NATURAL ENVIRONMENT TECHNICAL REPORT

Prepared for

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ECOLOGICAL SERVICES

January 26, 2022
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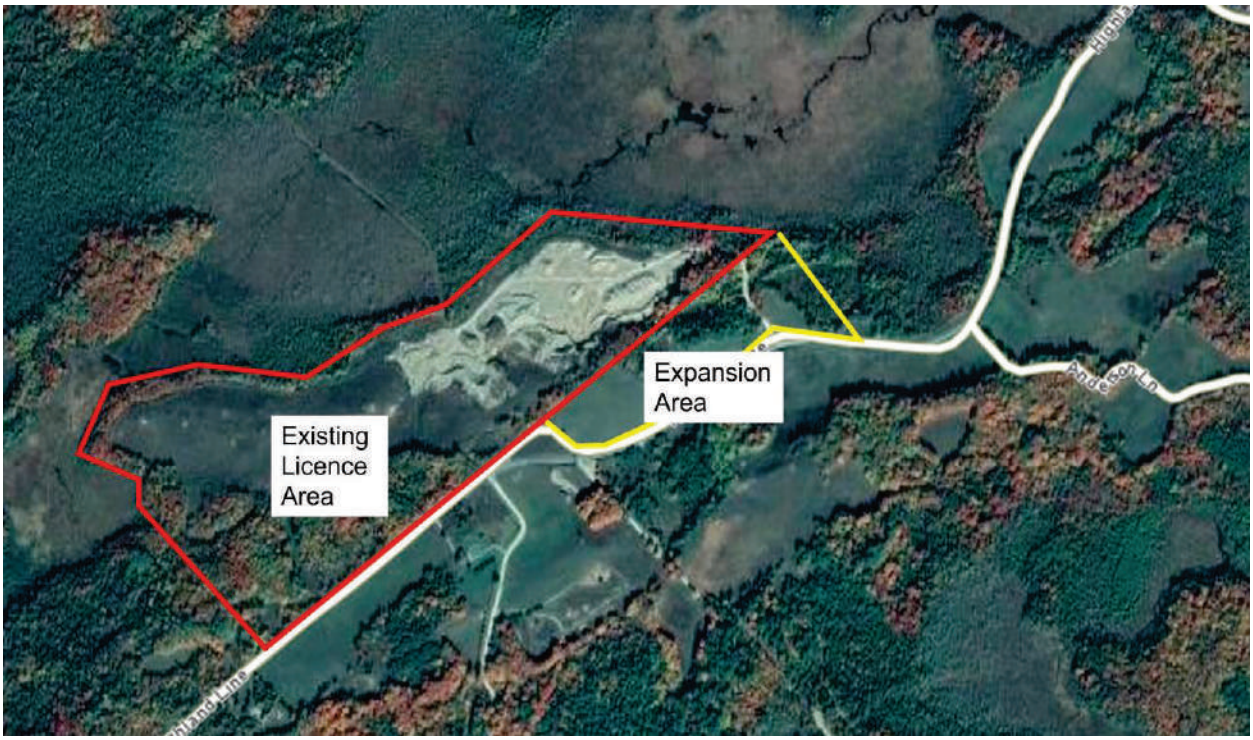
1. Summary

Under the Provincial Aggregate Resources Act, Arnott Brothers Construction Inc. is applying for an expansion of their Class A pit licence (609261) on the Highland Line in the Township of Lanark Highlands, Lanark County, parts of Lot 6, Concessions 10 and 11. It is known as the Crain-McKinnon Pit. The expansion will involve a below water expansion for the existing licence area, and a boundary expansion into a new area (see below). The original license area was covered in a Natural Environment Level 1&2 Technical Report by Muncaster (2006).



This natural environment assessment report follows the guidelines provided in the 2021 Aggregate Resources of Ontario Standards, which is to investigate whether significant natural heritage features are on or within 120 meters of a pit expansion. If these features are at risk of a negative impact, the natural environment assessment report typically follows three paths.

1. Determine a high impact potential and recommends against the pit expansion.
2. Determines a moderate impact potential and make mitigation and compensation recommendations to minimize or negate the impact.
3. Determines that there is a negligible risk of a negative impact.

This natural environment report also addresses the Natural Heritage assessment requirements (e.g, Environmental Impact Statement (EIS) or Environmental Impact Assessment (EIA)) of the Provincial Policy Statement (PPS) and the Lanark County Official Plan (OP).

Within the proposed pit expansion boundary, there is a species at risk, significant woodland feature and significant wildlife habitat. Within 120 m of the expansion boundary there is a significant woodland feature, significant wildlife habitat, fish habitat, wetland, and the habitat of species at risk. The risk to these significant features is low to moderate and mitigation recommendations are provided accordingly.

2. Summary of Mitigation Recommendations

Species at Risk (SAR)

As a general precaution for avoiding harm to SAR bats, it is recommended that no trees be removed during the maternity/roost season (April 15 to Sept. 15).

To help reduce sight and sound impacts to Eastern Meadowlarks using the fields south of Highland Line Road, it is recommended that extraction proceed from the north to the south towards Highland Line Road, such that extraction machinery will be mostly out of sight behind the height of the aggregate face, and the required roadside berm.

A seasonal Category 2 extraction restriction boundary from April 15 to July 31 (after Weir 2008) is recommended at the southwest end of the existing licence area to provide an extra layer of disturbance minimization for Eastern Whip-poor-will(see pg. 15 image). Whip-poor-will surveys will need to be conducted if pit operators are interested in bypassing this timing boundary during any particular year. However, it could be as many as 20 years before pit activity gets within this Category 2 area and if it is determined that Whip-poor-wills are not present at that time, or are no longer considered a SAR, we see no need for a seasonal restriction boundary during that particular year.

The pit operators will be required to register their pit activity with the MECP due to the Bank Swallow nesting taking place here and we recommend they do so.

Wetland

On top of the required 30 m MVCA wetland buffer, it is recommended that a further 15 m buffer be added at the northwest corner of the existing licence boundary, for a total 45 m (see pg. 18 image).

It is recommended that the open water created as part of the closure plan have sloping edges to enhance the creation of littoral zone habitat, and that several small islands be created that could support habitat to species such as waterfowl and turtles.

Woodland

It is recommended that all wooded portions bordering the wetland to the north and west of the existing pit licence area be maintained as woodland.

Wildlife Habitat

To protect painted turtle nesting that occurs beside the current extraction area it is recommended that turtle fencing (see MNR 2013) be installed at the edge of the unvegetated area (see page 23). The dividing line between unvegetated and vegetated areas is distinct in Google maps. It is also recommended that there be no excavation north of the turtle fencing.

Note of Caution

If the proposed below water table expansion were to significantly alter the hydrological regime of the adjacent wetland, this could result in significant impacts to the wetland, to fish habitat, and to significant wildlife habitat. It is our understanding that the hydrological regime will not be impacted, but we defer to the report by Gorrell (2022) in this regard. There is potential for a net ecological benefit from the creation of an aquatic feature here as part of the closure plans resulting in more wetland habitat, more significant wildlife habitat, more fish habitat, and possibly new SAR habitat.

3. Legislative Requirements

Aggregate Resources of Ontario Provincial Standards (AROPS) for Category 1, Class "A" pit below water licence application

As of 2021 the format for aggregate natural environment assessments has changed as described in *Ontario Standards: A compilation of the four standards adopted by Ontario Regulation 244/97 under the Aggregate Resources Act.* Under section 2.2. Natural Environment Report, natural heritage features on or within 120 m of the site need to be investigated. If they are found then: that have been identified as potentially relevant to a pit application

… the report must identify and evaluate any negative impacts on the natural features or areas, including their ecological functions, and identify any pit preventative, mitigative or remedial measures.

Note: A discussion of significant woodlands and valleylands are not required in ecoregion 5E as noted in 2.2 Natural Environment Report of the *Ontario Standards: A compilation of the four standards adopted by Ontario Regulation 244/97 under the Aggregate Resources Act.*

2020 Provincial Policy Statement (PPS)

Issued under the *Planning Act*, the 2020 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. Relevant sections from the PPS that apply to the proposed pit expansion are as follows:

2.1.4 Development and site alteration shall not be permitted in:
a) significant wetlands.

2.1.5 Development and site alteration shall not be permitted in:
d) significant wildlife habitat;

NOTE: Significant woodland restrictions within the PPS only apply to ecoregions 6E and 7E. The proposed pit expansion is in ecoregion 5E.

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.

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.

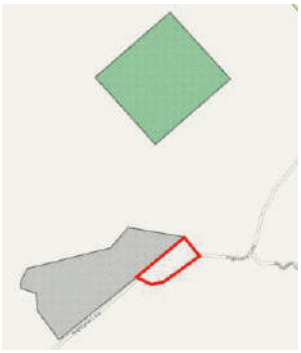
Lanark County Official Plan (2012) Requirements

Relevant Natural Heritage policies from the County Official Plan and Environmental Protection policies from the Township Official Plan require consideration through an Environmental Impact Statement (EIS), and an Environmental Impact Assessment (EIA), respectively. This is due to the proximity of prescribed natural heritage features in the OP. Although the PPS (2020) and the new aggregate policies of 2021 do not require a discussion of significant woodlands in ecoregion 5E, the Lanark County OP has designated Community Forests as significant woodlands, and we note the following from Section 5.5.4 of the OP.

> *…. where Significant Woodlands are located on the Canadian Shield are designated in local Official Plans, development and site alteration may occur on adjacent lands without the need to undertake an Environmental Impact Statement unless it is required in the local Official Plan.*

Relevant Images from the County Official Plans

The adjacent detail is from Schedule A of the Lanark County OP. The green square is marked as significant woodland and it is about 500 m north of the existing licenced area. The black hatched area indicates the existing licensed area, and the red outline is the approximate expansion area.



