NATURAL ENVIRONMENT TECHNICAL REPORT: LEVEL 1 and 2 L&D Harrison Pit

Prepared for
Brian Harrison

ECOLOGICAL SERVICES

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Jan 16, 2020

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1. Summary

Under the Provincial Aggregate Resources Act, Brian Harrison (operating as Dig'N Dirt Ltd.) is applying for a pit licence for a property at municipal address 2499 Washburn Road, RR2, Inverary ON at Part Lots 8 and 9, Concession 6, former township of Storrington, now in South Frontenac Township, County of Frontenac

This Level 1 and Level 2 report follows the guidelines provided in the *Aggregate Resources Policy Manual* and Aggregate Resources of Ontario Provincial Standards for a Natural Environment Level 1 Technical Report, which investigates whether significant natural heritage features are on or within 120 meters of a proposed project. If these features are present, the Level 2 report determines potential impacts from the proposed pit. This Level 1 and Level 2 report also address the Natural Heritage assessment requirements (e.g, Environmental Impact Statement (EIS) or Environmental Impact Assessment (EIA)) of the Provincial Policy Statement (PPS) and the Official Plans (OP) of both Frontenac County, and South Frontenac Township.

The proposed pit license area is outlined with a yellow dash/dot line in the adjacent image. The setback line (mostly 15 m) is indicated with a yellow dashed line. This image can be provided with a greater resolution by MHBC Planning Urban Design & Landscape Architecture. The entire pit will be within existing agricultural (i.e., soybeans) and cultural lands. Much of the surrounding lands within 120 m are also cultural and agricultural lands.

The potential for significant natural heritage features to occur within the soybean field that comprises most of the proposed pit licence area is very limited.

Within the adjacent lands, which are those within 120 m of the proposed pit boundary, there is significant wetland, significant wildlife habitat, significant woodland, fish habitat, and species at risk.

Natural heritage features are described in the Level 1 report and the potential for impacts to these features from pit operations is assessed in the attached Level 2 report. Some mitigation recommendations are provided in the Level 2 report, but on balance, it is our opinion that the operation of a pit at this location will be compatible with the adjacent significant natural heritage features and functions.

2. Legislative Requirements

Aggregate Resources of Ontario Provincial Standards (AROPS) for Category 3 Licence Applications

Aggregate Resources Program Policies and Procedures Manual section 2.01.07, relates to natural environment report standards as prescribed by AROPS. Specifically:

"A Natural Environment Level 1 report determines whether one or more of the following features exist on-site or within 120 metres of the site:

- *significant wetlands (including significant coastal wetlands);*
- *significant habitat of endangered and threatened species;*
- *significant Areas of Natural and Scientific Interest (ANSIs);*
- *significant woodlands (south and east of the Canadian Shield)*
- *significant valleylands (south and east of the Canadian Shield)*
- *significant wildlife habitat; and*
- *fish habitat.*

The Level 1 report must clearly conclude whether each of the features above exists on or is within 120m of the site. If any of these features are identified, then an impact assessment (i.e. Natural Environment Level 2 report) is required to determine any negative impacts on the natural features or ecological functions, and any proposed preventative, mitigation or remedial measures.

Provincial Policy Statement (PPS)

Issued under the *Planning Act*, the 2014 version of the PPS requires that municipalities consider natural heritage features in assessing development proposals. Guidance on the extent of adjacent lands is provided in a Natural Heritage Reference Manual (OMNR 2010). The adjacent land width for significant natural heritage features is 120 m. From the PPS:

2.1.4 Development and site alteration shall not be permitted in:
a) significant wetlands in Ecoregions 5E, 6E and 7E1; and

2.1.5 Development and site alteration shall not be permitted in:
b) significant woodlands in Ecoregions 6E;
c) significant valleylands in Ecoregions 6E;
d) significant wildlife habitat;
e) significant areas of natural and scientific interest;
… unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

2.1.6 Development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements.

2.1.7 Development and site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements.

Note: Adjacent lands do not apply to the habitat of endangered species and threatened species, as impacts are based on a species by species basis in accordance with federal and provincial requirements.

2.1.8 Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.4, 2.1.5, and 2.1.6 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

South Frontenac Township and Frontenac County OP's

In both the Township and County OP's, the importance of mineral aggregates is recognized as a benefit, but that aggregate extraction needs to be undertaken in an environmentally sound manner.

The adjacent image to the left is from Schedule 'A' – Land Use, Township of South Frontenac Official Plan, with the proposed licence area included with black hatched lines. The OP image includes:

- Blue: Mineral Aggregate
- Green: Provincially Significant Wetland
- White: Rural
- Red lines are the Canadian Shield Boundary.

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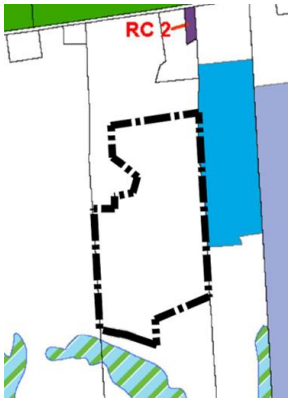
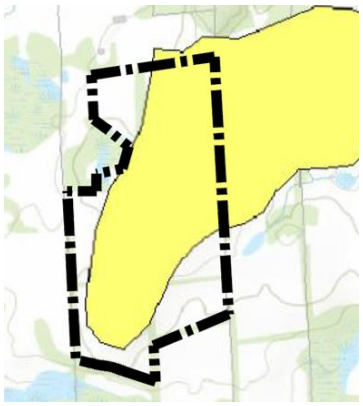
The adjacent image to the right is from Schedule 'C", Township of South Frontenac Zoning By-law 2003-75, with the proposed licence area included with black hatched lines. The By-law image includes:



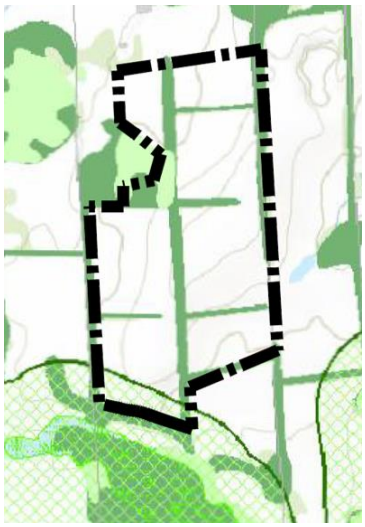
- White: Rural Zone (RU).
- Light Blue: Pit "A" Zone (PA).
- Grey (far right in image): Quarry "B" Zones (QB3).
- Blue with green diagonals: Environmental Protection Zone (EP), reflecting the provincially significant River Styx wetland.
- Green (top of image): Agricultural Zone (A)
- RC2: Rural Commercial Zone



The adjacent image to the left is from Frontenac County Official Plan Aggregate Resources Sand and Gravel map, with the proposed licence area included with black hatched lines. The yellow area is noted in the Official Plan as Sand and Gravel Tertiary.

The adjacent image to the right is an assemblage of Natural Heritage features that are identified in the Frontenac County Official Plan, with the proposed licence area included with black hatched lines. The image includes:

- Dark green: wooded area.
- Lime green: wetland.
- Green edge of white squares: 120 m around PSW.



3. History

Farming in this region, as well as within the proposed pit lands, goes back over 200 years (see Meacham 1978). With more than 200 years of disturbance, the proposed pit lands have been limited in their ability to develop significant ecological features.

The approximate proposed pit area is outlined in red in the adjacent 1954 image. It can be seen that farming activity extended all the way to the River Styx. It can also be seen when comparing 1954 and 2019 images, that there fewer trees and woodland in the past. Trees would have conflicted with farming activity and there was likely a greater proportion of homes using wood for heating purposes in the past.

There were also fewer wetlands in 1954 compared to today, and the nearby creek (clearly visible in the left side of the adjacent image) was more open. In more recent images, as well as our own field observations, the creek is more heavily occluded with vegetation, which would interfere with drainage. This interference is a likely cause for the development of the many wetland pockets that currently exist to the west of the proposed pit. However, the ultimate cause can likely be linked to farming practices, such as with tile drains, inhibiting creek vegetation, dredging the creek, and discouraging beaver activity.

It is also apparent when comparing older aerial images that there was less wetland south of the proposed pit area, and this is also likely related to farming practices. Similarly, there was less wetland further to the east and north. Another factor for the greater wetland presence today could be a result of Rideau Canal management activities (see Osborne et al. 1985).

4. Methodology

As a result of email confirmation on April 5, 2019, natural heritage screening was undertaken using the Dec. 2018 Natural Heritage Information Request Guide provided by the Ontario Ministry of Natural and Resources and Forestry (MNRF).

The site visits (occurring in 2019) are provided in Table 1 and listed by the primary focus of the visit. However, observations of any relevant natural heritage feature or species would be recorded during all visits. For example, Barn Swallows (Threatened) were observed nesting on May 5, but this was not the primary focus of the visit that day. Habitat communities are described following the methodology outlined in the Ecological Land Classification (ELC) manual for Southern Ontario (Lee *et al*., 1998) and if applicable, the *Ontario Wetland Evaluation System Southern Manual* (MNR 2002). Photographs of the site were also taken to document natural features observed during the site investigation.

Significant natural features were identified following the criteria outlined in the Natural Heritage Reference Manual (MNR 2010), Significant Wildlife Habitat Ecoregion Criteria Schedules (MNRF 2015) and Significant Wildlife Habitat Technical Guide (MNR 2000).

Breeding bird point count surveys were conducted using methods described in the Ontario Breeding Bird Atlas Guide for Participants (Cadman and Kopysh, 2001) and the Canadian Wildlife Service Forest Bird Monitoring Program. Evening visits were also included to provide a greater level of effort for species active at night such as nightjars and amphibians.

Snakes were assessed by examining areas of appropriate habitat such as rock piles, potential basking sites, and potential hibernacula. Other wildlife species of interest (e.g., butterflies, mammals) were noted as encountered, either directly or from other evidence (tracks, scat, den sites, etc.). Vascular plant species were used to characterize ELC community types. If specimens could not be identified they would be assessed later using appropriate references (e.g., Gleason and Cronquist 1991; Queen`s University Fowler Herbarium records).

