AECOM

Appendix A

Agency Correspondence – Information Request

From: Thompson, Melinda (MNRF)
To: Piette, Jessica
Cc: McKenna, Tara (MNRF)
Subject: RE: Request for Informatino - Hwy 401/Hwy 6 Improvements Project
Date: Friday, June 30, 2017 3:22:59 PM
Attachments: Highway6-Screening.pdf

Hello Jessica

Please see the attached screening for the area in question.

Melinda

MELINDA J. THOMPSON

MANAGEMENT BIOLOGIST | ONTARIO MINISTRY of NATURAL RESOURCES and FORESTRY | GUELPH DISTRICT OFFICE
1 Stone Road West, Guelph, Ontario, N1G 4Y2 | ☎ 519.826.6543 | melinda.thompson@ontario.ca
Learn more about Ontario's Species at Risk

From: Piette, Jessica [mailto:Jessica.Piette@aecom.com]
Sent: April 27, 2017 9:00 AM
To: Thompson, Melinda (MNRF); Laurence, Anne Marie (MNRF)
Cc: Kime, Heather; Leech, Fred; Schmied, Sarah; Ellis, Julie; Buck, Graham (MNRF)
Subject: FW: Request for Informatino - Hwy 401/Hwy 6 Improvements Project

Good morning Melinda and Anne Marie,

Please find below and attached a request for background information for the preliminary design review, detailed design and class environmental assessment for improvements to Highways 6 & 401 from Hamilton North Limits to Guelph South Limits in the Township of Puslinch, Highway 6 (Hanlon Expressway) from Maltby Road northerly to the Speed River in the City of Guelph and Guelph/Eramosa Township. Please refer to the attached request for information letters and map for the precise locations of the Study Areas.

Please do not hesitate to contact me should you have any questions.

Thank you and have a great day.

Jessica

Jessica Piette, (Hon) B.ES.
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From: Ellis, Julie
Sent: Tuesday, April 25, 2017 6:54 PM
To: graham.buck@ontario.ca
Cc: Piette, Jessica; Kime, Heather; Leech, Fred; Schmied, Sarah
Subject: Request for Informatino - Hwy 401/Hwy 6 Improvements Project

Good Evening Graham,

The Ministry of Transportation (MTO) has retained AECOM Canada Ltd. to undertake preliminary design review, detailed design and class environmental assessment for improvements to Highways 6 & 401 from Hamilton North Limits to Guelph South Limits in the Township of Puslinch, Highway 6 (Hanlon Expressway) from Maltby Road northerly to the Speed River in the City of Guelph and Guelph/Eramosa Township.

We are conducting a background review of the natural environment existing conditions present within the Study Areas of these two Projects. Please refer to the attached request for information letters and map for the precise locations of the Study Areas.

I am directing the request for information to you because as it is my understanding that my colleague Jessica Piette has contacted you previously regarding this project. If you have any questions about the project or require any clarifications please feel free to contact either Jessica or myself.

Should these requests need to be sent to another individual at the Guelph District please advise and I'll redirect them asap.

Thanks,

Julie Ellis B.Sc.
Terrestrial Ecologist
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Ministry of Natural Resources And Forestry

Ministère des Richesses naturelles et des Forets

Guelph District
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Ontario

June 30, 2017

Jessica Piette, (Hon) B.ES.
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Dear Jessica,

Thank you for your inquiry regarding the presence of species at risk and natural heritage features for Highway 6, Maddaugh Road to Highway 401 in the cities of Hamilton and Guelph, Ontario.

Digital mapping for some natural heritage features is available from Land Information Ontario (LIO). MNRF recommends contacting LIO to obtain relevant feature mapping. Datasets of potential interest (and the corresponding LIO dataset) include – wetlands ('Wetland Unit' dataset), ANSI ('ANSI dataset), wooded areas ('Wooded Areas'), wintering areas ('Wintering Areas'), and fish spawning areas ('Spawning Areas').

The Ministry of Natural Resources and Forestry (MNRF) has had an opportunity to review the natural heritage records and information available at the Guelph District Office, for the above noted file. Please see below for the following information and comments to address your questions noted in the email correspondence.

Wetlands

There are five Provincially Significant Wetland Complexes within the study area, including Beverly Swamp Wetland Complex, Cranberry Oil Well Bog Wetland Complex, East Morriston Swamp, Fletcher Creek Swamp, and Mill Creek Puslinch Wetland Complex.

Digital mapping of wetlands can be obtained from Land Information Ontario (LIO). The Warehouse Dataset Name is 'Wetlands' within LIO. LIO manages key provincial datasets, and is responsible for housing most of the Ministry's digital natural heritage and resource data. The LIO Warehouse also includes spatial data from a variety of other sources and agencies, including federal ministries and conservation authorities. The LIO website provides instructions on how to request/obtain data, and a full listing of all data in the Warehouse. The link to the LIO website is as follows: http://www.mnr.gov.on.ca/en/Business/LIO/index.html. LIO staff can also be contacted at lio@ontario.ca or at (705) 755-1878 for assistance.

ANSI

Fletcher Creek Swamp Forest Regional Life Science ANSI and Galt Moraine Regional Earth Science ANSI are within the study area,

Digital mapping of Areas of Natural and Scientific Interest can be obtained from Land Information Ontario (LIO). The Warehouse Dataset Name is 'ANSI' within LIO. LIO manages key provincial datasets, and is responsible for housing most of the Ministry's digital natural heritage and resource data. The LIO Warehouse also includes spatial data from a variety of other sources and agencies, including federal ministries and conservation authorities. The LIO website provides instructions on how to request/obtain data, and a full listing of all data in the Warehouse. The link to the LIO website is as follows: http://www.mnr.gov.on.ca/en/Business/LIO/index.html. LIO staff can also be contacted at lio@ontario.ca or at (705) 755-1878 for assistance.

Species at Risk

The Ministry notes that there are several species at risk (SAR) records for the area.

Species Name	Scientific Name	STATUS
Bank Swallow	*Riparia riparia*	THR
Barn Swallow	*Hirundo rustica*	THR
Bobolink	*Dolichonyx oryzivorus*	THR
Eastern Meadowlark	*Sturnella magna*	THR
Eastern Ribbonsnake	*Thamnophis sauritus*	SC
Eastern Small-footed Myotis	*Myotis leibii*	END
Grasshopper Sparrow	*Ammodramus savannarum*	SC
Jefferson Salamander	*Ambystoma jeffersonianum*	END
Little Brown Myotis	*Myotis lucifugus*	END
Monarch	*Danaus plexippus*	SC
Northern Myotis	*Myotis septentrionalis*	END
Redside Dace	*Clinostomus elongatus*	END
Snapping Turtle	*Chelydra serpentina*	SC
Tri-colored Bat	*Perimyotis subflavus*	END
Unisexual Ambystoma (Jefferson Salamander dependent)	*Ambystoma laterale – (2) jeffersonianum*	END

Please note that because the province has not been surveyed comprehensively for the presence of species at risk (SAR), the absence in the NHIC database of an EO in a particular geographic area does not indicate the absence of the species in that area. Consequently, the presence of an EO is useful to flag the presence of the species in the area, but is not an appropriate tool to determine whether a species is absent, or whether it should be surveyed for or not in a particular area.

Consequently, we provide the following advice with respect to determining the presence of species at risk on a property for which a land-use change or on-the-ground activity is being proposed (note that some of the following may not apply to a given type of proposed activity, or for a given study area):

I. Habitat Inventory

The District recommends undertaking a comprehensive botanical inventory of the entire area that may be subject to direct and indirect impacts from the proposed activity. The vegetation communities and aquatic habitats in the study area should be classified as per the “Ecological Land Classification (ELC) for Southern Ontario” system, to either the “Ecosite” or “Vegetation Type” level. With respect to aquatic habitats in the study area, we recommend you collect data on the physical characteristics of the waterbodies and inventory the riparian zone vegetation, so that these habitats can be classified as per the Aquatic Ecosites described in the ELC manual.

II. Potential SAR on the property

A list of species at risk that have the potential to occur in the area can be produced by cross- referencing the ecosites described during the habitat inventory with the habitat descriptions of species at risk known to occur in the county or regional municipality within which the area is located. The species-specific COSEWIC status reports (www.cosewic.gc.ca) are a good source of information on species at risk habitat needs and will be helpful in determining the suitability of the property’s ecosites for a given species.

Please note that the Species at Risk in Ontario list (SARO) is a living document and is amended periodically as a result of species assessment and re-assessments conducted by the Committee on the Status of Species at Risk in Ontario (COSSARO). The SARO list can be accessed on the webpage http://www.ontario.ca/environment-and-energy/species-risk-ontario-list

COSSARO also maintains a list of species to be assessed in the future. It is recommended to take COSSARO's list of anticipated assessments into consideration, especially when the proposed start date of the activity is more than 6 months away, or the project will be undertaken over a period greater than 6 months. The list can be viewed by going to http://www.ontario.ca/page/how-comment-protecting-species-risk.

III. SAR surveys

The District is of the opinion that each species at risk identified under Step II should be surveyed for, regardless of whether or not the species has been previously recorded in the area, or whether previous records are historical in nature. The survey report should describe how each species at risk was surveyed for, and provide a rationale for why, if any, certain species appearing on the county/ regional municipal list were not the subject of the survey. These rationales must be based on evidence demonstrating either that: suitable habitat for the species is not present on the property or; the project will not have any impacts -including indirect impacts- on the species. Some SAR surveys require an authorization under the *Endangered Species Act 2007* and/or a Scientific Collector's Permit; please contact the Guelph District office if you require further direction regarding these.

Guelph District additionally recommends contacting the municipal planning approval authority and the conservation authority to determine if they have any additional information or records of interest for the study area. Please contact our office if your investigations reveal the presence of species at risk on the subject property. MNRF will be happy to provide further advice regarding the provisions of the *Endangered Species Act* at that time.

We require more detailed information on the proposed project in order to assess the impacts of the works on Species at Risk. *When project details have been determined*, please fill out an Information Gathering Form (IGF) for any *threatened* or *endangered* species listed in the provided letter and submit it to our office (to ESA.Guelph@ontario.ca). The IGF can be found here (along with its associated guide). Please include detailed descriptions of the undertakings such as proposed timing and phasing of the project and details on what is required at each phase.

All sections and tables should be filled out in their entirety – incomplete forms will be returned and may delay the review process. Any applicable supplemental information that will assist with the review process should also be submitted with the IGF (e.g. field survey results, site plan/drawings, ELC mapping, etc.). Please note that forms are reviewed in the order in which they are received by MNRF and we will contact you with our response once the review is complete.

Sincerely,

Melinda Thompson

MELINDA J. THOMPSON

MANAGEMENT BIOLOGIST
ONTARIO MINISTRY of NATURAL RESOURCES and FORESTRY
melinda.thompson@ontario.ca

cc. Anne Marie Laurence, Management Biologist
Tara McKenna, District Planner

AECOM

Appendix B

Species at Risk Survey Results Memos

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To: Kirstie Houston
Senior Environmental Planner
Ministry of Transportation

Date: October 30, 2019

Project #: 60541071

From: Jessica Piette (AECOM)
Julie Ellis (AECOM)

cc:

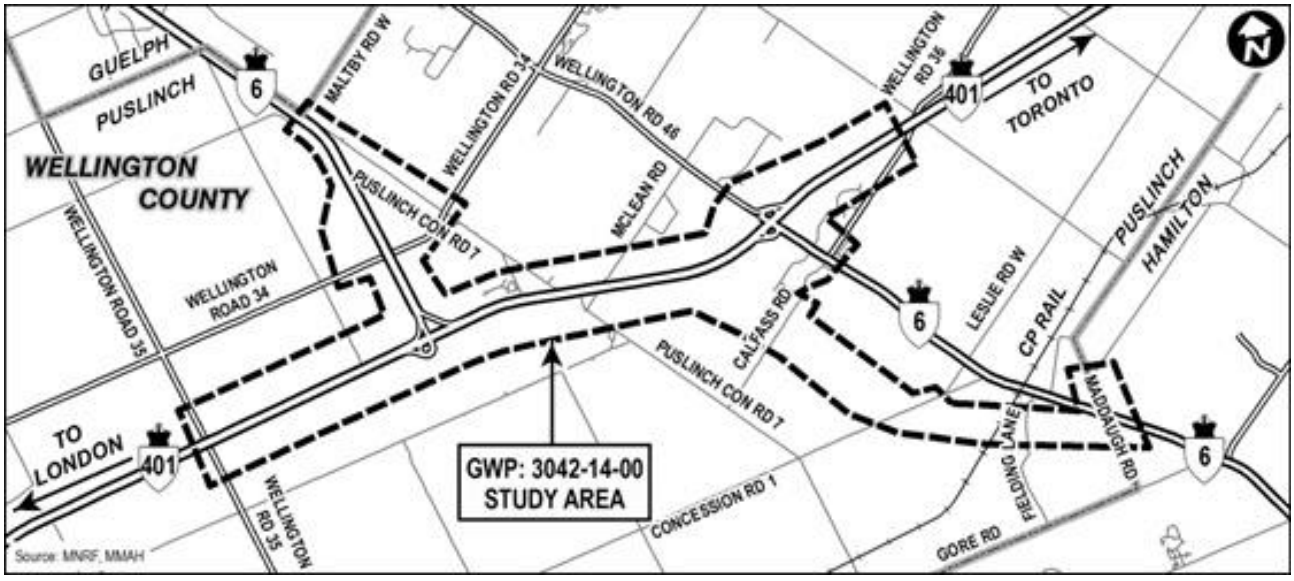
Memorandum

Subject: **Results of 2018 Bat SAR Surveys undertaken for the "Preliminary Design Update, Detail Design and Class Environmental Assessment Study for the Highways 6 and 401 Improvements" (G.W.P. 3042-14-00)**

1. Introduction

AECOM has been retained by Ministry of Transportation (MTO) to undertake the Preliminary Design Update, Detail Design and Class Environmental Assessment (EA) Study for the Highways 6 & 401 Improvements from Hamilton North Limits to Guelph South Limits including a New Alignment of a Segment of Highway 6 (G.W.P. 3042-14-00). A map showing the Study Area is provided in **Figure 1**.

