Tri-County Pit
Level 1 Screening and Level 2 Natural Environmental Assessment and Natural Heritage Evaluation
Township of East Garafraxa, Dufferin County

Prepared For:
Tri-County Aggregates Ltd.

Prepared By:
Beacon Environmental

Date:   Project:
December 2014   213363
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A. List of Vascular Plants Recorded from the Site, Lands within 120 m and Other Lands
B. Qualifications of Beacon Environmental Ecologists
1. Introduction and Background

Beacon Environmental was retained in the fall of 2013 to complete a Level 1 and Level 2 Natural Environment Assessment (EA) and Natural Heritage Evaluation (NHE) Report for the proposed Tri-County Pit. Tri-County Aggregates Ltd. is applying for amendments to the Township of East Garafraxa Official Plan (OP) and By-Law 60-2004 in order to change the current designation and zoning from Agricultural to Extractive Industrial. The following report has been completed to accompany the planning amendment applications, following which a licence application for a Category 3 Class “A” Pit Above Water will be submitted by Tri-County Aggregates Ltd. under the Aggregate Resources Act and Ontario Provincial Standards. This report includes a Natural Heritage Evaluation (NHE) as required under the Greenbelt Plan.

Tri-County Aggregates acquired the former Nodwell Estate, the East Half of Lot 2 and Part of the East Half of Lot 3, Concession 18, in September 2013. The site is in East Garafraxa Township, Dufferin County (see Figure 1). The Company has entered into an agreement to include part of the Kamphuis Farm, adjacent to the west, primarily for access to the established 17th Line haul route. The part of the Kamphuis Farm is in the West Half of Lot 3, Concession 18.

The Company proposes to licence part of the former Nodwell Estate and part of the Kamphuis Farm. The proposed licenced area is bounded to the south by adjacent pits and to the north by lands in the same ownership. At these boundaries, the excavation setback will be zero. Based on the Draft Planning Report (Long Environmental September 2014) the areas are:

<table>
<thead>
<tr>
<th></th>
<th>Area (ha)</th>
<th>Licence (ha)</th>
<th>Excavation (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nodwell Property</td>
<td>61.0</td>
<td>49.7</td>
<td>47.0</td>
</tr>
<tr>
<td>Kamphuis Farm</td>
<td>61.2</td>
<td>12.6</td>
<td>12.1</td>
</tr>
<tr>
<td><strong>Total ha</strong></td>
<td><strong>122.2</strong></td>
<td><strong>62.3</strong></td>
<td><strong>59.1</strong></td>
</tr>
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The proposed "site" to be licenced is a total of 62.3 ha (153.9 ac) and 59.1 ha (146 ac) of excavation within the site. The site is bound by 18th Line to the northeast, active agricultural lands and licenced pits to the west, south and east, and active agricultural lands and a woodland to the northwest and north.

2. Methods

The following activities were undertaken in the preparation of this report.

2.1 Background Information

A review of background information pertaining to the site and adjacent lands was completed. Materials reviewed included:
a) Dufferin County Official Plan (Adopted September 2014);
b) Official Plan for the Township of East Garafraxa (October 2005);
c) Provincial Policy Statement (2014);
d) Greenbelt Plan (MMAH, February 2005);
e) Ministry of Natural Resources and Forestry background request (2014);
f) Credit Valley Conservation background request (2014);
g) Shaw’s Creek Subwatershed Study – Subwatershed 17, Phase 1 Characterization Report (CVC March 2014);
h) Water Resources Assessment, Trip County Aggregates Ltd Proposed Lots 2 and 3, Concession 18 East Garafraxa, County of Dufferin (Groundwater Science Corp. November 2014);
i) Tri-County Pit Draft Planning Report (September 2014) and Site Plan (August 2014), Long Environmental Inc.;
j) Surficial Soil Study For Part Lots 2 & 3, Concession 18, Township of East Garafraxa, County of Dufferin (DBH Soil Services Inc. May 2014); and,
k) Aerial Photography (Dufferin County 2013).

Both the Ministry of Natural Resources and Forestry (MNRF) and the Credit Valley Conservation (CVC) were contacted for a request for background information to obtain additional natural heritage information pertaining to the site. Staff from the CVC and peer review consultants for East Garafraxa Township attended a site walk on August 27, 2014 to discuss the project and review site features. Requests included available wetland mapping, fisheries data and other available information pertaining to the natural heritage resources of the area (e.g., ANSI, rare species occurrence data, etc.).

2.2 Field Investigations

Field investigations were completed by Beacon ecologists in 2013 and 2014 for vegetation inventories, fisheries and aquatic surveys, breeding bird and breeding amphibian surveys, and incidental wildlife observations. In addition to the inventory of flora and fauna of the site, investigations included an assessment of physical terrain characteristics, and the ecological features and functions within and adjacent to the site (within 120 m where feasible). Objectives for the field investigations included identifying any potential significant natural heritage features and areas of environmental sensitivity and/or constraint. Field investigations were undertaken on the following dates (see Table 1).
Table 1. Dates and Tasks of Field Investigations (2013-2014)

<table>
<thead>
<tr>
<th>Dates</th>
<th>Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>November 4, 2013; May 27, June 23, August 27 and September 3, 2014</td>
<td>• Ecological Land Classification and Flora inventory</td>
</tr>
<tr>
<td>March 13, 2014</td>
<td>• Winter wildlife survey</td>
</tr>
<tr>
<td>August 27, 2014</td>
<td>• Site meeting with CVC and consultant representatives from the Township (Burnside Engineering)</td>
</tr>
<tr>
<td>April 21 and May 27, 2014</td>
<td>• Headwater Drainage Feature Assessment</td>
</tr>
<tr>
<td>May 22 and May 27, 2014</td>
<td>• Fish Community and Habitat Surveys (electro-fishing completed on May 22)</td>
</tr>
<tr>
<td>May 30, June 17, June 27, 2014</td>
<td>• Breeding bird surveys</td>
</tr>
<tr>
<td>April 21, May 27, June 23 2015</td>
<td>• Breeding amphibian surveys</td>
</tr>
</tbody>
</table>

Vegetation community boundaries were determined through a review of the aerial photography prior to the field investigation. These communities were then ground-truthed for detailed mapping and vegetation community descriptions. Vegetation community, or unit, descriptions were based on the Ecological Land Classification (ELC) system for Southern Ontario (Lee et al., 1998). Information collected for these units was consistent with the ELC system and included dominant species cover, community structure, as well as level of disturbance, presence of indicator species, and other notable features.

The site visits included spring, summer, and fall botanical inventories. Provincial status is based on the Provincially Rare Flora of Ontario (Oldham and Brinker, 2009) and the NHIC database (2012).

**Breeding Birds**

Breeding bird surveys were completed in accordance with standard southern Ontario breeding bird survey protocols and the MNR’s Bobolink survey protocol.

Early morning breeding bird surveys were conducted on May 30, June 17 and June 27 2014 between 5:20 and 9:20 am. Weather conditions ranged from sunny to slightly overcast, with no wind to gentle breezes, and temperatures from 10-17°C. No precipitation occurred during the visits. Surveys were carried out by traversing the study area to within 25 metres (m) of all woodlands, hedgerows and hay fields on the property and mapping the presence of all birds detected by sight and sound, except for those birds flying over the study area (birds soaring overhead, however, were recorded but not mapped). Birds were assumed to be breeding if present in suitable habitat or if foraging on site from nests that were off site.

**Breeding Amphibians**

Three evening breeding amphibian surveys were conducted on April 21, May 27, and June 23, 2014 during suitable weather conditions. Surveys followed the Marsh Monitoring Protocol (2008). On each
occasion, the site, lands within 120 m and other lands owned by the proponent were visited after dusk to listen for calling frogs and toads in areas supporting potential breeding habitats (i.e. ponds/wetlands) and noting the species and abundance of calling amphibians from those locations. Amphibian abundance was estimated using the following scale:

0 .... none heard
1 .... calls heard without overlapping of calls, possible to count number of individuals calling
2 .... call overlapping, but it is still possible to pick out individuals or count them
3 .... a chorus where it is impossible to pick out individuals or count them

Weather conditions at the time of the surveys were recorded, including temperature, wind speed, cloud cover, and precipitation.

Winter Wildlife

A winter wildlife survey generally involves identifying the tracks of wildlife in fresh snow to gauge the presence of the mammals present in a given area. A winter wildlife surveys was competed on March 13, 2014 following 15 cm of fresh snow within past 24 hours during each survey. The weather consisted of sunny, clear skies with a temperature range of -10 to -12°C. Compared to recent years there was above average snow cover, with snow pack lasting into early April. Average snow cover was between 0.45 m to 0.6 m during the surveys, including hard packed snow base and fresh snow. Tracks were identified to species were possible and approximate numbers of animals or tracks were recorded. Any other wildlife signs were noted.

Fish and Aquatic Habitat Assessment

Aquatic habitat assessments were completed on May 27, 2014 and included habitat mapping of the tributary of Shaw’s Creek. Fisheries habitat information was recorded along the watercourse and observations were noted on the following attributes (where applicable):

1. **Surrounding land use** – classifies potential pollution sources and adjacent land use that may affect the water body/aquatic environment.
2. **Riparian zone and canopy cover** – assessing whether the riparian zone consists of vegetation characterized by trees, shrubs, grasses and herbaceous plants, which help buffer the water body from runoff, provide shade and create habitat for fish and insects.
3. **Stream banks** – characteristics assessed include signs of erosion and bank scouring, undercut banks, evidence of the normal water mark and high water mark which indicate the water level fluctuation.
4. **In-stream characteristics** – details include substrate type (e.g. silt, gravel, cobble), aquatic vegetation, small and large woody debris. All of these in-stream characteristics provide habitat and cover for fish species and benthic macroinvertebrates, which are an important food source for fish.
5. **Stream morphology** – this includes the wetted width of the active channel and average wetted depth. Also a description of the stream morphology:
   a. **Runs** - typically deep, fast moving water with little to no turbulence of water.
b. **Riffles** – shallow, fast moving water typically running over rocks. Riffles provide areas of high oxygenated waters.

c. **Flats** – low flowing water with a smooth un-agitated surface.

d. **Pools** – deep pockets of slow moving water that provide ideal refuge habitat for fish.

6. **General water characteristics** – water colour and clarity, presence and description of algae, and description of flow.

A review of available fisheries data was completed for the study area and downstream reaches. Following the receipt of a permit from the MNRF, electro-fishing was conducted on May 22, 2014 on the tributary using a Halltech backpack electro-fisher. Electro-fishing was completed to get a better understanding of fish presence/absence and the community that inhabits the tributary.

**Headwater Drainage Feature Assessment**

Potential drainage features were identified on the property through aerial photographs and were assessed through ground-truthing according to the *Evaluation, Classification and Management of Headwater Drainage Features Guidelines* (CVC and TRCA, 2014). This Headwater Drainage Feature Analysis (HDFA) was completed in consultation with the Credit Valley Conservation (CVC).

3. **Natural Heritage Policy**

The following summary of natural heritage policy and legislation has been provided with relevance to the proposed aggregate development. An interpretation of potential site specific relevance has been provided based on Beacon’s understanding of the existing natural heritage features and functions found on and adjacent to the site.