MNRF protocols for targeted surveys were applied when necessary. For example:

Bobolink and Eastern Meadowlark: OMNR (2011) Bobolink Survey Methodology.
Barn and Bank Swallows: Standard avifaunal surveys, with focus on prospective nest sites.
Whip-poor-will: OMNR (2012) Whip-poor-will Survey Methodology.
Butternut: 10 m transect search pattern.
Turtles: Survey for nest specific substrates.
Rat Snakes: OMNRF (2016) and OMNRF (undated)

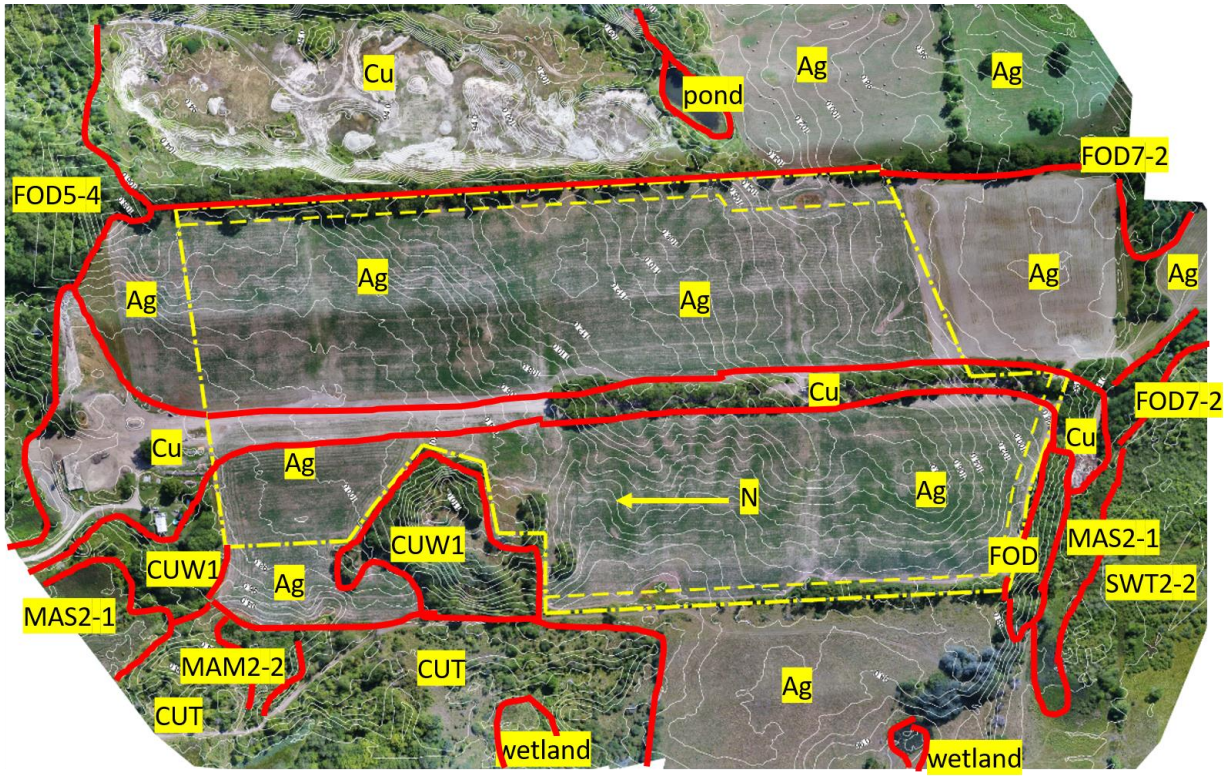
Table 1: Site visit summary. All ecology is surveyed during all visits, but detailed assessment is noted under the primary focus of the visit.

Survey Date (2019)	Starting Time	Weather Conditions	Surveyor	Primary Focus of Visit
May 5	0700	14 C, clear	Rob Snetsinger Chris Grooms	Initial Site Inspection
May 5	2030	17 C, clear	Dale Kristensen	Evening Birds
May 22	2000	13 C, clear	Rob Snetsinger Mary Alice Snetsinger	Evening Birds, Marsh Monitoring

May 25	2300	16 C, clear	Rob Snetsinger	Evening Birds
May 29	0600	14 C, clear	Chris Grooms	Birds
May 29	2130	15 C, clear	Rob Snetsinger	Marsh Monitoring
June 7	1930	19 C, clear	Rob Snetsinger	Bats
June 9	1100	20 C, clear	Rob Snetsinger	Bats
June 11	1600	21 C, clear	Rob Snetsinger	Bats
June 13	1100	13 C, overcast	Rob Snetsinger	Bats
June 16	2300	21 C, partly cloudy	Rob Snetsinger	Bats, Marsh Monitoring
June 18	1000	22 C, clear	Rob Snetsinger	Evening Birds
June 22	0700	21 C, clear	Chris Grooms	Birds
Aug 3	0700	23 C, clear	Rob Snetsinger Dale Kristensen	ELC

5. Ecological Land Classification

Ecological land classification (ELC) determination was based on Lee et al. (1998), using a minimum ELC polygon of 0.5 ha. ELC areas smaller than this were lumped into the larger surrounding type. Where ELC terms from Lee et al. (1998) were not appropriate, descriptors (e.g., Ag for agricultural) were used. The ELC map is provided below. The proposed licence boundary is indicated with the yellow dashed/dot line, and the mostly 15 m setback line is indicated with the yellow dashed line. As can be seen in the figure below, the proposed pit licence area is totally within either agricultural lands or cultural lands.



ELC Map Terms:

Agricultural (Ag): With the exception of a farm lane, the entire pit application area is within an active soybean field, which had just been seeded when this adjacent June 28, 2019 photo was taken.

The neighbouring fields to the west of the proposed pit area are used for cattle grazing and those to the east are cropped for hay. Bobolink (THR) were observed in the east and west fields, with confirmed nesting to the west of the proposed pit area.

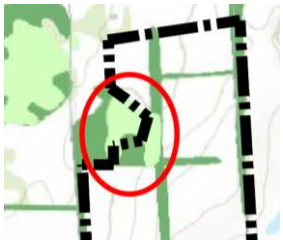
Cultural (Cu): This term refers to areas that have an ongoing cultural use. In regard to the Harrison pit proposal it refers to land associated with the residence area north of the proposed pit area, an existing pit area (Smith Pit) to the east, a work area north of the proposed pit area, a farm work area south of the proposed licence boundary, and a farm lane that runs down the middle of the property. The farm land is bordered by a single lines of trees (see adjacent image), which is too narrow to be considered as functional woodland. The dominant tree species in the lane is black cherry, which has been a focus of past lumber activity on the property. The shrub and understory layers of the lane are dominated by weedy and invasive species, as would be expected in a site that is all edge habitat.

Cultural Thicket (CUT): Includes the abandoned agricultural area to the west of the proposed pit licence area. It is dominated by shrubby species including European buckthorn, prickly ash, and gray dogwood. It also contains farm laneways. As part of the normal successional process, tree growth is occurring in this area by such species as white ash and American elm.

Deciduous Woodland (FOD): An indeterminate and small (~ 0.5 ha.) woodland is located along the southwestern edge of the proposed pit licence area. It is almost entirely located within a steep slope that separates the soybean field uplands, and the adjacent lowlands that eventually grade into wetland. The dominant tree species is black cherry in the 60 to 80-year age range, and past tree harvesting is evident. Its narrow width allows sun exposure, such that much of the woodland has an edge character, including a heavy shrub layer dominated by the non-native invasive European buckthorn.

Cultural Woodland (CUW1): As with all cultural sites, cultural woodlands have a high proportion of non-native species and result from, and are maintained by, anthropogenic-based disturbances. There are two CUW1 woodlands. The first is a small (~ 0.7 ha.) patchy area within the northwest corner of the proposed pit licence area. It has been excluded from the licence area due to the presence of a large underlying rock knob which eliminates its potential to contain underlying sand. This area was used as a hunting camp for many years, but all camp buildings were removed in 2019. The overstory is comprised of a mix of trees including black cherry, basswood, and apple. The understory is heavily dominated by

weedy species, including several non-native invasive species including European buckthorn, Tartarian honeysuckle, lilac, dog strangling vine, and Japanese barberry. The picture to the right is taken at the top of the rock knob, where tree growth is the least dense. This CUW1 woodland is **not** wetland, as is incorrectly indicated with lime green coloring in the Frontenac County mapping (see cut-out to the left). The presumed wetland (lime green within red circle) is actually comprised of soybean field and the CUW1 woodland. The photo was above was taken in the approximate center of the red circle.



The second cultural woodland is a small area (~ 0.5 ha.) associated with the site residence north of the proposed pit licence area. Many planted trees are present including Norway maple and Norway spruce. Other tree species observed include white spruce, silver maple, and sugar maple. The shrub layer and understory are relatively sparse, but include gray dogwood, Virginia creeper, European buckthorn, and grape. As well, the understory in parts of the woodland are relegated to landscaping and other resident uses.

Dry-Fresh Sugar Maple-Ironwood Deciduous Forest Type (FOD5-4): This approximately 4.5 ha. woodland is located about 65 m northeast of the proposed pit licence. It is a relatively young woodland with the average tree age in the 50 to 60-year range. During the 2019 surveys, multiple maple syrup lines were evident within the woodland, indicated syrup harvesting. Other common tree species observed include shagbark hickory, bur oak, basswood, and black cherry. The understory trees are predominately black cherry and ironwood, as is the shrub layer along with European buckthorn. The ground cover is predominately black cherry, ironwood, and maple seedlings, along with zig-zag goldenrod. There is some evidence of past tree harvesting, and there is much detritus (e.g., demolished buildings, old farm equipment) piled along one edge of the woodland.

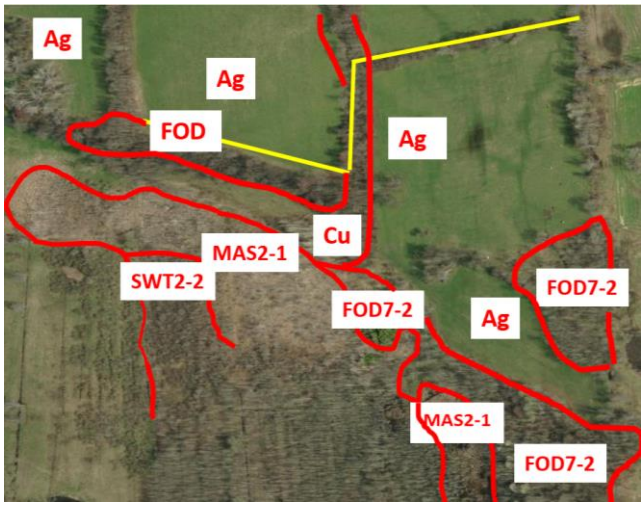
Fresh-Moist Ash Lowland Deciduous Forest Type (FOD7-2): With the exception of a small finger, the bulk of this woodland type begins about 110 m south of the proposed pit area and extends all the way to the River Styx. This woodland has a diffuse upland/wetland ecotone with adjacent wetland areas, especially starting more than 260 m south of the proposed licence boundary. Because of this diffuse boundary, more than 120 m from the proposed pit, it is not possible without more detailed study to determine its total size, but we estimate it to be in the 7 to 10 ha. range. The woodland portions closer to the proposed licence area are younger and more disturbed than the portions further south. The adjacent image is of the younger woodland within 120 m, where trees in the 20-30 year age range were common. The dominant species is green ash. No evidence of emerald ash borer was observed, but this invasive pest is present in the region and could kill many of the trees in this woodland within a few years. Other common tree species observed include American elm, white oak, bitternut hickory, and Manitoba maple.

Due the narrow width of the younger FOD7-2 woodland, it allows greater sun exposure. Consequently the shrub layer is relatively dense with commonly observed species include European buckthorn, Manitoba maple saplings, and grape. Common ground cover species included hog peanut, fleabanes, and strawberry.

The adjacent picture is of the older and larger FOD7-2 commencing more than 120 m south of the proposed licence area, and where trees greater than 70 years were more common.

There is a small (~ 0.9 ha) adjunct portion of this woodland, located more than 120 m southeast of the proposed licence area. It is located at the edge of a small escarpment that runs east to west. It includes similar tree species as the woodlands further south, but also include many apples trees, giving evidence of a past orchard use. The ground cover is also more heavily dominated by non-native and invasive species including Tartarian honeysuckle and European buckthorn.

