2019). The Graminoid Meadow Ecosite (MEG) in the western portion of the Site may be considered potential habitat if it were continuous open habitat. However, the MEG areas are patches divided by	Low potential for occurrence if agricultural fields on and off-Site continue to be predominantly used for row crops. If fields on and/or adjacent to the Site are rotated for hay prior to project works, there is a higher potential for occurrence since Bobolink is known to occur in the area. If the fields on Site are rotated for hay, no project works should occur within the agricultural fields on Site between April and August inclusive without first ensuring the absence of grassland bird

Species Name	Provincial (ESA) Status	Habitat Requirement	Habitat on Site	Project Concerns Associated with Habitat on Site
			treed hedgerows that result in patches of MEG areas that are considered too small and interrupted for Eastern Meadowlark. Not observed during the 2019 field campaign.	nests during that period. Otherwise, this species is not a concern for this project.
Eastern Whip-poor-will *(Caprimulgus vociferous)*	Threatened	Prefers areas that are a mix of open and forested habitats such as savannahs, open woodlands, and forest openings. Nests on the ground or forest floor.	Habitat on and/or near the Site is somewhat suitable, but there are no recorded occurrences within 2 km. Not observed during the 2019 field campaign.	Negligible potential for presence. Not a concern for this project.
Eastern Wood-Pewee (*Contopus virens)*	Special Concern	Woodland species, often found near clearings and edges.	Wooded areas along Marlborough Creek provide potentially suitable habitat and a single individual was observed there during the first round of breeding bird surveys in 2019 (but not subsequently). There are also recent records of Eastern Wood-Peewee occurrences within 1 km of the Site (MNRF, 2016).	This species is listed as Special Concern and so does not receive any specific legal protection as a SAR under the ESA, though individuals and active nests are protected under the federal SARA and the MBCA. Suitable habitat along the creek will be retained. Construction must be phased and monitored to prevent harm to individuals or active nests if present on Site during any works.
Least Bittern (*Ixobrychus exilis*)	Threatened	Found in large, quiet marshes and usually near cattails.	No suitable habitat on or near the Site. The stretch of Marlborough Creek passing along the northwestern corner of the Site is exposed to frequent residential, road, and railway noise, making it unsuitable for this shy species. Not observed during the 2019 field campaign.	Negligible potential for presence. Not a concern for this project.
Peregrine Falcon (*Falco peregrinus*)	Special Concern	Usually nest on tall, steep cliff ledges close to large bodies of water or on ledges of tall buildings.	No suitable habitat on or adjacent to the Site. Not observed during the 2019 field campaign.	Negligible potential for presence. Not a concern for this project.
Wood Thrush (*Hylocichla mustelina*)	Special Concern	Deciduous or mixed woodlands.	Wooded areas in the western portion of the Site provide suitable habitat though broader forest areas to the south would be preferable. One individual was observed along the southern edge on Site during two rounds of breeding bird surveys in 2019. There are also recent records of	This species is listed as Special Concern, and so does not receive any specific legal protection as a SAR under the ESA, though individuals and active nests are protected under the federal SARA and the MBCA. Preferable habitat to the south of the Site will remain.