3.1 **Provincial Policy Statement (2014)**

The Province recently released an updated Provincial Policy Statement (2014) under Section 3 of the *Planning Act*, which came into effect on April 30, 2014. The Provincial Policy Statement (2014) is intended to provide policy direction on matters of provincial interest related to land use planning.

Policy 2.1 of the Provincial Policy Statement (2014) provides direction to regional and local municipalities regarding planning policies for the protection and management of natural heritage features and resources. The 2014 PPS defines eight natural heritage features and provides planning policies for each (although not all apply on the Canadian Shield). The *Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement* (OMNR 2010) is a technical guidance document used to help assess the natural heritage features listed.

Section 2.1 of the 2014 PPS relates to Natural Heritage. The following subsections are provided.
2.1. Natural heritage systems shall be identified in Ecoregions 6E & 7E, recognizing that natural heritage systems will vary in size and form in settlement areas, rural areas, and prime agricultural areas.

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

2.1.5 Development and site alteration shall not be permitted in:
   a) significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E;
   b) significant woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary’s River);
   c) significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary’s River);
   d) significant wildlife habitat;
   e) significant areas of natural and scientific interest; and
   f) coastal wetlands in Ecoregions 5E, 6E and 7E that are not subject to policy 2.1.4(b) 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.

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.

Each of these features is afforded varying levels of protection subject to guidelines, and in some cases, regulations. The study area is located in Ecoregion 6E.


On behalf of the proponent, Long Environmental will be submitting an application for a Category 3 Licence under the Aggregate Resources Act. Based on the Act and the accompanying Provincial Standards (Version 1.0), a Category 3 Application is for a “Class “A” licence for a pit operation which is restricted to extracting aggregate material no closer than 1.5 metres above the established groundwater table”. The Provincial Standards go on to define the Site Plan and Reporting requirements for a Category 3 Application.
Section 2.2.1 of the Provincial Standards (Province of Ontario 1997) require a Level 1 Natural Environment Technical Report for Category 2 Applications that determines whether any of the following exist on and/or within 120 m of the site:

a) significant wetland;
b) significant habitat of endangered or threatened species;
c) fish habitat;
d) significant woodlands (south and east of the Canadian Shield);
e) significant valley lands (south and east of the Canadian Shield);
f) significant wildlife habitat; and/or 
g) significant Areas of Natural and Scientific Interest (ANSI).

If any of the above features are present on or within 120 m of the site, then a Natural Environment Level 2 assessment is required to:

a) determine the degree of impact on the natural features or ecological functions; and 
b) propose any preventative, mitigative or remedial measures that may be necessary.

3.3 Greenbelt Plan (2005)

The Greenbelt Act and the Greenbelt Plan that was established under Section 3 of the Act took effect on December 16, 2004. Schedule 4 of the Greenbelt Plan identifies the site as situated within the Protected Countryside area, with a small portion (0.6 ha) of the northern part of the property (farm field) within the Natural Heritage System component.

The Greenbelt Plan defines Key Natural Heritage Features (KNHF) as:

- Significant habitat of endangered species, threatened species and special concern species;
- Fish habitat;
- Wetlands;
- Life Science Areas of Natural and Scientific Interest (ANSIs);
- Significant valleylands;
- Significant woodlands;
- Significant wildlife habitat;
- Sand barrens, savannahs and tall grass prairies; and
- Alvars.

The Greenbelt Plan defines Key Hydrologic Features (KHF) as:

- Permanent and intermittent streams;
- Lakes (and their littoral zones);
- Seepage areas and springs; and
- Wetlands.
The following policies containing relevant provisions associated with the terrestrial environment are provided verbatim:

New mineral aggregate operations are permitted within the Natural Heritage System, subject to the following environmental policies:

**4.3.2.3**: Notwithstanding the Natural System policies of Section 3.2 of this Plan, within the Natural System policies of section 3.2 of this Plan, mineral aggregate operations and wayside pits and quarries are subject to the following:

a) No new mineral aggregate operation and no wayside pits and quarries, or any ancillary or accessory use thereto will be permitted in the following key natural heritage features and key hydrologic features:
   
   i. Significant wetlands;
   
   ii. Significant habitat of endangered species and threatened species; and
   
   iii. Significant woodlands unless the woodland is occupied by young plantation or early successional habitat (as defined by the Ministry of Natural Resources). In this case, the application must demonstrate that the specific provisions of policy 4.3.2.5 (c), (d) and 4.3.2.6 (c) have been addressed, and that they will be met by the operation;

b) An application for a new mineral aggregate operation or new wayside pits and quarries may only be permitted in other key natural heritage features and key hydrologic features not identified in 4.3.2.3 (a) and any vegetation protection zone associated with such other features where the application demonstrates:
   
   i. How the Water Resource System will be protected or enhanced; and
   
   ii. That the specific provisions in 4.3.2.5 (c), (d) and 4.3.2.6 (c) have been addressed, and that they will be met by the operation; and

c) Any application for a new mineral aggregate operation, or the expansion of an existing mineral aggregate operation shall be required to demonstrate:
   
   i. How the connectivity between key natural heritage features and key hydrologic features will be maintained before, during and after the extraction of mineral aggregates;
   
   ii. How the operator could immediately replace any habitat that would be lost from the site with equivalent habitat on another part of the site or on adjacent lands; and
   
   iii. How the Water Resource System will be protected or enhanced.

The Greenbelt Plan includes specific rehabilitation requirements. The policies applicable to the natural environment analysis are included below.

**4.3.2.4**: The Ministry of Natural Resources will pursue the following under the Aggregate Resources Act, for all mineral aggregate operations, including wayside pits and quarries, within the Protected Countryside:
a) Rehabilitated area will be maximized and disturbed area minimized on an ongoing basis during the life-cycle of an operation;
b) Progressive and final rehabilitation efforts will contribute to the goals of the Greenbelt Plan;
c) The Ministry of Natural Resources will determine the maximum allowable disturbed area of each mineral aggregate operation. Any excess disturbed area above the maximum will be required to be rehabilitated. For existing operations this shall be completed within 10 years of the date of approval of the Greenbelt Plan, and 50% completed within six years. For new operations, including expansions, the total disturbed area shall not exceed an established maximum allowable disturbed area;

4.3.2.5: When operators are undertaking rehabilitation of mineral aggregate operation sites in the Protected Countryside, the following provisions apply:

b) The disturbed area of a site will be rehabilitated to a state of equal or greater ecological value, and for the entire site, long-term ecological integrity will be maintained or restored, and to the extent possible, improved.

c) If there are key natural heritage features or key hydrologic features on the site, or if such features existed on the site at the time of application:

i. The health, diversity and size of these key natural heritage features and key hydrologic features will be maintained or restored and, to the extent possible, improved to promote a net gain of ecological health; and

ii. Any permitted extraction of mineral aggregates that occurs in a feature will be completed, and the area will be rehabilitated, as early as possible in the life of the operation.

4.3.2.6: Final rehabilitation in the Natural Heritage System will meet these additional provisions:

a) Where there is no underwater extraction, an amount of land equal to that under natural vegetated cover prior to extraction, and no less than 35% of each license, is to be rehabilitated to forest cover, which shall be representative of the natural ecosystem in that particular setting or ecodistrict.

c) Rehabilitation will be implemented so that the connectivity of the key natural heritage features and the key hydrologic features on the site and on adjacent lands will be maintained or restored, and to the extent possible, improved.

3.4 Dufferin County Official Plan (2014)

The County Official Plan was adopted by Council on September 11, 2014. The OP is now being reviewed at the provincial level by MMAH with a decision expected in 2015. Draft Appendix 1 – Natural Heritage Features of the OP identifies a woodland and watercourse north of the site. There are no other natural heritage features mapped from within or adjacent to the property.
The County’s draft 2014 OP and related policies, while not in effect at the time of application, have been reviewed and taken into consideration specifically regarding the assessment of natural heritage features and applicable policies.

Under Section 4.4 – Natural Heritage Features and Functions in regard to Determining Significance, the OP states:

**Determining Significance**

It will be the policy of the County that:

a) The responsibility for determining the significance of significant wetlands, significant areas of natural and scientific interest, and significant habitat of endangered species and threatened species, rests with the Province of Ontario. As new information becomes available, this Plan will be amended as appropriate to ensure that the information is as up to date as is feasible.

b) This Official Plan does not contain criteria to determine whether the woodlands shown on Appendix 1 are significant. A woodland would be classified as being significant if it is determined to be an area which is ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history.

However, the determination of significance cannot be made on a case-by-case basis in the absence of a County or local municipal study that reviews the nature, location and type of woodland features that exist. As a consequence, it is a policy of this Plan that the County will establish the criteria for determining significance at the time a natural heritage system strategy is undertaken.

c) This Official Plan does not contain criteria to determine what valleyland areas or wildlife habitat areas in the County are significant. These features would be considered significant if they are consider to be ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system. Given that a natural heritage system has not been established by this Plan, it is a policy of this Plan that the County will establish the criteria for determining significance at the time a natural heritage system is established.

Regarding woodlands, Section 4.4.4 states:

**4.4.4 Significant Woodlands**

The intent of this Plan is to preserve existing woodlands and vegetation and prohibit incompatible land uses that deter their long term benefits. Woodlands are illustrated on Appendix 1. Some areas may not be identified since the exact boundaries of mapped areas may change over time. Development and site alteration will not be permitted within or adjacent to significant woodlands unless it has been demonstrated that there
will be no negative impacts on the natural features or their ecological functions through the preparation of an EIS.

Regarding fish habitat, Section 4.4.7 states:

4.4.7 Fish Habitat
Fish habitat is spawning grounds and nursery, rearing, food supply, and migration areas on which fish depend directly or indirectly in order to carry out their life processes. Development and site alteration will not be permitted in or adjacent to fish habitat except in accordance with Provincial and Federal requirements.

Regarding watercourse, Section 4.4.8 states:

4.4.8 Watercourses
All of the watercourses in the County are considered to be environmentally significant. It is the intent of this Plan to protect all watercourses from incompatible development to minimize the impacts of such development on their function.

3.5 Town of East Garafraxa (2005)

The Township of East Garafraxa OP was approved by MMAH on October 26, 2005. Schedule B (revised June 2011) identifies the Environmental Features in the Township including PSWs, wetlands, watercourses, county forests, ANSIs and deer yards among other features. Specific to the site, Schedule B identifies a watercourse (unspecified thermal regime) to the north of the site. This corresponds to the tributary of Shaw’s Creek which has been assessed as part of this study.

Regarding fish habitat and forest areas the OP states:

7.8 FISH HABITAT
Water resources and vegetation abutting watercourses will be maintained in a clean and healthy condition to protect aquatic life and functions. Development adjacent to significant fish habitat areas shall demonstrate the following to the satisfaction of Council:

a) net gain or no net loss of productive capacity of fish habitat;
b) maintenance of minimum base flow of watercourses;
c) maintenance of existing watercourses in a healthy natural state;
d) maintenance of vegetative buffers in accordance with the sensitivity of the fishery resource and development criteria; and,
e) best available construction and management practices shall be used to protect water quality and quantity, both during and after construction. Treatment of surface run-off to maintain water quality and hydrological characteristics in receiving watercourses shall meet the standards established by the Ministries of Environment and Natural Resources.