Figure 1: Study Area



AECOM met with MNRF Guelph District on November 17, 2017 to determine Species at Risk (SAR) survey requirements including the requirements for bat SAR and bat SAR habitat assessments in woodland habitats throughout the Study Area. At that meeting, MNRF Guelph District indicated that while the *Survey Protocol for Species at Risk Bats within Trees Habitats* (MNRF, 2017), henceforth referred to as the April 2017 Survey

Protocol, should generally be adhered to; slight modifications proposed by AECOM to achieve field work and assessment efficiencies would be acceptable.

A draft work plan was submitted to MNRF Guelph District on March 21, 2018 for review. A final work plan, which was accepted by MNRF Guelph District, was re-submitted in April 2018 (AECOM, 2018 and is provided in **Attachment A**). AECOM undertook species-specific surveys in accordance with this work plan to confirm the presence or absence of bat species in the Project's Study Area, including the Tri-colored Bat (*Perimyotis subflavus)*, the Little Brown Myotis (*Myotis lucifugus)* / Northern Myotis (*Myotis septentrionalis)* and the Eastern Small-footed Myotis (*Myotis leibii)*, which are afforded protection under the *Endangered Species Act* (*ESA) (2007)*. The phases of this work plan are the following:

- Phase I: Bat Habitat Suitability Assessment – determination of areas suitable for bat SAR or bat SAR habitat (i.e., bat SAR habitat features);
- Phase II: Identification of Suitable Maternity Roost Trees –leaf-off surveys by walking transects or snag density plot surveys;
- Phase III: Acoustic Surveys – to confirm either the presence or absence of bat SAR; and
- Phase IV: Snag Density Survey – to determine whether or not bat SAR habitat features are high quality.

An agreement to provide a Letter of Advice (LOA) for some bat SAR habitat features in the Study Area was discussed during the meeting on November 17, 2017 as well as within the final accepted work plan (AECOM, 2018). AECOM identified a total of 75 potentially suitable bat maternity features within the Study Area. Of these, a total of 48 were considered for an LOA or partial LOA; however, all 75 features, where Permission to Enter (PTE) was granted, still required the completion of leaf off surveys (Phase II surveys). Following the Phase II surveys, those locations identified as LOA sites did not require the completion of acoustic monitoring (Phase III surveys). For the purposes of this memorandum, sites identified as eligible for a LOA will be referred to as Candidate Bat SAR Habitat.

The purpose of this memorandum is to summarize the field investigations and acoustic monitoring data analysis completed to assess presence of bat maternity roosting habitat and confirm the presence or absence of SAR bats within the Study Area. The following sections provide descriptions of each of the bat SAR potentially inhabiting wooded areas within the Lands, the methods and results of the SAR bat habitat assessment as well as the methods and results of the acoustic monitoring.

2. Bat Species Potential Present in the Study Area

2.1 Little Brown Myotis

During daylight hours, the Little Brown Myotis roosts in trees and anthropogenic structures such as barns, attics, and abandoned structures. In natural areas, Little Brown Myotis roosts in tree cavities in old growth deciduous, mixed or conifer forests (COSEWIC, 2013). Little Brown Myotis is most active in the few hours after dusk, when it emerges from its roost to forage for insects (MNRF, 2016a). The species mates late in the summer, and in winter, and females often form large maternal colonies in winter to rear their young.

2.2 Northern Myotis

Northern Myotis is primarily a forest-dwelling species (Owen *et al.*, 2002). It is often associated with old growth mixed or coniferous forests and is known to roost under loose bark or in tree cavities (COSEWIC, 2013; MNRF, 2016b). Unlike other bats, this species rarely roosts in anthropogenic structures (COSEWIC, 2013).

2.3 Eastern Small-footed Myotis

Eastern Small-footed Myotis roosts in a variety of habitats, including under rocks and bridges and in rock outcrops, caves, mines, and hollow trees. Individuals may change their roosting location daily. Along with other bat species, the Eastern Small-footed Myotis swarming occurs at or near their hibernacula (NatureServe, 2016). This species was recently emergency listed under the *ESA* (*2007*) as it is one of the rarest bats in eastern North America, and was one of the rarest even prior to the introduction of White Nose Syndrome (MNRF, 2016c).

2.4 Tri-colored Bat

Tri-colored Bat lives in a variety of forested habitats, forming day roosts and maternity colonies in older forests and occasionally in anthropogenic structures (MNRF, 2016d). This species is rare and thus has a scattered distribution in southern Ontario. The Tri-colored Bat forages over water and along streams in the forest where it eats flying insects and spiders.

3. Methods

An overview of the methods used to assess presence of bat maternity roosting habitat and confirm the presence or absence of SAR bats within the Study Area is provided below. Further details, including explanations and rationales for the slight modifications to the April 2017 Survey Protocol are provided in the final work plan, (AECOM, 2018), which is provided in **Attachment A**. This work plan and the modifications identified therein were accepted by the MNRF Guelph District.

3.1 Phase I: Bat Habitat Suitability Assessment

Ecological Land Classification (ELC) was initiated in 2017 and refined through additional field investigation during the growing season of 2018. These surveys were completed for the Study Area following ELC for Southern Ontario: First Approximation and its Application (Lee *et al.*, 1998). Through the completion of ELC, Phase I: Bat Habitat Suitability Assessment work is considered complete for the Project. The determination of areas suitable for bat SAR or bat SAR habitat was undertaken in 2017 during the development of the accepted work plan (AECOM, 2018) through:

- ELC field investigations on lands where PTE was secured; and.
- Aerial photograph interpretation for lands where PTE was not granted by the property owner.

Forested communities of similar ecosite type (i.e., FOD, SWM, SWD, CUW and CUP) were considered contiguous if the ELC polygons were connected or separated by a gap of less than 20 m, excluding gaps / separations associated with roads..

3.2 Phase II: Identification of Suitable Maternity Roost Trees

Field investigations to assess potentially suitable maternity roosting habitat were conducted during the leaf-off season from March 14 to April 18, 2018. All 75 potentially suitable bat SAR habitat features in the Study Area, where PTE was granted, were surveyed to identify the presence of suitable maternity roost trees (snag / cavity tree). A snag or cavity tree can be defined “as any standing live or dead trees ≥ 10 cm diameter at breast height (DBH) with cracks, crevices, hollows, and / or loose or naturally exfoliating bark” based on the *Survey Protocol for Species at Risk Bats within Treed Habitats: Little Brown Myotis, Northern Myotis & Tri-colored Bat* (MNRF, 2017).

In accordance with the accepted work plan (see **Attachment A** for greater details on methods utilized):

- Specific surveys to assess potentially suitable maternity roosting habitat during the leaf-on season were not undertaken;
- Woodlands greater than 2 hectares (ha) in size were surveyed via a plot method;
- Smaller woodlands were surveyed via a transect method.

Plot Method

The plot method involves the identification of all suitable maternity roost trees (snags / cavity tree), at least 10 cm DBH, within a defined number of 12.6 m-radius plots (each representing 0.05 ha), randomly distributed across the feature. Data collected for each suitable snag / cavity tree included tree species, number of cavities, decay class, and UTM co-ordinates.

Transect Method

The transect method involves recording every suitable snag / cavity tree within the entire feature. Data collected for each tree is the same as that collected for the plot method described above.

Each bat SAR habitat feature was visually searched using one of the methods described above, for suitable habitat characteristics of for each SAR bat, which include the following:

For Little Brown Myotis and Northern Myotis (leaf-off surveys):

- Snags ≥ 10 cm DBH;

The following information was recorded for each identified suitable snag using the field form provided in Appendix B of the *Survey Protocol for Species at Risk Bats within Treed Habitats: Little Brown Myotis, Northern Myotis & Tri-colored Bat* (MNRF, April 2017):

- Date;
- Name of observer;
- UTM co-ordinates;
- Tree species;
- Decay class;
- DBH;
- Description of cavities, including type (e.g., woodpecker cavities, peeling bark, leaf litter, leaf clusters, etc.), and number and height of cavities;
- Presence of other suitable snags nearby; and,
- Photos.

For Eastern Small-footed Myotis[1]:

- Rock piles which may provide habitat were also considered.

Eastern Small-footed Myotis is known to roost in rock piles and talus slopes (Moosman *et al*., 2015). Field staff searched for this potential roosting habitat within the identified potentially affected suitable bat habitats.

1. *Survey methods for the Eastern Small-footed Myotis are not prescribed in the Survey Protocol for Species at Risk Bats within Treed Habitats: Little Brown Myotis, Northern Myotis & Tri-colored Bat (MNRF, 2017), the methods discussed in this report were based on previous consultation with the MNRF.*

The following information was collected for any potential rock piles or talus slopes identified in the field:

- Date;
- Name of observer;
- UTM co-ordinates;
- Description of rock pile or talus slope (e.g., material, depth of crevice, etc.);
- Presence of other suitable cavity trees or snags nearby;
- Presence of guano, if noted; and,
- Photos.

3.3 Phase III: Acoustic Surveys

3.3.1 Field Methods

Only those bat SAR habitat features not being considered for LOA required Phase III surveys. Therefore, acoustic monitoring occurred at a total of 28 potentially suitable features in order to identify the presence or absence of bat SAR in the Study Area.

Through discussion with the MNRF and in accordance with the accepted work plan (AECOM, 2018); the minimum number of acoustic monitors placed per feature was determined to be four acoustic monitoring stations per ha up to a maximum of seven.

A total of 124 acoustic monitoring stations were installed across the Study Area. Acoustic monitoring occurred from June 1 to July 9, 2018 (SM3BAT and SM4BATFS, Wildlife Acoustics Brand) with each acoustic monitor deployed for a minimum of 10 nights. Typically the acoustic monitoring period occurs between June 1 and June 30; however, due to the large extant of the Study Area, the MNRF agreed to extend the monitoring period to include the first week of July.

The acoustic monitors were programmed to record from dusk for a period of five (5) hours. Recordings were saved onto SanDisk (SD) cards (SD XC 10, 64 or 128 GB) within the acoustic monitor. Within wooded features, the monitors were mounted on tree trunks at an average height of 1.6 m and ultrasonic microphones were attached to the detector using 3 m recording cables; microphones were positioned as high as possible, away from potential obstacles and angled away from prevailing winds. This placement improves recording quality by reducing surface echoes and ground noise caused by proximal vegetation, which can distort ultrasonic signals. Where feasible; acoustic monitors were placed in open areas immediately adjacent to the target wooded feature. The acoustic monitors in open areas were placed on the ground with their microphones affixed to painter's poles that were then extended to a height of 2- 3 m in the air. Microphones were positioned towards the wooded feature. The precise locations of acoustic monitoring stations were selected in situ, field staff considered landscape, likelihood of recording clean calls and proximity to maternity roosting features of interest (i.e., maternity roosting trees, leaf clusters (if noted), and rock piles).

3.3.2 Analysis Methods

A three-step process was utilized to analyze acoustic data to achieve the highest confidence in classification:

1. The recorded ultrasonic data was analyzed using the Wildlife Acoustics' Kaleidoscope Pro 3 Analysis Software in order to identify the bat species present. This software is designed to convert files, sort, and categorize bat data by species. It identifies bats to species by comparing

the recorded ultrasonic patterns (also known as a pass) to those of known species-specific patters using the up-to-date Bats of North America classifier (version 5.0.0).

2. Once complete, the results obtained from the Kaleidoscope software were then run through a secondary software program, SonoBat (Version 3.2) to gain a second opinion on the classified calls.
3. The SAR bat calls identified by both programs were manually verified. Manual vetting occurs to ensure the patterns are consistent with the typical characteristics of a call for each species. This visual confirmation of the patterns was undertaken at least once for each species recorded per SD card.

Where the recordings are not consistent with the known typical characteristics of a bat or the recording are outside the range of the software ability to apply species identification, the analyser assigns the recording as "No ID". No ID recordings can result from background noise such as vehicles, rustling plants, other wildlife, incomplete recordings of bat calls, or bats which are outside of the range of the microphone. An extensive review of the No ID files was conducted to further identify potential bat SAR within the dataset.

3.4 Phase IV: Snag Density Survey

Snag density as described in the April 2017 Survey Protocol was calculated using the data collected during the Phase II surveys. No additional field work was undertaken in order to complete this requirement. The following formulae were used to calculate snag density:

For Transect Surveyed Sites:

- Number of snags / affected area.

For Plot Surveyed Sites:

- Total number of snags / (number of plots × 0.05 ha).
- The calculations are based on the affected area of the bat SAR habitat feature rather than entire bat SAR habitat feature size; this is due to the large size of the Study Area and that only the affected areas could be investigated.

4. Results

A summary of the results is provided below.

4.1 Phase I: Bat Habitat Suitability Assessment

A total of 48 different forested communities were represented by 240 distinct polygons present in the Study Area. Any forested communities of the same Ecosite type that were touching or are separated by less than 20 m, excluding separations caused by roads were considered contiguous, this resulted in a total of 75 features considered as potentially suitable bat habitat.

4.2 Phase II: Identification of Suitable Maternity Roost Trees

4.2.1 Suitable Maternity Roost Trees for Little Brown Myotis and Northern Myotis (Leaf-off Surveys)

A total of 549 suitable maternity roost trees were identified within the 75 potentially suitable features in the Study Area. The average density of suitable maternity roost trees within the Study Area is 23 roost trees per ha; this value is generally representative of high-quality maternity roosting bat habitat (MNRF, 2017).

The most abundant species of maternity roost trees were Silver Maple (*Acer saccharinum*), White Elm (*Ulmus americana*), White Ash (*Fraxinus americana*), American Basswood (*Tilia Americana*), Red Pine (*Pinus resinosa*) and American Beech (*Fagus grandifolia*).

4.2.2 Suitable Maternity Roosting Habitat for Eastern Small-footed Myotis

A total of 40 rock piles were identified within the Study Area, of which 36 were associated with potentially suitable bat SAR habitat features and the remaining four were noted outside of potentially suitable bat SAR habitat features.

The majority of rock piles observed were long linear features, presumably former fence lines. Rock piles were observed with a total of 17 potentially suitable bat SAR habitat features.

4.3 Phase III: Acoustic Surveys

As requested by the MNRF, when installing acoustic monitors, field staff looked for the presence of leaf-clusters (i.e., particularly suitable habitat for Tri-colored Bat); however, since no leaf-clusters were noted during the installations, field staff considered the presence of maples and / or oaks as potentially suitable habitat for Tri-colored Bat.