Cattail Mineral Marsh Type (MAS2-1):



ELC boundaries (red line) at the southern edge of the pit licence area (yellow line) are shown to the right. This MAS2-1 is the closest wetland type from the southern end of the proposed licence area. At its closest, the MAS2-1 is about 50 m to the proposed licence area. It will be separated from the pit excavation area by a shrub border, a local vehicle travel corridor and farm work area, a 30 m high heavily treed escarpment, and a 15 m wide ARA excavation setback, which also acts as a 15 m top of slope buffer. This makes a total separation distance of about 65 m. This MAS 2-1 wetland area is about 2.1 hectares in size, of which about 1.4 hectares is within 120 m of the proposed pit licence area. This wetland is dominated by narrow leaved cattail, but also contains wetland shrub species including red-osier dogwood, *Spirea alba*, *Salix discolor* and *S. petiolaris*. The MAS2-1 area also contains an access trail towards the lake. In our opinion, the intrusion of these shrubs from the larger swamp area further south could represent the early stages of wetland succession from marsh to swamp, especially if drier conditions persist. There is a second MAS2-1 shown in the image above, but it is more than 120 m south of the proposed licence area. A third MAS2-1 wetland begins about 82 m north of the northern limit of the licence boundary (**see 82 m, MAS2-1** in the image at the start of the next page). This third MAS2-1 wetland will be separated from pit operations by an intervening woodlot, a house, outbuildings, driveway, and lawn.

Willow Mineral Thicket Swamp Type (SWT2-2): This wetland is located about 105 m south of the proposed southwest portion of the licence area, although with a 15 m top of slope buffer (ARA excavation setback), it will be more than 120 m from the area of pit excavation. There is about 0.1 ha of this SWT2-2 type within 120 m of the proposed licence area. We estimate the total size of the SWT2-1 to

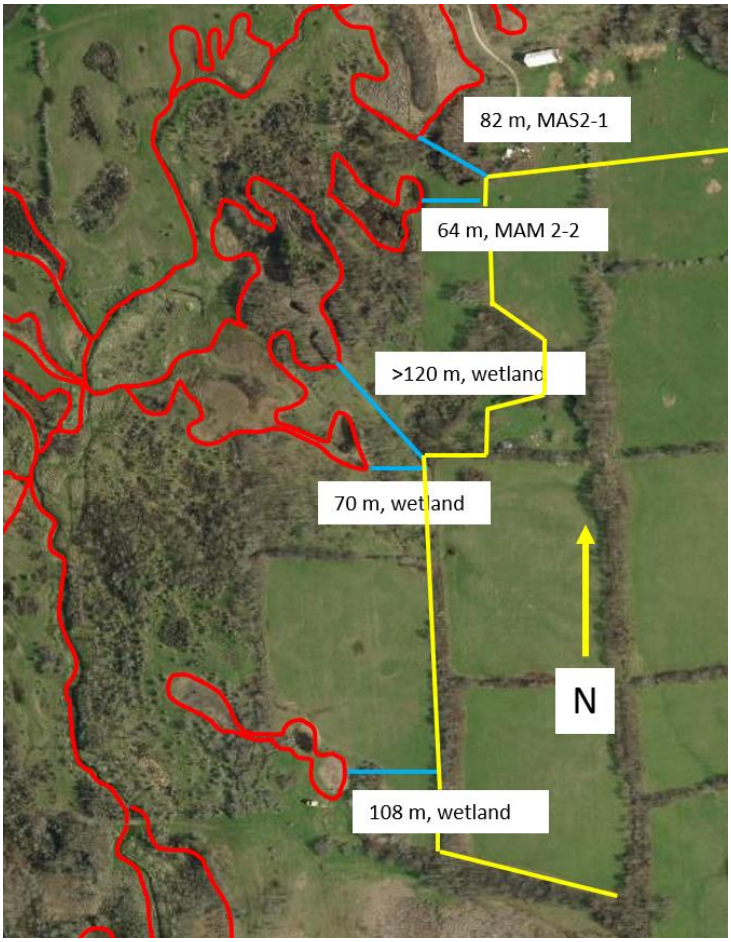
be about 2 ha, but did not attempt to accurately determine the total boundary of this wetland as it extends more than 120 m from the edge of the proposed license area. We can say that those portions that are within about 200 m of the pit licence area are dominated by willow shrubs including *Salix petiolaris* and *S. discolor*, as well as red-osier dogwood, round-leaved dogwood, and *Spirea alba*. Green ash and American elm are also present, and these trees may come to dominate this habitat, if drier conditions persist. Other common species observed included boneset, *C. trisperma*, and field bedstraw. At its southern limits about 260 m from the closest licence area it develops a complex ecotone with the previously described lowland forest (FOD 7-2).

Reed Canary Grass Mineral Meadow Marsh Type (MAM2-2): In the adjacent image, see the 64 m area marked at the northwest corner of the proposed licence area (yellow line) in adjacent image. It is approximately 0.46 hectares in size, of which about half is within 120 m of the proposed licence area. It is dominated by the invasive canary reed grass, but also contains the invasive *Phragmites australis*, rice cut grass, and water parsnip. This wetland exhibited ponding in spring, which allowed for amphibian breeding, but became dry enough in summer to be able to walk through without getting wet. Farming activity normally occurs up to the edge of this wetland patch, and there is an old farm access road to its immediate north.

Wetland: In the adjacent image focusing on the western edge of the proposed pit there are three areas highlighted with the term wetland. Of these, two are within 120 m. These are likely either MAS2-1, MAM2-2, or SWT2-2. One area is about 70 m west, and the second is about 108 m west of the proposed pit boundary. As these wetland areas are on private land, we did not access them, but we were able to assess connecting and nearby wetlands and the unknown wetland areas most likely exist as one or all three wetland types previously described.

Note:

- The approximate boundary is highlighted with a yellow line.
- The red lines represent the creek and wetland pockets.
- The blue lines are used to show closest distances to the proposed pit boundary.



6. Assessment of Natural Features

5.0 Species at Risk (Threatened and Endangered)

The list of potential species at risk (threatened or endangered) that were considered when undertaking this assessment are provided below. The list was compiled via the MNRF Information Request Guide (see MNRF 2018).

American Eel (Endangered): A species primarily of larger lakes and river, which are not found within 120 m of the proposed pit area.

Eastern Meadowlark (Threatened): One Eastern Meadowlark was observed on two separate times in a scrub area to the northwest, although more than 120 m from the proposed pit. Despite being searched for during every daytime visit, no other Meadowlark were observed, and it is our opinion that the observations made were of a transient, as breeding Meadowlarks are quite vocal and easy to discern.

Bobolink (Threatened): Bobolink were observed in the fields on the properties on either side of the proposed pit area, although only breeding evidence was observed in the fields on the property to the west.

This will be discussed in a Level 2 report.

Blanding's Turtle (Threatened): The River Styx area is known to contain Blanding's Turtles. However, at more than 400 m from the river, we rate the probability of them using the proposed pit area for nesting as low, especially as there are far more desirable sites much closer to the river. Female Blanding's turtles are noted for their long travel distances to nest sites, however Beaudry et al (2010) found that the average distance from water during these long travel routes was 127 m, highlighting a nesting females propensity to stay close to water during overland travels. This is similar to information provided with the OMNRF's Blanding's Turtle General Habitat Description, which notes average nesting distances to nearest wetlands ranging from 99.5 to 242 m. As a result, the relative isolation of the proposed licence area in relation to permanent water travel routes makes it less than desirable as a nesting location.

Barn Swallow (Threatened): There are Barn Swallows nesting in the remaining lower level of the old barn located to the north of the proposed pit.

This will be discussed in a Level 2 report.

Bank Swallow (Threatened): We expected to observe Bank Swallows on the adjacent pit property to the east as they are often drawn to the vertical sand faces created by pit operations. However, no Bank Swallows nor their nests were observed.

Gray Ratsnake (Threatened): The nearest posted sighting in iNaturalist is by Phil Bird, at a site about 4.5 km NW near Inverary Lake in an area that represents good ratsnake habitat features. This location is not far south of a distinct start of the Canadian Shield, where most of the sightings in iNaturalist occur. This is also reflective of the view that these snakes are mostly confined to the Canadian Shield (Pat Weatherhead pers. comm.). Consequently, the potential for them to be found in association with the proposed pit area is considered low, as the Canadian Shield starts to the north of the proposed pit area. As well, with the possible exception of the abandoned barn (more than 120 m from the proposed pit area) the proposed pit area does not contain Gray Ratsnake favorable habitat, or hibernacula favorable features.

No Gray Ratsnakes were observed during the field work, which also included road surveys along Washburn Road, and a survey of the barn.

Bats (Endangered): Four Ontario bat species were added to the Ontario SAR Act because of the impact of White Nose Syndrome, and not from habitat loss. Within several years, this fungus has been able to decimate population numbers because it attacks bats when they hibernate, and since Ontario hibernation sites for these species are limited, this fungus has the potential to wipe out whole populations. The huge reduction in population numbers means that there are extensive areas of summer habitat no longer being used in this region. Consequently, these SAR are not limited by a lack of summer habitat.

There are a variety of potential bat survey protocols, such as with MNR (2011), MNRF (2014), and MNRF (2015). However, in correspondence and conversations with the local MECP biologist (Monique Charette), MECP bat specialist biologist (Michelle Karam), and bat expert Toby Thorne, there is yet to be a universally acceptable method for bat surveys in the province.

Bat surveys were undertaken using the SM4BAT recorder from Wildlife Acoustics (same equipment used by Michelle Karam, MECP bat biologist). When in flight a bat that passes within about 30 m of the recorder will get recorded if it makes a navigation call, a prey search call, a feeding buzz, or a social call. This call is recorded as a single pass and the number of bat passes per unit time can be used as a measure of bat activity, and also as a way to compare between sites (eg., see Wolbert et al. 2014 Gannon et al. 2003, Hayes 1997, Sherwin et al. 2000, Law et al. 1998, and Thomas 1988). This doesn't necessarily give an indication of an overall population size as the recorder could be picking up 10 calls from 10 bats, or 10 calls from a single bat.

The SM4BAT is a static recorder that is left in one spot and provides a perspective of bat use of a site. We placed SM4BAT monitors near areas (see Table 1) with potential bat use (i.e., older trees) and to cover the entire proposed pit area, for a total recording time of 135 hours. Monitors were set at six locations and left for different amounts of time (dependent on monitor availability) and to exploit favorable weather (avoiding rainy nights).

Little Brown Myotis: As can be seen in Table 1, six Little Brown Myotis passes were picked up by the SM4BAT monitors. The detection of Little Brown Myotis by the monitors requires further discussion in a Level 2 report.

Northern Myotis: No Northern Myotis were picked up by acoustic monitoring.

Tri-Coloured Bat: Four Tri-Coloured Bat passes were picked up by acoustic monitoring, and their detection by the monitors requires further discussion in a Level 2 Report.

Eastern Small Footed Myotis: None were picked up by the recorders. The Ontario recovery strategy produced by Humphry (2017) notes roost sites to either be in buildings and or on rocky slopes. As a result, it is unlikely that this bat would be found in the proposed licence area, plus it is an extremely rare bat and the provincial Recovery Strategy distribution maps show that it has not been seen in this region for over 20 years.