Species Name	Provincial (ESA) Status	Habitat Requirement	Habitat on Site	Project Concerns Associated with Habitat on Site
			Wood Thrush occurrences within 1 km of Site (MNRF, 2016).	Construction must be phased and monitored to prevent harm to individuals or active nests if present on Site.
Mammals				
Little Brown Myotis (*Myotis lucifugus*)	Endangered	Widespread, roosting in trees and buildings. Hibernate in caves or abandoned mines.	Dead/dying Green Ash with peeling bark and snags in the western portion of the Site could provide suitable roosting habitat. Several potentially suitable foraging areas exist on and adjacent to the Site: agricultural fields in the eastern portion of the Site and south of the Site, edges of wooded areas along Marlborough Creek and over the creek itself, and open meadow areas (MEG ecosite) in the western portion of the Site. Observations from 2019 found the species was likely absent from the Site or potentially transient. It is possible individuals access the Site on occasion, but they do not appear to roost there.	Limited potential for presence on the Site if the species occurs in the broader vicinity, though acoustic monitoring for the Site in 2019 suggested the species is not present or that its presence is insignificant. Not a concern for this project. To prevent impacts to bat roosting habitat on Site in general, however, no clearing of trees should take place between May and September inclusive without first confirming the absence of bats. Trees should not be cleared within the month of June at all.
Tri-Coloured Bat (*Perimyotis subflavus*)	Endangered	Widespread, roosting in trees and buildings. Hibernate in caves or abandoned mines.	Dead/dying Green Ash with peeling bark and snags in the western portion of the Site could provide suitable roosting habitat. Several potentially suitable foraging areas exist on and adjacent to the Site: agricultural fields in the eastern portion of the Site and south of the Site, edges of wooded areas along Marlborough Creek and over the creek itself, and open meadow areas (MEG ecosite) in the western portion of the Site. No individuals, however, were detected on Site.	Limited potential for presence on the Site if the species occurs in the broader vicinity, though acoustic monitoring for the Site in 2019 suggested the species is not present or that its presence is insignificant. Not a concern for this project. To prevent impacts to bat roosting habitat on Site in general, however, no clearing of trees should take place between May and September inclusive without first confirming the absence of bats. Trees should not be cleared within the month of June at all.
Northern Long-Eared Bat (*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 on or adjacent to Site. Not observed during the 2019 field campaign.	Negligible potential for presence. Not a concern for this project.

Species Name	Provincial (ESA) Status	Habitat Requirement	Habitat on Site	Project Concerns Associated with Habitat on Site
Eastern Small-Footed Bat (*Myotis leibii*)	Endangered	Coniferous forest in hilly country. Hibernate in smaller caves Subject to air movement.	No suitable habitat on or adjacent to Site. Not observed during the 2019 field campaign.	Negligible potential for presence. Not a concern for this project.
Turtles				
Blanding's Turtle (*Emydoidea blandingii*)	Threatened	Prefers shallow water usually in large wetlands or shallow lakes. Can be found far from water bodies if searching for mates or nesting sites, which usually contain gravel, cobble, and/or sand.	Blanding's Turtles were observed within 2 km of Marlborough Creek on the western end of the Site in 2019 (personal communications with a local resident and the Kemptville District of the MNRF). However, none were observed on or adjacent to the Site in 2019, and the existing record is located more than 2 km from any other Site surface water features.	Some potential for occurrence. Marlborough Creek (the only suitable feature on Site to contain Blanding's Turtle) is not to be altered under the proposed development. Blanding's Turtle habitat is regulated to include a 30 m buffer around suitable wetland features (i.e., Marlborough Creek). Development thus cannot be permitted within a 30 m setback from the creek and this area must be maintained in its natural state. Respecting that setback will ensure that no impacts are anticipated to Blanding's Turtle.
Snapping Turtle (*Chelydra serpentine*)	Special Concern	Prefers shallow water usually in large wetlands or shallow lakes. Can be found far from water bodies if searching for mates or nesting sites, which usually contain gravel, cobble, and/or sand.	Suitable basking and overwintering habitats exist in Marlborough Creek along the northwestern edge of the Site as well as in the nearby Jock River. Other surface water features on Site may act as travel corridors (when they contain water). Roadside ditches in the broader area may provide suitable nesting habitat. Not observed during the 2019 field campaign and no records of occurrences in the area (MNRF, 2016).	Moderate potential for occurrence given that this species is relatively common. Marlborough Creek (the most likely feature on Site to contain Snapping Turtle) is not to be altered under the proposed development. An additional 30 m buffer around this feature will be respected such that no impacts are anticipated to Snapping Turtle.
Vascular Plants				
Butternut (*Juglans cinerea*)	Endangered	Variable but typically on well-drained soils.	Soil conditions on the Site are suitable but no individuals were observed on or within 50 m of Site.	Negligible potential for presence. Not a concern for this project.
Arthropods				
Monarch (*Danaus plexippus*)	Special Concern	Larvae (caterpillars) feed on milkweed plants in meadows and opens areas where milkweed grows. Adult butterflies are found in farmlands, meadows, open wetlands, prairies,	No milkweed was observed on Site. The Site contains some wildflowers in the MEG ecosite, albeit in very low abundance. The agricultural (corn) fields on Site are not typical habitat.	Low to moderate potential for occurrence given that this species is relatively common. However, since this species is listed as Special Concern, it does not receive any specific legal

Species Name	Provincial (ESA) Status	Habitat Requirement	Habitat on Site	Project Concerns Associated with Habitat on Site
		roadsides, city gardens, and parks where wildflowers provide nectar.		protections of individuals or habitat area as a SAR under the ESA.