7.10 FOREST AREAS
a) Significant Forest Areas include but are not limited to, county Forests, all woodlands 40 ha in size or larger and all forest stands that are in excess of 60 years of age and
4.0 ha in size. Only County Forests currently shown on Schedule B – Environmental Features. The identification of other significant forested areas shall be undertaken through the completion of an Environmental Impact Assessment, as outlined in Section 7.7 of this Plan. In addition to those items outlined in Section 7.7, an assessment of forested areas shall be undertaken to determine:

i) The size of the overall woodland feature;
ii) Whether the woodland is dominated by trees in excess of 60 years of age; and,
iii) The ecological functions of the woodland including the provision of interior habitat, provision of linkages to, or overlap with other natural heritage features and woodland diversity.

Schedule ‘B’ will be updated as additional significant forest areas are identified. The following policies are shall further apply to significant forest areas:

i) Disturbance of Significant Forest Areas should be minimized. Significant forests should generally be maintained as public or private open space. ii) Prior to development and siting alteration occurring in, and adjacent to Significant Forest Areas, an assessment of the forest area and the impact of the proposed development of the natural functions of that area shall be prepared by a qualified biologist to the satisfaction of Council and the County. Proposed developments in significant forest areas shall have site plan agreements containing specific management details regarding the protection of existing trees. iii) Existing tree cover or other stabilizing vegetation should be maintained on slopes in excess of 25 per cent (1 in 4 slopes); and,
iv) The cutting of trees will be regulated by a tree cutting By-law passed by the County of Dufferin or the Township.

b) Wherever possible, existing forested areas, tree lines and hedge rows shall be preserved, except where the removal of vegetation will result in lands being added for agricultural use.

3.6 Fisheries Act (2012)

Fish habitat is protected under the Federal Fisheries Act (1985). In Ontario, the federal department of Fisheries and Oceans Canada (DFO) manages fish habitat and the Ontario Ministry of Natural Resources (OMNR) manages fisheries.

The Fisheries Act has recently been updated through Bill C-38, which came into effect November 25th, 2013. Key changes include the combination of former Sections 32 and 35 into a new Section 35 addressing the removal of Harmful Alteration, Disruption or Destruction (HADD) of fish habitat. The prohibitions on killing fish and causing harmful alteration, disruption or destruction of fish habitat (HADD) have been replaced with a single prohibition in Section 35 against causing ‘serious harm to fish’ that are part of a commercial, recreational or aboriginal fishery, or to fish that support such a fishery.
“Serious harm to fish” is defined as "the death of fish or any permanent alteration to, or destruction of, fish habitat". “Serious harm to fish” includes the following:

1. The death of fish.
2. A permanent alteration to fish habitat of a spatial scale, duration or intensity that limits or diminishes the ability of fish to use such habitats as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes.
3. The destruction of fish habitat of a spatial scale, duration, or intensity that fish can no longer rely upon such habitats for use as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes.

Commercial, recreational or aboriginal fisheries include those fish that fall within the scope of applicable federal or provincial fisheries regulations as well as those that can be fished by aboriginal organizations or their members for food, social or ceremonial purposes, or for purposes set out in a land claims agreement. Fish that support these fisheries are those that contribute to the productivity of a fishery and may reside in bodies of water that contain fisheries or in water bodies that are connected by a watercourse to such water bodies.

Determining the applicability of the Section 35 prohibition to particular water bodies is now made on a case-by-case basis through a self assessment process to determine impacts fish and fish habitat and next steps. Development activities taking place in or near water may affect fisheries by adversely affecting fish or fish habitat. DFO recommends that proponents of these activities should:

- understand the types of impacts their projects are likely to cause;
- take measures to avoid and mitigate impacts to the extent possible; and,
- request authorization from the Minister and abide by the conditions of any such authorization, when it is not possible to avoid and mitigate impacts of projects that are likely to cause serious harm to fish.

Definitions of avoid, mitigation and offset are outlined below and taken from the Fisheries Protection Policy Statement (2013):

**Avoidance**

- Avoidance is the undertaking of measures to completely prevent serious harm to fish. Avoidance measures may include locating infrastructure or designing a project or one or more of its components to avoid serious harm to fish. Careful timing of certain activities may also avoid harm to fish and fish habitat.
- For some projects, serious harm to fish may be fully avoided while for others, serious harm to fish may only be partially avoided. When serious harm to fish cannot be fully avoided, mitigation measures should be undertaken.

**Mitigation**

- Mitigation is a measure to reduce the spatial scale, duration, or intensity of serious harm to fish that cannot be completely avoided. The best available mitigation
measures or standards should be implemented by proponents as much as is practically feasible.

- Mitigation measures include the implementation of best management practices during the construction, maintenance, operation and decommissioning of a project.

**Offsetting**

If all efforts have been made to avoid and mitigate impacts, any residual serious harm to fish should be addressed through “offsetting”. An offset measure is one that counterbalances unavoidable serious harm to fish resulting from a project with the goal of maintaining or improving the productivity of the commercial, recreational or aboriginal fishery. Offset measures should support available fisheries management objectives and local restoration priorities.

### 3.7 Provincial Endangered Species Act (2007)

Species at Risk awareness and legislation has increased extensively in recent years. The Ontario *Endangered Species Act* came into force in June 2008 and the Act is having a significant role in land use activities and planning due to protection of both the species as well as its habitat on all lands (i.e., private and public). Under the new *ESA* there are over 200 species in Ontario that are identified as extirpated, endangered, threatened, or of special concern.

The Act prohibits the killing or harming of threatened and endangered species, as well as the destruction of their habitat. There are, however, several transitional provisions that provide extended timelines before the protection of the habitats for certain species comes into force. For Special Concern species the Act does not afford protection to the individual or their habitat.

**There are two key protection provisions in the ESA:**

- Section 9 describes prohibited activities (e.g., kill, harm, harass, possess, collect, buy and sell) for species listed as extirpated, endangered or threatened on the Species At Risk in Ontario (SARO) List.
  - Section 10 prohibits the damage of destruction of protected habitat of species listed as extirpated, endangered or threatened on the SARO List.

**There are provisions for enforcement and penalties under the ESA that include:**

- The Act is binding on everyone including provincial and municipal governments and their staff, individuals, corporations, businesses.
- Provisions for appointment of officers, inspections, searches, seizure, forfeiture, stop work orders, and Habitat protection orders.
- The specific requirements of the due diligence defence (sec 39).
- Maximum penalties of $250K for individuals and $1M for corporations and/or imprisonment for up to 1 year for first offence.
It is important to note that the owner of the land, as well as the individual or organization carrying out any activities on those lands, are both subject to the enforcement and penalty provisions of the ESA should Sections 9 or 10 of the ESA be contravened.

The full requirements of the Act for the protection of habitat for all endangered and threatened species listed on the Species at Risk in Ontario List (SARO List) came into effect on June 20, 2013 and provides "general habitat" protection for those species that do not have specific "habitat regulation". The SARO List is itself a regulation and is updated about twice a year.

Under the "Definitions" provided in the Act under Section 2(1) “habitat” means:

(a) with respect to a species of animal, plant or other organism for which a regulation made under clause 55 (1) (a) is in force, the area prescribed by that regulation as the habitat of the species, or

(b) with respect to any other species of animal, plant or other organism, an area on which the species depends, directly or indirectly, to carry on its life processes, including life processes such as reproduction, rearing, hibernation, migration or feeding, and includes places in the area described in clause (a) or (b), whichever is applicable, that are used by members of the species as dens, nests, hibernacula or other residences; ("habitat").

Clause (a) consists of formal "regulation" of habitat and provides greater certainty of a species habitat and may identify specific habitat features, such as hibernacula.

Clause (b) is referred to as the “General Habitat”.

**“General Habitat” vs. “Habitat Regulation”**

The following summary was taken from the OMNR website under Species at Risk/Habitat Protection and Species at Risk:

*The Endangered Species Act 2007 provides two types of habitat protection; “general” and “regulated”.*

**General Habitat**

When a species is newly listed as endangered or threatened on the Species at Risk in Ontario (SARO) list, its habitat is also protected under the ESA 2007. The area of habitat protected is based on a general habitat definition found in the Act.

The definition of general habitat applies to areas that a species currently depends on. These areas may include dens and nests, wetlands, forests and other areas essential for breeding, rearing, feeding, hibernation and migration.

This protection remains in place until a species-specific habitat regulation is created.

**Regulated Habitat**

When a species is added to the SARO list, the process of identifying species-specific (or regulated) habitat begins.
A habitat regulation provides greater certainty of what is meant by a species habitat. It may describe features of the area (e.g., a creek, a cliff, or beach, or a human-made feature such as a barn) or geographic boundaries. The description may include areas where the species is found, has been found in the past, as well as areas that may be important to a species’ recovery.

A species-specific habitat regulation is the legal description of a species habitat. Once a species-specific habitat regulation is created it replaces the general habitat described above.

There are strict timelines associated with creating habitat regulations. For species listed after June 30th 2008, regulated habitat will need to be identified within 2 years for endangered species, and 3 years for those listed as threatened.

4. Existing Conditions

The study site falls within the Great Lakes – St. Lawrence Mixed Forest Zone, which covers most of southern Ontario. The site is situated in the Hillsburgh Sandhills region which is described as supporting mostly course grained sand material and having a variable, undulating topography (Chapman 1984; Groundwater Science Corp. 2014). Quaternary mapping for the study area indicates the site is within an area of deposit that consists of sand and gravel with some till or silt.

A localized area of glaciolacustrine deposit of fine to very fine sand is found in the northwest portion of the property (which is coincident with observed areas of standing water during the spring amphibian surveys).

The property is located within the northern limit of the Greenbelt Plan Protected Countryside, with approximately 0.6 ha within the Natural Heritage System (see Figure 2).

4.1 Vegetation

The vegetation and associated characterization was completed for the entire site, lands within 120 m and other lands (see Figure 1 and Figure 2). This is an important distinction for the identification of features that are either in the site, within 120 m of the site, and/or greater than 120 m from the site.

4.1.1 Vegetation Communities

The site and adjacent lands consist mainly of active agriculture, with deciduous forest, conifer plantation, and small wetland features. Field investigations identified six different Vegetation Types (e.g., CUM1-1, FOD5-2) and one Ecosites (e.g., MAS2). As characterized in the ELC system (Lee et al., 1998), naturalized vegetation areas (i.e., areas that have little or no disturbance) fall under Forest (FO). Cultural (CU) vegetation communities are defined as areas that are created or maintained by anthropogenic influences. The vegetation communities, or units, and their corresponding boundaries are illustrated on Figure 2 and detailed vegetation community descriptions are provided below.
Existing Conditions
& Proposed Site

Figure 2

Level 1 and 2 Natural Environment Assessment (NEA) and Natural Heritage Evaluation (NHE) for Tri-County Pit

Tri-County Aggregates Ltd.