The adjacent detail is from the Lanark County OP Schedule B Source Water Protection map. The approximate pit license and expansion area is enclosed by the red lines. The green shading represents a significant groundwater recharge area.

Groundwater issues will not be covered directly in this natural environment report, and instead will be addressed by Gorrell (2022).

Township of Lanark Highlands Official Plan (2016) Requirements

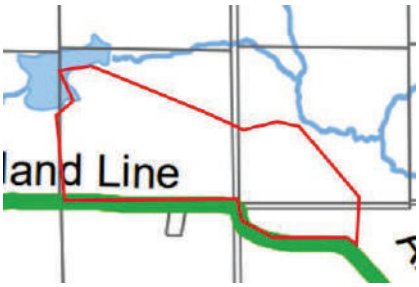
Policies intended to protect natural heritage features are described in Section 5.3 and include:

5.3.1 Endangered or Threatened Species Habitat
5.3.2 Wetlands
5.3.3 Areas of Natural and Scientific Interest (ANSI)
5.3.4 Significant Wildlife Habitat
5.3.5 Fish Habitat
5.3.6 Deer Yards
5.37 Groundwater Protection and Enhancement

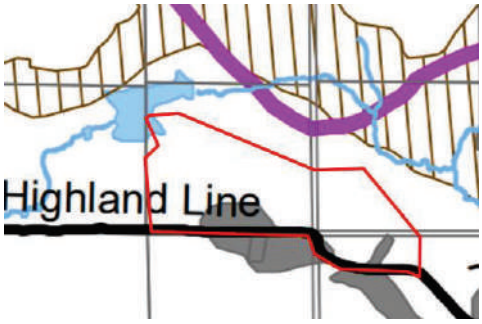
Note: Similar to the PPS (2020) and the 2021 Aggregate Policy for Ecoregion 5E, there is no specific mention of significant woodlands and valleylands in Section 5.3. There is no mention of valleylands at all in the OP, and discussions of significant woodlands are largely absent.

Natural heritage features of note in the Township OP are demoted in Schedule A and Schedule B as follows:

The adjacent detail is from Schedule A of the Township of Lanark Highlands OP, which is intended to show significant wetlands and watercourses. The approximate pit license area and expansion boundaries are enclosed by the red lines. As can be seen, there is no significant wetland noted in Schedule A. The blue areas represent a watercourse, and the larger blue area of water shown to the northwest of the pit license area is supposed to show a pond. From field visits, the existence of this pond is due to beaver activity, and it was largely dry in 2021.



The adjacent detail is from Schedule B: Development Constraints of the Township of Lanark Highlands OP. The approximate pit license area and expansion boundaries are enclosed by red lines. The dark grey associated with Highland Line denotes mineral aggregate reserves, the vertical hatched area at the top of the detail denotes organic soils, and the purple line denotes a deer yard boundary. The boundary of the deer yard would be the upland forest boundary, located about 500 m north of the license area and about 700 m north of the eastward expansion area.



4. Site History

The history of European settlement of these lands dates back to the 1820's and is provided in more detail for this site by Adams (2006). Early settlers would have cleared the land and tried farming, however farmland in Lanark was not particularly profitable and money made from timber harvesting became a necessity to maintain a family, and by the late 1800's much of Lanark County had been cleared (Keddy 1994). Good tillable soil is limited in the County, which meant that farming was never going to be a significant money earner in this region and as a result the marginal farms were abandoned and allowed to regenerate back into woodlands. With its deeper soils, the proposed pit expansion area would have been maintained as farmland longer than the more rugged areas of the County, and farmland along Highland Line south of the pit area is still actively used. Overall, the indication is that the pit area and the expansion area have a 200-year history of notable anthropological disturbance.

5. Methodology

A preliminary Species at Risk (SAR) list was provided by Carolyn Hann (MECP Management Biologist) for this site on Sept 29, 2020. As well, pre-screening for species at risk (SAR) was completed using the MNRF (2018) and MECP (2019a) screening protocols, but also included SAR that were listed in the OP.

The site visits provided in Table 1 are listed by the primary focus of the visit. However, incidental taxa of note would be recorded during all visits. For example, Bank Swallows (Threatened) were observed nesting on April 27, 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.

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).

The bat survey methodology was partly based on MNR (2011), MNRF (2014), and MNRF (2015), but was ultimately developed after conversations with Michelle Karam (MECP bat specialist), bat expert Toby Thorne (Toronto Zoo), and Monique Charette (MECP biologist).

Snake surveys were based on SAR snake protocols provided by MNRF (2016). The MNRF also provides protocols for targeted SAR surveys, which are applied where necessary, such as the MNR (2011) Bobolink Survey Methodology the MNR (2012) Whip-poor-will Survey Methodology, and the MNRF (2015) Blanding's Turtle Methodology, and the Canadian Wildlife Service survey protocol (see Jobin et al. 2011) for Least Bitterns.

Table 1 Site visit summary.

Survey Date	Starting Time	Weather Conditions	Surveyor	Main Purpose of Visit
April 7, 2021	1300	17 C, clear	Kenny Ruelland	Herps/SAR
April 8, 2021	1400	20 C, clear	Rob Snetsinger	Herps/SAR
April 27, 2021		12 C, clear	Rob Snetsinger	Herps/SAR
May 2, 2021	700	12 C, clear	Rob Snetsinger	Herps/SAR/Birds
May 19	1700	21 C, clear	Dale Kristensen Rob Snetsinger Kaitlyn Closs	Herps/Bats/Night Birds
May 30	630		Dale Kristensen Rob Snetsinger Kaitlyn Closs	Herps/Bats/Plants/Birds
June 2	2130	25 C, clear	Rob Snetsinger	Herps/Bats/Night Birds
June 5	1050	19 C, clear	Kaitlyn Closs	Herps
June 9	2100	28 C, clear	Rob Snetsinger	Herps/Bats/Night Birds
June 11	700	20 C, clear	Kaitlyn Closs	Herps
June 12	715	20 C, clear	Kaitlyn Closs	Herps
June 22	600	18 C, clear	Dale Kristensen	Herps/Birds
June 23	2100	23 C, clear	Rob Snetsinger	Night Birds

6. Ecological Land Classification

The ELC is based on Banton et al. (2009), which is used for sites in Site Region 5E. The minimum ELC polygon for mapping is 0.5 ha. Habitat types that are less than 0.5 ha., were lumped into the large habitat type. The ELC mapping polygons of Figure 2 are superimposed on a 2021 drone image. The existing licence area is outlined in red, the outward expansion area in blue, and the proposed extraction line with a purple dashed line. The ELC types are outlined in yellow and the ELC codes are described further below.

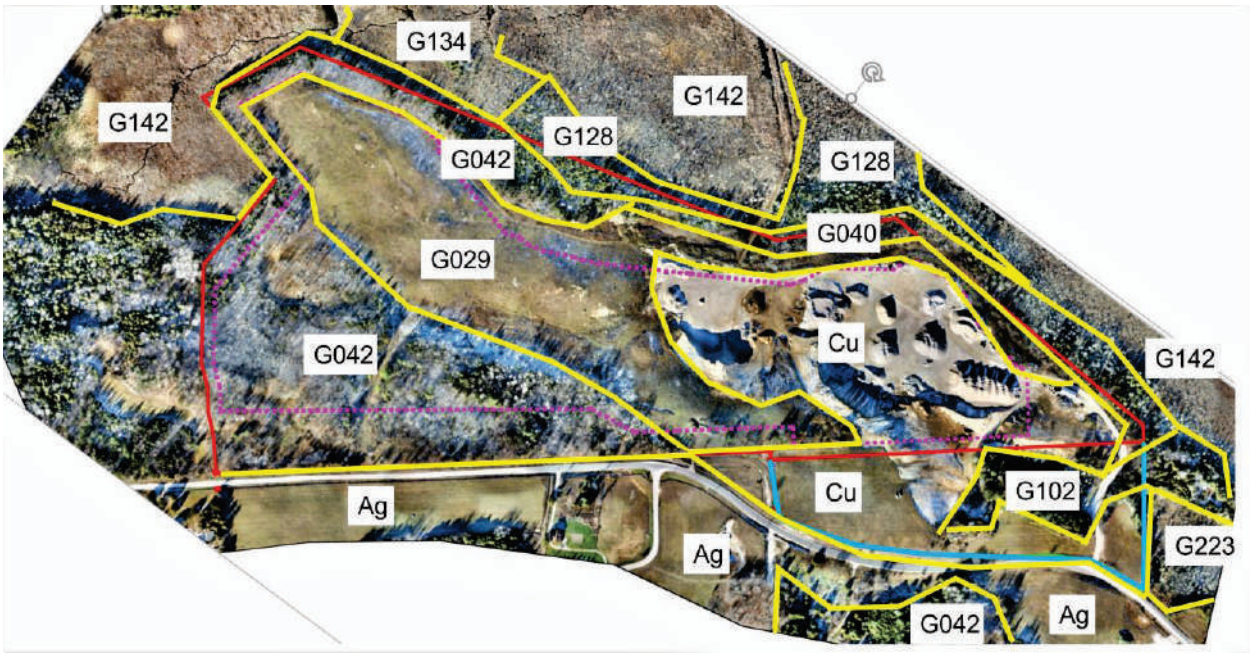


Figure 2. ELC mapping associated with existing licence boundary (red line) and proposed expansion boundary (blue line).

ELC Map Terms (Upland):

Agricultural (Ag): Refers to areas being actively managed for agricultural purposes, including hayfields and cash crops.

Cultural (Cu): Refers to areas that have an ongoing cultural use. Here they refer to the existing operational pit located to the north of Highland Line and the proposed expansion area that includes an area of grassland that has been kept cut short.