4.0 PROJECT DESCRIPTION

Two options have been proposed for the development of a residential community on Site. Both community designs provide a residential community on the western half of the Site. The options differ though in how the lands of the eastern half of Site would be used. This area is currently entirely under active agriculture. Under the "Residential and Employment Use Option" (herein Option A, see Figure 12), the eastern lands would be divided primarily into commercially zoned parcels for employment. Under the "Residential Use Option" (herein Option B, see Figure 13), those lands would be used for further residential development. Proportional land use under the two options is detailed in Table 15.

Table 15 Land usage for the Site under the two proposed development options

Developed Land Use	Option A	Option B
Park	2.6 ha	3.3 ha
Elementary School	2.9 ha	2.9 ha
Natural Lands along Marlborough Creek	4.0 ha	4.0 ha
Stormwater Management Facility	2.3 ha	2.3 ha
Village Commercial	1.3 ha	1.3 ha
Employment Areas	18.9 ha	0 ha
Residential Area • Single Residential Units • Townhouse Units	24.2 ha • 740 Units • 203 Units	37.7 ha • 903 Units • 260 Units

Under both options, the entire Site would be regraded and built upon, except for the retained buffer along Marlborough Creek. This would include removing all Site trees (again, except those in the creek buffer), and the removal of the Site headwater features Reaches 1 through 4.

Ground works are planned to begin in early 2020 with housing construction beginning by mid-summer of that year. All construction is anticipated to be completed by 2024.