Table 1. Acoustic Overnight Monitoring

Date In and Out (2019)	**Location**		**Results - passes**
June 16 (evening) June 18 (morning)	FOD7-2 (outside of proposed	44 21 56.27 N 76 23 12.99 W	Big Brown:18 Hoary Bat: 8 Silver Haired:1 Little Brown:1

	licence area)		
June 7 (evening) June 10 (morning)	FOD7-2 (outside of proposed licence area)	44 21 52.79 N 76 23 04.73 W	Big Brown :2 Hoary Bat :29 Red Bat:1 Silver Haired : 4 Little Brown:1 Tri-Colored: 1
June 7 (evening) June 10 (morning)	Ag, SE Fence Line (outside of proposed licence area)	44 21 56.78 N 76 22 56.19 W	Big Brown:53 Hoary Bat :15 Red Bat :3 Silver Haired:3 Little Brown :1
June 11 (evening) June 13 (morning)	CU (farm lane) (within proposed licence area)	44 22 02.45 N 76 23 05.31 W	Big Brown:273 Hoary Bat:91 Red Bat :4 Silver Haired :12 Little Brown:5 Tri-Colored:2
June 11 (evening) June 13 (morning)	CUW (outside of proposed licence area)	44 22 10.70 N 76 23 12.14 W	Big Brown :396 Hoary Bat :16 Red Bat : 9 Tri-Colored: 1
June 16 (evening) June 18 (morning)	CUW (outside of proposed licence area)	44 21 14.19 N 76 23 10.38 W	Big Brown :403 Hoary Bat : 64 Red Bat :11 Silver Haired : 5 Little Brown : 5

Eastern Whip-poor-will (Threatened): No Eastern Whip-poor-will were observed in association with the proposed pit licence area. The nearest eBird sighting is more than 5 km to the NE. Our survey notes are provided in Table 2.

Table 2. Whip-poor-will site visits (May 5, May 22, May 25, and June 18).

Date (2019)	Beaufort Scale	Background Noise	Moon	Call Detail	Reference Site near Sydenham
May 5	0	Calling amphibians	No moon	No calls	Calling
May 22	0	Nil (barking dogs)	5/6 moon	No calls, snipe heard calling	Not calling
May 25	0	Nil (barking dogs)	4/6 moon	No calls, snipe heard calling	Calling
June 18	0	Nil (barking dogs)	5/6 moon	No calls	Calling

Henslows Sparrow: These birds are largely extirpated from the region, with no sightings in eBird for the last 20 years. Recent sightings are only from Northern New York. No Henslows Sparrows were heard calling from the fields in the adjacent lands.

Butternuts (Endangered): No butternuts were observed within the pit area. No butternuts were observed on the adjacent lands. Fence line surveys for potential butternuts on the adjacent land were undertaken and due to the open nature of the adjacent field habitat we are confident that no butternuts are present.

5.1 Wetland

The River Styx PSW was evaluated in 1987 by Peter Sine and Peter McIntyre, for the Ontario Ministry of Natural Resources using the 2nd edition version of the wetland evaluation manual. They determined it to be a 369 ha. Class 1 wetland, making it provincially significant. The main body of the wetland is located about 700 m to the east of the proposed pit area. In the 2nd edition wetland manual, provincially significant species were important in helping the wetland attain its Class 1 status, however many of these same species would not provide scoring in 2019 using current 3rd edition of the manual. Regardless, it would be unusual for such a large wetland to be anything but significant under the current 3rd edition.

Portions of the mapped River Styx PSW located to the south of the proposed licence area are within 120 m. The closest area of wetland to the proposed pit license area is MAS 2-1, of which about 1.4 hectares is within 120 m of the proposed licence area. Further south of that is SWT2-2 habitat of which there is about 0.1 ha. within 120 m of the pit license area.

There is unevaluated wetland west of the proposed licence area, with the closest portion of wetland being about 64 m distant. In our opinion, this wetland to the west should be considered as part of the River Styx PSW, and thus be considered significant wetland. Regardless, it is the policy of the MNRF that unevaluated wetland within 120 m of a proposed licence area is to be considered significant, unless a wetland evaluation proves otherwise.

Since there is significant wetland within 120 m of the proposed pit license area, it will require a Level 2 discussion.

5.2 Area of Natural and Scientific Interest (ANSI)

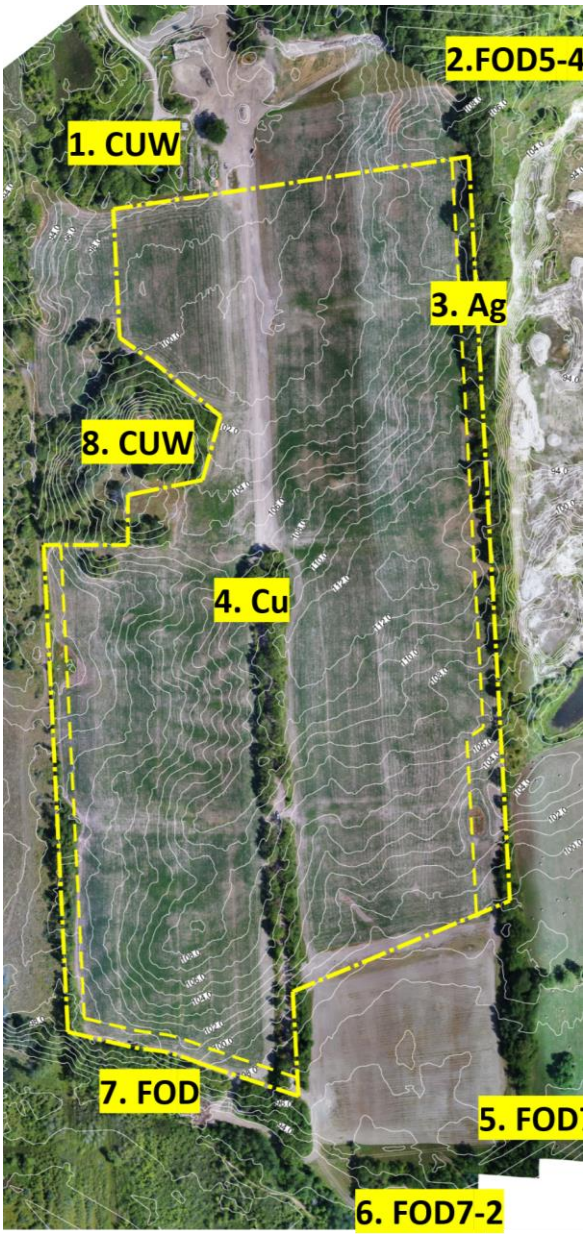
There are no ANSI's on or within 120 m of the proposed pit.

5.3 Valleylands

There are no valleyland features on or within 120 m of the proposed pit.

5.4 Woodlands

There are eight treed areas associated with the proposed pit area that are discussed below. It should be noted that some fence line clearing occurred to accommodate soybean production, and therefore older aerial images might give the impression that there are more trees present on site. The eight treed areas shown in the image below are discussed for potential significance.



1. CUW: An approximate 0.5 ha CUW woodland located NW of the proposed pit area. It is considered a cultural woodland due to its proximity to residential dwellings and the presence of many planted trees.

2. FOD5-4: An approximate 4.5 ha younger woodland located northeast of the proposed pit area that has been used as a sugar bush. It contains much cultural detritus and cast-off material along its western edge.

3. Ag: A thinly spaced single line trees along the eastern boundary of the proposed licence area that is not considered a woodland, due to the lack of trees and small size. For ELC purposes it was lumped in with the agricultural lands.

4. Cu: A tree lined farm lane that is not considered a woodland, as it only exists as a single line of trees on either side of the lane.

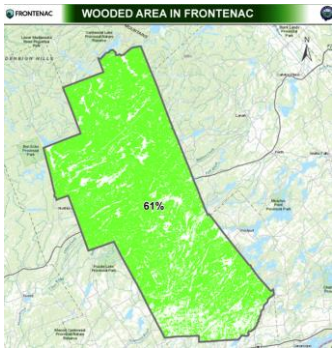
5. FOD7-2 (appears as 5.FOD in adjacent image). An isolated FOD7-2 woodland that is about 0.9 ha in size and is more than 120 m from the proposed licence boundary.

6. FOD7-2: A woodland of between 7 and 10 hectares that stretches to the River Styx and has a diffuse boundary with the significant River Styx wetland. It contains a younger area of trees (~0.7 ha) within 120 m of the proposed pit area, and a larger (~7 to 10 ha) area of older trees more than 120 m of the proposed pit area. A more precise estimate of the area coverage of this older treed area was not attempted due to its distance (i.e.,>120 m) from the proposed pit area.

7. FOD: An approximate 0.5 ha FOD woodland, south of the proposed licence area, located totally within a steeply sloping area, as can be seen from the contours in the adjacent image.

8.CUW: An approximate 0.7 ha woodland located on a rock knob and dominated by weedy non-native species. It has been used as a hunting base camp for many years and contained much garbage. The site was cleaned up and the hunt camp structures were removed in 2019.

Some of these wooded areas have potential for significance, when woodland ranking criteria provided by OMNR (2010) are applied.



1. **Size**. The proposed licence area is within Frontenac County (see adjacent image supplied by the County), which has more than 60% woodland cover. If woodland cover occupies more than 60% of the land, a minimum size is not suggested.

Conclusion: None of the woodlands are significant for size.

2. **Woodland Interior**. The woodlands associated with the licence area are too small or narrow to have significant interior habitat (i.e., > 100 m edge).

Conclusion: None of the woodlands are significant for size.

3. **Proximity**. Woodlands are considered significant if they are located within 30 m of an important natural feature, such as fish habitat or significant wetland. Woodland 1 is adjacent to presumed significant wetland, woodland 6 and 7 are within 30 m of identified significant wetland.

Conclusion: Woodland 1, 6, and 7 are significant for the proximity function, and this will be discussed in a Level 2 report.

4. **Linkages.** Woodlands are considered significant if they link two significant natural heritage features, which does not occur with the pit associated woodlands.

Conclusion: Not significant for linkages.

5. **Water Protection**: Woodlands are considered significant if they are located within a sensitive watershed or near the top of bank from a sensitive groundwater discharge, recharge, or headwater area. Woodland number 7 (described above) borders the River Styx with over 400 m of frontage.

Conclusion: Woodland number 7 is significant for water protection, and this will be discussed in a Level 2 report.

6. **Woodland Diversity/Uncommon Characteristics**. The woodlands are comprised of common trees found in the region, and they have experienced a number of cultural impacts including logging, trail cutting, garbage/storage, and a sugar bush operation. Many of them are narrow, making them prone to weedy invasive species, which dominate the understory.

Conclusion: Not significant for woodland diversity.

6.5 Wildlife Habitat

The Significant Wildlife Habitat Criteria for Site Region 6E (MNRF 2015) describes thresholds for habitat significance. Analysis of each wildlife habitat type is provided as follows:

Seasonal Concentration Areas:

Habitats of seasonal concentrations of animals applies when they occur in high densities for specific periods in their life cycles and/or particular seasons. These areas are generally localized and small in relation to the area of habitat used at other times of the year. MNRF (2015) lists 13 types of seasonal concentration habitats for consideration.

Waterfowl stopover and staging areas (terrestrial): Suitable stopover and staging habitat for migrating waterfowl include cultural meadow and thicket communities that are seasonally flooded. There are no areas of seasonally flooded field within 120 m of the proposed licence area.

Waterfowl stopover and staging areas (aquatic): These areas include ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration. There are a few pond areas within 120 m of the proposed licence area, but they are far too small to support significant numbers of staging or stopover waterfowl, and no significant numbers of waterfowl were observed.

Shorebird migratory stopover area*:* Shorebird migratory stopover would have shoreline areas that are usually muddy and un-vegetated, but can also include beach bars and seasonally flooded shoreline. These habitat features are not present on or within 120 m of the proposed pit.

Raptor wintering area*:* This habitat type includes a combination of fields and woodlands that provide roosting, foraging and resting habitat for wintering raptors. The best sites are those that are least disturbed, which does not apply to the proposed licence area.