Dry, Sandy: Field (G029): Approximately 10.5 hectares, all within the existing licence area. This field has a history of past disturbances and is dominated by non-native grasses and weedy forbs, many of which are non-native species. The vegetative coverage is not dense, likely due to the impoverished nature of the soils.

Dry Sandy: Aspen-Birch Hardwood (G040): An approximate 1 ha. patch, existing as a thin band from 15 to 50 m wide along the north-eastern end of the existing licence area, and acting as a buffer between wetland areas further north and the pit area. The dominant canopy species is *Populus tremuloides*, with lesser amounts of *Betula papyrif*era and *B. alleghaniensis*, *Acer saccharum*, *A. rubrum*, *Abies balsamea, Larix laricina,* and *Picea glauca*. The shrub layer includes canopy species saplings, as well as European buckthorn, and *Prunus* spp. Ground cover species include grass spp., and field forbs.

Dry, Sandy: Maple Hardwood (G042): This ELC type wraps around the cleared Dry, Sandy: Field (G029) that encompasses the unexcavated portion of the existing licence area. This G042 area extends westward and southwestward across the Highland Line. However, unlike the woodlands of Wheeler Maple Products, the bulk of the sugar maple trees in the pit property are of a younger age class (20–50 year age range). Sugar maple is the dominant species, but this woodland includes most of the common deciduous and coniferous tree species found in the region. The shrub layer is mostly non-existent, with the non-native invasive European buckthorn being the most prevalent. The ground cover layer is sparse and includes typical ferns and spring ephemerals from this region including wood fern, bracken, cohosh, trillium, sarsaparilla, Solomon's seal, and Canada mayflower.

Fresh, Silty to Fine Loamy: Conifer (G102): This approximately 2.0 ha. patch is bisected by the pit access road, with the largest proportion (~1.3 ha) within the proposed expansion area. It has patchy dominance with some areas being dominated by different conifer species, including balsam fir, white cedar, and white pine. There was no effective shrub layer, and a ground cover layer was largely absent.

ELC Map Terms (Wetland):

Mineral Thicket Swamp (G134): An area of approximately 2.5 ha. located to the northwest of the existing licence area. Primarily dominated by *Alunus rugosa,* but also includes *Salix spp.* and *Cornus stolonifera.* The main emergent observed was *Calamagrostis canadensis*, but also includes several *Carex* spp., *Impatiens capensis, Onoclea sensibilis, Scutellaria galericulata,* and *Ulmus americana.*

Organic Intermediate Conifer Swamp (G128): Located to the north of the existing licence area in two patches. The larger 2.7 ha patch starts about 55 m from the extraction area, and the smaller 1 ha. patch starts about 35 m from the extraction area. The dominant tree species is *Picea mariana*, followed by *Larix laricina, Thuja occidentalis, , Fraxinus nigra, Acer rubrum,* and *Betula alleghaniensis.* Passage through this ecotype is difficult due to large amounts of downed wood debris. The shrub layer is relatively sparse, and mainly occupied by tree saplings. Typical ground cover plants observed include *Cornus canadensis, Coptis trifolia, Maianthemum canadense*, *Equisetum pratense*, and fern and moss spp.

Mineral Intermediate Conifer Swamp (G223): Located directly east of the proposed pit expansion area, this swamp is approximately 1 ha. in size. The canopy is comprised primarily of a mix of *Picea mariana, Abies balsamea, Larix laricina, Betula papyrifera,* and *Acer rubrum.* The shrub layer is comprised of canopy saplings, *Cornus sericea*, *Alnus incana*, and *Salix* spp. The ground cover is variable, but common species observed include *Cornus canadensis, Coptis trifolia*, and *Maianthemum canadense.*

Mineral Meadow Marsh (G142): Refers to three wetland patches located to the west and north of the existing licence area. To the west is an approximate 6 ha area located from 41 to 68 m from the extraction area of the existing licence area. It is a graminoid marsh dominated by *Calamagrostis canadensis* and *Carex stricta*, with lesser amounts of *Typha*, various wetland herbs such as Thelypteris palustris and *Lythrum salicaria*, and sparse shrub patches dominated by *Salix discolor* and *Alnus incana.*

To the north of the existing licence area and associated with a north-south snowmobile trail, is an approximate 9-hectare area of G142 marsh that contains many dead trees (see image below), suggesting a drier history, likely due to beaver activity. It starts approximately 90 m north of the extraction limit. Further east is another G142 type of about 27 hectares that eventually connects to Highland Line. It starts about 75 m north of the existing extraction area.

7. Assessment of Natural Features

7.0 Species at Risk (SAR) (Threatened and Endangered)

A preliminary Species at Risk (SAR) list was provided by Carolyn Hann (MECP Management Biologist) for this site on Sept 29, 2020. As well, pre-screening for species at risk (SAR) was completed using the MNRF (2018) and MECP (2019a) screening protocols, but also included SAR that were listed in the OP.

Restricted Species: There is one restricted Species from the NHIC listings that we are not at liberty to discuss in this report. We have had much experience working with this species and are very aware of its habitat needs. From that, we can confidently say that the pit license area, and the adjacent 120 m, does not represent appropriate habitat. We are available to discuss specific details of this species.

American Eel (Endangered): American Eel have been historically reported for Dalhousie Lake and the Mississippi River, but we could find no records for Long Sault Creek, or its tributary that is associated with the proposed pit area. While eels will travel upstream in shallow streams for short distances, their preferences for deeper waters (>1.5 m) makes it unlikely that they would move through the Long Sault system. It is even further unlikely they would be found in the wetland north of the pit due to blockages provided by at least 3 beaver dams and one section of dense wetland vegetation that contains no water channel. Furthermore, the water associated with the wetland north of the pit area is too shallow to support eels.

Bank Swallow (Threatened): As many as 30+ Bank Swallows were observed nesting in one of the active pit faces. It is not surprising that Bank Swallows were seen as these birds are attracted to the sheer sand faces of sand pits for nest building purposes, and Heneberg (2001) notes that Bank Swallows preferentially move to sand pits over traditional nesting areas due to the good nesting qualities of the sand substrate. As such, it is likely that the Crain-McKinnon pit will continue to provide opportunities for Bank Swallow nesting for many years to come.

If there is a reasonable separation distance of 30 m during the nesting season, it is unlikely that pit activity will impact these swallows. We have observed many examples in Eastern Ontario in pits where Bank Swallows were tolerant to nearby to pit operations if there is no direct destruction of their nests. The pit operators will be required to register their pit activity due to the Bank Swallow nesting and we recommend they do so. Information on how to do this can be obtained from the following link.

http://www.ontario.ca/environment-and-energy/pits-or-quarries-and-endangered-or-threatened-species

A typical restriction usually involves not removing nests during the breeding season (early May to mid-August). The following documents may prove helpful prior to registering:

- Pits & Quarries section of the MNRF Bank Swallow General Habitat Description document.
- Pit and quarry sections of the MNRF (2017): Best Management Practices for the Protection, Creation and Maintenance of Bank Swallow Habitat in Ontario
- Bank Swallow Fact Sheet produced by the Ontario Stone, Sand & Gravel Association.

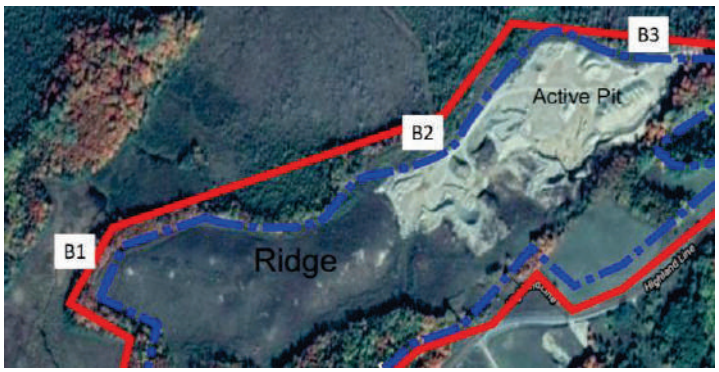
Barn Swallow: Not observed. The existing pit and the proposed expansion area lack suitable nesting structures, and none are known to occur within the adjacent lands.

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 by SAR bats. Consequently, SAR bats are not limited by a lack of summer habitat.

There are a variety of potential bat survey protocols, such as with MNR (2011a), 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.

Snag surveys were completed on April 8, 2021 and repeated on May 19, 2021. The woodlands around the pit area are relatively narrow, ranging in width from 30 to 70 m and three snag transects were run along this entire width. The woodlands on the south side of the pit are younger aged and have experienced recent cutting and contained less than 2 snags/hectare. The woodlands north of the pit contained about 3 snags/hectare. From MNR (2011a), this small number of snags is well below the 10 snag/hectare threshold would otherwise require bat acoustic surveys. However, for the sake of due diligence, bat acoustic surveys were carried out.

Bat acoustic 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, but it can give a good indication of bat usage and having undertaken many acoustic surveys over the last 3 years we have developed a good baseline of site comparators.



Over the period of May 30 to June 9, we placed the SM4BAT monitor at three sites along the north edge of the pit area where bat activity should be the highest due to its proximity to a likely foraging area. Over the 10 nights of recording, 2 Little Brown were recorded at B2, and 9 Little Brown and 4 Tri-colored were from B3. It is not unusual for us to record a few SAR bats at any monitoring station as they will forage over several kilometers, but these numbers are far too low to suggest maternity or roost activity. More importantly, all the SAR bat passes were recorded well after sunset, which suggests they were flying in from a distant roost site. Likely from the significant woodland, containing large old trees that is located on the north side of the wetland, about 700 m from the existing licence area.