Legend
- Site (Proposed Licence Limit)
- 120 m from the Site
- Tri-County Property
- Watercourse
- ELC Communities
- Greenbelt Natural Heritage System
- Amphibian Breeding Locations
- Butternut Locations
- Woodland and Wetland 30 m VPZ

Bird Locations (2014)
- Bank Swallow
- Barn Swallow
- Bobolink

Bird Habitat (2014)
- Bobolink
- Barn Swallow

Tributary of Shaw's Creek

0.6 ha
Greenbelt NHS

Other Lands Owned by Kamphuis

Other Lands Owned by Tri-County Aggregates Ltd.

Dufferin County Air Photo 2013

UTM Zone 17 N, NAD 83

Project 213363
December 2014
Unit 1: Dry-Moist Old Field Meadow (CUM1-1) - within site

There are several areas on the property that consist of old field meadow. These features are dominated by various pasture grasses, notably Smooth Brome Grass (*Bromus inermis*), mixed with old field forbs such Tall Goldenrod (*Solidago canadenis* var *scabra*), Wild Carrot (*Daucus carota*), and Common Milkweed (*Asclepias syriaca*).

Unit 2: Hedgerow (H) - within site (except Unit 2c)

There are several hedgerows on the site and adjacent lands.

Unit 2a, situated along the southern property boundary has an open canopy of Black Cherry (*Prunus serotina*), American Basswood (*Tilia americana*), Manitoba Maple (*Acer negundo*), and White Elm (*Ulmus americana*).

Unit 2b is has a relatively closed tree canopy dominated by Manitoba Maple and Black Cherry, with lesser amounts of American Basswood and White Ash (*Fraxinus americana*).

Unit 2c is dominated by mid-aged to mature Sugar Maple (*Acer saccharum*) with lesser amounts of Black Cherry and White Ash.

Unit 2d is dominated by Black Cherry, with lesser amounts of American Basswood, Manitoba Maple, Sugar Maple, and white Elm.

Unit 2e is has patchy tree/shrub cover consisting of Black Cherry, another cherry species (*Prunus* sp.), and White Elm.

Unit 3: Raspberry Cultural Thicket (CUT1-5) – greater than 120 m from site

This small thicket community is situated on the slope adjacent to the watercourse near the northern property boundary. Sporadic trees include Manitoba Maple and Green Ash (*Fraxinus pennsylvanica*). Wild Red Raspberry (*Rubus idaeus* spp. *strigosus*) is abundant in the understory. Ground covers include old field species such Panicled Aster (*Symphyotrichum lanceolatum*) and burdock (*Arctium* sp.).

Unit 4: Reed Canary Grass Mineral Meadow Marsh (MAM2-2) – greater than 120 m from site

This small marsh feature, dominated by Reed Canary Grass (*Phalaris arundinacea*), is situated along the watercourse near the northern property boundary.

Unit 5. Dry-Fresh Sugar Maple-Beach Deciduous Forest (FOD5-2) - within 120 m of site

This mature deciduous forest is situated at the north end of the property and is dominated by Sugar Maple, in association with American Beach (*Fagus grandifolia*), Black Cherry, and American Basswood, among others. Several young Butternut (*Juglans cinerea*) trees were observed at the
woodland edge. Ground covers include Yellow Trout Lily (*Erythronium americanum*), Garlic Mustard (*Alliaria petiolata*), sedges (*Carex pennsylvania, C. pedunculata*), and Blue Cohosh (*Caulophyllum giganteum*), and various ferns.

**Unit 6: Reed Canary Grass Mineral Meadow Marsh (MAM2-2) - within 120 m of site**

This wetland feature is situated along the watercourse. Reed Canary Grass is dominant, in association with Sensitive Fern (*Onoclea sensibilis*) and Fowl Manna Grass (*Glyceria striata*). A monitoring station along the east side of this wetland, DP2-13, indicates that the water table is well below the wetland from early June to late November (Groundwater Science 2014).

**Unit 7: Shallow Aquatic/Mineral Shallow Marsh (SA/MAS2) – greater than 120 m from site**

This wetland community is situated within the woodlot at the north end of the site. This feature supports standing water with floating vegetation such as Greater Duckweed (*Lemna minor*) and emergent vegetation such as Large Manna Grass (*Glyceria grandis*) and Woolgrass (*Scirpus cyperinus*), among others. The area also supports inclusions of Winterberry (*Ilex verticillata*) thicket with organic soil depths below 30 cm and sparse ground cover including Bulb-bearing Water-hemlock (*Cicuta bulbifera*) and Northern Manna Grass (*Glyceria borealis*). One area of shallow marsh had potential groundwater indicators including Three-way Sedge (*Dulichium arundinaceum*) and Fraser’s St. John’s Wort (*Tridenum fraseri*). Water level measurements on-site indicate a groundwater level within the sand and gravel unit over 5 m below the surficial silt/clay/till unit, and 1 to 1.5 m below Unit 7. This suggests that any groundwater express is likely related to a local shallow system and is not associated with the water table system within the sand and gravel unit proposed for extraction (Groundwater Science 2014).

**Unit 8: Scotch Pine Coniferous Plantation (CUP3-3) - within site**

This mid-aged planation is situated at the east end of the property. Scotch Pine (*Pinus sylvestris*) is dominant, with lesser amounts of Sugar Maple, White Cedar (*Thuja occidentalis*), White Pine (*Pinus strobus*), and Black Walnut (*Juglans nigra*). The understory is very dense with Sugar Maple, Common Buckthorn (*Rhamnus cathartica*), and Choke Cherry (*Prunus serotina*).

**Unit 9: Jack Pine Coniferous Plantation (CUP3-4) - within site**

This community, situated on the eastern edge of the property has an open canopy of Jack Pine (*Pinus banksiana*) with a few Norway Spruce (*Picea abies*). Groundcovers and dominated by pasture grasses and other old field species.

**Unit 10: Anthropogenic - within site**

This unit contains an existing farm house and barn with associated lawn and trees such as Sugar Maple, Apple (*Malus* sp.), and Norway Spruce.
Unit 11: Agricultural – row crops - within site

Much of the site and adjacent lands consist of agricultural fields planted in row crops (soy beans).

Unit 12: Agricultural - hay - within site

Agricultural fields on the west side of the property are planted in hay (Orchard Grass and legumes).

4.1.2 Flora

A total of 145 species of vascular plants were identified during the botanical inventories, with 44 (or 30%) species non-native to Ontario. This relatively high percentage of non-native species is due to the representation cultural vegetation communities, active agriculture and associated disturbances that can result in non-native species becoming established. The native deciduous forest units, particularly FOD5-2, have lower levels of disturbance, support high proportions of native species and therefore have a higher floristic quality.

The majority of the species on the property are common and secure in Ontario (ranked S5 by the Natural Heritage Information Centre) or are non-native (ranked SNA). Two species – Black Walnut (*Juglans nigra*) and Glade Fern (*Diplazium pycnocarpon*) – are ranked S4 (apparently secure). Glade Fern was observed in ELC unit 5. Black Walnut has been extensively planted and is widely naturalized. Species of conservation interest include Three-way Sedge and Fraser’s St. John’s Wort recorded from Unit 7, which will be protected.

Two Butternut trees (*Juglans cinerea*) were also recorded (see Figure 2) from other lands owned by Tri-County Aggregates to the north of the site along the edge of the woodland. Both Butternut trees are located greater than 120 m from the site. This tree is designated as Endangered both nationally, by the Committee on Status of Endangered Wildlife in Canada (COSEWIC), and provincially, by the Committee on the Status of Species at Risk in Ontario (COSSARO). Butternut is typically found on rich, moist, well-drained forests and is often found on stream bank areas. The Butternut trees are located in ELC unit 5 (FOD5-2). The Endangered Butternut is discussed further in Section 5.3.1.

A complete list of vascular plants observed in the study area is provided in Appendix A.

4.2 Wildlife

4.2.1 Breeding Birds

Breeding birds were surveyed within the different vegetation communities located within the site and adjacent lands. For the purposes of the breeding bird surveys, the study area was divided into three areas. These areas are associated with the ELC vegetation communities shown on Figure 2 and are described as:

a) Agricultural and Open Country including all cultural meadows, thickets, agricultural fields (row crop), hedgerows and former homesteads within the site and adjacent lands.
b) Agricultural and Open Country including agricultural fields (hay)
c) Sugar Maple Bush (FOD5-2) and the Marsh habitat within (SA/MAS2) and adjacent (MAM2-2) this feature.

Breeding bird surveys were conducted on the mornings of May 30, June 17 and June 27, 2014. Weather conditions for the surveys were ideal, with temperatures within 5°C of normal and it was not raining, nor excessively windy. Breeding birds were considered to be probably breeding if they were in suitable habitat and some evidence of breeding was noted (e.g., song) during the survey. Species that were likely nesting outside of the study area, but were foraging on the site were also noted. The results of the 2014 breeding bird surveys are presented in Table 2.

The breeding bird surveys recorded 37 species of birds breeding on the site, lands within 120 m and other lands owned by the proponent. An additional three species, Great Blue Heron (*Ardea Herodias*), Canada Goose (*Branta Canadensis*) and Mallard (*Anas platyrhynchos*) were observed flying over the site. There is no suitable breeding habitat for these species on site.

Bobolink (*Dolichonys oryzivorus*), Barn Swallow and Bank Swallow (*Riparia riparia*), are listed as Threatened nationally by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and provincially by the Committee on the Status of Species at Risk in Ontario (COSSARO). Eastern Wood-Pewee (*Contopus virens*) is listed as Special Concern by COSEWIC and provincially by COSSARO. Bobolink, Barn Swallow and Eastern Wood-Pewee were observed breeding on site, while the Bank Swallow was observed foraging over the site and sitting in the hedgerow along the southwest corner of the site adjacent the active aggregate site. These three species are discussed further under Sections 5.3.2, 5.3.3 and 5.3.4, respectively.