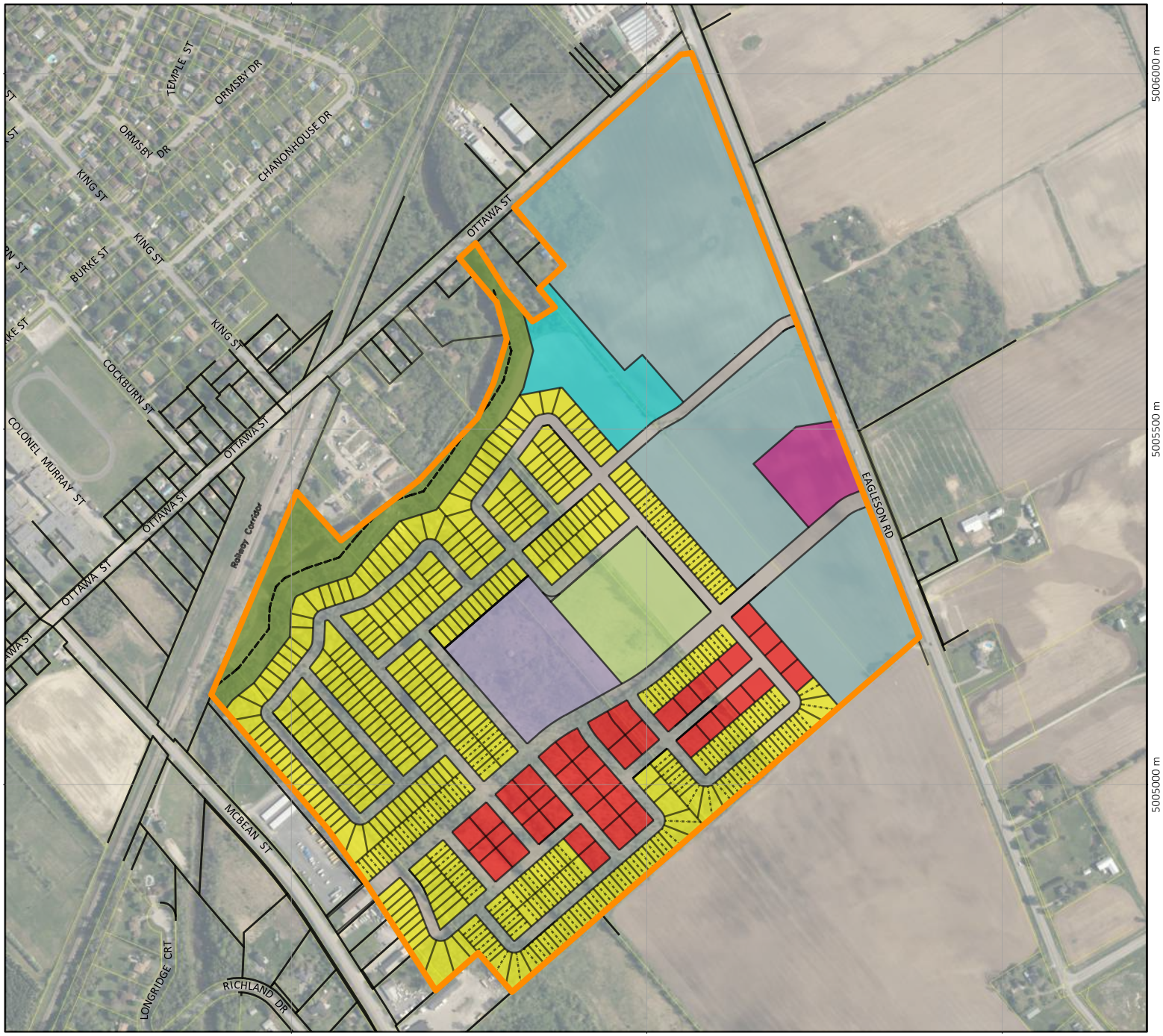

Figure 12 Map showing the proposed development under Option A

Legend

Project Area

Residential and Employment Use Option

- Drain Corridor
- Employment Area
- Park
- SWM
- School
- Single Homes
- Townhomes
- Village Commercial