Pit activity should not be an impediment to continued foraging over the wetland, or even over the pit area itself as bats are very tolerant to nearby human activity. For example, bat numbers are high in urban areas and we have recorded bat foraging activity overhead a downtown city festival containing large crowds of people. Furthermore, bats are only active at night when pit operations are shut down.

The closure plan for the pit will result in the formation of a small lake at this site, that is expected to develop wetland features over time. This is seen as a potential benefit to bats in that it should result in higher insect production for foraging purposes.

It is our understanding that the outer band of trees around the pit licence area will be maintained in a buffering capacity. Like woodlands throughout the region, these trees could be used for roosting purposes at some point. As a general precaution for avoiding harm to SAR bats, we recommend that no trees be removed during the maternity/roost season (April 15 to Sept. 15).

Blanding's Turtle (Threatened): Blanding's Turtles are known to this region, with their favored habitat being that of isolated, but interconnected wetlands with open water. In this regard, the wetland to the north of the existing licence area does not represent favored habitat. No Blanding's Turtles were observed during the field work, that included the placement of a game camera for 33 days on the most suitable open water area associated with the pit licence area. Only Painted Turtles were observed.

Bobolink (Threatened): The closest posting in eBird is about 6 km away and about 18 km away in iNaturalist. No Bobolink were observed on site, nor in the adjacent fields on other side of the Highland Line.

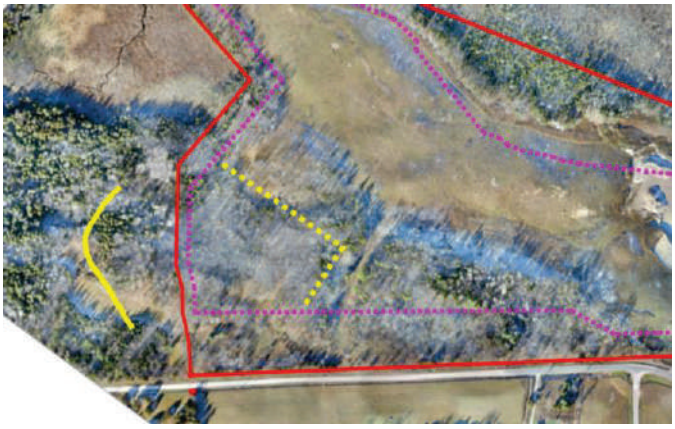
Butternut: Not observed. The closest sighting that we are aware of is more than 4 km to the north.

Eastern Meadowlark (Threatened): A 2017 eBird record by the North Leeds Birds covering a 9.5 km stretch of Highland Line lists 1 Eastern Meadowlark. A similar posting was made in 2003 by Birds Canada for Highland Line. The closest posting in iNaturlist is about 20 km away. During the breeding bird surveys, three Eastern Meadowlark were observed in a hay field south of Highland Line (see red circle in adjacent image) on May 30. A single incident sighting could indicate that the meadowlarks were passing through, but if they were nesting it would put the expansion area and the existing licence area within Category 3 habitat and possibly Category 2 habitat, depending on nest location.

In our experience, Eastern Meadowlark are tolerant of nearby human activity. For example, we have observed them nesting in a small 1 ha. field within the City of Kingston surrounded by houses and apartment buildings, as well as nesting within several meters of busy highways. Impacts could be caused by direct intrusion and disturbance of the nest, which would not be the case with any pit activity as it won't be occurring on the south side of Highland Line. Nevertheless, the construction of the required berm along the north side of the Highland Line should provide sufficient sight and sound buffering. It is our understanding that construction of a berm will be a site plan condition for licence expansion approval, and therefore does not need to be a specific recommendation of the Natural Environment report. However, it is recommended that extraction proceed from the north to the south towards Highland Line, such that extraction machinery will be mostly out of sight behind the berm and the height of the aggregate face.

Eastern Whip-poor-will (Threatened):

Whip-poor-will were calling (see solid yellow line in adjacent image) from the woodland that is west of the existing pit licence area (see Table 1). On May 19, three were calling from this area. On June 2, 9, and 23 only one was calling from this area. This change in numbers is not unusual in the early part of the season as Whip-poor-will compete for prospective sites. Whip-poor-will were also heard on the June nights in proximity to Highland Line, about 800 m west of the pit area.



We often find Whip-poor-will in the vicinity of active pits and quarries, which can also be borne out with a search of eBird records. This may either reflect the landscape that supports these geological features, or it could be that Whip-poor-wills are attracted to the open areas of pits and quarries for aerial feeding and will use adjacent woodlands for nesting. From MNR (2013) the distance of 20 m to 170 m (Category 2) from a nest is considered the approximate defended

territory and is considered to have a moderate tolerance to alteration. We don't consider a pit operation to be a significant source of disturbance, as it does not involve blasting, and the pit operation does not operate at night when Whip-poor-wills are active, and there is little reason why Whip-poor-wills cannot be active over a pit in the evening, especially as there is much evidence to suggest that they are attracted to pits. Nevertheless, we would expect most night feeding flights to focus on the wetland areas further north as these would more likely contain a higher density of aerial insect prey. Nevertheless, a seasonal Category 2 extraction restriction boundary from April 15 to July 31 (after Weir 2008) is recommended at the southwest end of the existing licence area to provide an extra layer of disturbance minimization (see dashed yellow line in above image. Whip-poor-will surveys will need to be conducted if pit operators are interested in bypassing this timing boundary during any particular year. However, it could be as many as 20 years before pit activity gets to within this Category 2 area and if it is determined that Whip-poor-wills are not present at that time, or are no longer considered a SAR, we see no need for a seasonal restriction boundary during that particular year. Category 3 habitat is mainly for foraging, and it has a high level of tolerance to alteration, and in this regard, daily pit activities are not considered a detriment to these birds for reasons discussed above.

Table 1. Whip-poor-will results of four site visits.

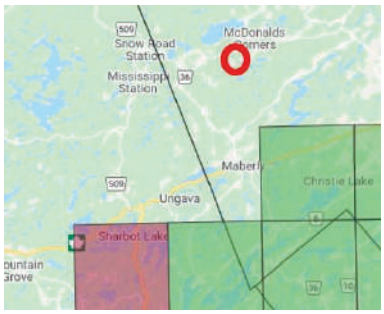
Date (2021)	Beaufort Scale	Background Noise	Call Detail
May 19	0	0	3 calling from forest west of pit licence area, off property about
June 2	0	0	1 calling from forest west of pit licence area, off property about
June 9	0	0	1 calling from forest west of pit licence area, off property about
June 23	0	0	1 calling from forest west of pit licence area, off property about

Flooded Jellyskin (Endangered): There are records in this region (see COSEWIC 2015). It is commonly associated with ash trees and requires humid habitat that is both calcareous and subject to seasonal flooding. Ash trees were largely lacking in the surrounding woodland and this area is not prone to seasonal flooding.

The area around the pit shown with blue in the adjacent image is described in the Ontario Geological Survey to be in Unit 46, which is composed of carbonate metasedimentary rocks of the Grenville Supergroup and Flinton Group that includes marble, calc-silicate rocks, skarn and tectonic breccias. As a result, bedrock conditions in the blue area (i.e., calcareous) are favorable for this lichen. Accordingly, field surveys focused on the wetland/upland interfaces where appropriate conditions might occur, with a specific search for lichen bearing ash trees. No Flooded Jellyskin were observed.

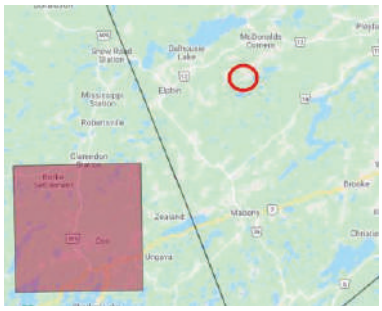
Gray Fox (Threatened): This species is considered a habitat generalist (see ECCC 2018/MECP2019b) and the mix of deciduous woodland and open habitat associated with the pit area represents suitable habitat. However, there are few records from this region in ECCC 2018/MECP2019b and there are no Gray Fox postings in iNaturalist within 50 km of the pit area. No Gray Foxes were observed during the field work.

Gray Ratsnake (Threatened): The pit expansion area (red circle in adjacent image) is beyond the northern range of the ratsnake, as indicated by the red and green squares in the adjacent detail from the Ontario Herp Atlas, although there is a potential sighting in iNaturlist within 10 km area of the pit area. This northward limit is partly due to the shorter season that inhibits this obligate thermoregulator from completing its life cycle.



No ratsnakes were observed during the field work, and the pit licence area and expansion area are mostly too open for snake use from the perspective of predator avoidance and foraging. The site also lacks hibernacula and nesting features.

Hog Nosed Snake (Threatened). The proposed pit expansion area (see red circle) is outside any demonstrated range of the Hog Nose Snake from the Ontario Herp Atlas, where the bulk of the sightings are over 100 km to the west. There is a single Herp Atlas square posting from before 1999 (see red square in adjacent image), but it is from more than 10 km away. No Hog Nosed snakes were observed during the field work.



Least Bittern (Threatened): In eBird the closest posting is from 2013 along the Elphin Maberly Line, more than 6 km away from the proposed pit area. There are no nearby postings in iNaturalist. Nevertheless, Least Bittern surveys were carried out as prescribed in Jobin et al. (2011), and none were detected. This was not particularly surprising as most postings in eBird end near Perth, suggesting that Least Bitterns do not range into this area, and the adjacent portions of the wetland do not contain good Least Bittern habitat features, which would be wetlands with more extensive areas of open water with an emergent vegetation edge.

Monarch Butterfly: Not observed and the open areas of the existing licence area had minimal amounts of milkweed. The closest sighting that we are aware of is more than 5 km to the north.