All species have a provincial breeding status as determined by the Ministry of Natural Resources of S4 (apparently secure) or S5 (secure), with the exception of European Starling (*Sturnus vulgaris*) (SE), which is a non-native species.
### Table 2. Breeding Birds Recorded from the Site, Lands within 120 m and Other Lands

<p>| Common Name           | Scientific Name               | National Species at Risk COSEWIC | Species at Risk in Ontario Listing | Provincial breeding season | SRANK | CVC Status | Area- sensitive (OMNR) | Survey 1 | Survey 2 | Survey 3 | Survey 1 | Survey 2 | Survey 3 | Survey 1 | Survey 2 | Survey 3 | Survey 1 | Survey 2 | Survey 3 |
|-----------------------|-------------------------------|---------------------------------|------------------------------------|----------------------------|-------|------------|------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|        |
| Red-tailed Hawk       | <em>Buteo jamaicensis</em>           | S5                              |                                    |                            |       |            |                        | 1      | 1      |        |        |        |        |        |        |        |        |        |
| Wild Turkey           | <em>Meleagris gallopavo</em>         | S5                              |                                    |                            |       |            |                        | 1      | 5      |        |        |        |        |        |        |        |        |        |
| Killdeer              | <em>Charadrius vociferus</em>        | S5                              |                                    |                            |       |            |                        | 2      | 2      | 2      |        |        |        |        |        |        |        |        |
| Mourning Dove         | <em>Zenaida macroura</em>            | S5                              |                                    |                            |       |            |                        | 1      | 1      |        |        |        |        |        |        |        |        |        |
| Yellow-billed Cuckoo  | <em>Coccyzus americanus</em>         | S4                              |                                    |                            |       |            |                        |        | 1      |        |        |        |        |        |        |        |        |        |
| Downy Woodpecker      | <em>Picoides pubescens</em>          | S5                              |                                    |                            |       |            |                        |        |        |        | 1      |        |        |        |        |        |        |
| Hairy Woodpecker      | <em>Picoides villosus</em>           | S5                              |                                    |                            |       |            |                        |        |        |        | 1      | 1      |        |        |        |        |        |
| Northern Flicker      | <em>Colaptes auratus</em>            | S4                              |                                    |                            |       |            |                        |        | 2      | 1      | 1      |        |        |        |        |        |        |
| Eastern Wood-Pewee    | <em>Contopus virens</em>             | SC                              |                                    | S4                          |       |            |                        | 1      | 2      |        |        |        |        |        |        |        |        |        |
| Great Crested Flycatcher | <em>Myiarchus crinitus</em>       | S4                              |                                    |                            |       |            |                        | 1      |        | 1      |        |        |        |        |        |        |        |        |
| Eastern Kingbird      | <em>Tyrannus tyrannus</em>           | S4                              |                                    |                            |       |            |                        | 1      | 2      | 2      |        |        |        |        |        |        |        |        |
| Horned Lark           | <em>Eremophila alpestris</em>        | S5                              |                                    |                            |       |            |                        | 5      | 3      |        |        |        |        |        |        |        |        |        |
| Bank Swallow          | <em>Riparia riparia</em>             | THR                             |                                    |                            |        |            |                        | 2      |        |        |        |        |        |        |        |        |        |        |
| Barn Swallow          | <em>Hirundo rustica</em>             | THR                             |                                    |                            |        |            |                        | 2      |        | 1      | 5      |        |        |        |        |        |        |        |
| Blue Jay              | <em>Cyanocitta cristata</em>         | S5                              |                                    |                            |       |            |                        | 1      | 1      | 1      | 1      |        |        |        |        |        |        |        |
| American Crow         | <em>Corvus brachyrhynchos</em>       | S5                              |                                    |                            |       |            |                        | 2      | 2      | 2      | 1      |        |        |        |        |        |        |        |
| Black-capped Chickadee| <em>Poecile atricapillus</em>        | S5                              |                                    |                            |       |            |                        | 1      | 3      | 1      | 1      |        |        |        |        |        |        |        |
| White-breasted Nuthatch| <em>Sitta carolinensis</em>         | S5                              |                                    |                            |       |            |                        |        |        |        |        | A      | 1      |        |        |        |        |        |
| Brown Creeper         | <em>Certhia americana</em>           | S5                              |                                    |                            |       |            |                        |        | 1      | 1      | 2      |        |        |        |        |        |        |        |
| House Wren            | <em>Trogilodites aedon</em>          | S5                              |                                    |                            |       |            |                        | 2      |        |        |        |        |        |        |        |        |        | 1      |</p>
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</tr>
<tr>
<td>Baltimore Oriole</td>
<td>Icterus galbula</td>
<td>S4</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>American Goldfinch</td>
<td>Spinus tristis</td>
<td>S5</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>
Credit Valley Conservation has compiled a list of bird species they consider to be of ‘conservation concern’ in the document Birds of the Credit River Watershed (CVC, 2002). Of the species considered breeding on site, 15 are also identified as conservation concern. Note that this document was produced in 2002, prior to the enactment of the provincial Endangered Species Act and the listing of many species (e.g. Barn Swallow and Bobolink). This designation is comprised of a number of criteria:

- species identified as endangered, threatened or special concern (vulnerable) in Ontario by the Ministry of Natural Resources, or rare (e.g., S1, S2) as identified by the Natural Heritage Information Centre (no species recorded met this criteria at the time of publication, but do now, e.g., Bobolink, Barn Swallow);
- Habitat Specialists, includes species that use the Credit Valley watershed as important wintering habitat, and area sensitive species. This criterion applied to species such as: Bobolink, Grasshopper Sparrow (Ammodramus savannarum), and Pine Warbler (Dendroica pinus);
- Research Priorities, includes species declining in Ontario, uncommon breeding species in the watershed, species with little data regarding breeding in the watershed. This criterion applied to species such as: Wild Turkey (Meleagris gallopavo), Clay-coloured Sparrow (Spizella pallida), Least Flycatcher (Empidonax minimus), and Killdeer (Charadrius vociferus).

Of the breeding species, six are considered ‘area sensitive’ by the Ministry of Natural Resources. This indicates that these species generally require larger patches (i.e., greater than 10 ha) of habitat in which to breed. Over half of the species are woodland area sensitive species: Hairy Woodpecker (Picoides villosus), White-breasted Nuthatch (Sitta carolinensis) and Scarlet Tanager (Piranga olivacea) The remaining are open country area sensitive species: Bobolink, Brown Thrasher (Toxostoma rufum), Savannah Sparrow (Passerculus sandwichensis) and Grasshopper Sparrow.

**Area 1 – Agricultural and Open Country (Including Cultural Meadows, Hedgerows Former Homesteads and Agricultural Fields (Row Crop))**

This area comprises almost the entire eastern half of the property including all the agricultural lands, hedgerows and cultural meadows in this area. The agricultural lands on this half of the property were planted in corn and beans during the breeding bird surveys. The dominant species recorded in this community were American Goldfinch (Spinus tristis), Indigo Bunting (Passerina cyanea), Song Sparrow (Melospiza melodia) and Wild Turkey. Two area-sensitive species (those that are usually found breeding successfully only in larger areas of contiguous habitat) were observed, including Brown Creeper and Savannah Sparrow. Brown Creeper was only observed during one visit so may represent an individual that was migrating through the site or that was not successful in breeding at the site. Multiple Savannah sparrow were documented along the edge of the fields in the hedgerows, although these species are considered to be area sensitive they are fairly common in agricultural areas and are known to nest along the edges of fields. A group of Wild Turkeys were observed feeding in this area during the second breeding bird season. Due to successful reintroduction efforts this species is now common in many of southern Ontario’s woodlots and forests.
Area 2 – Agricultural and Open Country (Including Agricultural Fields (Hay) and Hedgerows)

This area comprises the majority of the western half of the property including all the agricultural lands which have been planted in hay and the hedgerows that are located around the edge of this community. The dominant species recorded in this community were Savannah Sparrow, Song Sparrow, Bobolink and European Starling. Bobolink was only observed during the first visit (May 30) as the hay field was harvested between the first and second visit making the habitat was no longer suitable for this species. The field was plowed in the fall from crop rotation. Savannah Sparrow and Song Sparrow were present throughout this community during all surveys, however were less numerous during the second survey after the hay had been cut.

Area 3 – Sugar Maple Forest (FOD5-2) (Including Marsh habitat within (SA/MAS2 and adjacent (MAM2-2)

This community is located outside of the proposed site in lands within 120 m and other lands owned by the proponent to the north. It is characterized as a Sugar Maple bush with a marsh community in the middle of this feature and along the southern edge of the feature. The dominant species recorded in this community was Red-eyed Vireo (*Vireo olivaceus*). Four area-sensitive species were observed including Hairy Woodpecker, White-breasted Nuthatch, Brown Creeper and Scarlet Tanager. Hairy Woodpecker, White-breasted Nuthatch and Scarlet Tanager are all known to occur in larger deciduous forests. Brown Creeper was observed along the edge of the forest community and is often more commonly associated with more open communities with the occasional tree or shrub or agricultural hedgerows surrounded by agricultural lands.

Habitat for Migrant Birds

Regionally significant habitat for migrant birds is typically associated with physiographic features. Great Lakes shorelines and major north to south natural areas (e.g., Niagara Escarpment) are often found to provide habitat for many migrant species. The deciduous woodland may provide some resting and foraging habitat for smaller perching birds during the spring and fall migrations but it does not represent a large contiguous patch of woodland for migrant birds. Flooded agricultural fields in the spring can also provide habitat for migratory waterfowl which use them to rest and feed. Agricultural lands in the hay field in the western half of the property were flooded in the early spring during the amphibian call surveys (April 21, 2014). During this survey only Canada Goose and Mallard Ducks were observed. In order for this type of habitat to be considered significant it must be used by a certain number of certain species of waterfowl. Based on the observations made over the course of the field investigation it is unlikely that these small flooded areas meet the criteria to be considered significant according the Significant Wildlife Habitat Technical Guide (OMNR, 2000).

4.2.2 Winter Wildlife Habitat

The primary consideration for winter bird habitat in southern Ontario is cover and food. The site and majority of the lands within 120 m provide very limited winter cover. Winter cover opportunities are found in other lands owned by the proponent to the north, namely in the deciduous woodlot. The old meadow habitat may provide food for small mammals. Overall, the winter habitat opportunities on the property provide some value at the local level, but would not be considered important.
A winter wildlife survey was completed on March 13, 2014 during ideal conditions for further assessment of seasonal habitat use. The following species were recorded as being active during the winter season through direct observation or other observations (e.g., tracks, scat, carcass):

- White-tailed Deer (*Odocoileus virginianus*);
- Coyote (*Canis latrans*);
- Snowshoe Hare (*Lepus americanus*);
- Eastern Gray Squirrel (*Sciurus carolinensis*);
- Wild Turkey (*Meleagris gallopava*)

These species are expected to be residents of the woodland and adjacent local naturalized areas. Fresh sets of Coyote tracks (2 individuals) were observed along the south side of the woodland where they had been feeding on a White-tailed Deer carcass located in the open field approximately 30 m south of the woodland. Coyote tracks continued onto the western boundary of the woodland and edge of the watercourse.

Fresh Snowshoe Hare tracks and scat were observed within the southern part of the woodland along the riparian zone of the watercourse (in Unit 6). There was evidence of browsing on shrubs. One set of fresh Snowshoe Hare tracks were observed in the open field approximately 100 to 150 m west of the woodland. Older Coyote, Snowshoe Hare and White-tailed Deer tracks were observed along the hedgerow Unit 2d (see Figure 2) and adjacent field.

There was an abundance of small mammal tracks (Gray Squirrel) within the woodland along the slopes of the ravine associated with the watercourse.

Fresh Wild Turkey tracks (group of approximately 6 to 7) were observed where the group had moved from the northwest edge of the property along the riparian zone of the watercourse, into the woodland towards the isolated wetland (Unit 7). Older tracks were seen on the east side of the property along the watercourse.

In summary there was good evidence of wildlife activity and use of winter habitat associated with the woodland and riparian zone of the watercourse as well as for movement in the immediate adjacent fields. There was very limited evidence of winter wildlife activity in the area of the site likely due to the openness and lack of shelter.

### 4.2.3 Amphibians

Amphibians can be a particularly important part of the ecosystem in part because of their relatively large biomass. As they concentrate in preferred breeding areas, these sites are often important for conservation purposes.