N

0 200 m

Project: TAGG 786 V2
Created By: AF
MTM Zone 9
(NAD 83)
Printed on: 2020-01-13

KILGOUR & Associates

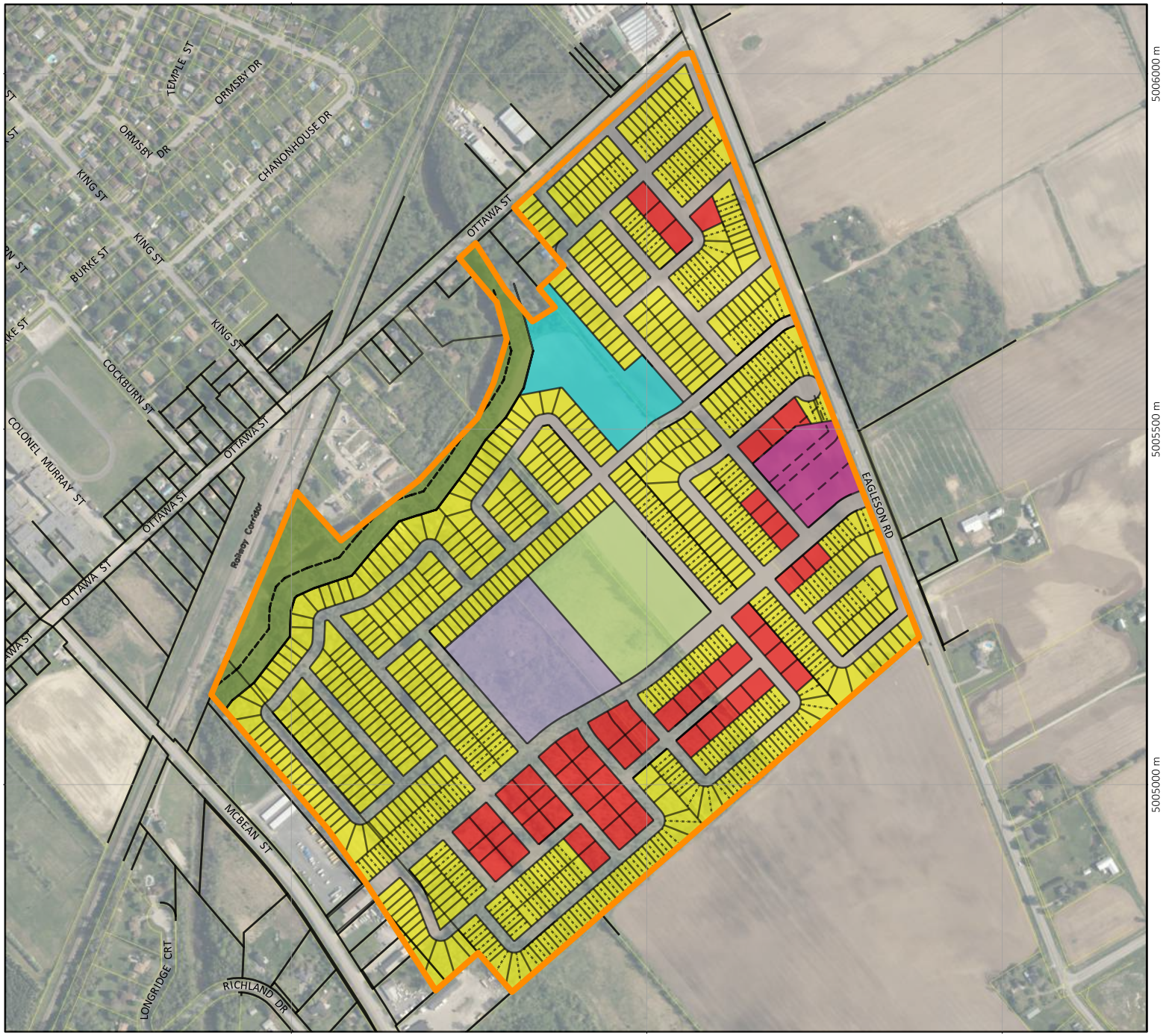

Figure 13 Map showing the proposed development under Option A

Legend

Project Area

Residential Use Option

- Drain Corridor
- Employment Area
- Park
- SWM
- School
- Single Homes
- Townhomes
- Village Commercial

N

0 200 m

Project: TAGG 786 V2
Created By: AF
MTM Zone 9
(NAD 83)
Printed on: 2020-01-13

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5.0 IMPACT ASSESSMENT

5.1 Impacts to Surface Water Features

The roadside ditches along Eagleson Rd. and Ottawa St. may be subject to some disturbance and/or reconstruction during the development of the Site but will otherwise be fully retained. As these features do not provide habitat for fish, frogs or turtles, such disturbances are not considered to be consequential so long as standard erosion and sediment controls are employed during construction to prevent the transport of any sediment to downstream receivers.

Headwater Reaches 1 through 4 will be removed from the Site. Reaches 1 through 3 were assigned management recommendations of "Mitigation" under Headwater Drainage Feature Assessment for the Site (Table 9). These features currently serve to convey runoff from the active agricultural areas of the Site, though likely provide some allochthonous input and filtration functionality. Both of these services can be provided through the use of stormwater management ponds and/or vegetated swales through the community. As such, no negative impacts are anticipated to the broader watershed following their removal.

Reach 4 was assigned a management mecommendation of "Conservation" under the Headwater Drainage Features Assessment for the Site (Table 9). This feature may also be removed but must be replaced by a new feature (not necessarily in the same location) that would recreate or augment the functionality of the current feature. The current feature is long (795 m), but is unnatural in form, being perfectly linear, and does not provide habitat for fish, frogs or turtles. The ultimate design for an outlet channel for the site stormwater management facility has not yet been finalized. However, a suitably constructed outlet channel, situated within a naturalized corridor with 30 m setbacks, and planned following principals of natural design to provided fish habitat (with potential to support turtles and frogs), would ensure no negative impacts to the broader watershed even if the feature were significantly shorter.

Marlborough Creek will be fully preserved and protected within a retained corridor of natural habitat with a width of 30 m or more. As such, no negative impacts are anticipated to this feature.

5.2 Impacts to Trees and Vegetation

All existing trees and vegetation on the Site, outside of the setback around Marlborough Creek, will be removed. The eastern side of the Site, however, an area of 29 ha, is currently completely devoid of natural vegetation, being under active agricultural usage. Much of the western side of the Site has limited tree cover, consisting of meadows and recently regenerating woodlands with only ~30% canopy cover.