As a result of the acoustic monitoring, there were 50,784 identified recorded passes, including calls from seven Ontario bat species, including three SAR, Little Brown Myotis, Eastern Small-footed Myotis and Tri-colored Bat ; all of which are listed as Endangered on the Species at Risk in Ontario (SARO) list and are therefore afforded protection under the *ESA* (2007).

In total, there were 2,575 recorded passes of Little Brown Myotis, 248 recorded passes of Eastern Small-footed Myotis and seven recorded passes of Tri-colored Bat. The remaining passes were from bat species that are not listed as being at risk under the *ESA* (2007). These data reflects the number of times ultrasonic bat calls from bats was recorded by the acoustic monitor (i.e., the number of times a bat flew by the acoustic monitor’s microphone). This type of data confirms species presence and does not provide an indication of the number of individuals present. Furthermore, there were a total of 15,126 No ID recordings, referring to those records that the classifiers could not confidently identify to species or were the result of background noises similar in frequency to bat calls.

Evidence for the presence of Myotis Species bats, namely Little Brown Myotis and Eastern Small-footed Myotis within the in the Study Area is strong given the abundance of passes, numerous bat SAR habitat features, and agreement between software classifications. Evidence for the presence of Little Brown Myotis is particularly strong given the relatively large number of passes (i.e., 2,575) recorded. Meanwhile the evidence of the presence of Tri-colored Bat is somewhat weaker due to the relatively low abundance of passes (i.e., seven) recorded and limited agreement between classification software. SonoBat identified a single pass of Tri-colored bat which was based of 45 pulses which Kaleidoscope identified as a No ID. An AECOM qualified Ecologist verified the pass to ensure the patterns were consistent with the typical characteristics of the species. Kaleidoscope initially identified a total of 45 passes of Tri-colored Bat, the number of pulses varying from 21 to 2 pulses. An AECOM qualified Ecologist verified each pass to ensure the patterns were consistent with the typical characteristics of the species; resulting in total of 7 passes of Tri-colored Bat.

4.4 Phase IV: Snag Density

Maternity roost density for each bat habitat feature and an average density for the Study Area was calculated. Since all snag densities were calculated using the affected area, and some individual bat habitat features were very small, the resulting snag densities represent inflated and unrealistic maternity roost densities per ha. The average maternity roost density for the entire Study Area is 23 maternity roost trees per ha.

5. Conclusions and Next Steps

Phase I analysis identified a total 75 potentially suitable bat habitat features, each of these received Phase II surveys (leaf-off only). The MNRF proposed to carry 48 features or portions of features forward under the LOA process; as a result, these features are considered Candidate Bat SAR Habitat and did not require Phase III surveys. The remaining 28 suitable bat habitat features received Phase III (i.e., acoustic monitoring) to confirm the presence or absences of bat SAR in these features. Bat SAR have been identified in all features that received acoustic monitoring, with the exception of two.

Dependant on final highway design, up to 93.96 Ha of confirmed and Candidate Bat SAR Habitat may be impacted. As a result, both a LOA and permit under Section 17(2) (c) of the *ESA (2007)* are likely to be required in order for the Project to proceed to construction.

In order to confirm that permitting under Section 17(2) (c) of the *ESA (2007)* is required, an Information Gathering Form (IGF) must be completed at Detail Design and submitted to Ministry of Environment, Conservation and Parks (MECP). This is due to the administrative changes wherein, the MECP took over will be administration of the ESA(2007) as of April 2019.

In order to advance the LOA, detailed mapping of each Candidate Bat SAR Habitat (i.e., those previously identified to receive an LOA) must be provided to MECP at the time of IGF submission.

Reasonable steps to minimize adverse effects on bat SAR and bat SAR habitat will be developed during detail design in consultation with MECP through the permitting process. However, on a preliminary basis, mitigation measures to be considered include, but are not limited to, the following:

5.1 Design Measures

- Shield highway illumination to reduce light spill within bat SAR habitat and any restoration areas.

- Develop compensation, enhancement, restoration and overall benefit, in co-operation with MECP through permitting process, which may include the following:
  - Installation of artificial roosting structures such as bat boxes within the Study Area;
  - Reforestation plantings in or adjacent to the Study Area; and,
  - Effectiveness monitoring of any compensation, enhancement, restoration and overall benefit measures applied.

5.2 Construction Constraints:

- Limit clearing of trees and removal of rock piles to the October 1 – March 31 period.
- Restrict construction activities within 30 m of known retained cavity trees or identified structures to daylight hours when possible. While bats could be affected by construction activities (noise, vibration, lighting etc.) occurring equally during the day and night, nightly construction activities would interfere with bats while they are actively foraging and moving around the area creating additional disturbances that can essentially be controlled. Therefore, limiting construction activities to a specific period during daylight hours reduces the timing and duration of disturbance in these areas to resident bats and other wildlife.

6. References

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Roost tree selection by maternal colonies of northern long-eared myotis in an intensively managed forest. United States Department of Agriculture Forest Service, General Technical Report NE-292, Northeastern Research Station, Newtown Square, PA, p. 6.

Attachments

Attachment A: **Bat SAR Habitat Assessment Work Plan (2018)**
Highways 6 & 401 Improvements from Hamilton North Limits to Guelph South Limits including a New Alignment of a Segment of Highway 6 Detailed Design and Class Environmental Assessment (G.W.P. 3042-14-00). April 2018

AECOM Imagine it. Delivered.

Attachment A

Bat SAR Habitat Assessment Work Plan (2018)

Highways 6 & 401 Improvements from Hamilton North Limits to Guelph South Limits including a New Alignment of a Segment of Highway 6 Detailed Design and Class Environmental Assessment (G.W.P. 3042-14-00). April 2018

AECOM Imagine it. Delivered.

Ministry of Transportation

Bat SAR and Bat SAR Habitat Assessment Work Plan (2018)

Highways 6 & 401 Improvements from Hamilton North Limits to Guelph South Limits including a New Alignment of a Segment of Highway 6 Detailed Design and Class Environmental Assessment (G.W.P. 3042-14-00)

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Date: May, 2018

Project #: 60541071

Statement of Qualifications and Limitations

The attached Report (the "Report") has been prepared by AECOM Canada Ltd. ("AECOM") for the benefit of the Client ("Client") in accordance with the agreement between AECOM and Client, including the scope of work detailed therein (the "Agreement").

The information, data, recommendations and conclusions contained in the Report (collectively, the "Information"):

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- represents AECOM's professional judgement in light of the Limitations and industry standards for the preparation of similar reports;
- may be based on information provided to AECOM which has not been independently verified;
- has not been updated since the date of issuance of the Report and its accuracy is limited to the time period and circumstances in which it was collected, processed, made or issued;
- must be read as a whole and sections thereof should not be read out of such context;
- was prepared for the specific purposes described in the Report and the Agreement; and
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This Statement of Qualifications and Limitations is attached to and forms part of the Report and any use of the Report is subject to the terms hereof.

AECOM: 2015-04-13

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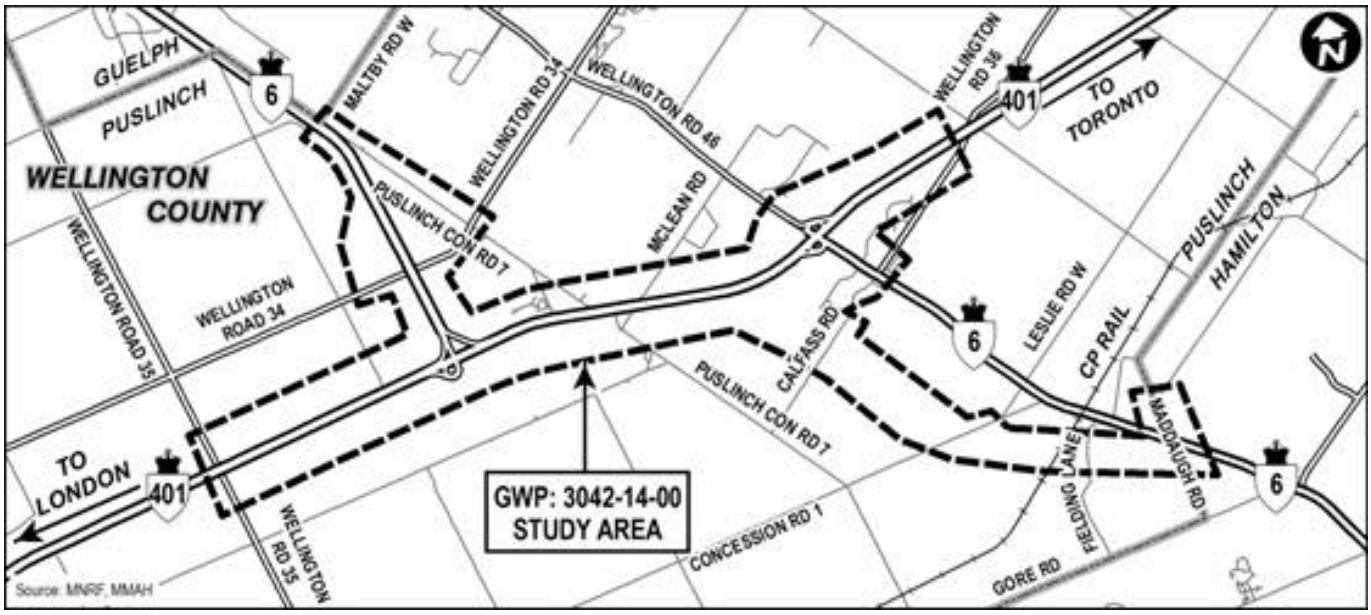
Attachments

1. Project Study Area and Background

AECOM has been retained by MTO to undertake the Preliminary Design Update, Detail Design and Class Environmental Assessment (EA) Study for the Highways 6 & 401 Improvements from Hamilton North Limits to Guelph South Limits including a New Alignment of a Segment of Highway 6 (G.W.P. 3042-14-00). Species-specific surveys to confirm the presence or absence of bat species afforded protection under the *Endangered Species Act* (*ESA) (2007)* have been requested by the MNRF Guelph District to be completed within the Project's study area. A map indicating the location of the Project's study area is provided below.



AECOM met with MNRF Guelph District on November 17, 2017 to determine Species at Risk (SAR) survey requirements including the requirements for bat SAR and bat SAR habitat assessment in woodland habitats throughout the Study Area. At that meeting, MNRF Guelph District indicated that while the *Survey Protocol for Species at Risk Bats within Trees Habitats* (MNRF, 2017), henceforth referred to as the April 2017 Survey Protocol, should generally be adhered to; slight modifications proposed by AECOM to achieve field work and assessment efficiencies would be acceptable. This work plan has been prepared to provide a detailed description of the proposed bat SAR surveys and bat SAR habitat assessment for the Project.

A draft work plan was submitted to MNRF Guelph District on March 21, 2018 for review. MNRF Guelph District provided a response with revisions to the work plan on April 3, 2018 (Attachment A). This work plan, dated April 2018, includes revisions based on input from MNRF Guelph District.

2. Bat SAR and Bat SAR Habitat Assessment (Little Brown Myotis, Northern Myotis and Tri-colored Bat)

The April 2017 Survey Protocol requires five phases of work which must be completed to determine the presence of bat SAR and bat SAR habitat as listed below:

- Phase I: Bat Habitat Suitability Assessment
- Phase II: Identification of Suitable Maternity Roost Trees
- Phase III: Acoustic Surveys
- Phase IV: Snag Density Survey
- Phase V: Complete an Information Gathering Form (IGF)

A summary of work completed, work anticipated, proposed methods and proposed variances from the April 2017 Survey Protocol is discussed in the sections below.

2.1 Phase I: Bat Habitat Suitability Assessment

Phase I: Bat Habitat Suitability Assessment work is considered complete for the Project. The determination of areas suitable for bat SAR or bat SAR habitat was undertaken in 2017 through:

- ELC field investigations on lands where Permission to Enter (PTE) was secured; and.
- Aerial photograph interpretation for lands where PTE was not granted by the property owner.

2.2 Phase II: Identification of Suitable Maternity Roost Trees

The April 2017 Survey Protocol highlights the importance of observers to be able to clearly identify attributes that are suitable for the establishment of maternity roosts by conducting surveys during both the leaf-on and leaf-off period. For ecosites less than 10 hectares (ha), the April 2017 Survey Protocol notes that a walking transect through the entire ecosite is to be completed to identify suitable habitat. For large ecosites (greater than 10 ha), the April 2017 Survey Protocol notes that snag density plot surveys should be conducted to include a minimum of 10 plots per ecosite with an additional plot for each hectare within a site greater than 10 ha in size. With each ecosite, the following species specific surveys are to be completed:

- **Tri-colored Bat**: field visits should take place during the leaf-on season the same year the acoustic monitoring is to be conducted so that foliage characteristics (i.e., dead/dying leaves along a dead branch) can be observed. The following trees are to be documented:
  - any oak tree ≥ 10 cm dbh
  - any maple tree ≥ 10 cm dbh IF the tree includes dead/dying leaf clusters
  - any maple tree ≥ 25 cm dbh

- **Little Brown Myotis/Northern Myotis**: field visits should occur during the leaf-off period so that the view of tree attributes (hollows, cracks etc.) is not obscured by foliage. The following trees are to be documented:
  - any snags (any standing live or dead tree ≥ 10 cm dbh with cracks, crevices, hollows, cavities, and/or loose or naturally exfoliating bark)

During the November 17, 2017 meeting, MNRF Guelph District agreed that the following modifications to Phase II of the April 2017 Survey Protocol are acceptable:

- Similar and contiguous Ecosites will be considered as larger woodland units for the purposes of Phase II and III studies, so long as the results determined are applied to the entire feature.
- Snag density plots will be undertaken in large areas (>2 ha) rather than transects for Phase II studies.
- Woodlands where disturbance will be minimal limited to their edges will be considered for a Letter of Advice (LOA) rather than full permitting.
- For Tri-coloured bats:
  - Field visits during the leaf-on season for Phase II of the April 2017 Survey Protocol are not required provided the locations of the acoustic monitors used in Phase III are determined with consideration to Tri-coloured bat habitat and that any appropriate leaf clusters noted in woodlands are recorded.
  - Tri-coloured bat habitat will be inferred from the results of acoustic monitoring

Based on the foregoing, AECOM is proposing all Phase II work for the Project be undertaken as described below:

- AECOM will undertake field visits during the leaf-off period within the highway right-of-way for this Project to document trees suitable for Little Brown Myotis and Northern Myotis (no change from April 2017 Survey Protocol).
- AECOM will not undertake field visits during the leaf-on period to document all trees suitable for Tri-colored Bat, but will instead document suitable trees with dead/dying leaf clusters during Phase III surveys.
- Woodlands of the same ecosite type (i.e., FOD, SWM, SWD, CUW and CUP) will be considered contiguous if the ELC polygons are touching or are separated by less than 20 m, not including separations caused by roads.
- Within these continuous woodlands, AECOM will undertake leaf-off surveys utilizing the transect methods for any woodlands within affected areas less than 2 ha in size.
- Within woodlands with affected areas equal to or greater than 2 ha in size, surveys will be conducted using snag density plots.
- In consultation with MNRF Guelph District, AECOM has identified a total of 48 woodlands which can be addressed through the conditions in an LOA on the basis that the anticipated disturbance to these sites is minimal and, as such, the associated disturbances on habitat function will be minimal (including consideration of the landscape context, such as current and future connectivity, existing and proposed disturbances in the area). Phase II studies shall be undertaken in these areas to support MNRF Guelph District review and consideration of these locations and the suitability of an LOA. AECOM intends to provide MNRF with the results of the Phase II studies associated with these locations prior to the initiation of Phase III studies for the Project.
  - At the request of the MNRF Guelph District the three sites (BAT45, BAT065, BAT072) which were previously recommended as potential candidates for a Letter of Advice will undergo acoustic monitoring . These revisions have been reflected in **Table 1** below.