Breeding amphibian habitat locations are shown on Figure 2. Two potential breeding sites were established from interpretation of aerial photography and ground-truthing. These were:

- **Site #1:** a woodland wetland *(located greater than 120 m from the site)*
- **Site #2:** an open agricultural area with standing water in the spring *(located within 120 m of the site)*
Weather conditions at the time of the three amphibian surveys are summarized in Table 3.

### Table 3. Amphibian Call Survey Details

<table>
<thead>
<tr>
<th></th>
<th>Survey Round 1</th>
<th>Survey Round 2</th>
<th>Survey Round 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date:</td>
<td>April 21, 2014</td>
<td>May 27, 2014</td>
<td>June 23, 2014</td>
</tr>
<tr>
<td>Start time:</td>
<td>20:40</td>
<td>22:15</td>
<td>22:30</td>
</tr>
<tr>
<td>Temp (°C):</td>
<td>13-17</td>
<td>20</td>
<td>19</td>
</tr>
<tr>
<td>Wind (Beaufort scale):</td>
<td>2</td>
<td>0-1</td>
<td>0-1</td>
</tr>
<tr>
<td>Cloud cover (%):</td>
<td>90</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>Precipitation</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

1 Beaufort Scale: 0=calm (<1 km/h), 1=light air (1.1-5.5 km/h), 2=light breeze (5.6-11 km/h)

The results of the amphibian surveys are summarized in Table 4. Only one species, Spring Peeper (*Pseudacris crucifer*), was recorded calling on the property during the surveys. Spring Peeper were heard at two locations during the first survey round and at one location during the second round. Spring Peeper were also heard calling from undefined locations to the north and west of the property. No frogs were heard calling on the property during the third round.

An incidental observation of a Wood Frog (*Rana sylvatica*) was made in ELC unit 5 on June 23, 2014 suggesting that the forest area may provide amphibian habitat during the summer.

### Table 4. Results of Nocturnal Amphibian Call Surveys

<table>
<thead>
<tr>
<th>Location (Figure 2)</th>
<th>April 21, 2014</th>
<th>May 27, 2014</th>
<th>June 23, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SPPE – 3</td>
<td>SPPE – 3</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>SPPE – 3</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

SPPE = Spring Peeper
Code 0 – No calling
Code 1 – Individuals can be counted; calls not simultaneous. Estimated number of individuals indicated in brackets
Code 2 – Calls distinguishable; some simultaneous calling. Estimated number of individuals indicated in brackets
Code 3 – Full chorus; calls continuous and overlapping.

### 4.2.4 Mammals

In the settled landscapes of southern Ontario, the remaining mammal species are mostly those that have benefited from agricultural expansion and other human activities. Many of the sensitive species have been extirpated and the remaining ones are generally widespread and common. All incidental observations of mammals were recorded during all site visits by Beacon ecologists. Table 5 presents the mammals recorded from the site, lands within 120 m and other lands owned by the proponent.
Table 5. Mammals Recorded from the Site, Lands within 120 m and Other Lands

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Status</th>
<th>Study Area Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gray Squirrel</td>
<td>Sciurus carolinensis</td>
<td>Common</td>
<td>• Occasionally observed in woodlot</td>
</tr>
<tr>
<td>Eastern Chipmunk</td>
<td>Tamius striatus</td>
<td>Common</td>
<td>• Occasionally observed in woodlot</td>
</tr>
<tr>
<td>Coyote / Fox</td>
<td>Canis latrans / Vulpes vulpes</td>
<td>Common</td>
<td>• Tracks observed in agricultural lands and woodlot</td>
</tr>
<tr>
<td>White-tailed Deer</td>
<td>Odocoileus virginianus</td>
<td>Common</td>
<td>• Observed occasionally during site visits. Tracks and scat common throughout the property</td>
</tr>
</tbody>
</table>

It is likely that a range of other mammal species is present on the site, such as small mammals. However, based on the habitat present, it is unlikely that any species of particular conservation concern is present.

4.3 Aquatic Environment

4.3.1 Shaw’s Creek

Shaw’s Creek is located within the Credit Valley Conservation watershed and has a drainage catchment of 77.8 km$^2$. The Shaw’s Creek subwatershed is located in the CVC upper watershed (Subwatershed 17) which lies above the Niagara Escarpment and includes features such as Caledon Lake. Shaw’s Creek is a predominately coldwater stream that contains a population of Brook Trout (Salvelinus fontinalis). Shaw’s Creek flows into the Credit River at the Town of Alton (CVC 2014).

4.3.2 Tributary of Shaw’s Creek

The Shaw’s Creek headwater tributary traverses part of the lands within 120 m of the site as well as other lands owned by the proponent to the north of the site (see Figure 3). This creek is within subcatchment number 17-01 which includes a number of tributaries that flow into Caledon Lake to the northeast (CVC 2014). The watercourse elevation where the feature enters other lands owned by Tri-County is approximately 475.9 m and 472.2 m near the downstream boundary of the property (Groundwater Science 2014).

This watercourse is described as a warmwater intermittent watercourse (CVC 2014) that originates 0.8 km to the northwest at 17th Line. The tributary is described as consisting of an agricultural drain feature, watercourse and ponds. Within the adjacent lands it is an intermittent watercourse that flows in an easterly direction through several on-line ponds where it eventually discharges into Caledon Lake approximately 4.5 km downstream. The surrounding land use on the site is agricultural with the exception of the woodlot which the watercourse flows through. Adjacent properties to the east and west of the site contain operating and/or approved gravel pits (i.e., Greenwood and Rayburn Pits).

Based on a water balance completed by Groundwater Science (2014), which includes estimated infiltration recharge and runoff as well as seasonal variations, the direct runoff contribution area of the...
site (proposed Licensed area) to the tributary of Shaw's Creek is approximately 5.4 ha. Under current conditions an additional 29.3 ha of the site may contribute overland flow toward Shaw’s Creek on a seasonal basis. The seasonal runoff would be concentrated in spring / snowmelt (April and May), especially during frozen soil conditions, or, larger precipitation events (e.g. later in October to November). Under average conditions little or no runoff would occur in winter (precipitation is stored in snowpack) or during smaller precipitation events in the remainder of the year (e.g. in summer months when evapotranspiration is greater than rainfall).

4.3.3 Fish Habitat

Aquatic habitat surveys were completed in the Tributary within the 120 m adjacent lands and other lands owned by Tri-County. The aquatic habitat is described below as per the established reaches. Several reaches were established where habitat or riparian habitat changed. In total 4 reaches (Reach A-D) were assessed (see Figure 3) with the physical characterization of each provided below. There is seasonal, direct fish habitat along Reaches A-D with approximately half of the length of Reach C and all of Reach D located within 120 m of the site.

Reach A

Reach A is the furthest most upstream reach of the tributary, north of the site on other lands owned by the proponent. This reach has been channelized and potentially realigned at some point to accommodate agricultural practices. The tributary in this location has high steep banks with some evidence of erosion. The wetted width is approximately 0.50 m, wetted depth was 0.15 m at the time of the survey and bankfull width was 2 m. Substrates were 100% sand with some detritus. Through this reach the stream morphology consisted of riffle and run, no pools were observed. Canopy cover was low at approximately 30% and riparian cover was dominated by grasses and herbaceous vegetation. Filamentous algae were growing throughout Reach A.

Reach B

The channel becomes naturalized as it enters the woodlot and was assessed as Reach B. The tributary meanders through the woodlot with a wide, defined natural channel. The tributary in this location has low gradual banks that are well vegetated. The wetted width is approximately 1.50 m, wetted depth was 0.20 m at the time of the survey and bankfull width was 5.7 m. Substrates were dominated by sand with gravel, cobble and few scattered boulders. Through this reach the stream morphology consisted of runs and pools with isolated sections of riffles near boulders. In-stream cover was provided by woody debris, leaf litter and some aquatic vegetation. Canopy cover was 100% and provided by mature deciduous trees while riparian cover was dominated by grasses and herbaceous vegetation.

Reach C

The tributary transitions to an open area located in vegetation unit 6 which is dominated with wetland vegetation (see description in Section 4.1.1). The channel divides into two distinct channels with several smaller channels created during high flow. The stream banks are very low and gradual in this
Figure 3

Level 1 and 2 Natural Environment Assessment (NEA) and Natural Heritage Evaluation (NHE) for Tri-County Pit

Tri-County Aggregates Ltd.

Legend
- Site (Proposed Licence Limit)
- 120 m from the Site
- Tricounty Property
- Watercourse
- Watercourse 30 m VPZ
- Reach Breaks
- Greenbelt Natural Heritage System

HDFA - Areas of Investigation

Existing Conditions - Aquatic Resources & Proposed Site

Other Lands Owned by Tri-County Aggregates Ltd.

0.6 ha Greenbelt NHS

120 m from the Site

Tricounty Property

Watercourse

Watercourse 30 m VPZ

Reach Breaks

Greenbelt Natural Heritage System

0
55
110
220 Metres

UTM Zone 17 N, NAD 83

1:5,500

Project 213363

December 2014
location. The average wetted width of both channels was approximately 0.40 m, wetted depth was 0.10 m at the time of the survey. Substrates were dominated by sand with some gravel patches. In-stream cover was provided by woody debris, leaf litter and some aquatic vegetation. Canopy cover was 20% and provided by mature deciduous trees while riparian cover was dominated by ferns and grasses. Potential seepage areas were identified through the presence of iron staining and minimal flow not coming from the channels. At the eastern edge of the woodlot the two channels merge back together.

**Reach D**
Reach D is the lower portion of the tributary located on lands within 120 m of the site where it exits the woodlot. The average wetted width of both channels is approximately 0.60 m, wetted depth was 0.13 m at the time of the survey. Substrates were dominated by sand with some gravel patches. The channel consisted of dense Reed Canary grass cover throughout. Canopy cover was 15% and provided by shrubs while riparian cover was dominated by ferns and grasses. There is a farm access crossing located in this reach with a small CSP culvert. The crossing is approximately 2-2.5 m wide.

### 4.3.4 Fish Community
Available fisheries data were reviewed and fish community surveys were undertaken to identify the presence/absence of fish species and to help characterize the fish community in the tributary. Fish community records provided by CVC (2005) identified the presence of Brook Stickleback (*Culaea inconstans*) and species in the Carp and Minnow family.

During the spring of 2014 survey, the entire tributary was electro-fished along Reaches A to D. A total of 4 species were captured and are described in **Table 6**, below.