The removal of trees from the property will be mitigated through the planting of trees on or adjacent to house lots throughout the new community and within common areas such as stormwater management areas and parks. With tree planting at a minimum level equivalent to one tree per lot and additional tree planting in common areas, over 1000 trees will be planted throughout the development. This level of tree planting represents a decrease in canopy cover from current tree density levels on the western half of the Site, but an increase in canopy cover over the eastern agricultural areas. No areas of significant woodland will be removed as no areas of significant woodland exist on Site.

Existing riparian trees along Marlborough Creek will be retained and protected within a reserved corridor of natural habitat with a width of 30 m or more.

5.3 Impacts to Species at Risk

No SAR legally protected under the ESA were found to use habitat on the Site during the 2019 field campaign. It is possible, however, that Little Brown Myotis may transiently occur in wooded areas on Site. So long as no clearing of wooded areas occurs when bat species may be present, no negative impacts would be anticipated to these individuals.

Blanding's Turtles were not observed on Site, though an occurrence record for the species does occur on Ottawa Street near the western boundary of the Village of Richmond. This point occurs just within 2 km of the western most end of Marlborough Creek on the Site, thereby defining this small portion of the Site as legally protected Category 2 Blanding's Turtle habitat (MNRF, 2013). Blanding's Turtle Category 2 habitat is regulated to include a 30 m buffer around suitable wetland features (i.e., Marlborough Creek). However, as no development will occur within 30 m of the creek and this area is to be maintained in its natural state, no impacts are anticipated to either the species or its habitat. All other channelized features on Site are situated more than 2 km away from any recorded Blanding's Turtles occurrences and are thus not deemed to constitute Blanding's Turtle habitat based on definitions of their Category 1, 2, and 3 habitats (MNRF, 2013). As shallow, linear farm ditches with firm substrate, the other channelized features on Site would provide very limited habitat suitability regardless.

Two bird species listed as Special Concern, Wood Thrush and Eastern Wood-pewee, were observed during daytime breeding bird surveys. These species are not afforded any specific legal protection of individuals or habitat areas as SAR under the ESA, though individuals and active nests are protected under the federal SARA and the MBCA. Regardless, Wood Thrush were observed along the southern border of the Site, and additional suitable habitat that will not be altered under the proposed development exists south of the Site. A single Eastern Wood-pewee was observed along the wooded riparian area immediately adjacent to the Marlborough Creek, which will be preserved. As such, no significant impacts are anticipated to the habitat of either species. Limiting the clearing of trees to outside of the breeding season will prevent any potential impact to individuals.

Barn Swallow and Snapping Turtle were not observed during the 2019 field campaign but have a moderate potential to interact with the proposed development. Open areas in the eastern half of the Site could provide suitable foraging habitat for Barn Swallow, but there is no available nesting habitat directly on Site and no individuals were present. Suitable basking and overwintering habitats for Snapping Turtles exist in Marlborough Creek along the northwestern edge of the Site as well as in the nearby Jock River. These suitable habitat areas will be retained under the proposed development.

6.0 MITIGATIONS

6.1 Surface Water Features

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 m) from watercourses, drainage features and top of steep slopes.

All changes to Site drainage must be done in consultation with and under a permit from the RVCA. As Marlborough Creek is the only fish bearing feature on the Site, and it is not subject to any alteration or disturbance within >30 m of its riparian corridor, no permits or consultation with Fisheries and Oceans Canada (DFO) are required.

The outlet channel for the Site stormwater management facility must be planned and constructed following principles of natural channel design. The feature should be situated within a naturalized corridor with 30 m setbacks and should provide fish habitat suitable for forage fish common in the area.

Marlborough Creek must be fully preserved and protected within a retained corridor of natural habitat with a width of 30 m or more.