Pale Bellied Frost Lichen (Endangered). The closest sightings we are aware of is 33 km away on Darling Long Lake and 25 km to Palmerston Lake. It requires a nearby larger water body to provide the appropriate conditions of humidity (Environment Canada 2016) and this is not present here. As well, the adjacent woodlands on site are too narrow, which would allow too much air flow to support the necessary humid conditions. None were observed.

Wood Turtle (Endangered): Despite possible historical references in Central Ontario and associated research (e.g., Amato et al., 2007) there are no Wood Turtle sightings that we are aware of that would be relevant to the proposed pit expansion area. Furthermore, there are no sightings posted in iNaturalist for the province of Ontario, and none were observed during the field work.

7.1 Wetland

The Lanark County and Lanark Township OP's do not recognize provincially significant wetland on or within 120 m of the existing pit licence area or the proposed pit expansion areas. There is an approximate 129 ha. wetland that gets as close as 55 m to the north and west portions of the proposed extraction boundary of the existing licence area and is immediately east of the proposed expansion boundary. The following detail from the Mississippi Valley Conservation Authority (MVCA) shows an estimated boundary of "non-evaluated" wetland in green, the MVCA regulation limit of 30 m from the wetland in yellow, our inclusion of the expansion boundary in red, and a recommended further 15 m buffer in light blue. Other than a few minor changes, the MVCA wetland boundary mapping is very similar to the wetland mapping evident in Figure 2 of this report.

The proposed extraction line for the existing licence area will not extend beyond the 30 m MVCA regulation line. No proposed extraction line is yet proposed for the expansion area, but it is recommended that the MVCA regulation limit be respected at its eastern end.

The MDMNRF considers non-evaluated wetlands as significant, until a wetland proves otherwise. This policy might seem redundant with the advent of Conservation Authority waterways regulations that prohibit development in all wetlands, not just provincially significant wetlands. However, it is reasonable to expect a wetland of this size (i.e., 129 ha.) to score as significant.

The MVCA enforces *Ontario Regulation 153/06, Development, Interference with Wetlands and Alteration to Shorelines and Watercourses Regulation.* Constraints stemming from the regulation are described in MVCA (2019), which includes Section 7.0, which pushes for a 15 m setback from the stable top of slope. We concur with this setback distance and recommend 15 m be out from the woodland edge be added as a buffer at the northeast end of the existing licence area (see blue line in the above figure).

The ELC section of this report describes four wetland communities within 120 m of the existing and expansion pit areas. A meadow marsh (G142), a thicket swamp (G 134), and two conifer swamp types (G128, and G 223). The first three types described above will all be buffered by an intervening woodland, and the last type will be buffered by field habitat

Biological features, such as diversity are not expected to be impacted by the proposed pit due to a lack of biological interactions between the type of upland and the adjacent wetland. The existing pit licence area would have little value to wetland species in their needs for life cycle completion, and ongoing significant

changes to wetland features such as diversity appear to be controlled by factors (i.e., beaver activity) unrelated to adjacent upland land use.

Features of significance that might be relevant to the wetland such as fish habitat and significant wildlife habitat are discussed under separate headings in this report.

The closure plan calls for the conversion of the pit licence area to a small lake that will no doubt develop wetland features as it become colonized by wetland plant and animal species. This is seen as a net wetland gain to the pit project. It is recommended that the "lake" have sloping edges to provide littoral zone habitat, and that several small islands be created that could support habitat to species such as waterfowl and turtles.

It is our understanding from Gorrell (2022) that the creation of the lake will not pull water away from the existing wetland, as this could result in a negative impact to the adjacent wetland.

In summary, no impacts from the proposed pit activities to the adjacent unevaluated wetland are expected due to a lack of potential wetland/upland interactions, the length and nature of the intervening buffers, and the relative benign nature of normal pit operations. Furthermore, the creation of the lake and expected formation of wetland features will result in a net increase in wetland.

7.2 Area of Natural and Scientific Interest (ANSI)

There are no identified ANSI's within 120 m of the pit expansion areas. In this regard, we refer to the following excerpt from Section 4.4 of the Natural Heritage Reference Manual.

> *The need to evaluate the ecological function of adjacent lands (i.e., undertake an EIS or equivalent study) would be removed if proponents choose to avoid having development and site alteration occur within the extent of adjacent lands.*

Accordingly, no further analysis is warranted regarding ANSI's.

7.3 Woodlands

The pit associated woodlands are in Site Region 5E and in the Canadian Shield. They are also within the Township of Lanark Highlands that has woodland cover of over 70% (see MVCA 2011 and 2019), indicated a healthy woodland coverage. A woodland impact assessment is not necessarily required as per the wording in the PPS, Natural Heritage Reference Manual (OMNR 2010), and the updated 2021 Aggregate Policy for Ecoregion 5E. Furthermore, neither the Lanark County or the Lanark Highlands OP's denote the presence of significant woodland on or within 120 m of the pit expansion areas. Nevertheless, the wooded areas that border the wetland provide a valuable riparian function for both habitat use, bank stabilization, and buffering to the adjacent wetland that contains fish habitat and significant wildlife habitat. Accordingly, it is recommended that all wooded portions bordering the wetland of the existing pit licence area be maintained as woodland.

7.4 Wildlife Habitat

The Significant Wildlife Habitat (SWH) Criteria for Site Region 5E (MNRF 2015) describes thresholds for habitat significance of specific types of SWH. Analysis of each type is provided below under the four following headings:

- Seasonal concentration areas
- Rare vegetation communities or specialized habitats for wildlife
- Habitats of species of conservation concern, excluding the habitats of endangered and threatened species.
- Animal movement corridors.

Seasonal Concentration Areas:

Habitats of seasonal concentrations of animals apply when they occur in high densities for specific periods in their life cycles. As described in MNRF (2015), 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): Requires seasonally flooded terrestrial communities, which are not present within 120 m of the existing and the proposed pit area.

Waterfowl stopover and staging areas (aquatic): The wetland areas within 120 m of the existing and proposed pit expansion areas lack sufficient open water to support significant waterfowl stopover or staging.

Shorebird migratory stopover area*:* Requires shoreline habitat which is not present on or within 120 m of the existing and proposed pit expansion areas.

Raptor wintering area*:* Requires a combination of fields (for mammal productivity) and woodlands (for roosting), which are present, but the sparsely vegetated and cropped fields of the pit area would not provide suitable mammal productivity to support raptor wintering. It is conceivable that the hay fields to the south might support this functionality, but there are no records of raptor threshold species for this area.

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: The MNR (2015) threshold for SWH bat maternity colonies requires mature woodlands with more than 10/ha large diameter (>25 cm dbh) wildlife trees. The hardwood woodland periphery around the pit is mostly younger aged (adjacent image) and the tree diameter threshold was not met. There were also very few snag trees present and accordingly, the thresholds for significant bat maternity were not met and no further analysis is necessary.

However, in the interests of due diligence, acoustic monitoring was undertaken. The second order of significance for Bat Maternity Colonies is having more than 10 Big Brown Bats and 5 Silver-haired bats within a colony. This can be determined with capture/recapture, but this is rarely done due to costs and concerns to bat well being. It can also be done by exit surveys, but in our experience, and from attending MNRF workshops, this method has a low probability of success. From our numerous bat acoustic monitor sets undertaken in the last three years throughout Eastern Ontario, we know that bats will be recorded at every site where the monitors are placed, and it is our opinion (and noted in the scientific literature) that the number of passes/hours can provide an estimate of bat numbers. For example, at a Big Brown maternity reference site near Sydenham that averages around 15 bats/year, an average pass rate of about 140/hour is not uncommon.

A bat monitor was located at three locations on larger diameter snag trees where it was felt that the potential for recording the highest bat activity was good due to the adjacent wetland.

As expected, bats were recorded by the monitors (Table 2), but the pass/hour numbers were well below what we expect of a maternity roost. We do note that there is a significant woodland starting more than 550 m north of the pit, and the bats from Table 2 could be flying in from there on foraging flights over the wetland.

Table 2. Bat acoustic monitoring

Date In and Out (2021)	Site	Results – passes/hr
May 30 (evening) June 2 (morning)	B1	Big Brown: 2.4 Silver: 8.6
June 2 (evening) June 5 (morning)	B2	Big Brown: 8.7 Silver: 6.4
June 5 (evening) June 9 (morning)	B3	Big Brown: 5 Silver: 1.5

***Turtle Wintering Areas**:* Two potential turtle SWH wintering area were noted in proximity to the pit licence area in the adjacent image (see T1 and T2). Basking surveys were conducted at both sites and a game camera was set up at two locations at T1 for 33 days. Only Painted Turtles were observed, and the highest number of turtles at any one time at T1 was six, starting about 80 m from the licence boundary. The highest number at any one time at T2 was 15, but all sightings were more than 120 m from the proposed extraction boundary.

Due to presumed beaver activity in 2021, the water levels in T1 became too shallow to support overwintering. Overwintering at area T2 should be possible within the two drainage ditches

located on either side of the snowmobile trail that runs through the wetland, with appropriate depths beginning about 190 m north of the extraction boundary.

Threshold numbers of turtles for overwintering SWH within 120 m were not met. On the assumption that water levels at T1 return to appropriate depths for turtle wintering, impacts are not anticipated as there will be no direct aggregate related intrusion into this area, and it will be setback about 80 m from the extraction area, behind an intervening treed buffer.

Snake 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. No hibernacula features were observed within the licence area or the expansion area, or expected due to its topographic features.

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. Bank Swallow nesting was observed in sand piles of the existing pit and this is discussed in Section 6.0 Species at Risk.

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): The required rocky islands or a peninsula within a lake or large river is not present.

Deer Yarding Areas: Deer yarding areas in Lanark County have been identified, and these are well to the north (i.e., >120 m) from the proposed pit expansion area. We observed no evidence of significant deer use (e.g., well warn trails, scats, browse damage) that would indicate significant yarding or winter congregations.