- At the request of MNRF Guelph District, 29 woodlands site which were previously recommended for acoustic monitoring are now candidates for an LOA. These revisions have been reflected in **Table 1** below.
- Finally, AECOM understands, from email correspondence with MNRF Guelph District dated April 3, 2018, that in order for the MNRF Guelph District to prepare an LOA for the below sites; mapping showing the candidate Letter of Approval locations is required. However, in areas where other SAR studies are being undertaken to confirm presence/absence (e.g. Jefferson Salamander sampling), an LOA specific to SAR bats will not be provided until the MNRF Guelph District has received all of the information needed to ensure that there are no timing window conflicts that would negatively impact SAR. AECOM will provide these maps to the MNRF Guelph District as part of the documentation of this study.

Table 1: Summary of Proposed Letter of Advice Locations

Bat ID	Affected Area (ha)	Ecosites
BAT003	0.47	SWD
BAT006	0.25	FOD
BAT008	0.22	SWD
BAT009	0.04	SWD
BAT010	0.25	SWM
BAT011	1.58	SWD
BAT012	1.08	SWM
BAT013	0.23	SWM
BAT014	0.01	FOM
BAT015	1.58	SWM
BAT017	0.03	CUW
BAT018	0.05	FOD
BAT019	0.38	FOD
BAT020	0.13	CUW
BAT021	0.03	FOD
BAT022	0.23	CUW
BAT023	0.12	FOD
BAT025	0.03	CUW
BAT026	0.09	CUW
BAT027	0.03	FOD
BAT028	0.83	SWM
BAT029	0.18	SWC
BAT030	0.23	FOD
BAT031	0.31	FOD
BAT032	0.08	FOD
BAT033	0.11	CUW
BAT034	0.29	CUW
BAT036	1.00	CUP
BAT037	0.23	CUP
BAT038	0.78	CUP
BAT039	0.51	SWM
BAT042	0.38	CUW
BAT043	0.06	SWD
BAT044	0.01	SWC
BAT046	2.12	CUP
BAT047	0.15	CUP
BAT048	0.40	CUP

Bat ID	Affected Area (ha)	Ecosites
BAT049	0.50	CUW
BAT050	0.62	CUW
BAT051	0.25	FOM
BAT056	0.69	CUW
BAT058	0.09	FOD
BAT063	0.41	CUW
BAT066	0.01	SWM
BAT070	0.02	SWD
BAT071	0.26	CUP
BAT073	0.03	CUP
BAT074	0.00	CUP
TOTAL: 48		

The April 2017 Survey Protocol recommends that within each ELC ecosite determined to be potentially suitable as maternity roost habitat, acoustic surveys are completed to confirm either the presence or absence of bat SAR. The Protocol requires:

- A minimum total of four (4) acoustic monitoring stations per ha of ELC ecosite for full coverage of an ELC ecosite, ranging up to a maximum of ten (10) per ELC ecosite.
- Acoustic monitoring on a minimum of ten (10) evenings between June 1-30, commencing after dusk and continuing for five (5) hours under conditions of warm mild nights (i.e., ambient temperature greater than 10°C) with low wind and no precipitation.
- Acoustic monitors to be placed within 10 m of the best potential maternity roost trees identified in the Phase II surveys.

During the November 17, 2017 meeting, MNRF Guelph District indicated that the following modifications to Phase III of the 2017 protocol suggested by AECOM are acceptable:

- Extension on the timing of Phase III Acoustic Surveys into the first or second week of July, with exact dates determined through consultation with MRNF.
- Similar and contiguous ecosites will be considered a single, larger woodland unit for the purpose for Phase III studies, provided the survey results were applied to the entire feature.
- Woodlands with edge effects only will be considered for an LOA rather than full permitting.

Based on the foregoing, AECOM is proposing that Phase III work be undertaken as described below:

- All reasonable attempts will be made to complete the acoustic monitoring within the June 1 - June 30, 2018 period. However, if this does not provide an adequate window to complete the work, acoustic monitoring as late as July 13, 2018, with the permission of the MNRF Guelph District.
- Acoustic monitoring will be undertaken in similar and contiguous ELC ecosites and considered larger woodland units where appropriate and as identified during the Phase II surveys. The results of the Phase III acoustic monitoring will be applied to the entire contiguous woodland feature.
- No acoustic monitoring will be undertaken within woodlands which are considered potential candidates for an LOA rather than full permitting, subject to review and agreement by MNRF Guelph District based on the results of the Phase II surveys.

AECOM recognizes that April 2017 Survey Protocol recommends that four (4) acoustic monitoring stations per hectare up to a maximum of ten (10) acoustic monitoring stations be established per woodland. AECOM proposes

that a maximum of seven (7) rather than ten (10) acoustic monitoring stations would provide suitable coverage throughout the woodlands. As part of the draft work plan reviewed by MNRF Guelph District, AECOM sought MNRF Guelph District's confirmation that the use of up to seven (7) rather than ten (10) acoustic monitoring stations per woodland would be suitable. In the response received April 3, 2018, MNRF Guelph District did not recommend additional monitors for any of the locations at which a maximum of seven (7) are proposed. During Phase III acoustic monitors will be placed in proximity to the best potential maternity roost trees as identified in the Phase II surveys. A summary of each woodland, its affected area, ecosite type and summary of proposed investigations is provided in **Table 2** in **Section 2.3** below.

The following items have been revised or added at the request of the MNRF Guelph District, as it pertains to Phase III Acoustic Surveys, based on email correspondence dated April 3, 2018:

- As previously mentioned in **Section 2.2** the following woodlands are no longer considered candidates for an LOA: BAT045, BAT065 and BAT072. Acoustic monitoring will be undertaken at BAT045 and BAT072. However, due to BAT065's connectivity to BAT005, an additional monitor is not required; rather the results from BAT005 will be applied to BAT065 per the recommendation of MNRF Guelph District.
- Acoustic monitoring will be undertaken in the portions of BAT012 and BAT056 that have been identified by MNRF Guelph District as not suitable for an LOA (refer to **Table 1** and **Table 2**). This has resulted in a reduction of the number of acoustic monitors required in BAT012 from seven (7) to three (3). This change has been reflected in **Table 2** below. There has not been a reduction in the number of acoustic monitors required in BAT056.
- AECOM has added an additional woodland, now identified at BAT075 as a location that requires both Phase II and III surveys. Revisions to reflect this additional woodland are provided in **Table 2** below.
- For highly cluttered areas (i.e., densely vegetated forests or areas with dense understory vegetation) AECOM will place at least one monitor in a forest gap/migration corridor (i.e., forest gap or edge), if present, to increase the likelihood of capturing a clear recordings.

2.3 Phase IV: Snag Density Survey

Snag density surveys as described in the April 2017 Survey Protocol can be calculated using the data collected during the Phase II surveys. No additional field work is necessary to complete this requirement. As such, no variances from the 2017 Survey Protocol are proposed.

2.4 Phase IV: Complete an Information Gathering Form (IGF)

An IGF will be completed upon the completion of all SAR surveys associated with the Project. No variances or efficiencies are proposed in order to complete this task.

2.5 Data Management

Data will be collected, compiled and organized in such a way that it can be easily retrieved for analysis; for both bat SAR habitat assessment and acoustic monitoring, digital records will be collected using a combination of tablets and acoustic monitors.

3. Bat SAR and Bat SAR Habitat Assessment (Eastern Small-footed Myotis)

In the active season, Eastern Small-footed Myotis (*Myotis leibii*) is known to roost in numerous habitat types including: in or under rocks/rock outcrops, in buildings, under bridges, caves, mines, hollow trees and /or under tree bark. As habitat assessment for the Eastern Small-footed Myotis is not addressed in the April 2017 Survey Protocol. AECOM proposes the conducted habitat assessment for the species using the following method:

Field staff will search for this potential roosting habitat within the identified potentially affected suitable bat habitats.

The following information was collected for any potential rock piles or talus slopes identified in the field:

- Date;
- Name of observer;
- UTM co-ordinates;
- Description of rock pile or talus slope (e.g., material, depth of crevice, etc.);
- Presence of other suitable cavity trees or snags nearby;
- Presence of guano, if noted; and,
- Photos.

Should suitable habitat for the species be identified, acoustic monitoring stations will be placed in close proximity to the features. Furthermore, results of the acoustic monitoring stations throughout the study area will be screened for the ultrasonic recordings of this species.

4. Summary of Woodlands and Proposed Work

A summary of each potentially suitable woodland identified as bat habitat and the proposed work to be conducted at each location is provided below.

Table 2: Summary of Woodland and Proposed Work

Bat ID	Affected Area (ha)	Ecosite	Proposed Candidate for Letter of Advice	Phase 2		Phase 3
				Proposed Survey Method	No. of plots	Proposed No. of Monitors
BAT001	1.39	FOD	-	Transects	-	6
BAT002	3.15	FOD	-	Plots	10	7
BAT003	0.47	SWD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT004	1.03	SWC	-	Transects	-	4
BAT005	0.48	SWD	-	Transects	-	2
BAT006	0.25	FOD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT007	0.63	FOD	-	Transects	-	3

Bat ID	Affected Area (ha)	Ecosite	Proposed Candidate for Letter of Advice	Phase 2		Phase 3
				Proposed Survey Method	No. of plots	Proposed No. of Monitors
BAT008	0.22	SWD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT009	0.04	SWD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT010	0.25	SWM	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT011	1.58	SWD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT012	0.65	SWM	-	Transects	-	3
BAT012	1.08	SWM	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT013	0.23	SWM	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT014	0.01	FOM	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT015	1.58	SWM	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT016	5.05	FOD	-	Plots	10	7
BAT017	0.03	CUW	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT018	0.05	FOD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT019	0.38	FOD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT020	0.13	CUW	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT021	0.03	FOD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT022	0.23	CUW	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT023	0.12	FOD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT024	2.50	FOM	-	Plots	10	7
BAT025	0.03	CUW	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT026	0.09	CUW	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT027	0.03	FOD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT028	0.83	SWM	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT029	0.18	SWC	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT030	0.23	FOD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT031	0.31	FOD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT032	0.08	FOD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT033	0.11	CUW	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT034	0.29	CUW	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT035	0.77	CUP	-	Transects	-	3
BAT036	1.00	CUP	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT037	0.23	CUP	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT038	0.78	CUP	Letter of Advice	Transects	-	0 (Letter of Advice
BAT039	0.51	SWM	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT040	0.22	SWC	-	Transects	-	1
BAT041	0.16	CUP	-	Transects	-	1
BAT042	0.38	CUW	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT043	0.06	SWD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT044	0.01	SWC	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT045	0.22	FOM	-	Transects	-	1
BAT046	2.12	CUP	Letter of Advice	Plots	10	0 (Letter of Advice)
BAT047	0.15	CUP	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT048	0.40	CUP	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT049	0.50	CUW	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT050	0.62	CUW	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT051	0.25	FOM	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT052	1.54	FOC	-	Transects	-	6
BAT053	1.52	FOD	-	Transects	-	6
BAT054	1.42	CUW	-	Transects	-	6
BAT055	8.44	FOD	-	Plots	10	7
BAT056	7.14	CUW	-	Plots	10	7
BAT056	0.69	CUW	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT057	2.03	FOM	-	Plots	10	7

Bat ID	Affected Area (ha)	Ecosite	Proposed Candidate for Letter of Advice	Phase 2		Phase 3
				Proposed Survey Method	No. of plots	Proposed No. of Monitors
BAT058	0.09	FOD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT059	18.86	CUP	-	Plots	18	7
BAT060	9.72	CUP	-	Plots	10	7
BAT061	1.03	SWD	-	Transects	-	4
BAT062	0.22	SWC	-	Transects	-	1
BAT063	0.41	CUW	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT064	0.46	FOC	-	Transects	-	2
BAT065	0.07	FOC	-	Transects	-	0 (Apply results from BAT005)
BAT066	0.01	SWM	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT067	1.22	FOD	-	Transects	-	5
BAT068	0.40	CUW	-	Transects	-	2
BAT069	1.14	CUW	-	Transects	-	5
BAT070	0.02	SWD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT071	0.26	CUP	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT072	0.10	CUW	-	Transects	-	1
BAT073	0.03	CUP	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT074	0.00	CUP	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT075	1.46	FOC	-	Transects	-	6
Total	**90.4**	**-**	**-**	**-**	**98**	**124**

5. Schedule of Tasks

A schedule of each task is provided below in **Table 3.**

Table 3: Schedule of Tasks

Task	Schedule
Phase I: Bat Habitat Suitability Assessment	Completed in 2017
Phase II: Identification of Suitable Maternity Roost Trees	Leaf-Off Season (It is recognized that Leaf-Off season can vary dependent on seasonal changes and geographical location. AECOM intends to complete all Phase II prior to the complete emergence of leaves which would obscure cavities. Determination of leaf emergence is likely to vary by location and species present.)
Phase III: Acoustic Surveys	June 1, 2018 to as late as July 13, 2018, with the permission of the MNRF Guelph District.
Bat SAR and Bat SAR Habitat Assessment (Eastern Small-footed Myotis)	Same timing frame as Phase II and Phase III above
Phase IV: Snag Density Survey	Desktop exercise to be completed after field investigations
Phase IV: Complete an Information Gathering Form (IGF)	Desktop exercise to be completed after field investigations
Preparation of LOA Mapping	Desktop exercise to be completed after final MNRF endorsement of this work plan.