**Table 6. Electro-fishing Results from Tributary of Shaw’s Creek (May 22, 2014)**

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Latin Name</th>
<th>Thermal Regime</th>
<th>Spawning Season</th>
<th>S-Rank</th>
<th>OMNR Status</th>
<th>General Abundance</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brook Stickleback</td>
<td><em>Culaea inconstans</em></td>
<td>Coolwater</td>
<td>Spring-Summer (May-July or temperatures between 8-19°C)</td>
<td>S5</td>
<td>None</td>
<td>Common</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Creek Chub</td>
<td><em>Semotilus atromaculatus</em></td>
<td>Coolwater</td>
<td>Spring (May-June or temperatures between 13-27°C)</td>
<td>S5</td>
<td>None</td>
<td>Common</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Northern Redbelly Dace</td>
<td><em>Chrosomus eos</em></td>
<td>Coolwater</td>
<td>Spring-Summer (May-July or temperatures between 13-27°C)</td>
<td>S5</td>
<td>None</td>
<td>Common</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Common Name</td>
<td>Latin Name</td>
<td>Thermal Regime</td>
<td>Spawning Season</td>
<td>S-Rank</td>
<td>OMNR Status</td>
<td>General Abundance</td>
<td>Tolerance</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------------</td>
<td>----------------</td>
<td>--------------------------------------</td>
<td>--------</td>
<td>-------------</td>
<td>-------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>White Sucker</td>
<td>Catostomus commersonii</td>
<td>Coolwater</td>
<td>Spring (April-June or temperatures between 10-20°C)</td>
<td>S5</td>
<td>None</td>
<td>Common</td>
<td>Tolerant</td>
</tr>
</tbody>
</table>

Notes:

1 - Information provided by the Ontario Freshwater Fishes Life History Database (Eakins, 2013)

**Tolerance** - Ability of a species to adapt to environmental perturbations or anthropogenic stresses

**S-rank:** The Natural Heritage provincial ranking system (provincial S-rank) is used by the MNR Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities.

Definitions are as follows:
- S3 Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
- S4 Apparently Secure; uncommon but not rare; some cause for long-term concern due to declines or other factors.
- S5 Very common and demonstrably secure in Ontario.
- SNA Not Applicable; a conservation status rank is not applicable because the species is not a suitable target for conservation activities (i.e., exotic or hybrid).

**OMNR Status:** Based on ranking by SARO (Species at Risk in Ontario). If a species is classified as at risk they are added to the SARO List and protected under the Endangered Species Act, 2007.

Based on the fish community information provided by CVC and results of the fish survey, the fish species in the tributary are all coolwater and typically spawn in the spring and/or summer or when optimal temperatures are suitable, depending on the fish species (Table 6). Based on the substrates and suitable habitat identified in the tributary, the fish species likely use the watercourse for spawning if water level conditions allow for access. All of the species can be found in riverine systems at varying depths and substrates. All of the species identified in the tributary are provincially ranked as S5 indicating that each of the fish species is secure, widespread and common within Ontario. These fish are considered to be tolerant or have an intermediate tolerance to environmental perturbations or anthropogenic stresses.

The subwatershed study classifies the fish community within the tributary of Shaw’s Creek as warmwater. The study also indicates that Brook Trout inhabit downstream reaches of the tributary, upstream and along Highpoint SR and upstream of Caledon Lake (CVC 2014).

### 4.3.5 Stream Levels and Streamflow

As part of the ARA study requirements, Groundwater Science (2014) completed a study to determine the elevation of the established (ground) water table within the site and adjacent lands. As part of this study, stream level and streamflow monitoring was completed at DP1-13 (upstream station at property boundary) and DP2-13 (downstream station at property boundary), see Groundwater Science (2014) report for details and mapping.
Based on data collection and analysis by Groundwater Science (2014), the water level hydrograph at DP1-13 (upstream reach) and DP2-13 (downstream reach) indicated the following information about the Shaw’s Creek tributary that is of consideration to opportunities for fish and function as fish habitat:

- The tributary experiences rapid increase and subsequent decrease in streamflow and water levels in response to precipitation and snowmelt;
- apart from precipitation events, stream depths of less than 1 cm (DP1-13), and/or dry conditions, commonly occurred from early June 2014 to late September;
- dry conditions were recorded in August;
- an overall increase in stream depth and flow in October and November 2014 (depths less than 2 cm at DP2-13);
- surface water levels are consistently higher than groundwater elevations indicating recharge conditions; and,
- indications of very rapid infiltration of water along stream bed.

Following the snowmelt and spring freshet, a decrease in flow was observed in late spring and summer conditions with streamflow observations from May to October varying from approximately 1 to 13 L/s. Observations made by Groundwater Science in July, September and October identified flow in the upstream reach that infiltrated within the channel as the flow moved downstream such that no flow was observed where the tributary exits lands owned by the proponent. This indicates that it is a losing watercourse with no groundwater discharge during these observation periods.

During April to mid-May 2014, groundwater discharge conditions were observed at the downstream station (DP2-13), after which recharge conditions were observed as described above. For the majority of the year, the tributary provides a recharge function to the shallow groundwater system with the water table frequently below the bed of the stream (Groundwater Science).

Temperature was collected at these monitoring stations from below the grade of the streambed and therefore could not be used for stream surface water temperatures. Temperature loggers will be installed at these stations for monitoring the stream through 2015.

4.3.6 Summary

Based on the information collected through background review, site investigations and reports prepared by others, it has been shown that the tributary of Shaw’s Creek generally dries up during the summer months (June to late September). The upstream reach (DP1-13) has water levels recorded on several occasions when water levels downstream (DP2-13) were dry. The water level and streamflow information confirms the intermittent classification of the watercourse, with flows during the spring freshet and after rain events in the summer. The feature provides seasonal fish habitat including spawning habitat in the early spring (likely April and May) to four different fish species that then seek refuge in downstream reaches as the flows decrease and the watercourse becomes dry. This feature also contributes water, sediment, nutrients and organic matter to downstream reaches when flowing. Flow observations along the tributary indicate that there is rapid infiltration during periods of the year (June to October) and the watercourse is functioning as a losing system. This limits movement of fish and as a result they will move downstream to suitable. Some groundwater discharge was recorded which may provide fish habitat functions during April and May and potentially in November.
4.4 Headwater Drainage Feature Assessment

Potential Headwater Drainage Features (HDF) were identified using air photo interpretation and then ground-truthing. HDF assessments were completed on April 21\textsuperscript{st} and May 27\textsuperscript{th}, 2014. The site is located in the Hillsburgh Sandhills which is composed primarily of coarse-grained sandy material (CVC 2014; Groundwater Science 2014) and the topography of the area is very undulating with several bowl-like depressions.

The site and adjacent lands were broken up into 5 areas to assess the potential HDF’s and were loosely based on areas bounded by hedgerows (see Figure 3). The results of the assessment are described further below.

Area 1

During the initial field visit the 3 small depressions were still covered in snow. This area is described as knob and basin relief by DBH as part of their surficial soils assessment (2014). Site conditions during the 2\textsuperscript{nd} visit were dry and plowed through. There was not standing or flowing water observed.

Area 2

One depression was identified in this area and contained moist soils during the initial visit. The feature was dry during the second visit. No standing water or discharge channel flow was observed leaving the depression.

Area 3

No features were observed in this area.

Area 4

During the initial site visit, large areas of standing water were observed on lands within 120 m of the site and adjacent property, which can be seen on Figure 3 as the darker tone of the aerial photo. Three depression areas were identified with an undefined swale feature connecting them that were found to support standing water. The depressions appear to drain into the larger feature located on the adjacent property. During the second visit, all features were dry. No vegetation was growing in these areas. Breeding amphibians were heard calling on April 21\textsuperscript{st} 2014 from the larger area of standing water on the adjacent lands to the west (see Section 4.2.3 of this report).

Area 5

Area 5 was only visited during the second site visit and no standing water was observed. No vegetation was growing in these areas.
**Summary**

Due to the soil conditions on the site and adjacent lands, any water that may accumulate in the depressions are likely drained and do not travel along the surface, therefore no HDF’s were identified on the site or adjacent lands. This conclusion is supported by the site geologic characterization completed by Groundwater Science (2014) and the soil survey report completed by DBH Soil Services Inc. (2014). The surficial soils are identified as well drained sandy materials that are developed over sand and gravel deposits. The majority of the soil inspection sites completed by DBH (2014) are characterized as well drained (drainage class) soils. During surveys completed by DBH, there was no observation of standing or flowing water, or microdrainage channels.

**5. Natural Environment Level 1 Screening**

**5.1 Context**

As part of this study the existing natural heritage features and conditions were characterized for the site, lands within 120 m and other lands owned by the proponent as shown on Figure 2. For the purposes of the Level 1 natural environment screening, it is based on the proposed area to be licenced (“the site”) as shown on Figure 4, plus the 120 m of adjacent lands. The natural heritage features are mapped on Figure 2 and Figure 3.

The site and adjacent lands consist of active agricultural fields with discontinuous treed hedgerows, small coniferous plantations, a native woodland, three small old field meadows, a shrub thicket, two wetland areas associated with the woodland and watercourse, and an unoccupied farm house and outbuildings.

The *Aggregate Resources Act* Provincial Standards require a determination if any of the following natural heritage features exist on or within 120 m of the site:

- a) significant wetlands;
- b) significant habitat of endangered and threatened species;
- c) fish habitat;
- d) significant woodlands;
- e) significant valleylands;
- f) significant Areas of Natural and Scientific Interest (ANSIs); and
- g) significant wildlife habitat.

The same seven natural heritage features are identified as part of Section 2.1 of the Provincial Policy Statement for the protection and management of natural heritage features and resources.

The following section provides an overview of the above mentioned natural heritage features and discusses the relevance of each to the project. These sections are also intended to address policies relating to natural heritage features under the Official Plans for Dufferin County, the Township of East Garafraxa and the Greenbelt Plan.
5.2 Significant Wetlands

The designation of wetlands, as either regionally or provincially significant, is completed through a standardized assessment known as the Ontario Wetland Evaluation System. The Ontario Ministry of Natural Resources (OMNR) is generally responsible for the evaluation of wetlands, although wetland data information may be provided by other agencies, such as local conservation authorities. The final designation of a wetland as either locally or provincially significant is ultimately the responsibility of the OMNR.

There are three wetlands found within the northern part of property that are all associated with the woodland and watercourse (units 4, 6 and 7). There are no wetlands within the proposed licenced area, while wetland unit 6 (a meadow marsh community) is located within 120 m of the proposed licenced boundary (see Figure 2 and Figure 4).

The nearest provincially significant wetland is the Caledon Lake Provincially Significant Wetland (PSW) Complex, which is approximately 560 m to the east of the property and proposed licenced boundary.

5.3 Significant Habitat of Endangered and Threatened Species

Field investigations have identified four endangered or threatened SAR consisting of one Endangered species (Butternut) and three Threatened species (Bank Swallow, Bobolink, and Barn Swallow). Each species is discussed further in the sections below.

5.3.1 Butternut (Endangered)

This species was listed as Endangered by both the Committee On the Status of Species At Risk in Ontario (COSSARO) in 2004 and the Committee On the Status of Endangered Wildlife In Canada (COSEWIC) in 2003 due to declining populations. The Butternut is subject to the provisions of the provincial Endangered Species Act (2007) and the federal Species at Risk Act (2002).

Butternut can be found through most of the southern and eastern mixed deciduous forests in Ontario except the Bruce Peninsula and Manitoulin Island. Butternut is threatened by a disease known as Butternut canker and hybridization with other walnut species.

Butternut trees were observed from two locations along the edge of the northern woodlot (unit 5). The locations of the trees are outside of the proposed licenced area and 120 m adjacent lands. The Recovery Strategy for Butternut provides recommendations for regulated habitat for this species to consist of a minimum radius of 25 m around the base of the stem of Retainable trees (Poisson and Uric 2013). Based on the locations of the Butternut trees being outside of the proposed development, the individual trees and any potential habitat will be protected. Based on the protection of the trees, formal Butternut Health Assessments did not need to be completed.
EXISTING FEATURES

NOTES

1. This site plan is prepared under the Aggregate Resources Act for a Class A License, Category 3, Pit Above Water.

2. Property boundary from:

- Existing land use derived from 2013 aerial photo and site reconnaissance.
- Existing zoning from Township of East Garafaxa zoning by-law, December 2004.
- Topographic mapping for site and surrounding lands performed by First Base Solutions, April 20, 2013 (orthophoto, contour interval 1m).