6.2 Trees and Vegetation

Please note that this report does not constitute permission to remove any trees from the Site. Removal of trees can only be undertaken following appropriate consultation with City planning staff. To minimize impacts to trees adjacent to or to be retained on the Site, the following general protection measures are recommended as necessary during construction:

- Tree removal on Site should be limited to that which is necessary to accommodate construction.
- To minimize impact to remaining trees during Site development:
    - Erect a fence beyond the critical root zone (CRZ; i.e., 10x the trunk diameter) of trees. The fence should be highly visible (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 trees;
    - Do not attach any signs, notices, or posters to any trees;
    - Do not raise or lower the existing grade within the CRZ of trees without approval;
    - Tunnel or bore when digging within the CRZ of a tree;
    - Do not damage the root system, trunk, or branches of any remaining trees; and

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

6.3 Wildlife

6.3.1 Species at Risk

Trees on the Site have potential to support various bat species, albeit in small numbers, including the possibility of transient Little Brown Myotis. As such, trees on Site must not be cut down during the roosting season (May to September inclusive; MNRF, 2015c). Therefore, to protect bats in general, no trees should be cleared between May and September. Clearing trees outside of the bird breeding/nesting window, which mostly overlaps with the bat window (generally early April to late August; Government of Canada, 2018) would ensure no impacts to Wood Thrush and Eastern Wood-pewee as well as other bird species in general.

6.3.2 General Wildlife Mitigations

During several field visits to the Site, common wildlife species were observed, all of which are represented throughout the adjacent landscape. The following mitigation measures shall be implemented on Site during construction of the project to generally protect wildlife:

- Areas shall not be cleared during sensitive times of the year for wildlife (breeding season), unless mitigation measures are implemented and/or the habitat has been inspected by a qualified Biologist.
- Do not harm, feed, or unnecessarily harass wildlife.
- Manage waste to prevent attracting wildlife to the Site. Effective mitigation measures include litter prevention and keeping all trash secured in wildlife-proof containers and promptly removing it from the Site, especially during warm weather.
- Drive slowly and avoid hitting wildlife.
- Manage stockpiles and equipment on Site to prevent wildlife from being attracted to artificial habitat. Cover and contain any piles of soil, fill, brush, rocks and other loose materials and cap ends of pipes where necessary to keep wildlife out. Ensure that trailers, bins, boxes, and vacant buildings are secured at the end of each work day to prevent access by wildlife.
- Check the entire work site for wildlife prior to beginning work each day.
- Inspect protective fencing and/or other installed wildlife exclusion measures daily and after each rain event to ensure their integrity and continued function.
- Monitor construction activities to ensure compliance with the project-specific protocol (where applicable) or any other requirements.
- The MBCA protects the nests and young of migratory breeding birds in Canada. The City of Ottawa guidelines stipulate 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 (City of Ottawa, 2015).
- Follow the best practices for the construction and maintenance of bird-safe buildings, such as applying visual markers on windows to prevent birds from colliding with glass and reducing the

intensity and direction of night lighting (turn off lights at night if possible). See https://flap.org/workplaces-safe-for-birds/ for more resources and tips on designing and maintaining bird-friendly buildings.

7.0 CLOSURE

It is our professional opinion that no negative impacts are anticipated to significant natural heritage features or SAR or their habitat under the proposed development if the recommended mitigations are followed.

This report was prepared for exclusive use by Tamarack Homes and its authorized agents. It may be distributed only by Tamarack Homes. Questions relating to the data and interpretation can be addressed to the undersigned.

Respectfully submitted,

KILGOUR & ASSOCIATES LTD.

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Katherine Black, MSc	Anthony Francis, PhD
Lead Biologist	Project Director

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Appendix A Qualifications of Report Authors

Katherine Black, MSc

Ms. Black is a Biologist with a background in vegetation ecology; she has performed vegetation surveys in a variety of natural and disturbed environments, including wetland, tundra, and forest environments. She has also worked on projects in aquatic ecology, ecohydrology, and biostatistics. Ms. Black has worked in a variety of research settings, including technical laboratories, greenhouses, construction sites, and remote fly-in field sites. Since joining Kilgour & Associates Ltd., she has provided technical field and logistical support for Environmental Impact Statements, Tree Conservation Reports, Headwater Drainage Features Assessments, Integrated Environmental Reviews, Constraints Analyses, Existing Conditions Reports, species at risk monitoring, and sorting and identification of aquatic macroinvertebrates. Ms. Black is certified in the Ontario Wetland Evaluation System protocol, Ontario Reptile and Amphibian Survey methods, and Butternut Health Assessment (BHA #731).

Anthony Francis, PhD

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

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