6. References

Ministry of Natural Resources and Forestry (MNRF), 2017:

Survey Protocol for Species at Risk Bats within Trees Habitats. Guelph District. April 2017.

AECOM Imagine it. Delivered.

Attachment A

MNRF Correspondence

Ellis, Julie

From:	Laurence, Anne Marie (MNRF) <annemarie.laurence@ontario.ca>
Sent:	Tuesday, April 03, 2018 1:44 PM
To:	Kime, Heather
Cc:	Kamstra, James; Ellis, Julie; Piette, Jessica
Subject:	RE: Bat SAR and Bat SAR Habitat Assessment Workplan - 2018
Attachments:	MNRFComments_Table2_April3_2018.docx
Importance:	High
Follow Up Flag:	Follow up
Flag Status:	Flagged

Hi Heather (and AECOM project team),

Thank you for providing the MNRF Guelph District Office the opportunity to review the above-cited document, dated March 2018. MNRF offers the following comments:

As you will see in the attached revised Table 2, MNRF was able to further scope your work to add a number of other ELC communities to AECOM's list of locations that we believe can be dealt with through the conditions in a Letter of Advice (LOA) specific to listed bat species. This was based on an analysis of potential impacts of proposed tree removal and associated disturbances on habitat function including consideration of the landscape context (such as current and future connectivity, existing and proposed disturbances in the area etc.).

In general, MNRF is supportive of what AECOM has proposed in terms of the number (density) of acoustic detectors for the subject ELC communities listed in Table 2, with a few recommendations, as follows:

BAT045: MNRF recommends that 1 acoustic detector be placed in this community, as this community is connected to BAT016 .
BAT065: Although this is a relatively small ELC community (0.07 ha, because of connectivity with BAT005 (same forest patch), a LOA would not be appropriate in this case. However, because of the small size, the project team may not wish to include an acoustic detector in this community – any results from BAT005 can be applied to BAT065 as it is very likely the same bats would be using the entire patch.

Note that additional minor comments are also provided in the attached revised Table 2.

Additional comments:

- We also note that there may be suitable SAR bat habitat present within the Limits of Work shown on Figure 1.17 and Figure 1.18 [redacted] that does not appear to be included in Table 2.
- For highly cluttered areas where acoustic monitoring is proposed, we recommend that at least one monitor be placed in a forest gap/migration corridor (if present) to increase the chance of a clear recording.
- In order for the MNRF to prepare a LOA to the proponent at a future date, we will require maps showing the locations where we have indicated that a LOA will be issued for SAR bats. However, in areas where other SAR studies are being undertaken to confirm presence/absence (e.g. Jefferson Salamander sampling), we will not issue an LOA specific to SAR bats until we have all of the information that we need to ensure that there are no timing window conflicts that would negatively impact SAR. Therefore, this is just an FYI on the need for the maps at some point, but is no urgency in providing these maps until we have the full spectrum of SAR data for the project area.

Please let me know if you have any questions or concerns on the above or attached comments.

Best regards,

Anne Marie

_____

Anne Marie Laurence
Management Biologist
Ministry of Natural Resources & Forestry
Guelph District
(519) 826-4132

Bat ID	Affected Area (ha)	Ecosite	Proposed Candidate for Letter of Advice	Phase 2		Phase 3
				Proposed Survey Method	No. of plots	Proposed No. of Monitors
BAT001	1.39	~~CUP~~FOD	-	Transects	-	6
BAT002	3.15	FOD	-	Plots	10	7
BAT003	0.47	SWD	-Letter of Advice	Transects	-	~~2~~0 (Letter of Advice)
BAT004	1.03	SWC	-	Transects	-	4
BAT005	0.48	SWD	-	Transects	-	2
BAT006	0.25	FOD	-Letter of Advice	Transects	-	~~1~~0 (Letter of Advice)
BAT007	0.63	FOD	-	Transects	-	3
BAT008	0.22	SWD	-Letter of Advice	Transects	-	~~1~~0 (Letter of Advice)
BAT009	0.04	SWD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT010	0.25	SWM	-Letter of Advice	Transects	-	~~1~~0 (Letter of Advice)
BAT011	1.58	SWD	-Letter of Advice	Transects	-	~~6~~0 (Letter of Advice)
BAT012	1.73	SWM	-	Transects	-	7
BAT013	0.23	SWM	-Letter of Advice	Transects	-	~~1~~0 (Letter of Advice)
BAT014	0.01	FOM	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT015	1.58	SWM	-Letter of Advice	Transects	-	~~6~~0 (Letter of Advice)
BAT016	5.05	FOD	-	Plots	10	7
BAT017	0.03	CUW	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT018	0.05	FOD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT019	0.38	FOD	-Letter of Advice	Transects	-	~~2~~0 (Letter of Advice)
BAT020	0.13	CUW	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT021	0.03	FOD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT022	0.23	CUW	-Letter of Advice	Transects	-	~~1~~0 (Letter of Advice)
BAT023	0.12	FOD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT024	2.50	FOM	-	Plots	10	7
BAT025	0.03	CUW	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT026	0.09	CUW	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT027	0.03	FOD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT028	0.83	SWM	-Letter of Advice	Transects	-	~~3~~0 (Letter of Advice)
BAT029	0.18	SWC	-Letter of Advice	Transects	-	~~1~~0 (Letter of Advice)
BAT030	0.23	FOD	-Letter of Advice	Transects	-	~~1~~0 (Letter of Advice)
BAT031	0.31	FOD	-Letter of Advice	Transects	-	~~1~~0 (Letter of Advice)
BAT032	0.08	FOD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT033	0.11	CUW	-Letter of Advice	Transects	-	~~1~~0 (Letter of Advice)
BAT034	0.29	CUW	-Letter of Advice	Transects	-	~~1~~0 (Letter of Advice)
BAT035	0.77	CUP	-	Transects	-	3
BAT036	1.00	CUP	-Letter of Advice	Transects	-	~~4~~0 (Letter of Advice)
BAT037	0.23	CUP	-Letter of Advice	Transects	-	~~1~~0 (Letter of Advice)
BAT038	0.78	CUP	-Letter of Advice	Transects	-	~~3~~0 (Letter of Advice
BAT039	0.51	SWM	-Letter of Advice	Transects	-	~~2~~0 (Letter of Advice)
BAT040	0.22	SWC	-	Transects	-	1
BAT041	0.16	CUP	-	Transects	-	1
BAT042	0.38	CUW	-Letter of Advice	Transects	-	~~2~~0 (Letter of Advice)
BAT043	0.06	SWD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT044	0.01	SWC	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT045	0.22	FOM	~~Letter of Advice~~-	Transects	-	~~0 (Letter of Advice~~1)
BAT046	2.12	CUP	-Letter of Advice	Plots	10	~~7~~0 (Letter of Advice)
BAT047	0.15	CUP	Letter of Advice-	Transects	-	~~1~~0 (Letter of Advice)
BAT048	0.40	CUP	Letter of Advice-	Transects	-	~~2~~0 (Letter of Advice)
BAT049	0.50	CUW	Letter of Advice-	Transects	-	~~2~~0 (Letter of Advice)
BAT050	0.62	CUW	-Letter of Advice	Transects	-	~~2~~0 (Letter of Advice)
BAT051	0.25	FOM	-Letter of Advice	Transects	-	~~1~~0 (Letter of Advice)

Comment [mnr1]: The BAT012 areas adjacent to Hwy 6 can be dealt with through a LOA (no acoustic monitoring recommended). We are more concerned with the BAT012 adjacent to [redacted] on your map as it will break connectivity of the forest – we recommend that acoustic monitoring focus on that area.

Comment [mnr2]: Within same patch as BAT016.

Bat ID	Affected Area (ha)	Ecosite	Proposed Candidate for Letter of Advice	Phase 2		Phase 3
				Proposed Survey Method	No. of plots	Proposed No. of Monitors
BAT052	1.54	FOC	-	Transects	-	6
BAT053	1.52	FOD	-	Transects	-	6
BAT054	1.42	CUW	-	Transects	-	6
BAT055	8.44	FOD	-	Plots	10	7
BAT056	7.83	CUW	-	Plots	10	7
BAT057	2.03	FOM	-	Plots	10	7
BAT058	0.09	FOD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT059	18.86	CUP	-	Plots	18	7
BAT060	9.72	CUP	-	Plots	10	7
BAT061	1.03	SWD	-	Transects	-	4
BAT062	0.22	SWC	-	Transects	-	1
BAT063	0.41	CUW	-Letter of Advice	Transects	-	~~2~~0 (Letter of Advice)
BAT064	0.46	FOC	-	Transects	-	2
BAT065	0.07	FOC	~~Letter of Advice~~	Transects	-	~~0 (Letter of Advice)~~
BAT066	0.01	SWM	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT067	1.22	FOD	-	Transects	-	5
BAT068	0.40	CUW	-	Transects	-	2
BAT069	1.14	CUW	-	Transects	-	5
BAT070	0.02	SWD	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT071	0.26	CUP	-Letter of Advice	Transects	-	~~1~~0 (Letter of Advice)
BAT072	0.10	CUW	~~Letter of Advice~~-	Transects	-	~~0 (Letter of Advice)~~
BAT073	0.03	CUP	Letter of Advice	Transects	-	0 (Letter of Advice)
BAT074	0.00	CUP	Letter of Advice	Transects	-	0 (Letter of Advice)

Comment [mnr3]: The small part of BAT056 adjacent to [redacted] along the road (section furthest east on north side of Calfass Rd) can be dealt with through a LOA. The section connected to BAT052 and BAT057 should be monitored.

Comment [mnr4]: Same patch as BAT005. Monitoring recommended.

Comment [mnr5]: Connected to BAT072. Acoustic monitoring recommended.

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To: Kirstie Houston
Senior Environmental Planner
Ministry of Transportation (MTO)
3rd Flr, 659 Exeter Road
London, ON N6E 1L3

Date: November 19, 2019
Project #: 60541071

From: Jessica Piette (AECOM)
Julie Ellis (AECOM)

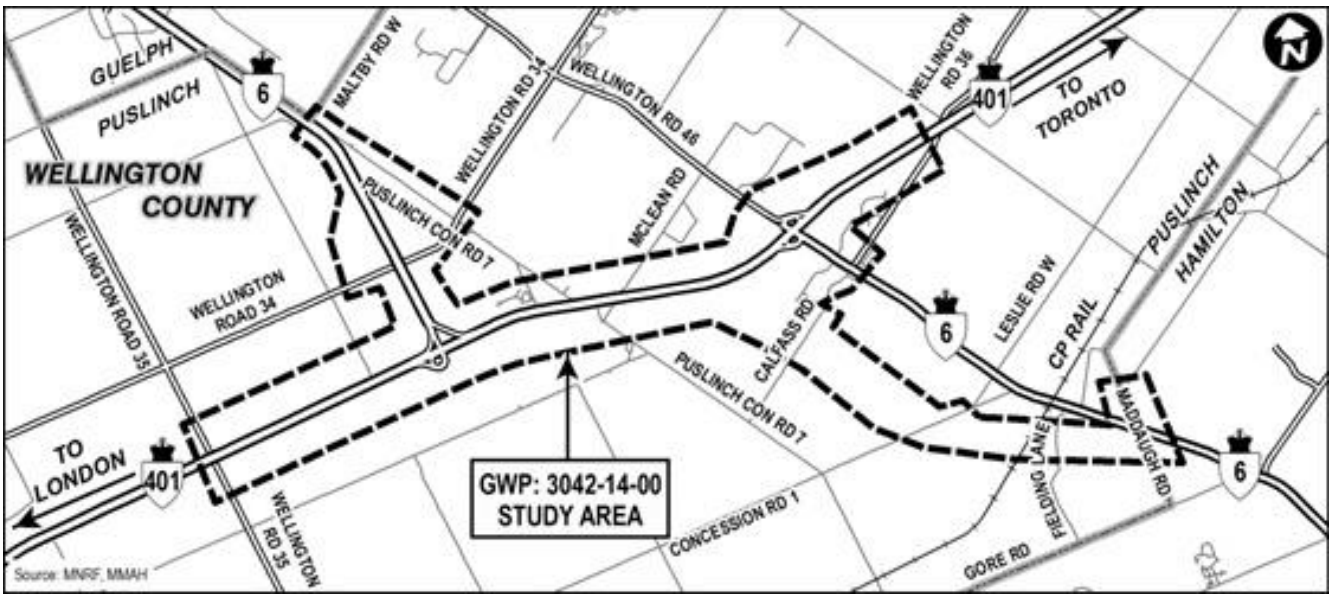
Memorandum

Subject: **Results of 2019 Bat SAR Surveys undertaken for the "Preliminary Design Update, Detail Design and Class Environmental Assessment Study for the Highways 6 and 401 Improvements"**

1. Introduction

AECOM Canada Ltd. (AECOM) has been retained by Ministry of Transportation (MTO) to undertake the Preliminary Design Update, Detail Design and Class Environmental Assessment (EA) Study for the Highways 6 & 401 Improvements from Hamilton North Limits to Guelph South Limits including a New Alignment of a Segment of Highway 6 (G.W.P. 3042-14-00). A map showing the Study Area is provided in **Figure 1**.