Rare Vegetation Communities:

Rare vegetation community types are those with SRANKS of S1 to S3 (i.e., extremely rare - rare - uncommon in Ontario). MNRF (2015) lists the following rare types for site region 5E: Beach/Beach Ridge/Bar/Sand Dunes, Shallow Atlantic Coastal Marsh, Cliffs and Talus Slopes, Rock Barren, Sand Barren, Alvar, Old Growth Forest, Bog, Tallgrass Prairie, Savannah, Red Spruce Forest, White Oak Forest. None of these types is present on or within 120 m of the proposed pit. The proposed pit extension is found within the Bancroft Ecodistrict 5E-11, where Henson and Brodribb (2005) identify Atlantic Coastal Plain Shallow Marsh Type (S2), Dry Black Oak – Pine Tallgrass Savannah Type (S1), and Dry Tallgrass Prairie Type (S1). None of these habitat types were observed on or adjacent to the proposed pit area.

Specialized Habitats for Wildlife

Waterfowl Nesting Area: The potential waterfowl nesting area extends 120 m into the upland from wetland habitats G129-G135, and G142-G152. To be considered SWH, there needs to be at least 3 or more nesting pairs of the listed species, excluding Mallards, or 10 or more nesting pairs of the listed species, including Mallards. Only Wood Ducks were observed in a flyover, and therefore the threshold for possible significant waterfowl nesting was not observed.

Bald Eagle and Osprey Nesting, Foraging and Perching Habitat: Although both species are known to occur in this region, neither were observed within 120 m of the existing and proposed pit expansion areas. Furthermore, the adjacent wetland lacks the necessary open water that would support foraging activity.

Woodland Raptor Nesting Habitat*:* None of the candidate raptor species were observed, and no raptor nests were observed. The probability of nesting is also low because the adjacent woodlands are mostly composed of younger aged trees.

Turtle and Lizard Nesting Areas*:* Eight recently depredated turtle nests were observed within a partially vegetated area adjacent to an area of active pit activity. At this location, the distinction of active pit activity is noted by aggregate piles, vehicle routes, and no vegetation. Raccoons were observed nearby and were the likely culprits for nest depredations.

The nests extended across an approximate 90 m length marked by the orange rectangle in the adjacent image. Turtles were observed basking on logs within the drainage ditches on either side of the snowmobile trail north of the existing licence area, and it is likely that they move south (see dashed orange line in adjacent image) through the easily passable snowmobile trail to access the nesting area.

Only Painted Turtles have ever been observed here and the presence of 5 or more nests constitutes SWH. This nest area is currently not at risk from excavation as it is our understanding that the pit has reached its floor depth here. However, inadvertent vehicle damage could occur, and it is recommended that turtle fencing be installed (see MNR 2013) at the edge of the unvegetated area to prevent this. This line is clearly visible in Google map images, and varies from 10 to 30 m from the northern tree line.

The pit application is asking to go below grade here and it is recommended that there be no excavation north of the turtle fencing.

Seeps and Springs*:* None found.

***Aquatic Feeding Habitat**:* This category is mainly intended for aquatic areas used by feeding moose. Open water areas of the adjacent wetland are small and mostly devoid of the submergent aquatic vegetation that would attract feeding moose. No moose sign was observed during the field work, but white tail deer sign was (tracks and scats), and sightings of moose in this general region south of Dalhousie Lake are sparse. White tail deer sightings are also more numerous in this region, which can be a negative indicator for moose due to parasite transfer issues.

***Mineral Licks**:* No seepage areas were observed, and there were no track concentrations which might suggest a feature being exploited by Cervids.

***Denning Sites for Mink, Otter, Marten, Fisher, and Eastern Wolf**:* Mink, otter, fisher, and the Eastern wolf are present in the region, but no potential dens were observed, nor evidence of extensive use by these species such as otter runs, scat piles, or tracks.

Amphibian breeding habitat **(woodland):** There are no woodland ponds associated with the pit area. Numerous logs were turned over looking for salamanders and none were observed.

Amphibian breeding habitat **(wetland):** Requires wetlands and pools > 500 m^2. Four wetland sites were surveyed (see 1 to 4 in following image) and one pool (see 5 in following image) using the marsh monitoring protocol (BSC 2009). Field data are provided in Table 3. To be considered SWH, requires a Call Level Code 3 for indicator species or the presence of listed salamander species.

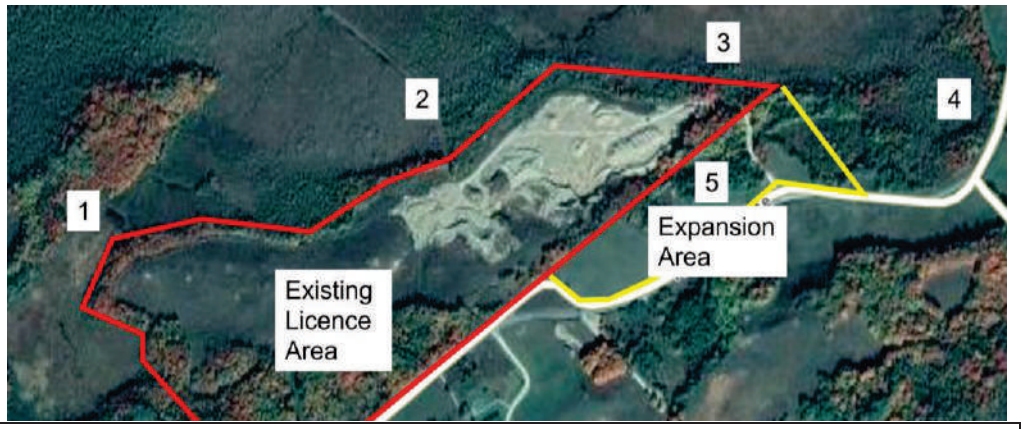


Table 3. Marsh Monitoring Protocol results of three site visits (2021).

Site	Beaufort Scale (on 3 visits)	Call Level Code (1,2,3): TF –Tree Frog, WF – Wood Frog, SP – Spring Peeper, AT- American Toad			Background Noise Code
		April 8 (8 C)	May 19 (21 C)	June 2 (25 C)	
1	0,0,0	SP1	SP2 TF1	No calls	0,0,0
2	0,0,0	LP1 SP3	SP3	SP3 GF 1	0,0,0
3	0,0,0	WF2 SP2	SP3	SP3	0,0,0
4	0,0,0	WF2 SP2	SP3 AT1	SP3	0,0,0
5 Pit Pond (<500 m^2)	0,0,0	No calls	SP 1 TF 1 AT1	SP1 TF 1	0,0,0
Other incidental amphibian species observed at other times included leopard frogs at Site 1 (in low numbers) and					

green frogs and leopard frogs at site 3 (in low numbers) and these latter observations were more than 120 m from pit licence boundary.

As can be seen in Table 3, only Spring Peepers attained Call Level 3, but these are not a SWH indicator species for amphibian breeding in wetlands. The Pit Pond was surveyed, but because it is less than the required 500 m^2 threshold size, it cannot be considered SWH. Regardless, Call Level Code 3 numbers were also not met for the pond.

Mast Producing Areas: White tailed deer, Wild Turkey and black bear are known to this region. The most important indicator is a mature forest >0.5 ha containing numerous large beech and red oak trees that supply the energy-rich mast that wildlife prefer. The woodlands associated with the existing pit licence area and the pit expansion area are either dominated by younger sugar maple trees or coniferous trees. While a few mast trees are present, they do not meet the threshold for having 50% coverage of mast tree species in the 40 to 65 cm DBH range. Furthermore, the forest understory is sparsely covered in mast shrub species, and most open areas lack mast shrub species.

Habitat for Species of Conservation Concern

Marsh bird breeding habitat: Three sites were chosen (see adjacent image) to survey for SWH marsh bird breeding habitat as they all contained the required shallow water with emergent vegetation. Swamp areas were also surveyed, but they did not contain appropriate emergent vegetation features.

The potential for Sites 1 to 3 to contain SWH was not high as they did not have much open water that would support use by aquatic waterfowl.

Of the indicator species, an American Bittern was observed at Site 1, but consistently calling from an area of wetland well over 120 m from the existing licence area. A Marsh Wren was heard from Site 2 but calling from an area of wetland well over 120 m from the existing licence area. Three Sandhill Cranes were observed in the open fields of the existing licence area on April 8. This would have been a migratory stopover, as they were not observed after that.

Due to a lack of sufficient numbers of indicator species nesting in the wetland, the threshold for SWH marsh bird breeding habitat was not met.

Open country bird breeding habitat: Requires grassland habitat 30 ha or larger in size. Fields of this size are not present within 120 m of the existing licence area and the proposed pit expansion area.

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 existing and proposed pit expansion areas.

Special concern and Rare Wildlife Species: Provincial S1, S2, and SC species that are not threatened or endangered (see Table 4).