The lack of mammal productivity in the open areas (agriculture: soybean field) associated with the pit expansion areas would minimize any value of the proposed pit for winter raptor use.

Bat hibernacula*:* These are found in crevice and cave ecosites, which were not observed on or within 120 m of the proposed pit.

Bat Maternity Colonies: Habitat criteria require FOD, FOM, SWD, or SWM woodlands that are mature and contain >10/ha large diameter wildlife trees, with a preference for snags or trees in early stages of decay. These criteria are somewhat limiting as we have recorded bats in high numbers in all types of habitats, not just woodlands. There are some large diameter trees in all of the wooded areas near the proposed pit area, but the number of cavity and snag trees is limited within the 120 m area. One possible reason for this is that dead trees within and near farmland would normally be targeted for firewood and to prevent potential damage to farm equipment.

The FOD woodlands where bat monitors were placed had the fewest numbers of bat passes recorded (see Table 1), and these numbers are far too low to suggest maternity use. The highest number of bat pass recordings were for the two small cultural woodlands (CUW) located NW and W of the proposed pit area. However, as these woodlands do not meet criteria type (i.e., FOD, FOM, SWD, or SWM) they cannot be considered for potential significance. Nevertheless, the average number of passes of Big Brown Bats for each woodland was about 133 per night. In contrast, the number of passes for a reference maternity site near Sydenham containing about 7 Big Brown Bats was about 1000 per night. As a result, it is our

opinion that the numbers recorded were insufficient to suggest significant maternity use, and instead represent feeding forays.

The number of bats monitored increased, the closer the monitors were placed to the old barn foundation, suggesting that the barn foundation is a more likely maternity area. The foundation is more than 120 m from the proposed pit area, and consequently a Level 2 discussion is not warranted.

Bat Migratory Stopover Area: According to Amy Cameron (MNR Species at Risk Biologist), criteria have not yet been developed for identifying bat movement corridors and therefore they do not need to be considered at this time. The only place in the province currently identified as SWH for bat movement corridors is Long Point (Ecoregion 7E) for silver-haired bats

Turtle Wintering Areas*:* There are no turtle appropriate wintering areas within 120 m of the proposed pit expansion area.

Reptile hibernaculum: MNRF (2015) notes that sites located below the frost line in burrows, rock crevices, and other natural locations are needed. These areas should also have proper moisture levels to keep reptile from drying out during the winter, and south facing slopes are preferred in providing more moderate winter conditions.

The proposed pit will be mostly within agricultural lands containing deep sandy soils and no cover, which minimizes their potential as reptile hibernacula. No hibernacula were found in the adjacent 120 m lands, nor did we find features (e.g., exposed southern rocky slopes) that would be indicative of hibernacula.

No snakes were observed during any of the site visits, but in our opinion, the most likely location for snakes and reptile hibernacula would be in association with the old barn, more than 120 m of the proposed pit licence area.

Colonially -Nesting Bird Breeding Habitat (Bank and Cliff): Nesting sites for these species includes eroding banks/cliffs, sandy hills, quarries, steep slopes, rock faces or piles. There is a pit to the east of the proposed licence area, but no Bank Swallows were observed here. We normally expect to find Bank Swallows in pits, and the lack of sightings may be due to the overgrown unused nature of the pit.

Colonially -Nesting Bird Breeding Habitat (Trees/Shrubs): No Heronries were observed on or within 120 m of the proposed pit.

Colonially -Nesting Bird Breeding Habitat (Ground): Nesting occurs on rocky islands or peninsula within a lake or large river. These features are not present on or within 120 m of the pit.

Migratory Butterfly Stopover Areas: A butterfly stopover area needs to be located within 5 km of Lake Ontario. The proposed pit is more than 5 km from Lake Ontario.

Landbird Migratory Stopover Areas: Requires woodlots to be greater than 10 ha, which are not present within 120 m of the proposed pit area.

Deer Yarding Areas: In general, the MNRF determines the location of significant deer yards and deer winter congregation areas. Regional deeryards are also identified in the County of Frontenac Natural Heritage Study (2012), and none were identified on or within 120 m of the proposed pit.

Deer Winter Congregation Areas: In general, the MNRF determines the location of deer winter congregation areas, and these have not been identified within 120 m of the proposed pit area. Regional

deeryards are also identified in the County of Frontenac Natural Heritage Study (2012), and none were identified on or within 120 m of the proposed pit.

Rare Vegetation Communities:

Rare vegetation community types are those with SRANKS of S1 to S3 (i.e., extremely rare - rare - uncommon in Ontario). OMNRF (2015) lists the following rare types for site region 6E: Cliffs and Talus Slopes, Sand Barren, Savannah, Tallgrass Prairie, Alvar, and Old Growth Forest. None of these types is present on or within 120 m of the proposed pit.

The proposed pit expansion is found within the Picton Ecodistrict 6E-15, where Henson and Brodribb (2005) identify the following significant habitat types:

Little Bluestem – Switchgrass – Beachgrass Dune Grassland Type	S2
Graminoid Coastal Meadow Marsh	S2
Dry Bur Oak – Shagbark Hickory Tallgrass Woodland Type	S1
Dry Tallgrass Prairie Type	S1
Red Cedar – Early Buttercup Treed Alvar Grassland	S2
Tufted Hairgrass - Canada Bluegrass - Philadelphia Panic Grass Alvar Grassland	S2/S3

None of these habitat types were observed on or adjacent to the proposed quarry expansion area .

Specialized Habitats for Wildlife

OMNR (2015) lists 11 categories of *Specialized Habitat for Wildlife* for Site Region 6E, discussed as follows:

***Waterfowl Nesting Area**:* A waterfowl nesting area can extend 120 m from a wetland. We wouldn't expect waterfowl nesting on the proposed pit lands because the adjacent wetland areas are lacking in open water and too densely vegetated to provide appropriate habitat. No waterfowl nesting was observed on the proposed pit lands, nor would it be expected because these lands are too exposed.

Bald Eagle and Osprey Nesting, Foraging and Perching Habitat: Although both species are known to occur in this region, and 2 immature Bald Eagles were observed flying overhead on May 5, 2019, the property lacks foraging opportunities and no nests were observed within 120 m. The property is located between two large waterbodies (River Styx and Dog Lake) where both Osprey and Bald Eagle have been recorded in eBird and therefore it would not be unusual to see flyovers, such as the two noted above.

***Woodland Raptor Nesting Habitat**:* None of the candidate raptor species were observed during the field work.

***Turtle Nesting Areas**:* The distance of more than 400 m between the River Styx and the proposed licence area means that turtle nesting is unlikely. Especially when considering the density of the intervening vegetation, the lack of good water connections, and the lack of ponding. There are some small ponds on adjacent lands to the east and west that are at considerable distances (> 500 m) to the River Styx and they do dry up on occasion, which reduces their potential turtle habitat value, as a potential landing spot to initiate nesting. No turtles, or signs of turtles were observed during the field work, and the farm fields of the proposed licence area do not have desirable nesting features.

***Seeps and Springs**:* Forested areas with seeps and springs. No forested seeps and springs were found.

***Amphibian breeding habitat* (woodland):** There is no woodland with ephemeral ponds within 120 m of the proposed licence area.

***Amphibian breeding habitat* (wetland):** Six wetland areas were surveyed for amphibian breeding. Field data from these are provided below in Table 3. Three of the six areas are considered significant for amphibian breeding (i.e., attaining call level code 3), and this will be discussed in a Level 2 report.

Table 3. Marsh Monitoring Protocol results of four site visits (2019).

Site	**Beaufort Scale (on 3 visits)**	**Call Level Code** **CH – Chorus Frog GY – Grey Tree Frog** **SP – Spring Peeper LF – Leopard Frog** **AT- American Toad GR- Green Frog**				**Background Noise Code (mostly from barking dogs)**
		May 5	May 22	May 29	June 16	
SWT2-2/MAS2-1 (~ 70 m S of proposed licence area (River Styx PSW)	0,0,0,0	CH-3 SP-3 AT-2 GY-1 LE -1	CH-1 SP-1 AT-1 GY-2	SP-1	GY-1 LF-1	1,1,0,0
MAM2-2 (~ 64 m west of proposed licence area, and partially on proponent property)	0,0,0,0	CH-3 SP-2	CH-1 SP-1 AT-1 GY-2	SP-1	0	1,1,0,0
MAS2-1 (~ 82 m NW of proposed pit area, and extending into adjacent landowner property)	0,0,0,0	CH-3 SP-2	CH-1 SP-1 AT-1 GY-2	SP-1 AT-1	SP-1	1,1,0,0
Wetland (~ 70 m west of proposed licence area on adjacent landowner property… assessed from fenceline)	0,0,0,0	CH-2 SP-1	CH-1 SP-1 AT-1 GY-2	GY-2	GY-1	1,1,0,0
Pond (~ 40 m east of proposed licence area on adjacent landowner property… assessed from fenceline)	0,0,0,0	0	LE -1	GR-1	0	1,1,0,0
Pond (~ 108 m east of proposed licence area on adjacent landowner property… assessed from fenceline)	0,0,0,0	SP-1	SP-1	SP-1	0	1,1,0,0

Woodland Area Sensitive Bird Breeding Habitat: Habitat with interior habitat for breeding birds. None of the treed areas within 120 m are large enough to contain interior habitat.

Habitat for Species of Conservation Concern

OMNR (2015) lists 4 categories of *Habitat for Species of Conservation Concern* for Site Region 6E, discussed as follows:

Marsh bird breeding habitat: All wetlands if there is shallow water with emergent aquatic vegetation. There are a few wetlands within 120 m that contain emergent vegetation, but none of the relevant significant threshold species were observed inhabiting these wetlands. The only threshold species observed during the field work were four Green Herons observed flying over the farm fields on May 29, and noted as a flyby in the birding records. The property is located between two large waterbodies (River Styx and Dog Lake) where Green Heron have been recorded in eBird and therefore it would not be unusual to see flyovers, such as those noted above.

Open country bird breeding habitat: Requires grassland habitat 30 ha or larger in size. There are adjacent (i.e., <120 m) fields, but none is greater than 30 ha.

Shrub/early successional bird breeding habitat: This requires large fields (>30 ha) succeeding to shrub and thicket habitat. This is not present within 120 m of the proposed expansion area.

Terrestrial Crayfish: These only occur in SW Ontario.

Special concern and Rare Wildlife Species: Refers to provincial S1, S2, and SC species that are not threatened or endangered. The list of potential species in Table 2 were provided by the following four sources:

1. Henson and Brodribb, Picton Ecodistrict 6E-15 (2005).
2. NHIC 1 km grids 18UQ8914 and 18UQ8913.
3. eBirds
4. Field observations or knowledge of the region from past work.

Table 2. Potential SAR species associated with the proposed pit.

Species	Preferred Habitat	Info. Source	Suitable Habitat within 120 m	Seen
Reptiles				
Snapping Turtle (SC)	Prefer lakes or large rivers with soft bottoms.	4	Yes	No
Map Turtle (SC)	Prefer lakes or large rivers with soft bottoms.	4	No	No
Musk Turtle (SC)	Prefer lakes or large rivers with soft bottoms.	1	No	No
Birds				
Wood Thrush (SC)	A range of woodland habitats	4	Yes	Yes, but > 120 m
Black Tern (SC)	Open water wetlands	1	No	No
Cerulean Warbler (SC)	Large mature deciduous woodlands with extensive core habitat	1	No	No
Bald Eagle (SC)	Mature woodlands in association with water bodies	4	Yes	No
Plants				
Swamp Rose Mallow (SC)	Shoreline marshes	1	No	No
Bushy Cinquefoil S3	Shoreline beach habitat.	1	No	No
American BeachGrass S3	Beach habitat.	1	No	No
Sand Reed Grass	Beach habitat	1	No	No

Animal Movement Corridors

MNRF (2015) list two types of animal movement corridors; amphibian movement corridors and deer movement corridors.