Figure 1: Study Area



In 2018, AECOM undertook species-specific surveys for Little Brown Myotis (*Myotis lucifugus),* Northern Myotis (*Myotis septentrionalis),* Eastern Small-footed Myotis (*Myotis leibii)* and Tri-colored Bat (*Perimyotis subflavus)*, hereafter refer to as bat SAR. The results of these surveys are documented in Results of 2018 Bat SAR Surveys undertaken for the Preliminary Design Update, Detail Design and Class Environmental Assessment Study for

the Highways 6 and 401 Improvements (AECOM, 2018). These surveys were limited to the Limits of Work for the Study Area. The Limits of Work consist of the proposed and existing infrastructure, the Limits of work are illustrated in **Figure 1**.

In 2019, as part of the ongoing design refinement process, areas of potential design modifications expanding the project footprint were identified. In addition, some surplus property beyond the original EA footprint, which was acquired through the property expropriation and negotiation process, was identified to be potentially beneficial for further design refinements or mitigations. As a result, each of these additional areas required investigation to determine existing conditions. The Limits of Work were thus expanded, resulting in the need for additional species-specific surveys for bat SAR at five locations. Based on the changes and increase in the size of potentially impacted areas, it was determined that additional Phase II: Identification of Suitable Maternity Roost Trees surveys were required at all five (5) locations and that additional Phase III: Acoustic Surveys were required at four (4) locations.

The purpose of this memorandum is to summarize the 2019 field investigations and acoustic monitoring data analysis completed to assess presence of bat maternity roosting habitat and confirm the presence or absence of SAR bats within the newly added Limits of Work. The following sections provide descriptions of each of the bat SAR potentially inhabiting wooded areas within the Lands, the methods and results of the SAR bat habitat assessment as well as the methods and results of the acoustic monitoring.

2. Bat Species Potential Present in the Study Area

2.1 Little Brown Myotis

During daylight hours, the Little Brown Myotis roosts in trees and anthropogenic structures such as barns, attics, and abandoned structures. In natural areas, Little Brown Myotis roosts in tree cavities in old growth deciduous, mixed or coniferous forests (COSEWIC, 2013). Little Brown Myotis is most active in the few hours after dusk, when it emerges from its roost to forage for insects (MNRF, 2016a). The species mates late in the summer during swarming events and in winter when males and females congregate for hibernation. In the spring, females often form large maternal colonies to rear their young.

2.2 Northern Myotis

Northern Myotis is primarily a forest-dwelling species (Owen *et al.*, 2002). It is often associated with old growth mixed or coniferous forests and is known to roost under loose bark or in tree cavities (COSEWIC, 2013; MNRF, 2016b). Unlike other bats, this species rarely roosts in anthropogenic structures (COSEWIC, 2013).

2.3 Eastern Small-footed Myotis

Eastern Small-footed Myotis roosts in a variety of habitats, including under rocks and bridges and in rock outcrops, caves, mines, and hollow trees. Individuals may change their roosting location daily. Along with other bat species, the Eastern Small-footed Myotis swarming occurs at or near their hibernacula (NatureServe, 2016). This species was recently emergency listed under the *ESA* (*2007*) as it is one of the rarest bats in eastern North America and was one of the rarest even prior to the introduction of White Nose Syndrome (MNRF, 2016c).

2.4 Tri-colored Bat

Tri-colored Bat lives in a variety of forested habitats, forming day roosts and maternity colonies in older forests and occasionally in anthropogenic structures (MNRF, 2016d). This species is rare and thus has a scattered

distribution in southern Ontario. The Tri-colored Bat forages over water and along streams in the forest where it eats flying insects and spiders.

3. Methods

An overview of the methods used to assess presence of bat maternity roosting habitat and confirm the presence or absence of SAR bats within the Study Area is provided below.

3.1 Phase I: Bat Habitat Suitability Assessment

Ecological Land Classification (ELC) for the additional Limits of Work was completed following ELC for Southern Ontario: First Approximation and its Application (Lee *et al.*, 1998). The determination of areas suitable for bat SAR or bat SAR habitat was undertaken in 2018 during the development of the accepted work plan (AECOM, 2018b) through:

- ELC field investigations on lands where PTE was secured; and
- Aerial photograph interpretation for lands where PTE was not granted by the property owner.

Forested communities of similar ecosite type (i.e., FOD, SWM, SWD, CUW and CUP) were considered contiguous if the ELC polygons were connected or separated by a gap of less than 20 m, excluding gaps / separations associated with roads.

3.2 Phase II: Identification of Suitable Maternity Roost Trees

Field investigations were conducted to assess potentially suitable maternity roosting habitat and identify the presence of suitable maternity roost trees (snag / cavity tree). A snag or cavity tree can be defined “as any standing live or dead trees ≥ 10 cm diameter at breast height (DBH) with cracks, crevices, hollows, and / or loose or naturally exfoliating bark” based on the *Survey Protocol for Species at Risk Bats within Treed Habitats: Little Brown Myotis, Northern Myotis & Tri-colored Bat* (MNRF, 2017). These surveys were conducted during the leaf-off season on March 27 and May 3, 2019.

A total of four (4) features required survey in 2019 of which PTE was granted for a portion of two (2) of the four (4) features. For the remaining features, surveys were undertaken from the roadside and/or adjacent property where PTE was granted.

The surveys were undertaken in accordance with Survey Protocol for Species at Risk Bats within Treed Habitats: Little Brown Myotis, Northern Myotis & Tri-colored Bat (MNRF, 2017), utilizing the Transect Method. The transect method involves recording every suitable snag / cavity tree within the entire feature. Data collected for each tree is the same as that collected for the plot method described above.

Each bat SAR habitat feature was visually searched using one of the methods described above, for suitable habitat characteristics for each SAR bat, which include the following:

For Little Brown Myotis and Northern Myotis (leaf-off surveys):

- Snags ≥ 10 cm DBH;

The following information was recorded for each identified suitable snag using the field form provided in Appendix B of the *Survey Protocol for Species at Risk Bats within Treed Habitats: Little Brown Myotis, Northern Myotis & Tri-colored Bat* (MNRF, April 2017):

- Date;
- Name of observer;
- UTM co-ordinates;
- Tree species;
- Decay class;
- DBH;
- Description of cavities, including type (e.g., woodpecker cavities, peeling bark, leaf litter, leaf clusters, etc.), and number and height of cavities;
- Presence of other suitable snags nearby; and,
- Photos.

For Eastern Small-footed Myotis[1]:

- Rock piles which may provide habitat were also considered.

Eastern Small-footed Myotis is known to roost in rock piles and talus slopes (Moosman *et al*., 2015). Field staff searched for this potential roosting habitat within the identified potentially affected suitable bat habitats.

The following information was collected for any potential rock piles or talus slopes identified in the field:

- Date;
- Name of observer;
- UTM co-ordinates;
- Description of rock pile or talus slope (e.g., material, depth of crevice, etc.);
- Presence of other suitable cavity trees or snags nearby;
- Presence of guano, if noted; and,
- Photos.

3.3 Phase III: Acoustic Surveys

3.3.1 Field Methods

A total of four (4) acoustic monitoring stations were setup within the Limits of Work. Acoustic monitoring occurred from June 14 - 30, 2019 (SM3BAT, Wildlife Acoustics Brand) with each acoustic monitor deployed for a minimum of ten (10) nights. The acoustic monitors were programmed to record from dusk for a period of five (5) hours onto SDXC cards (Class 10) within the acoustic monitor. Within wooded features, the monitors were mounted on tree trunks at an average height of 1.6 m and ultrasonic microphones were attached to the detector using 3 m recording cables; microphones were positioned as high as possible, away from potential obstacles and angled away from prevailing winds. This placement improves recording quality by reducing surface echoes and ground noise caused by proximal vegetation, which can distort ultrasonic signals. Where feasible, acoustic monitors were placed in open areas immediately adjacent to the target wooded feature. The acoustic monitors

1. *Survey methods for the Eastern Small-footed Myotis are not prescribed in the Survey Protocol for Species at Risk Bats within Treed Habitats: Little Brown Myotis, Northern Myotis & Tri-colored Bat (MNRF, 2017), the methods discussed in this report were based on previous consultation with the MNRF.*

in open areas were placed on the ground with their microphones affixed to painter's poles that were then extended to a height of 2- 3 m in the air. Microphones were positioned towards the wooded feature.

The precise locations of acoustic monitoring stations were selected in situ; field staff considered landscape, likelihood of recording clean calls and proximity to maternity roosting features of interest (i.e., maternity roosting trees, leaf clusters (if noted), and rock piles).

3.3.2 Analysis Methods

A three (3) step process was utilized to analyze acoustic data to achieve the highest confidence in classification:

1. The recorded ultrasonic data was analyzed using the Wildlife Acoustics' Kaleidoscope Pro 5 Analysis Software in order to identify the bat species present. This software is designed to convert files, sort, and categorize bat data by species. It identifies bats to species by comparing the recorded ultrasonic patterns (also known as a pass) to those of known species specific patterns using the Bats of North America classifier (Version 5.1.0).
2. Once complete, the results obtained from the Kaleidoscope software were analyzed through a secondary software program, SonoBat (Version 4.2.0) to provide an alternate assessment of the call.
3. The SAR bat calls identified by both programs were manually verified. Manual vetting occurs to ensure the patterns are consistent with the typical characteristics of a call for each species. This visual confirmation of the patterns was undertaken at least once for each species recorded per SD card.

Where the recordings are not consistent with the known typical characteristics of a bat or the recording are outside the range of the software ability to apply species identification, the analyser assigns the recording as "No ID". No ID recordings can result from background noise such as vehicles, rustling plants, other wildlife, incomplete recordings of bat calls, or bats which are outside of the range of the microphone. An extensive review of the No ID files was conducted to further identify potential bat SAR within the dataset.

3.4 Phase IV: Snag Density Survey

Snag density as described in the April 2017 Survey Protocol was calculated using the data collected during the Phase II surveys. No additional field work was undertaken in order to complete this requirement. The following formulae were used to calculate snag density:

<u>For Transect Surveyed Sites:</u>

- Number of snags / affected area.

<u>For Plot Surveyed Sites:</u>

- Total number of snags / (number of plots × 0.05 ha).
- The calculations are based on the affected area of the bat SAR habitat feature rather than entire bat SAR habitat feature size; this is due to the large size of the Study Area and that only the affected areas could be investigated.

4. Results

A summary of the results is provided below. It should be noted these results pertain only to the portions of the Limits of Work surveyed in 2019.

4.1 Phase I: Bat Habitat Suitability Assessment

Phase I: Bat Habitat Suitability Assessment was conducted in 2018 and is documented in *Results of 2018 Bat SAR Surveys undertaken for the "Preliminary Design Update, Detail Design and Class Environmental Assessment Study for the Highways 6 and 401 Improvements (AECOM, 2018).*

4.2 Phase II: Identification of Suitable Maternity Roost Trees

4.2.1 Suitable Maternity Roost Trees for Little Brown Myotis and Northern Myotis (Leaf-off Surveys)

A total of 31 additional suitable maternity roost trees were identified within the additional Limits of Work. The average density of the additional suitable maternity roost trees for the additional Limits of Work is ten (10) roost trees per ha; this value is generally representative of high quality maternity roosting bat habitat (MNRF, 2017).

4.2.2 Suitable Maternity Roosting Habitat for Eastern Small-footed Myotis

A total of five (5) additional rock piles were identified within the Study Area that were associated with potentially suitable bat SAR habitat features.

4.3 Phase III: Acoustic Surveys

As requested by the MNRF, in 2018 for the Highways 6 and 401 Improvements surveys, when installing acoustic monitors, field staff looked for the presence of leaf-clusters (i.e., particularly suitable habitat for Tri-colored Bat); however, since no leaf-clusters were noted during the installations, field staff considered the presence of maples and / or oaks as potentially suitable habitat for Tri-colored Bat.

As a result of the acoustic monitoring, there were 255 identified recorded passes, including calls from Little Brown Myotis, a species which is listed as Endangered on the Species at Risk in Ontario (SARO) list and is therefore afforded protection under the *ESA* (2007).

In total, there were seven (7) recorded passes of Little Brown Myotis and the remaining passes were from bat species that are not listed as being at risk under the *ESA* (2007). This data reflects the number of times ultrasonic bat calls from bats was recorded by the acoustic monitor (i.e., the number of times a bat flew by the acoustic monitor's microphone). Acoustic monitoring data confirms species presence and does not provide an indication of the number of individuals present nor the exact location, or tree being used. Furthermore, there were a total of 48 No ID recordings, referring to those records that the classifiers could not confidently identify to species or were the result of background noises similar in frequency to bat calls.

4.4 Phase IV: Snag Density

Maternity roost density for each bat habitat feature and an average density for the Study Area has been calculated . All snag densities were calculated using the affected areas surveyed in 2019, the average maternity roost density for the additional Limits of Work in features is nine (9) maternity roost trees per ha.

5. Conclusions and Next Steps

Changes to the Limits of Work resulted in the need for additional species-specific surveys within previously unstudied portions of the Study Area. Through the additional surveys seven (7) passes of Little Brown Myotis were recorded within the Study Area.

Dependant on final highway design, these changes may result in up to an additional 4.18 Ha of confirmed and Candidate Bat SAR Habitat to be impacted. As a result, both a LOA and permit under Section 17(2) (c) of the *ESA (2007)* are likely to be required for the Project to proceed to construction.

In order to confirm that permitting under Section 17(2) (c) of the *ESA (2007)* is required, an Information Gathering Form (IGF) must be completed at Detail Design and submitted to Ministry of Environment, Conservation and Parks (MECP) This is due to administrative changes as of April 2019, that resulted in the MECP taking over responsibility of the administration of the ESA(2007) from the MNRF.

In order to advance the LOA, detailed mapping of each Candidate Bat SAR Habitat (i.e., those previously identified to receive a LOA) must be provided to MECP at the time of IGF submission.

Reasonable steps to minimize adverse effects on bat SAR and bat SAR habitat will be developed during detail design in consultation with MECP through the permitting process. However, on a preliminary basis, mitigation measures to be considered include, but are not limited to, the following:

5.1 Design Measures

- Shield highway illumination to reduce light spill within bat SAR habitat and any restoration areas.
- Develop compensation, enhancement, restoration and overall benefit, in co-operation with MECP through permitting process, which may include the following:
  - Installation of artificial roosting structures such as bat boxes within the Study Area;
  - Reforestation plantings in or adjacent to the Study Area; and,
  - Effectiveness monitoring of any compensation, enhancement, restoration and overall benefit measures applied.