Table 4. Potential SAR species associated with the pit. Source #'s refer to: 1. Henson and Brodribb, Bancroft Ecodistrict 5E-11 (2005). 2. MNRF (2018) screening protocol (ebird, iNat, NHIC grids 18UQ7877, 7977, 7876, 7976) 3. Lanark OP 4. Field Observations 5. Carolyn Hann (MECP)

Species	Preferred Habitat	Source	Suitable Habitat	Seen <120m
Mammals				
Southern Flying Squirrel (SC)	Woodlands	1	Yes	No
Reptiles				
Snapping Turtle (SC)	Prefer lakes or large rivers with soft bottoms.	2,5	No	No
Five Lined Skink (SC)	Rock Barrens	1,3	No	No
Eastern Ribbon Snake (SC)	Riparian habitat	3	Yes	No
Murk Turtle (SC)	Open water wetland with lily pads	3	No	No
Birds				
Wood Thrush (SC)	A range of woodland habitats	1,2,5	Yes	Yes
Black Tern (SC)	Open water wetlands	1,3	No	No
Cerulean Warbler (SC)	Large mature deciduous woodlands with extensive core habitat	1	No	No
Wood-pewee (SC)	Mature woodlands	2,5	Yes	No
Bald Eagle (SC)	Mature woodlands in association with large water bodies	1,2	No	No
Red-headed Woodpecker (SC)	Open woodlands	1	No	No
Louisiana Waterthrush (SC)		1		No
Plants				
Rams Head Lady Slipper (S3)	Moist coniferous woodlands, usually in proximity to wetlands.	1	Yes	No
Alpine Woodsia (S2)	Calcareous cliffs	1	No	No
Fogg's Goosefoot (S2)	Woodlands, cliffs, rock outcrops	1	Yes	No
Auricled Twayblade (S3)	Alder thickets with alluvial sand	1	No	No
Drooping Bluegrass (S3)	Grasslands	1	Yes	No
Little Prickly Pear Cactus (S3)	Rock barrens	1	No	No
Hidden Fruited Bladderwort (S3)	Wetlands	1	Yes	No
Scrub Oak (S1)	Woodlands	1	Yes	No
Insects				No
Ebony Boghaunter (S2)	Bog habitat	1	No	No

Wood Thrush: One Wood Thrush was calling on two of the site visits, but from well inside the adjacent woodland to the west and therefore well outside of any potential impact range, and in our opinion, mitigation is not required.

Animal Movement Corridors

Amphibian Movement Corridors: Amphibian movement corridors refer to areas that provide movement zones between breeding and summer habitat. To be significant, corridors should consist of native vegetation, not be crossed by roads, and have no gaps such as fields or waterways. The fields and various gaps (eg., roads) of the existing and proposed pit expansion areas do not have these features and therefore would not act as amphibian movement corridors.

***Cervid Movement Corridors**:* Deer movement corridors are those associated with deer wintering habitat. Regional deer linkages and winter deeryards have been identified for Lanark County and none are associated on or within 120 m of the proposed pit expansion area.

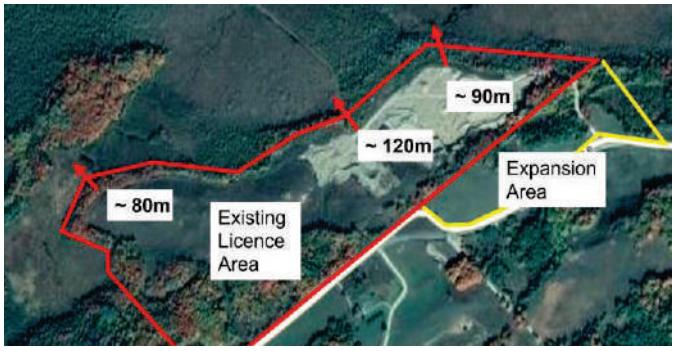
Furbearer Movement Corridor: Intended to protect otter and mink denning sites and movement to and from those sites. These are typically found within a riparian area of a lake, river, stream, or wetland. No sign of mink or otter were observed during the field visits or picked up on the game camera. The limited open water and associated fish habitat within 100 m (i.e., the denning site distance threshold) limits its potential as SWH for otter. Any movement of mink or otter in association with the existing licence area and the proposed pit expansion area would be on the northern and western woodland edges. These are outside of any excavation area, and therefore, even if corridor use occurred here, there would be no interference.

Exceptions for EcoRegion 5E

Eco-District 5E-11 – Rare Forest Types: Jack Pine: Any forest stand with more than 40% jack pine coverage is to be considered significant. This is not present within 120 m of the existing and proposed pit expansion areas.

7.5 Fish Habitat

Fish habitat features are largely lacking in the adjacent wetland due to the density of wetland vegetation. As a result, it is mostly confined to a few channels and a beaver pond, as shown in the adjacent image. The distances refer to proximity to the extraction area, although no further extraction is expected at the 120 m and 90 m sites as it is our understanding that this area has reached the pit floor. All three areas are buffered by dense intervening vegetation.



The fish habitat north of the existing and proposed pit expansion area exists in wetland that connects to Long Sault Creek. As a tributary to the Long Sault Creek, it originates in a wetland area that is over 600 m west of the pit at the corner of Highland Line and the 12th Concession Line. From there, it follows a meandering 2.5 km creek before connecting to Long Sault Creek about a kilometer east of the 9th Concession Line.

Fish sampling with seine nets was undertaken by Muncaster Environmental Planning Inc (2006) within open water areas north of the pit licence area signified by "~ 120 m" in the above image. These open water areas are found on either side of a snowmobile trail. The Muncaster (2006) catch results are presented in Table 5. Tolerance levels, thermal regimes and status in Table 5 were provided by the Ontario Freshwater Fishes Life History Database (http://www.ontariofishes.ca/home.htm), which credits Freshwater Fishes of Canada by Scott and Crossman (1973) as a primary information source.

Table 5. Muncaster (2006) fish sampling results.

Common Name	Tolerance Level	Thermal Regime	Status
Brassy Minnow	Intermediate	cool	common

Brook Stickleback	Intermediate	cool	common
Central Mudminnow	Tolerant	cool	common
Creek Chub	Intermediate	cool	common
Finescale Dace	Intermediate	cool	common
Northern Redbelly Dace	Intermediate	cool	common

These results are like those from electrofishing efforts at two sites at the 9th Concession Long Sault Creek crossing which caught Carps, Common Shiner, Creek Chub, Finescale Dace, White Sucker, and Northern Redbelly Dace (see Long Sault Creek 2015 GeoHub data). The MNRF Fish ON-Line database has 2011 data for the main body of Long Sault Creek that crosses the 9th Concession Line as containing Brook Trout, Brown Bullhead, Burbot, Northern Pike, Pumpkinseed, Rock Bass, White Sucker, and Yellow Perch. Brook Trout have been historically stocked in the creek.

Except for Brook Trout, all of the fish caught in Long Sault Creek have a tolerance level of either Tolerant or Intermediate. Brook Trout are considered Intolerant and are thus more sensitive to impacts. In our opinion, the potential for Brook Trout to be found in the wetland system within 120 m of the existing and proposed pit expansion areas is low due to the many fish obstructions between this area and Long Sault Creek including three beaver dams, and dense areas of wetland vegetation.

As can be seen with their associated tolerance levels in Table 5, none of the fish caught near the pit by Muncaster (2006) would be sensitive to adjacent impacts and all are common species. As previously noted, most fish habitat is well setback from potential pit excavation areas, and all the intervening distances are densely vegetated with both wetland and upland vegetation. In our opinion, this is more than adequate to mitigate potential surface impacts to fish associated with the proposed pit expansion. It is also our opinion that silt screens are unnecessary due to the setback distances, and the intervening vegetation.

A potential negative impact to the fish habitat may occur if water is drawn away from the watercourse/wetlands from the below water aspect of the pit expansion application license. We are not qualified to discuss the hydrological aspects of this but would be looking to the hydrological report by Gorrell (2022) to show that there is little risk of water level changes in the adjacent wetland/water course.

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9. 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**.**

Report preparation was carried out by Rob Snetsinger.

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Employment

1985 - present: Environmental Consultant.
Specializing in floral and faunal resource inventories, wetland evaluations, woodland/forest assessments, environmental impact assessments, and habitat restoration.

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Development and instruction of various courses at Queen's University:

Education
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M.Sc., Biology, Queen's University. Kingston, Ontario.
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Technical
Butternut Health Assessor
Ecological Land Classification Certification
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2021 – Field Assistant, Ecological Services
2021 – Discovery Student White Lake Provincial Park, MNRF

8. Appendix 1: Plant List

Scientific Name	Common Name	S Rank
Abies balsamea	Balsam Fir	S5
Acer rubrum	Red Maple	S5
Acer saccharum var. saccharum	Sugar Maple	S5
Actaea rubra	Red Baneberry	S5
Adiantum pedatum	Northern Maidenhair-fern	S5
Alnus incana	Speckled Alder	S5
Amelanchier laevis	Smooth Serviceberry	S5
Aralia nudicaulis	Wild Sarsaparilla	S5
Arctium minus	Lesser Burdock	SNA
Asclepias incarnata	Swamp Milkweed	S5
Asclepias syriaca	Kansas Milkweed	S5
Athyrium filix-femina var. angustum	Lady Fern	S5
Betula alleghaniensis	Yellow Birch	S5
Betula papyrifera	Paper Birch	S5
Botrychium virginianum	Rattlesnake Fern	S5
Bromus inermis	Awnless Brome	SNA
Buglossoides arvensis	Corn-gromwell	SNA
Calamagrostis canadensis	Canada Blue-joint	S5
Calla palustris	Wild Calla	S5
Campanula rapunculoides	Creeping Bellflower	SNA
Carex granularis	Meadow Sedge	S5
Carex interior	Inland Sedge	S5
Carex lacustris	Lake-bank Sedge	S5
Carex pensylvanica	Pennsylvania Sedge	S5
Carex rosea	Rosy Sedge	S5
Carex stipata	Stalk-grain Sedge	S5
Carex stricta	Tussock Sedge	S5
Carex trisperma	Three-seed Sedge	S5
Carex vulpinoidea	Fox Sedge	S5
Caulophyllum thalictroides	Blue Cohosh	S5
Cichorium intybus	Chicory	SNA
Clematis virginiana	Virginia Virgin-bower	S5
Clintonia borealis	Blue Bead-lily	S5
Coptis trifolia	Goldthread	S5
Cornus canadensis	Bunchberry	S5
Cornus sericea	Red-osier Dogwood	S5
Dactylis glomerata	Orchard Grass	SNA
Daucus carota	Wild Carrot	SNA
Decodon verticillatus	Hairy Swamp Loosestrife	S5
Dendrolycopodium dendroideum	Treelike Clubmoss	S5