***Amphibian Movement Corridors**:* Amphibian movement corridors refer to areas that provide movement zones between breeding and summer habitat. Potential corridors would be in association with riparian and wetland habitat. Such habitat exists to the west and north of the proposed pit area, but more than 120 m away.

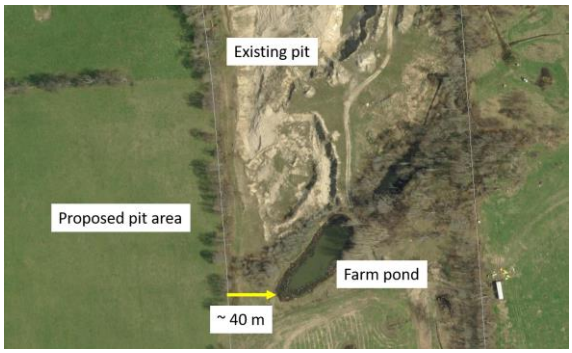
***Deer Movement Corridors**:* Deer movement corridors are those associated with deer wintering habitat. Regional deer linkages and winter deeryards have been identified for the County of Frontenac (2012), and these are not associated with the proposed pit.

6.6 Fish Habitat

Fish habitat exists in the River Styx more than 380 m south of the proposed licence area, but there are no appropriate areas of open water areas that could provide fish habitat in the intervening River Styx wetland within 120 m of the proposed pit area to provide fish habitat.

There is likely fish habitat in a creek to the west and north of the proposed licence area, but this creek habitat is more than 120 m away.

There is a farm pond on the adjacent property to the east, about 40 m east of the proposed pit licence boundary. It was a depressional area that would dry up on occasion, and so the landowner (J. Smith) altered local drainage patterns to maintain it on a more permanent basis and also stocked it with fish. Whether it still contains fish is unknown, but potential drying or freezing to the bottom are not conducive to fish maintenance. As well, the pond does not have a good connection to likely fish habitat about 700 m further east.



As the pond is on private lands, we did not assess its fish habitat value and therefore must assume it to be fish habitat, and this will be discussed in a Level 2 report,

NATURAL ENVIRONMENT LEVEL 2: IMPACT ASSESSMENT

Significant Feature – Species at Risk

Bobolink (Threatened): A few Bobolink observations were made more than 120 m to the east of the proposed pit licence area, and with no breeding confirmation. However, Bobolink were observed in the field to the west of the proposed pit license area, including evidence of breeding. This Bobolink field is used for cattle grazing. The core breeding observations were about 80 m from the proposed pit boundary line, which would make it about 95 m from the edge of pit excavation work, given the 15 m ARA excavation setback buffer line. Our breeding observations are not unusual as Fletcher and Koford (2003) note how Bobolinks avoid near edge habitat, and this is consistent with our observations of Bobolink throughout the region, where they tend to locate their nest areas nearer the center of fields. This distance would make their use west of the proposed pit area as Category 3 habitat, as described in the MNRF General Habitat Description for Bobolinks. Category 3 habitat is considered to have a high level of tolerance. Since there will be no direct intrusion into this field from the proposed pit operation, and since pit operations tend to be relatively benign with respect to imparting impacts to adjacent habitat, it is our opinion that no special mitigation measures are required for Bobolink.

Bats (Endangered)

During the bat breeding season of 2019, we undertook hundreds of hours of overnight acoustic bat monitoring efforts in the region. Monitors were set in different woodland types, parks, a cemetery, farmland, suburban backyards, and the urban core of Kingston. Regardless of where they were placed, the SMRBAT recorded bat activity. In other words, bats are everywhere. Monitors were also set at known maternity roosts. All common Ontario bat species were picked up by the monitors, but Big Brown Bats dominated at most sites. Three of the four endangered Ontario bats (Little Brown Myotis, Northern Myotis, and Tri-Colored Bat) were picked up by the monitors at most sites in the region, albeit in low numbers. In some locations, endangered bats were picked up in high numbers, suggesting nearby maternity use or roost use.

Given that bats were recorded at all sites in the region, it suggests a broad range of habitat usage. Thus, the purpose of the recording should be to determine if there is a critical or sensitive area at threat. As previously discussed in the Level 1 report, there are a variety of MNRF bat survey protocols in circulation, but from conservations and correspondence with Michelle Karam, a management biologist and bat specialist with MECP, the ecology of a site should dictate the effort required and the impact should not remove key habitat that will alter populations (e.g. removal of a hibernacula or removal of habitat which is essential to the life cycle and that is sparse on the landscape). In that regard, there are no bat hibernacula in the proposed pit lands, and the potential for bat maternity and roost use on the proposed pit licence area is limited because it is predominately composed of a soybean field and lacks quality woodlands.

The SM4BAT monitor results provided in Table 1 of the Level 1 report show that bat activity was lowest at the south end of the property (near the largest woodland area) and highest at the northern end. The number of calls recorded at all sites was not particularly high, ranging from a call average of less than 1 pass her hour to 18 passes per hour. None of these numbers suggest a population concentration, but instead suggest general feeding areas. By comparison to other sites we surveyed in the region in 2019 where the average number of passes was 36, the number of passes in the proposed pit lands is relatively low. This suggests the proposed pit lands are only sparsely used by bats, which is not surprising as the

soybean fields would not be expected to produce high numbers of insect prey. In another comparison, a monitor we set up near a single known maternity roost (near Sydenham) that contained about seven bats produced up to 200 passes per hour.

Little Brown Myotis: In our opinion, the six Little Brown Myotis passes recorded during the 135 hours of recording are too small to suggest roosting or maternity use on site, and instead represent foraging passes. In a review of the literature for the Recovery Strategy, Environment Canada (2018) notes that Little Brown Bats will fly up to 3 km on foraging flights from roost areas.

The highest number of passes were in the northern most locations, in proximity to the on-site residence, and unused sheds and a barn. These bats are expected to use anthropogenic structures for roosting and maternity use, and this is reflected in research by Schowalter et al. (1979) who found that 195 of 196 maternity sites in an urban area used structures. In our opinion, the most likely location for maternity use would be the barn structure. We did a visual and physical survey of the barn for potential bat use prior to the finalization of the proposed pit boundaries, We found many nooks and crannies in the ceiling that could provide bat habitat, however when we learned that the proposed pit area would be more than 120 m from the barn, we did not set up acoustic monitors around the barn.

The low number of Little Brown Myotis passes recorded suggest a single bat on a foraging flight from a roost or maternity site. These bats do favor old structures for roosting and maternity, and there are a number within 3km of the proposed pit area. Given the lack of Little Brown Myotis passes recorded during surveys, it is our opinion that they will not be at risk from the proposed pit operation. They are also only active at night, when pit operations are dormant, and so there should be no conflicts with the pit operations. However, as a general precaution, we recommend that any future tree clearing within the pit boundary (i.e., the treed farm lane) take place outside of the bat breeding and roosting season from mid-April to mid-September.

Tri-Colored Bat: Research has shown most roost sites to be in live trees in either dead or live foliage, and that oak is favored, although they can be found in many tree species, and they do not have site fidelity to any one tree (e.g., see Carter et al., 1999, Kurta et al. 1999, and Veilleux 2003). Similar results were also recorded by Schaefer (2017), but also that they avoided roost trees near roads and that they would travel kilometers to reach feeding areas. There is a lack of oak trees in association with the proposed licence area and in a review of the literature for the Recovery Strategy, Environment Canada (2018) notes that Tri-Colored Bats will fly up to 5 km on foraging flights from roost areas.

The low number of Tri-Colored Bat passes recorded suggest a single bat on a foraging flight from a roost or maternity site. These bats favor mature woodlands, and there are a number with potential roost and maternity sites within 5 km of the proposed pit area. Given the minimal number of Tri-Colored Bat passes recorded during surveys, it is our opinion that they will not be at risk from the proposed pit operation. They are also only active at night, when pit operations are dormant, and so there should be no conflicts with pit operations. However, as a general precaution, we recommend that any future tree clearing within the pit boundary take place outside of the bat breeding and roosting season from mid-April to mid-September.

Barn Swallow (Threatened)

There is an old barn foundation (i.e., no upper structure) located more than 120 m to the north of the pit license area. We counted several active Barn Swallow nests in the barn foundation. The area around the barn foundation was a weedy area that contained much garbage and cast-off farm material, and this was cleaned up in 2019. The Barn Swallows continued to thrive during the clean-up, and had successful

nesting, which is a testament to their tolerance to nearby human activity. As the barn foundation is more than 120 m from the pit licence area, it is our opinion that no special mitigation measures are required.

In summary, the proposed pit activities do not constitute development or site alteration in the habitat of the subject endangered and threatened species, for the purposes of the Provincial Policy Statement, South Frontenac OP and the County of Frontenac OP,

Significant Feature – Significant Wetland

As described in the Level 1 report, there are several wetland areas to the west of the proposed pit area that are within 120 m. We consider all these wetland areas to be part of a larger wetland area that should be complexed with the Provincially Significant River Styx wetland. Wetland features and functions analysis of these wetland areas to the west is based on four criteria; biodiversity/sensitivity, hydrology, fish habitat, and special features, as discussed below.

Biodiversity/Sensitivity: A wetland can develop high levels of biodiversity and sensitivity if given enough time free of impacts. However, the potential for the western wetland areas to develop these features is limited as they have only recently developed (likely from changing farming practises), and because they continue to be impacted by farming and other activities. Furthermore, from the wetland areas that we could assess from the fence line, the wetlands within 120 m were dominated by hardy wetland species that are resistant to impacts such as canary reed grass, narrow leaved cattail, and various shrub species, which also indicates a lower level of biodiversity and sensitivity.

Given the setback distances to potential pit operations, with the closest wetland area being about 64 m away, and the robust nature of these wetlands, impacts to biodiversity/sensitivity are not anticipated.

Hydrology: Water is important in maintaining wetland health and if pit operations resulted in water being pulled away from these wetland areas to the west, it could constitute a significant impact. However, the pit operation will not go below the water table, and therefore risks to hydrology are unlikely. For further information please see Malroz (2020).

Special Features: Special features refers to the presence of rare species, such as endangered, threatened, special concern, or S1, S2, or S3 species. No rare species were observed or expected due to a lack of capacity of the wetlands to the west to provide appropriate habitat. Consequently, in our opinion, no mitigation measures for special features are required.

Fish Habitat: None of the wetlands to the west within 120 m of the proposed pit area is considered to have fish habitat due to a lack of standing water and because of poor hydrological connections apparent in aerial images to the fish habitat that is likely present in the creek more than 270 m further west. In our opinion, no mitigation measures are required here.

In summary, impacts from the proposed pit activities to the adjacent unevaluated wetlands are expected to be minimal due to a lack of potential wetland/upland interactions, the length and nature of the intervening buffers, the robustness of these wetlands, and the relative benign nature of normal pit operations. However, we do recommend putting in a silt fence between the pit operations and the wetland area that is approximately 64 m from the northwest part of the proposed pit boundary. The silt fence should be maintained, until pit operations that get to within 120 m of the wetland go below the existing topographic grade.