5.2 Construction Constraints:

- Limit clearing of trees and removal of rock piles to the October 1 – March 31 period.
- Restrict construction activities within 30 m of known retained cavity trees or identified structures to daylight hours when possible. While bats could be affected by construction activities (noise, vibration, lighting etc.) occurring equally during the day and night, nightly construction activities would interfere with bats while they are actively foraging and moving around the area creating additional disturbances that can essentially be controlled. Therefore, limiting construction activities to a specific period during daylight hours reduces the timing and duration of disturbance in these areas to resident bats and other wildlife.

6. References

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Roost tree selection by maternal colonies of northern long-eared myotis in an intensively managed

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To: Kirstie Houston
Senior Environmental Planner
Ministry of Transportation

cc:

Date: May 27, 2020
Project #: 60541071
From: Joanne Gui (AECOM)
Shelley Lohnes (AECOM)

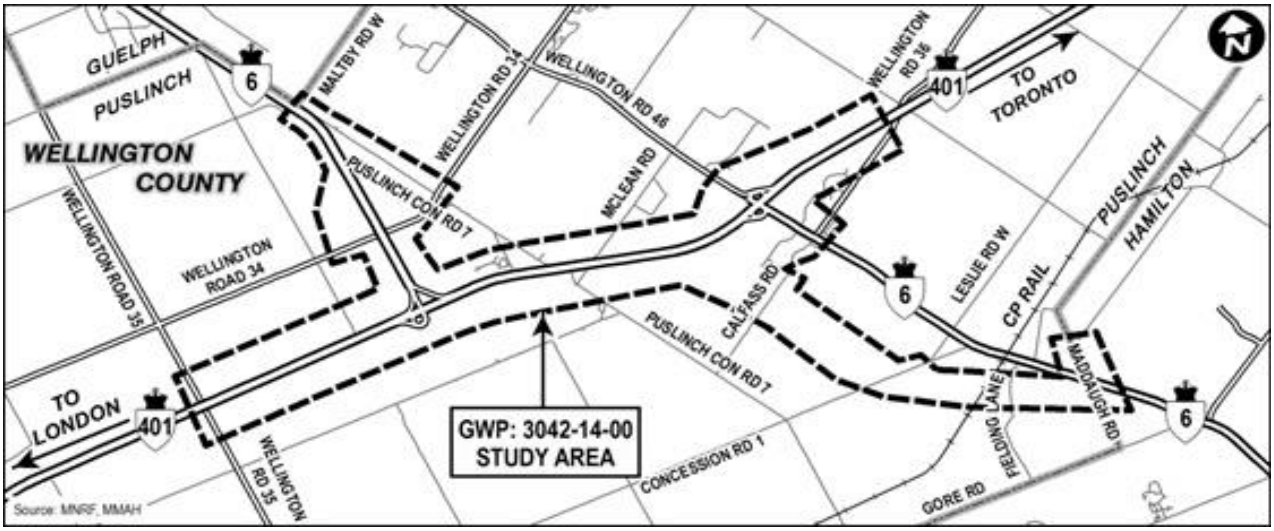
Memorandum

Subject: **Bobolink and Eastern Meadowlark Surveys Undertaken for the "Preliminary Design Update, Detail Design and Class Environmental Assessment Study for the Highways 6 & 401 Improvements**

1. Introduction

AECOM Canada Ltd. (AECOM) has been retained by Ministry of Transportation (MTO) to undertake the Preliminary Design Update, Detail Design and Class Environmental Assessment (EA) Study for the Highways 6 & 401 Improvements from Hamilton North Limits to Guelph South Limits including a New Alignment of a Segment of Highway 6 (G.W.P. 3042-14-00). Species-specific surveys were completed within the Project's Study Area to confirm the presence or absence of Bobolink (*Dolichonyx oryzivorus*) and Eastern Meadowlark (*Sturnella magna*), herein referred to as grassland bird Species at Risk (SAR). Surveys were completed within the Project's Study Area shown on **Figure 1**. Bobolink and Eastern Meadowlark are both designated as Threatened on the *Species at Risk in Ontario* (*SARO*) list and therefore afforded protection under the *Endangered Species Act* (*ESA*) (*2007*).

Figure 1: Project Study Area



2. Methods

AECOM undertook species-specific surveys to determine the presence or absence of the grassland bird SAR in accordance with the *Bobolink Survey Methodology*, dated April 2012 from the Ministry of Natural Resources and Forestry Guelph District, henceforth referred to as the 2012 Protocol.

Features were identified as candidate grassland bird SAR habitat based on both the results of the 2017 field investigations (where habitat assessments and Ecological Land Classification [ELC] surveys were undertaken) and through interpretation of aerial photography. Any additional features identified during 2018 surveys were also assessed for suitability.

Three rounds of surveys were conducted at each feature to determine habitat suitability and species presence/absence. Surveys were conducted from June 5 to July 4, 2018 and each survey was separated by a week or more from previous surveys. Surveys were undertaken from 30 minutes after dawn to 9:00 am under suitable weather conditions of no rain, no to low wind speed and good visibility. Features that were identified as suitable habitat during the 2018 surveys, and had either Bobolink or Eastern Meadowlark present, were included as confirmed habitat regardless of whether all three rounds of surveys were undertaken.

According to the 2012 Protocol for species-specific surveys, surveyors walked parallel transects crossing the fields lengthwise at 250 m intervals, recording the number, sex, and behaviour of any observed grassland bird SAR. At 250 m intervals, a GPS location was recorded and a point count survey occurred. A 10-minute observation and listening period was undertaken and if present, the number, sex, and behaviour of the grassland bird SAR was recorded.

Breeding bird surveys were also conducted throughout the Study Area in 2017 and 2018. In addition to the sites selected as candidate grassland bird SAR habitat as described above, any additional suitable habitat, delineated by Property IDs, was identified during the breeding bird surveys. One round of point count surveys was conducted at each site to determine the presence of birds, and where there were Bobolink or Eastern Meadowlark recorded, the Property ID was assessed for habitat suitability for Bobolink and Eastern Meadowlark.

Where Permission to Enter (PTE) was not granted for direct access to the site, AECOM followed an alternative survey method. Surveyors walked along the edge of the feature or as close to the edge of the feature as possible from adjacent properties to which PTE was granted. Point count stations occurred along this transect at 100 m intervals, and the number, sex, and behaviour of any observed grassland bird SAR was recorded. At each point count station, the 2012 Protocol was followed.

The data was recorded on AECOM's standard Breeding Bird Survey Point Count and Breeding Bird Transect Field Sheets. The data to be recorded using the survey form is consistent with what is required by the 2012 Protocol. Representative photos were taken at all candidate sites.

3. Results

Species-specific surveys were conducted for all survey sites except for one site where PTE was not granted. An alternative survey method was used during the first round of surveys but due to a thick shrub right-of-way and excessive noise from the adjacent Highway 401, surveyors were unable to see past the vegetation or hear calling birds. As a result, this site could not be surveyed.

Bobolink was observed in suitable habitat at four survey sites and Eastern Meadowlark was observed in suitable habitat at five survey sites within the Study Area. Bobolink was also observed at an additional site; however, the site was considered unsuitable habitat as the feature consisted of a mown field.

A total area of 37.58 ha of habitat was found confirmed to support either Bobolink and/or Eastern Meadowlark during field investigations. Within the limits of work, a total area of 2.40 ha of confirmed habitat may be affected by the project.

4. Conclusions and Recommendations

Bobolink in suitable habitat was observed at four sites and Eastern Meadowlark in suitable habitat was observed at five sites within the Study Area..

Reasonable steps to minimize adverse effects on Bobolink and Eastern Meadowlark and their habitat will be developed during detail design in consultation with MECP. However, on a preliminary basis, mitigation measures to be considered include, but are not limited to:

Design Measures:

- Under the *ESA* (*2007)*, where the level of impact to SAR and its habitat is under a certain threshold or involves certain species, an exemption requiring *Notice of Activity* (NOA) registration may apply provided certain conditions are met.
- As part of this process, a mitigation and restoration plan should be developed concurrently with the NOA registration. This includes activities impacting 30 ha or less that are habitat for Bobolink and Eastern Meadowlark (as per Section 23.6) under the *ESA* (*2007*). Since the habitat for Bobolink and Eastern Meadowlark overlaps with 2.40 ha of the proposed limits of disturbance, the activities meet the conditions required to submit a NOA registration during Detail Design.

Construction Constraints:

The following mitigation measures are recommended

- To ensure compliance with the Migratory Birds Convention Act (*MBCA*) (1994), limit vegetation removal to be outside of the active season for birds (April 1 – August 31).
- If vegetation clearing cannot be scheduled outside of the breeding bird season; have an Avian Biologist conduct a nest survey in the area to be cleared in. Nest surveys should only be conducted in simple habitats (open fields or open thickets) where the entire area can be thoroughly searched.
  - If the active nests of migratory birds are located, record its location using handheld GPS, and delay vegetation clearing within 10 m of the nest or at a distance determined by the Avian Biologist, to allow for fledging.
  - To avoid potential nest abandonment and/or predation, physically flag nests if they are located close to an active construction zone and are at risk of accidental damage.

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To: Kirstie Houston
Senior Environmental Planner
Ministry of Transportation

Date: May 27, 2020
Project #: 60541071
From: Jessica Piette (AECOM)
Brandon Holden (AECOM)

Memorandum

Subject: **Eastern Whip-poor-will and Common Nighthawk Survey Results, Highways 6 & 401 Improvements**

Introduction

AECOM has been retained by Ministry of Transportation to undertake the Preliminary Design Update, Detail Design and Class Environmental Assessment Study for Highways 6 & 401. The Study Area is shown in **Figure 1**. Targeted surveys were completed to confirm the presence or absence of Eastern Whip-poor-will (C*aprimulgus vociferus*) and Common Nighthawk (*Chordeiles minor*). Eastern Whip-poor-will is Threatened in Ontario and is afforded protected under the *Endangered Species Act* (*ESA*) (*2007*). Common Nighthawk is designated as Special Concern.

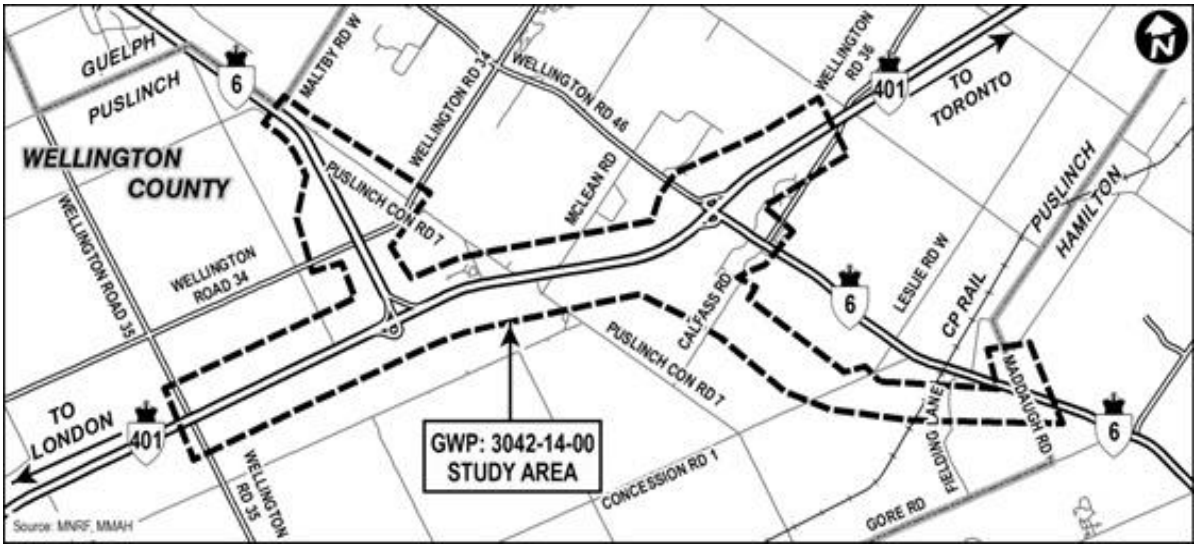


Figure 1: Study Area

Methods

AECOM undertook targeted surveys to determine the presence or absence of Eastern Whip-poor-will and Common Nighthawk within the Study Area in accordance with the *Eastern Whip-poor-will and Common Nighthawk Survey Protoco*l (MNRF Guelph District, 2018).

Surveys were conducted at 24 features that were identified as candidate crepuscular bird SAR habitat within or immediately adjacent to the anticipated Limits of Work. These features were previously identified through air photo interpretation and ground-truthing during Ecological Land Classification surveys (Lee et al., 1998).

Twenty-two (22) survey stations were then identified to survey the 24 features (**Attachment A**, **Figures 1 – 8**). MNRF Guelph District (2018) provides primary (i.e., May 25 to June 6, 2018) and secondary (i.e., June 23 to July 7, 2018) survey windows for the breeding season, both of which were utilized for these investigations. Surveys were conducted when the moon was visible between 30 minutes after sunset and 30 minutes prior to sunrise, and under suitable weather conditions: little or no cloud cover, calm or light winds, no precipitation and temperatures above 10°C. Field observers conducted a three-minute listening point count a few minutes after arriving at a given station. They recorded the total number of Eastern Whip-poor-will and Common Nighthawk present, including the distance and direction of any calls heard. The data was recorded on AECOM's Eastern Whip-poor-will Survey Form, which is consistent with MNRF Guelph District (2018) requirements.

Results

A total of 24 features, covered through 22 stations were surveyed for presence of Eastern Whip-poor-will and Common Nighthawk. Due to unfavourable weather conditions during the primary survey window, the secondary window was utilized at several locations. A summary of survey dates is provided in **Attachment B, Table 1**.

No Eastern Whip-poor-will or Common Nighthawk were recorded during field investigations. Field forms noting conditions of each survey are provided in **Attachment C**.

Conclusions and Recommendations

- No Eastern Whip-poor-will or Common Nighthawk were recorded during field investigations.
- Although no SAR were observed at the identified locations, it is still recommended that vegetation removal occur outside of the breeding bird season of April 1 to August 31 of any calendar year.