Diphasiastrum digitatum	Fan Club-moss	S5
Dryopteris intermedia	Evergreen Woodfern	S5
Dryopteris marginalis	Marginal Wood-fern	S5
Dulichium arundinaceum	Three-way Sedge	S5
Echium vulgare	Common Viper's-bugloss	SNA
Equisetum arvense	Field Horsetail	S5
Erigeron philadelphicus	Philadelphia Fleabane	S5
Erythronium americanum	Yellow Trout-lily	S5
Euphorbia cyparissias	Cypress Spurge	SNA
Euthamia graminifolia	Flat-top Fragrant-golden-rod	S5
Fagus grandifolia	American Beech	S4
Fragaria virginiana	Virginia Strawberry	S5
Fraxinus americana	White Ash	S4?
Fraxinus nigra	Black Ash	S5?
Galium boreale	Northern Bedstraw	S5
Galium mollugo	Great Hedge Bedstraw	SNA
Galium obtusum	Blunt-leaf Bedstraw	S4S5
Galium palustre	Marsh Bedstraw	S5
Geum canadense	White Avens	S5
Geum fragarioides	Barren Strawberry	S5
Glyceria canadensis var. canadensis	Canada Mannagrass	S4S5
Gymnocarpium dryopteris	Oak Fern	S5
Hydrocharis morsus-ranae	European Frogbit	SNA
Impatiens capensis	Spotted Jewel-weed	S5
Iris versicolor	Blueflag	S5
Larix laricina	American Larch	S5
Lemna minor	Lesser Duckweed	S5
Leonurus cardiaca	Common Motherwort	SNA
Lonicera canadensis	American Fly-honeysuckle	S5
Lotus corniculatus	Birds-foot Trefoil	SNA
Lythrum salicaria	Purple Loosestrife	SNA
Maianthemum canadense	Wild-lily-of-the-valley	S5
Matteuccia struthiopteris	Ostrich Fern	S5
Medeola virginiana	Indian Cucumber-root	S5
Mitella diphylla	Two-leaf Bishop's-cap	S5
Myrica gale	Sweet Bayberry	S5
Onoclea sensibilis	Sensitive Fern	S5
Oryzopsis asperifolia	White-grained Mountain-ricegrass	S5
Osmorhiza claytonii	Hairy Sweet-cicely	S5
Osmunda regalis	Royal Fern	S5
Osmundastrum cinnamomeum	Cinnamon Fern	S5
Ostrya virginiana	Eastern Hop-hornbeam	S5
Parthenocissus inserta	Virginia Creeper	S5
Phalaris arundinacea	Reed Canary Grass	S5

Phleum pratense	Meadow Timothy	SNA
Phragmites australis ssp. australis	European Reed	SNA
Physalis alkekengi	Strawberry Ground-cherry	SNA
Picea glauca	White Spruce	S5
Picea mariana	Black Spruce	S5
Pilosella praealta	King Devil	SNA
Pinus strobus	Eastern White Pine	S5
Poa compressa	Canada Bluegrass	SNA
Poa pratensis ssp. pratensis	Kentucky Bluegrass	S5
Polygaloides paucifolia	Gay-wing Milkwort	S5
Polygonatum pubescens	Downy Solomon's-seal	S5
Populus balsamifera	Balsam Poplar	S5
Populus grandidentata	Large-tooth Aspen	S5
Populus tremuloides	Trembling Aspen	S5
Potentilla argentea	Silvery Cinquefoil	SNA
Potentilla norvegica	Norwegian Cinquefoil	S5
Potentilla recta	Sulphur Cinquefoil	SNA
Prunus pensylvanica	Pin Cherry	S5
Prunus serotina	Wild Black Cherry	S5
Pteridium aquilinum	Bracken Fern	S5
Quercus rubra	Northern Red Oak	S5
Ranunculus acris	Tall Butter-cup	SNA
Ranunculus fascicularis	Early Buttercup	S4
Ranunculus gmelinii	Small Yellow Water Crowfoot	S5
Rhamnus cathartica	Buckthorn	SNA
Ribes cynosbati	Prickly Gooseberry	S5
Ribes glandulosum	Skunk Currant	S5
Rubus arcticus	Dwarf Raspberry	S5
Rubus idaeus ssp. strigosus	Wild Red Raspberry	S5
Rubus occidentalis	Black Raspberry	S5
Rubus pensilvanicus	Pennsylvania Blackberry	SU
Rumex verticillatus	Swamp Dock	S4
Salix discolor	Pussy Willow	S5
Salix petiolaris	Meadow Willow	S5
Sisyrinchium montanum	Strict Blue-eyed-grass	S5
Solanum dulcamara	Climbing Nightshade	SNA
Solidago canadensis	Canada Goldenrod	S5
Spiraea alba	Narrow-leaved Meadow-sweet	S5
Spiraea tomentosa	Hardhack Spiraea	S4S5
Symphyotrichum cordifolium	Heart-leaf Aster	S5
Symphyotrichum novae-angliae	New England Aster	S5
Symphyotrichum puniceum	Swamp Aster	S5
Taraxacum erythrospermum	A Dandelion	SNA
Thalictrum dioicum	Early Meadowrue	S5
Thalictrum pubescens	Tall Meadow-rue	S5

Thelypteris palustris	Marsh Fern	S5
Thuja occidentalis	Eastern White Cedar	S5
Tilia americana	American Basswood	S5
Toxicodendron radicans	Climbing Poison Ivy	S5
Trientalis borealis	Northern Starflower	S5
Trifolium pratense	Red Clover	SNA
Trillium erectum	Red Trillium	S5
Trillium grandiflorum	White Trillium	S5
Tsuga canadensis	Eastern Hemlock	S5
Tussilago farfara	Colts foot	SNA
Typha angustifolia	Narrow-leaved Cattail	SNA
Typha latifolia	Broad-leaf Cattail	S5
Ulmus americana	American Elm	S5
Uvularia grandiflora	Large-flowered Bellwort	S5
Verbascum thapsus	Great Mullein	SNA
Viburnum acerifolium	Maple-leaf Viburnum	S5
Vicia cracca	Tufted Vetch	SNA
Viola renifolia	White Violet	S5
Viola sororia	Woolly Blue Violet	S5
Vitis riparia	Riverbank Grape	S5
Wolffia borealis	Dotted Watermeal	S4S5
Zanthoxylum americanum	Northern Prickley Ash	S5

9. Appendix 2: Bird List

Species	02-May	30-May	22-Jun	26-Jun	From other visits	Where Observed
Alder Flycatcher			1			Wetland
American Bittern	1	1		1		Wetland
American Crow		3		3	5	Throughout
American Goldfinch			5	3		Field
American Robin	2		3	2	4	Throughout
American Woodcock					1	Woodland
Bank Swallow		1		20	30	Pit
Barred Owl					1	Wetland
Black and White		2		1	1	Woodland

Warbler						
Black capped Chickadee		2	2	2	1	woodland
Blue Jay		5		3	4	Woodland
Brown Thrasher	1			2		Field
Chestnut Sided Warbler		3	4	3		Wetland
Common Grackle		2		2	4	Woodland
Common Raven	6	3	5	2	3	Throughout
Common Yellowthroat		3	6	4	4	Wetland
Downy Woodpecker		1			1	Woodland
Eastern Meadowlark		3				Field to the south
Eastern Whip-poor-will					3	Woodland
Field Sparrow	1	1	1			Field
Gray Catbird		3	1	1		Woodland
Great Blue Heron					2	Wetland
House Wren			1	1	1	Pit
Indigo Bunting		2	2			Field
Mallard					5	Wetland
Marsh Wren			2	2	2	Wetland
Mourning Dove		1	1	1	2	Wetland
Northen Harrier	1					Flyby
Northern Flicker		3				Woodland
Ovenbird		1		1		woodland
Red eyed Vireo	1		3	3		Woodland
Red Winged Blackbird		4	3	5	20	Wetland
Rose Breasted Grosbeak		5				woodland
Ruby Crowned Kinglet					1	Woodland
Ruffed Grouse				1	1	Woodland
Sandhill Crane		3				Field
Song Sparrow	3		5	4	3	Throughout
Swamp Sparrow	4	6			4	Throughout

Turkey Vulture		2			2	Flyby
Virginia Rail	1				3	Wetland
White Breasted Nuthatch	2			2	1	Woodland
White Throated Sparrow		1		2	1	Woodland
Wild Turkey					4	Woodland
Willow Flycatcher		2				Wetland
Wilsons's Snipe					1	Flyby
Wood Duck					2	Wetland
Wood Thrush					1	Woodland
Yellow Bellied Sapsucker	1					woodland
Yellow Billed Cuckoo		4			2	woodland
Yellow rumped Warbler					1	Woodland
Yellow Warbler		5	1	3	3	Wetland

10. Appendix 2: Herp and Mammal List

Herps

Painted Turtle	Up to 30 basking on logs north of pit and captured in game camera
Leopard Frog	Wetland areas
Green Frog	Wetland areas
Spring Peeper	Wetland areas
Tree Frog	Wetland areas
Wood Frog	Wetland areas
American Toad	Wetland areas

Mammals

White Tailed deer	Tracks in pit areas
Racoon	Tracks and captured on game camera
Red Squirrel	Woodlands
Chipmunk	Woodlands
Coyote	Scats and tracks
Big Brown Bat	Recorded by acoustic monitor
Eastern Red Bat	Recorded by acoustic monitor
Hoary Bat	Recorded by acoustic monitor
Silver Bat	Recorded by acoustic monitor
Little Brown Bat	Recorded by acoustic monitor
Tri-Colored Bat	Recorded by acoustic monitor