Portions of the mapped River Styx PSW are within 120 m of the south of the proposed licence area. The closest area of wetland to the proposed pit license area is MAS 2-1 at approximately 50 m, of which about

1.4 hectares is within 120 m of the proposed licence area. Further south of that is SWT2-2 at approximately 75 meters, of which there is about 0.1 ha. within 120 m of the pit license area. There will also be a 15 m wide excavation setback from the woodland to the north of this wetland, meaning the closest area of pit operations will be 65 m. The intervening lands will include an approximate 30 m wide woodland, and an approximate 10 m wide shrub boundary.

Wetland features and functions analysis of this significant wetland to the south is based on four criteria; biodiversity/sensitivity, hydrology, fish habitat, and special features, as discussed below.

Biodiversity/Sensitivity: The closest wetland habitat (MAS2-1) to the south is dominated by an area of dense cattails, which are known to have relatively low vegetative biodiversity and to be tolerant of nearby impacts. For example, cattail stands often grow at the edge of highways. As well, during amphibian surveys, this cattail area did not contain high numbers of calling amphibians, nor high avifauna biodiversity.

The SWT2-2 wetland habitat that is located about 90 m from proposed pit excavation does contain a higher vegetation biodiversity, including significant amphibian use, and higher avifauna use. However, impacts to this SWT2-2 are not anticipated due to the setback distance, but also because of the many intervening buffers including a layer of shrubs, a woodland layer, and buffering by the intervening MAS2-1 cattails.

In our opinion, no mitigation measures are recommended, other than those discussed in the significant woodlands and significant wildlife sections (i.e., amphibian breeding) section of the Level 2 report.

Hydrology: Water is important in maintaining wetland health and if pit operations resulted in water being pulled away from these wetland areas to the south, it could constitute a significant impact. However, the pit operation will not go below the water table, and therefore risks to hydrology are unlikely. For further information please see Malroz (2020).

Special Features: Special features refers to the presence of rare species, such as endangered, threatened, special concern, or S1, S2, or S3 species. No rare species were observed or expected due to the nature of the wetland habitat to the south. In our opinion, no mitigation measures for special features are required.

Fish Habitat: None of the wetland areas to the south within 120 m of the proposed pit area is considered to have fish habitat due to a lack of standing water, or a water connection. In our opinion, no mitigation measures are required here.

In summary, the proposed pit activities will not have a negative impact to the significant wetland features, or their ecological functions, for the purposes of the Provincial Policy Statement, South Frontenac OP and the County of Frontenac OP, as a result of a lack of potential wetland/upland interactions, the length and nature of the intervening buffers, and the relative benign nature of normal pit operations.

Significant Woodland

Three woodland areas were described in the Level 1 report as having significance for protection to potential significant wetland protection and protection to fish habitat. The discussion of each below corresponds to their numbering in the Level 1 report.

1. CUW: This small cultural woodland is located to the north of the proposed licence area and is adjacent to residential buildings. It contains many planted trees, and thus was considered a cultural

woodland. It is located between the proposed pit area and potential significant wetland further north. The CUW woodland provides about 82 m of buffering (i.e., a significant proximity function), which is a more than adequate width (e.g., see King et al. 2016).

In our opinion, a woodland setback for this CUW is not required because of its width and because the current woodland edge would have habituated to the existing farm fields, such that it contains many robust and resistant species that would not be impacted by adjacent farm or pit activities.

As the woodland is outside of the pit area, there will be no need to remove any trees of the woodland to accommodate pit operations.

6. FOD7-2: This woodland provides both a wetland buffering function and protection to River Styx fish habitat. All of this functional ability occurs more than 120 m south of the proposed pit area and is therefore at very little risk of negative impacts. In our opinion, no mitigation or recommendations are required for this woodland.

As the woodland is outside of the pit area, there will be no need to remove any trees of the woodland to accommodate pit operations.

7. FOD: This small 30 m woodland is located on a steep slope and is located between significant wetland about 20 m further south, and the proposed pit licence area that is immediately adjacent to the north. Along with the adjacent 20 m slope bottom, and a 15 meter excavation setback, there is about 75 m of buffering provided (i.e., a significant proximity function), which is a more than adequate width (e.g., see King et al. 2016).

In our opinion, the 15 m woodland setback for this FOD was necessary as it is located on a steep slope. Woodlands on steep slopes have the potential to be more vulnerable to adjacent activities. Accordingly our recommendation for a 15 m wide limit of excavation setback (i.e., top of slope buffer), was incorporated into the site plan. As the woodland is outside of the pit area, there is no need to remove any trees to accommodate pit operations. Nevertheless, it is suggested that the sloping FOD woodland be allowed to remain intact during the operational life of the pit.

In summary, the proposed pit activities will not have a negative impact to the significant woodland features, or their ecological functions, for the purposes of the Provincial Policy Statement, South Frontenac OP and the County of Frontenac OP.

Significant Feature – Significant Wildlife Habitat

Amphibian Breeding Habitat

Significant amphibian breeding was noted for three wetland areas in the adjacent lands of the proposed pit licence area. These are:

1. Significant breeding calls (i.e., Call Level Code 3) were focused in a small (~0.06 ha) MAM2-2 wetland pond that dried up in the summer. The pond is located immediately adjacent to existing farmland (planted to soybeans in 2019). This pond will be separated from pit activities by a setback distance of about 64 m and farming is proposed to continue in the intervening lands. In our opinion, pit activity at 64 m away will be less impactful than farm use that currently operates with no setback for the breeding area. In other words, the pit has some potential to improve the situation.

Should farming activity no longer be viable, natural vegetative growth in the intervening lands would further improve the situation.

2. Significant breeding calls (i.e., Call Level Code 3) came from a cattail dominated wetland (MAS2-1) to the north, of which about 0.2 ha of the wetland is within 120 m of the proposed pit licence area. The bulk of the calls were coming from that part of the wetland that is more than 120 m from the proposed pit licence area. The closest part of this wetland to the pit licence area is about 82 m, with an intervening woodlot, lawns, a house, and outbuildings.

3. Significant breeding calls (i.e., Call Level Code 3) originated from a cattail/shrub wetland area (MAS2-1/SWT2-2) concentrated from an area starting about 90 m south of the proposed pit licence area (and 105 m from the area of proposed excavation). There is also an intervening 30 m width of trees located on a steep slope, an intervening 10 m width of upland shrubs.

Breeding amphibians are generally tolerant to nearby human activity, as long as there is no direct intrusion into their breeding areas. As an example, we have observed significant amphibian breeding in wetlands and ponds immediately adjacent to roads throughout this region, including next to Washburn Road in 2019. In contrast to local roads, the setback distances and intervening vegetation of the three significant amphibian breeding areas described above will provide additional buffering. This will help ensure that the functional ability of these wetland areas to provide amphibian breeding will not be impacted.

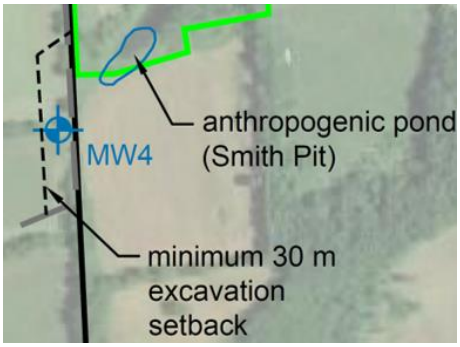
As they simply involve excavation without blasting or the use chemicals, pit operations are generally considered benign to adjacent natural heritage features. The only potential impact to any nearby adjacent amphibian breeding habitat would be from water diversion, which should not be an issue with the proposed pit, as they do not intend to extract below the water table (see Malroz 2020).

We do recommend installing a silt fence between the pit operations and the significant amphibian breeding area that is approximately 64 m from the proposed pit boundary. The silt fence should be maintained in-place, until such time as the pit operations go below the existing topographic grade.

In summary, subject to the above mitigation measure, the proposed pit activities will not have a negative impact to the significant wildlife habitat features, or their ecological functions, for the purposes of the Provincial Policy Statement, South Frontenac OP and the County of Frontenac OP.

Fish Habitat

We can only assume fish are present in the farm pond located on the property to the east of the proposed pit site, as it may have a connection (albeit limited) to obvious fish habitat about 700 m further east, and has been stocked with fish in the past. As based on historical aerial imagery and our survey from the fence line, the pond is not deep and experiences extremes in water depth, can freeze to the bottom or be oxygen limited in winter. Consequently we would only expect to find hardy generalist fish species that would not be sensitive to adjacent impacts.



As pit operations involve excavation without blasting or chemicals, they can be considered to be benign to adjacent natural heritage features. In our opinion, the only potential impact to this fish habitat would

be from water diversion. Due to a higher water table at this location Malroz (2020) is recommending a 30 m setback for excavation (see proposed black dashed line in the adjacent image) in order to avoid conditions whereby water could be drawn away from the pond. This will result in a total setback from the pond of about 70 m, which is more than adequate for what at best would be marginal fish habitat.

In our opinion, no mitigation for potential fish habitat in this pond are warranted, given the 70 m setback. Therefore, the proposed pit activities will not have a negative impact on fish habitat, or its ecological function, for the purposes of the Provincial Policy Statement, South Frontenac OP and the County of Frontenac OP.

LEVEL 2 SUMMARY OF RECOMMENDATIONS

Species at Risk

1. To avoid any impacts to SAR bats that may occasionally be on site, it is recommended that any future tree clearing within the pit boundary (i.e., the treed fence line) take place outside of the bat breeding and roosting season from mid-April to mid-September.

Significant Wetland

2. It is recommended that a silt fence be installed between the pit operations and the wetland area that is approximately 64 m from the NW corner of the proposed pit boundary. The silt fence should be maintained until such time that pit operations within 120 m of this wetland go below the existing topographic grade.

Significant Wildlife Habitat

3. It is recommended that a silt fence be installed between the pit operations and the wetland area that is approximately 64 m from the NW corner of the proposed pit boundary. The silt fence should be maintained until such time that pit operations within 120 m of this habitat go below the existing topographic grade.

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8. Qualifications

Ecological Services has been in operation in eastern Ontario since 1985. Our experience includes environmental impact assessments, management plans, wetland evaluations, and municipal land use planning. We have research experience in aquatic ecology and chemistry, forest fragmentation, avian ecology, and fisheries ecology.