References

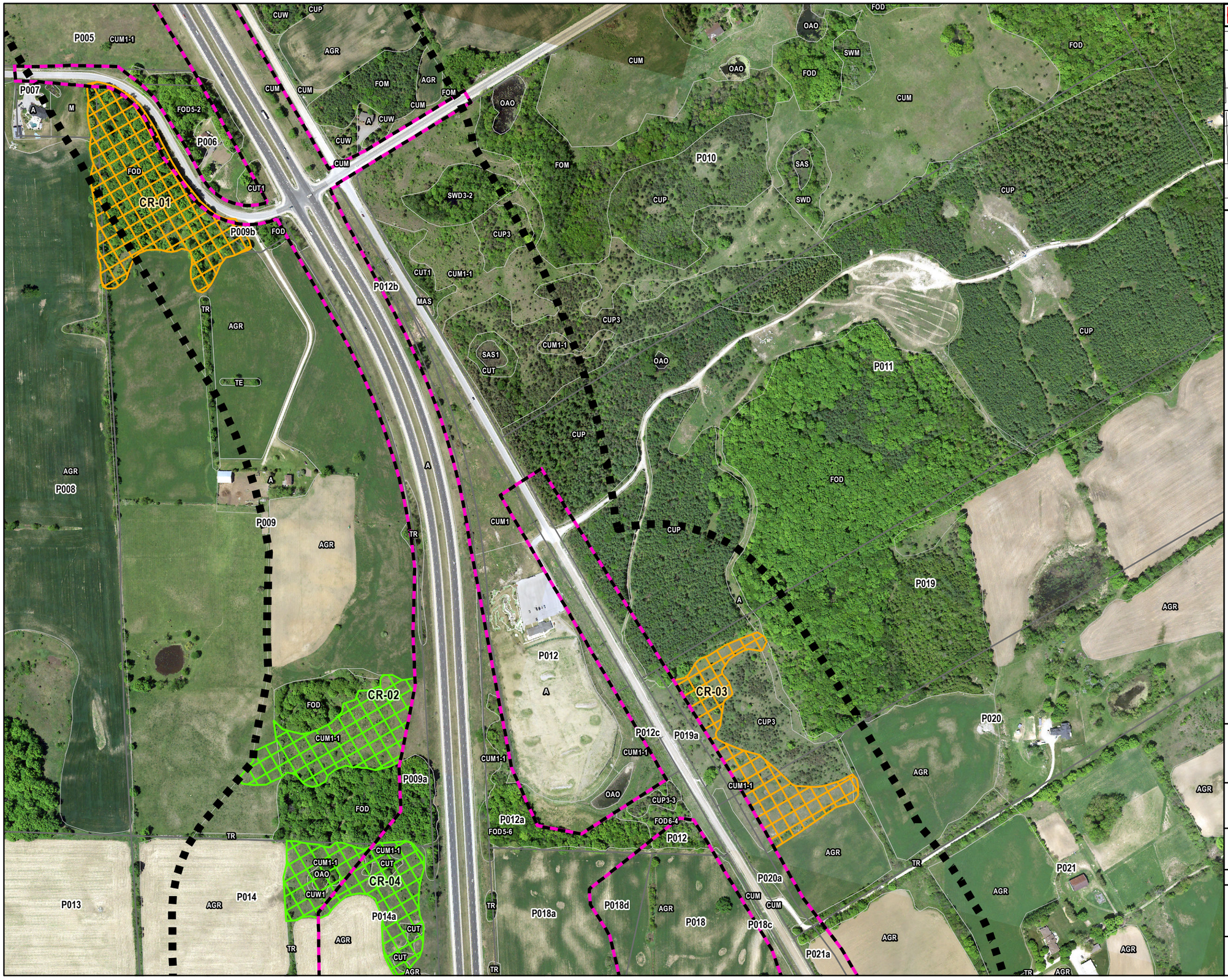
Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurrary, 1998:
Ecological Land Classification for Southern Ontario: First Approximation and its Application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.

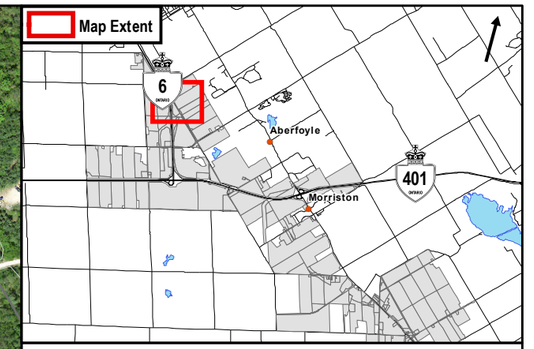
Ministry of Natural Resources and Forestry (MNRF) Guelph District, 2018:
Eastern Whip-poor-will (*Caprimulgus vociferous*) and Common Nighthawk (*Chordeiles minor)* Survey Protocol.

AECOM Imagine it. Delivered.

Attachment A

Survey Stations





Legend

- CR-01 AECOM Survey Location ID
- Hwy401-6 Limits Of Work
- Vegetation Community
- Property Fabric
- Buffer - 200m from MTO ROW

Crepuscular SAR Habitat

- Field Verified Candidate Crepuscular Bird SAR Habitat
- Potentially Suitable Crepuscular Bird SAR Habitat Identified By Aerial Photo Interpretation

N

Note: Map contains confidential information

0 50 100 200 300
Meters

Highway 401/6

Draft Crepuscular Bird SAR Survey Locations

4/10/2018	1:5,000	Datum:NAD83 Zone17 Source: MTO, Puslinch, LIO
P#: 60541071	V#: 001	

AECOM

Figure 1

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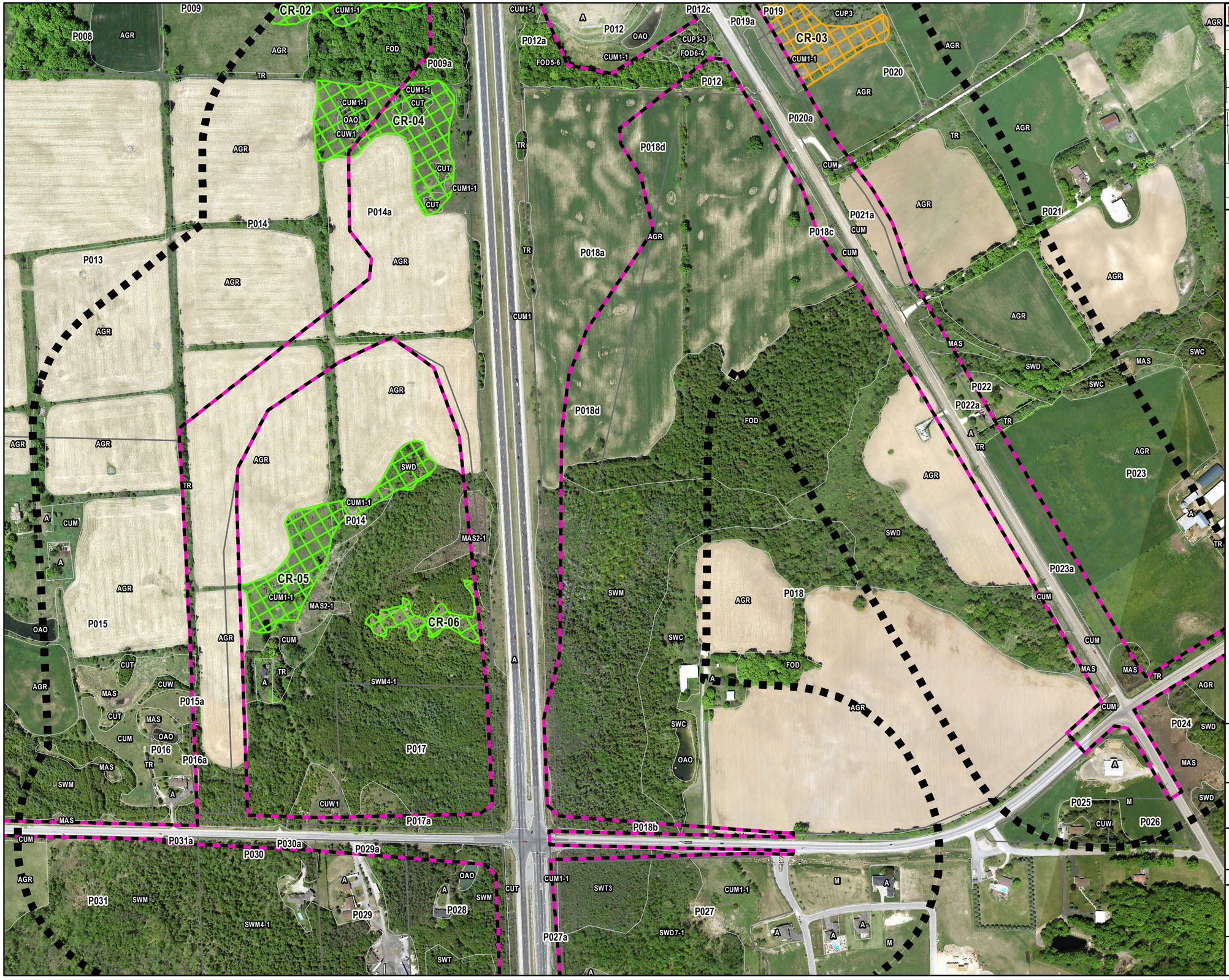

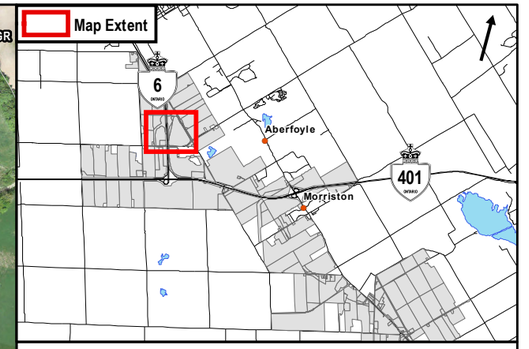

Legend

- CR-01 AECOM Survey Location ID
- Hwy401-6 Limits Of Work
- Vegetation Community
- Property Fabric
- Buffer - 200m from MTO ROW

Crepuscular SAR Habitat

- Field Verified Candidate Crepuscular Bird SAR Habitat
- Potentially Suitable Crepuscular Bird SAR Habitat Identified By Aerial Photo Interpretation

N

Note: Map contains confidential information

0 50 100 200 300
Meters

Highway 401/6

Draft Crepuscular Bird SAR Survey Locations

4/10/2018	1:5,000	Datum:NAD83 Zone17 Source: MTO, Puslinch, LIO
P#: 60541071	V#: 001	

AECOM

Figure 2

Map location: \\CAKCN1FP01\Data\Projects\60541071 HWY 401-6\900\CAD_GIS\920-929 (GIS-Graphics)\Data\06_Analysis\SAR\MXD_Terrestrial_SAR_CONI_EWPW_20171212.mxd
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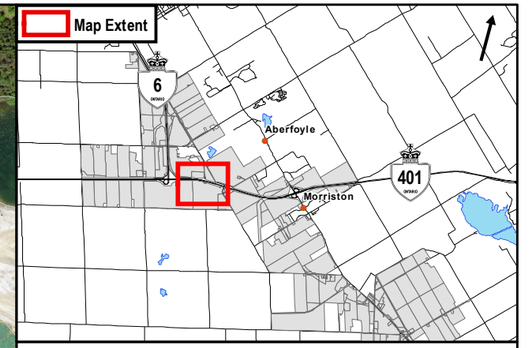

Legend

- CR-01 AECOM Survey Location ID
- Hwy401-6 Limits Of Work
- Vegetation Community
- Property Fabric
- Buffer - 200m from MTO ROW

Crepuscular SAR Habitat

- Field Verified Candidate Crepuscular Bird SAR Habitat
- Potentially Suitable Crepuscular Bird SAR Habitat Identified By Aerial Photo Interpretation

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Note: Map contains confidential information

0 50 100 200 300
Meters

Highway 401/6

Draft Crepuscular Bird SAR Survey Locations

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P#: 60541071	V#: 001	

AECOM

Figure 3

Map location: \\CAKCN1FP001\Data\Projects\60541071 HWY 401-6\900CAD_GIS\920-928\GIS-Graphics\Data\06_Analyses\SAR\MXD_Terrestrial_SAR_CONI_EWPW_20171212.mxd
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Highway 401/6

Draft Crepuscular Bird SAR Survey Locations

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Figure 4

Map location: \\CAKCN1FP001\Data Projects\60541071 HWY 401-6\60\CAD_GIS\920-929 (GIS-Graphics)\Data\06_Analysis\SAR\MXD_Terrestrial_SAR_CONL_EWPW_20171212.mxd
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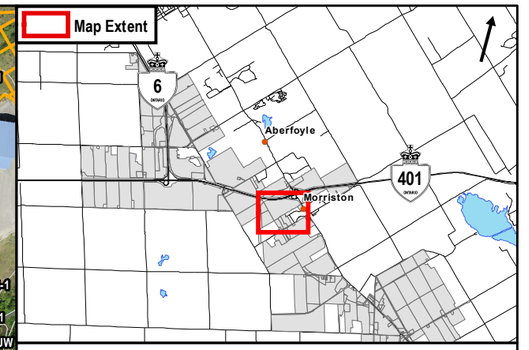

Legend

- CR-01 AECOM Survey Location ID
- Hwy401-6 Limits Of Work
- Vegetation Community
- Property Fabric
- Buffer - 200m from MTO ROW

Crepuscular SAR Habitat

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- Potentially Suitable Crepuscular Bird SAR Habitat Identified By Aerial Photo Interpretation

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Note: Map contains confidential information

0 50 100 200 300
Meters

Highway 401/6

Draft Crepuscular Bird SAR Survey Locations

4/10/2018	1:5,000	Datum:NAD83 Zone17 Source: MTO, Puslinch, LIO
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AECOM

Figure 5

Map location: \\CAKCN1FP001\Data\Projects\60541071 HWY 401-6\900\CAD_GIS\920-929 (GIS-Graphics)\Data\06_Analysis\SAR\MXD_Terrestrial_SAR_CONI_EWPW_20171212.mxd
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