We have worked with government at the federal, provincial, local and international levels. Other clients have included Crown corporations, planning and engineering firms, developers, and local groups. Our association with Queen's University provides us access to current and broad-based research, and also provides us with a pool of expert associates. A work prospectus is available at http://ecologicalservices.webs.com**.**

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Employment

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Reviewed works affecting fish habitat and preparing letters of advice and authorizations under the *Fisheries Act.*

1993 - 1997: Ecosystem Management Coordinator. Parks Canada, St. Lawrence Islands National Park. Mallorytown, Ontario.
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Wetland Evaluation Certification
Ecological Land Classification Certification
Butternut Health Certification
MTO/DFO/OMNRF Fisheries Protocol Training as a Fisheries Specialist

9. Appendix 1: Plant List

Species Name	**Common Name**	**S-Rank**
Ferns and Allies		
Equisetum arvense	Field Horsetail	S5
Onoclea sensibilis	Sensitive Fern	S5
Grasses and Sedges		
Bromus inermis	Smooth Brome	SNA
Calamagrostis canadensis	Canada Bluejoint	S5
Carex bebbii	Bebb's Sedge	S5
Carex comosa	Bristly Sedge	S5
Carex gracillima	Graceful Sedge	S5
Carex granularis	Meadow Sedge	S5
Carex hystericina	Porcupine Sedge	S5
Carex retrorsa	Retrorse Sede	S5
Carex rosea	Rosy Sedge	S5
Carex stipata	Stalk-grain Sedge	S5
Carex vulpinoidea	Fox Sedge	S5
Dactylis glomerata	Orchard Grass	SNA
Elymus virginicus	Virginia Wild Rye	S4
Festuca rubra	Red Fescue	SNA
Glyceria striata	Fowl Manna Grass	S5
Leersia oryzoides	Rice Cutgrass	S5
Lolium perenne	Perennial Ryegrass	SNA
Phalaris arundinacea	Reed Canary Grass	SNA
Phleum pratense	Timothy	SNA
Poa compressa	Canada Bluegrass	SNA
Poa pratensis ssp. pratensis	Kentucky Bluegrass	S5
Scirpus atrovirens	Dark-stem Bulrush	S5
Scirpus cyperinus	Wool-grass	S5
Trees and Shrubs		
Acer negundo	Box Elder	S5
Acer platanoides	Norway Maple	SNA
Acer saccharum var. nigrum	Black Maple	S4?
Acer saccharum var. saccharum	Sugar Maple	S5
Berberis thunbergii	Japanese Barberry	SNA
Betula papyrifera	Paper Birch	S5

Carya cordiformis	Bitter-nut Hickory	S5
Carya ovata	Shag-bark Hickory	S5
Celastrus scandens	Climbing Bittersweet	S5
Cornus amomum	Silky Dogwood	S5
Cornus foemina	Gray Dogwood	S5
Cornus sericea	Red-osier Dogwood	S5
Crataegus crus-galli	Cockspur Hawthorn	S5
Fraxinus americana	White Ash	S4?
Fraxinus pennsylvanica	Green Ash	S5
Juniperus communis	Ground Juniper	S5
Juniperus virginiana	Eastern Red Cedar	S5
Lonicera tatarica	Tartarian Honeysuckle	SNA
Malus pumila	Common Apple	SNA
Parthenocissus inserta	Virginia Creeper	S5
Picea abies	Norway Spruce	SNA
Picea glauca	White Spruce	S5
Pinus strobus	Eastern White Pine	S5
Populus deltoides	Eastern Cottonwood	S5
Populus tremuloides	Trembling Aspen	S5
Prunus serotina	Black Cherry	S5
Prunus virginiana	Choke Cherry	S5
Quercus alba	White Oak	S5
Quercus macrocarpa	Mossy-cup Oak	S5
Ostrya virginiana	Eastern Hop-hornbeam	S5
Rhamnus cathartica	European Buckthorn	SNA
Rhus typhina	Staghorn Sumac	S5
Ribes cynosbati	Bristly Gooseberry	S5
Ribes lacustre	Bristly Black Currant	S5
Rubus idaeus ssp. idaeus	Common Red Raspberry	SNA
Rubus occidentalis	Black Raspberry	S5
Salxi candida	Hoary Willow	S5
Salix discolor	Pussy Willow	S5
Salix petiolaris	Meadow Willow	S5
Salix purpurea	Basket Willow	SNA
Spiraea alba	Meadowsweet	S5
Tilia americana	American Basswood	S5
Ulmus americana	American Elm	S5
Viburnum lentago	Nannyberry	S5
Vitis riparia	Riverbank Grape	S5
Zanthoxylum americanum	Northern Prickley Ash	S5
Herbs		
Achillea millefolium	Yarrow	S5

Agrimonia gryposepala	Tall Hairy Groovebur	SNA
Alliaria petiolata	Garlic Mustard	SNA
Alisma triviale	Northern Water-plantain	S5
Amaranthus retroflexus	Red-root Amaranth	SNA
Ambrosia artemisiifolia	Annual Ragweed	S5
Amphicarpaea bracteata	American Hog-peanut	S5
Arctium minus	Lesser Burdock	SNA
Asclepias incarnata	Swamp Milkweed	S5
Asclepias syriaca	Kansas Milkweed	S5
Bidens beckii	Water-marigold	S5
Chenopodium album	Lamb's Quarters	SNA
Cinna latifolia	Slender Wood Reedgrass	S5
Cicuta maculata	Spotted Water-hemlock	S5
Circaea canadensis	Broad-leaved Enchanter's Nightshade	S5
Cirsium vulgare	Bull Thistle	SNA
Conyza canadensis	Fleabane	S5
Cynanchum rossicum	Dog Strangling Vine	SNA
Datura stramonium	Jimson Weed	S5
Daucus carota	Wild Carrot	SNA
Dianthus armeria	Deptford-pink	SNA
Echium vulgare	Blueweed	SNA
Erigeron acris	Bitter Fleabane	S5
Erigeron philadelphicus	Philadelphia Fleabane	S5
Erigeron strigosus	Daisy Fleabane	S5
Eupatorium perfoliatum	Boneset	S5
Euthamia graminifolia	Flat-top Fragrant-golden-rod	S5
Eutrochium maculatum var. maculatum	Spotted Joe-pye Weed	S5
Fragaria virginiana	Virginia Strawberry	S5
Galium mollugo	Great Hedge Bedstraw	SNA
Geum alepiccum	Yellow Avens	S5
Hydrocharis morsus-ranae	European Frogbit	SNA
Hypericum punctatum	Common St. John's-wort	S5
Impatiens capensis	Spotted Jewel-weed	S5
Iris versicolor	Blueflag	S5
Lotus corniculatus	Birds-foot Trefoil	SNA
Lycopus americanus	American Bugleweed	S5
Lysimachia quadrifolia	Whorled Loosestrife	S4
Lythrum salicaria	Purple Loosestrife	SNA
Medicago sativa	Alfalfa	SNA
Mentha arvensis	Corn Mint	S5
Oenothera biennis	Common Evening-primrose	S5
Potentilla recta	Sulphur Cinquefoil	SNA

Prunella vulgaris	Self-heal	S5
Ranunculus abortivus	Kidney-leaved Buttercup	S5
Ranunculus acris	Tall Buttercup	SNA
Rudbeckia hirta var. hirta	Black-eyed Susan	SU
Rumex crispus	Curly Dock	SNA
Scutellaria lateriflora	Mad Dog Skullcap	S5
Sium suave	Hemlock Water-parsnip	S5
Solidago caesia	Blue-stemmed Goldenrod	S5
Solidago canadensis var. canadensis	Canada Goldenrod	S5
Solidago flexicaulis	Broad-leaved Goldenrod	S5
Symphyotrichum lanceolatum ssp. lanceolatum	Panicled Aster	S5
Symphyotrichum lateriflorum	Starved Aster	S5
Symphyotrichum novae-angliae	New England Aster	S5
Taraxacum officinale	Brown-seed Dandelion	SNA
Thlaspi arvense	Field Penny-cress	SNA
Toxicodendron radicans	Climbing Poison Ivy	S5
Tragopogon dubius	Meadow Goat's-beard	SNA
Trifolium hybridum	Alsike Clover	SNA
Trifolium pratense	Red Clover	SNA
Trifolium repens	White Clover	SNA
Urtica dioica ssp. gracilis	Stinging Nettle	S5
Verbena hastata	Blue Vervain	S5
Vicia cracca	Tufted Vetch	SNA

10. Bird List

Species	Habitat Found	May 5	May 29	June 22
Alder Flycatcher	Scrub to west		1	
American Crow	Throughout	5	3	7
American Goldfinch	Near barn and house	1	1	
American Redstart	Woodland >120 m south		1	
American Robin	Throughout	15	20	24
Bald Eagle	Fly-by	2		
Baltimore Oriole	Woodland near house		7	3
Barn Swallow	Barn Foundation to North	5		5
Belted Kingfisher	Flyby		1	1
Black-billed Cuckoo	Woodland >120 m south		1	
Black-capped Chickadee	Throughout	2	1	
Blue Jay	Throughout	13	11	4
Blue-gray Gnatcatcher	woodland >120 m south	2		
Bobolink	Field to west	3		
Bobolink	2 in east and 7 in west field			x
Bobolink	Field to west		6	
Brown Thrasher	Scrub to west	5	4	2
Brown-headed Cowbird	Throughout	5	1	8
Canada Goose	Fly-by	50	5	
Caspian Tern	Fly-by	4		
Cedar Waxwing	near house			3
Chestnut-sided Warbler	Scrub to west		3	
Chipping Sparrow	Near house	5		3
Common Grackle	Near house	2		2
Common Loon	Fly by			1
Common Raven	Fly-by	2		
Common Yellowthroat	Wetland and scrub to West	2	16	4
Double-crested Cormorant	Fly-by	5		
Downy Woodpecker	Near house			1
Eastern Kingbird	Scrub to west	2	5	
Eastern Meadowlark	Field to West	1	1	
Eastern Phoebe	Near house	1		
Eastern Wood-Pewee	woodland > 120 south		2	1
European Starling	Throughout		9	7
Gray Catbird	Throughout		13	8
Great Blue Heron	Flyby		1	

Great Crested Flycatcher	Woodland >120 m south		6	
Green Heron	Flyby		4	
House Wren	Near House and Barn	4	12	6
Indigo Bunting	Scrub area north of house		2	
Killdeer	Access road and near house	5		
Mourning Dove	Throughout	9	11	13
Northern Cardinal	Near house		1	2
Northern Flicker	Field to West	4	3	1
Pileated Woodpecker	woodland >120 m south	3	4	
Red-bellied Woodpecker	woodland >120 m south			1
Red-eyed Vireo	woodland >120 m south		2	6
Red-tailed Hawk	Fly-by	1		1
Red-winged Blackbird	cattail wetland to south	15	41	33
Ring-billed Gull	Fly-by	3	10	1
Rock Pigeon (Feral Pigeon)	House to North	1		
Rose-breasted Grosbeak	Throughout	9	5	5
Ruffed Grouse	woodland >120 m south	2	1	
Savannah Sparrow	Field to West	4	5	
Song Sparrow	Throughout	35	58	54
Swamp Sparrow	Swamp to south and west	6	1	5
Tennessee Warbler	Scrub to west		1	
Tree Swallow	Throughout	5		1
Turkey Vulture	Flyby		1	3
Veery	woodland >120 m south		2	2
Warbling Vireo	woodland >120 m south		11	1
White-breasted Nuthatch	woodland >120 m south	2	3	
White-throated Sparrow	woodland >120 m south	1		
Wilson's Snipe	Scrub to west	4	2	
Wood Duck	Fly-by	2		
Wood Thrush	woodland >120 m south		2	5
Yellow Warbler	Wetland south and east		25	11
Yellow-bellied Sapsucker	woodland >120 m south		2	
Yellow-rumped Warbler	Woodland by house	3		
Yellow-throated Vireo	woodland >120 m south		1	

11. Herp and Mammal List

Herps

Painted Turtle	Wetland south of Washburn Road, 120 north of proposed pit area
Leopard Frog	Wetlands east and south
Spring Peeper	Wetlands east and south
Tree Frog	Wetlands east and south
Chorus Frog	Wetlands east and south
Green Frog	Wetlands east and south

Mammals

White Tailed deer	Tracks at southern edge of soybean field and in the treed farm lane
Red Squirrel	In FOD7-2 woodland more than 120 m south of proposed pit area
Chipmunk	In FOD7-2 woodland more than 120 m south of proposed pit area
Coyote	Scats within proposed pit area