3. The water table has been established from monitoring of on-site and off-site groundwater flow, and is expected to remain 1.5m above the seasonally high water table.

4. Existing surface drainage, location of site entrance & exit, entrance & exit from farm, location of cross sections, and location of site entrance.

5. Existing tree cover, existing 1m contours, and width of existing tree cover.

6. Greenbelt - natural heritage system, 18th Line, 17th Line, and 16th Line.

7. Existing tree.

8. Existing features - watercourse, existing building and use, shed.


10. Existing test pits, Stantec 2010.

11. Selected sand & gravel resource area, secondary significance.


13. Existing test pit, Groundwater Science Corp. 2014.

14. Other lands owned by Tri-Kamp Farms.

15. Property records data from:

- Property records data from Tri-Kamp Farms.

16. Owner Tri-County Kamphuis.

17. Total property area, Ha:

- Property area, Ha: 61.0 61.2 122.2
- Licensed area: 49.7 12.6 62.3
- Excavation area: 47.0 12.1 59.1
5.3.2 Bank Swallow (Threatened)

This species has been listed as Threatened by both COSSARO (in 2014) COSEWIC (in 2013) due to declining populations. The Bank Swallow and its habitat are subject to the provisions of the provincial *Endangered Species Act (2007)* and the federal *Species at Risk Act (2002)*.

The Bank Swallow is an aerial insectivore that nests in burrows in natural and human-made banks made of silt or sand. Many nests are on banks of rivers and lakes, but can also be found in active sand and gravel pits or former ones where the banks remain suitable. They breed in colonies that range in size from several to a few thousand pairs.

Bank Swallows were observed flying over the agricultural lands on the southern edge of the property and sitting in a hedgerow along the southern edge of the property (see Figure 2). An active aggregate operation is located to the south west of the site and it is possible that these birds are nesting off site. There is no suitable habitat for this species within the site or adjacent lands.

5.3.3 Barn Swallow (Threatened)

This species was listed as Threatened by both COSSARO and COSEWIC in 2011 due to declining populations. The Barn Swallow and its habitat are subject to the provisions of the provincial *Endangered Species Act (2007)* and the federal *Species at Risk Act (2002)*.

The Barn swallow is an aerial insectivore. It is a very widespread and common species and the most widespread swallow species in the world (Turner and Rose 1989). The species has become closely associated with humans, to the extent that in some regions it is now almost commensal. It nests in or on a great variety of artificial structures (e.g., buildings, barns, bridges). While when foraging, it often feeds in open country habitat over human-modified landscapes (e.g., short turf, agricultural lands, around livestock) as well as over more natural habitats such as wetlands and open water. While it is breeding this swallow typically prefers areas where water is nearby. It is likely that the swallow has benefitted greatly from human activities; previously it was likely confined to coasts and upland areas with caves and cliffs.

The birds usually breed in groups of fewer than five nests, although larger groupings are sometimes recorded (e.g., 50). Pairs bonds often persist and individual adults return to the same nest site, with first-years returning within 3 km of their natal site (Turner and Rose 1989 and citations therein).

One active Barn Swallow nest was observed on a light fixture on the porch of the abandoned homestead on the east side of the property (see Figure 2). Barn Swallow was observed actively foraging over the meadow to the south of this location and on the east side of 18th Line.

Unlike nesting habitat for some rare species, nesting habitat for Barn Swallow can be replaced successfully and in a relatively short period of time given the nesting habitat consists of nest cups on man-made structures. There are criteria specific to the compensation of nests that include the number of nests created, the placement of the nests relative to the existing nests and suitable foraging habitat and the placement of the nests on the structures they are installed in (discussed in Section 7.5).
The Endangered Species Act also applies to foraging habitat and the meadow community near the old homestead. The extent of habitat replacement would be negotiated with the MNR through the Permit process and typically would be a minimum of 1:1 habitat replacement.

5.3.4 Bobolink (Threatened)

This species was listed as Threatened by both COSSARO and COSEWIC in 2010 due to declining populations. The Bobolink and its habitat are subject to the provisions of the provincial Endangered Species Act (2007) and the federal Species at Risk Act (2002).

The Bobolink is a songbird that breeds in extensive agricultural grasslands, especially hayfields, and old fields with tall lush forb vegetation. Historically in the east, the species benefited from human alteration of the landscape, however, in the last several decades the populations in Ontario and other jurisdictions are thought to have declined. The putative declines are thought to be due to a combination of: changes in agricultural practice (leading to direct mortality when fields are plowed in June), habitat loss (due to natural succession or urbanization), pesticide exposure and bird control on their wintering grounds. Despite declines, it is still a common species in southern Ontario, especially immediately south of the Canadian Shield where there tends to be more marginal agricultural lands.

On May 30, 2014 four pairs of Bobolink were recorded as breeding (nesting territories) in the hay fields on lands within 120 m of the site (see Figure 2). On the same day another five Bobolink were observed flying over the hay field within the site where the Bobolink nesting territories were observed and one Bobolink was perched along the fencerow on the south side of this field. While Bobolink were not observed breeding in the southern portion of the hay field within the site, the hay field conditions observed provide suitable habitat for Bobolink as shown on Figure 2. The hay field was harvested prior to the following two breeding bird surveys (June 17 and 27) and no additional Bobolink observations were made.

5.3.5 Additional Species

As part of the request for background information, other SAR species which the MNRF indicated (G. Findlay, pers. comm. 2014) could potentially be associated with the habitats on or adjacent to the site include two additional Endangered species; Little Brown Myotis (Myotis lucifugus) and Northern Myotis (Myotis septentrionalis); two Threatened species, Chimney Swift (Chaetura pelagica) and Eastern Meadowlark (Sturnella magna); and three species of Special Concern; Canada Warbler (Wilsonia canadensis), Milksnake (Lampropeltis triangulum) and Monarch Butterfly (Danaus plexippus).

Each Endangered or Threatened species is discussed further in the sections below. Special Concern species are discussed in Section 5.8 under the assessment for Significant Wildlife Habitat.

Little Brown Myotis (Endangered)

This species was not recorded from the property and is listed as Endangered by both COSSAR and COSEWIC in 2013 due to declining population The Little Brown Myotis is subject to the provisions of
the provincial *Endangered Species Act* (2007) and has not been listed under the federal *Species at Risk Act* (2002).

Little Brown Myotis is widespread in southern Ontario. It is a nocturnal species that roosts in trees and buildings during the day and forages and feeds at night. They often select attics, abandoned buildings and barns for summer colonies where they can raise their young.

Potentially suitable habitat for this species is present in cavity trees within the woodlot and in the abandoned house and shed at the old farmstead. Targeted surveys for this species was not completed.

**Northern Myotis (Endangered)**

This species was not recorded from the property and is listed as Endangered by both COSSAR and COSEWIC in 2013 due to declining population. The Northern Myotis is subject to the provisions of the provincial *Endangered Species Act* (2007) and has not been listed under the federal *Species at Risk Act* (2002).

Northern Myotis is found throughout forested areas in southern Ontario where it is associated with forests roosting under loose bark and in the cavities of trees.

Potentially suitable habitat for this species is present in cavity trees within the woodlot and in the abandoned house and shed at the old farmstead. Targeted surveys for this species was not completed.

**Eastern Meadowlark (Threatened)**

This species was not recorded from the property and is listed as Threatened by both COSSARO 2009 and COSEWIC in 2007 due to declining populations. The Eastern Meadowlark and its habitat are subject to the provisions of the provincial *Endangered Species Act* (2007) and the federal *Species at Risk Act* (2002).

Eastern Meadowlark is a songbird that breeds in tall grasslands, including pastures and hayfields. It can also be found in alfalfa fields, weedy borders of croplands, roadsides, orchards, airports, shrubby overgrown field, or other open areas. Small trees, shrubs or fences posts are used as elevated song perches.

Potentially suitable habitat for this species exists in the hay fields on and within 120 m of the site. However, following the appropriate survey protocol no Eastern Meadowlark were recorded. One individual was heard to the north of other lands owned by the proponent during the aquatic habitat assessment of the property in May 2014 but was not heard during any of the three breeding bird surveys.
Chimney Swift (Threatened)

This species was not recorded from the property and is listed as Threatened by COSSARO in 2009 and COSEWIC in 2007 due to declining populations. The Chimney Swift and its habitat are subject to the provisions of the provincial *Endangered Species Act* (2007) and the federal *Species at Risk Act* (2002).

Prior to European settlement Chimney Swifts primarily nested on cave walls in hollow trees or tree cavities in old growth forests. Now they nest almost exclusively in and around urban settlements where the nest and roost in chimneys and other manmade structures.

The chimney at the farm house was monitored during amphibian and breeding bird surveys and no Chimney Swift were observed.

5.4 Fish Habitat

The designation of fish habitat can be completed by agencies such as the OMNR or local conservation authorities, although the federal Department of Fisheries and Oceans (DFO) is ultimately responsible for fish habitat and its designation. Fish habitat is protected under the federal *Fisheries Act*. The PPS states that development and site alteration shall not be permitted in fish habitat, “except in accordance with provincial and federal requirements”.

There is one watercourse present that provides direct, seasonal fish habitat that occurs within the 120 m boundary of the proposed licenced area and other lands owned by the proponent, consisting of the lower reach of the watercourse as described in Section 4.3.3. There are also two on-line ponds downstream along 18th Line that could potentially support fish habitat.

5.5 Significant Woodlands

Under the current 2014 Dufferin County OP, which has yet to be approved by MMAH, the woodland to the north of the site is shown on the Draft Appendix 1 – Natural Heritage Features mapping. As outlined in Section 3.4 of this report, the County’s OP states that there are no criteria for determining whether the woodlands shown on Appendix 1 are significant and such a determination cannot be made on a case-by-case basis. The OP states that the criteria for determining woodland significance will be completed as part of the completion of a natural heritage system strategy.

Until such time as the criteria for determining woodland significance is completed, the OP provides the following definition under Section 7.8.2, subsection 131:

*Significant*: means

*b. in regard to woodlands, an area which is ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to site*
quality, species composition, or past management history. These are to be identified using criteria established by the Ontario Ministry of Natural Resources;

The “adjacent lands” as referenced in Sections 4.4.9 for significant woodlands is 120 m and are described as “the lands contiguous to a natural heritage feature or area where it is likely that development or site alteration would have a negative impact on the feature or area.”

Under the Township OP the term “forest areas” is used and significant forest areas are defined as including all county forests, all woodlands 40 ha or larger and forest stands that are a minimum 4.0 ha and are in excess of 60 years old. Based on the latter definition it is possible to consider the woodland within (and on adjacent lands to the north) as a significant forest as the area is greater than 4.0 ha in size and supports a forest community (Sugar Maple-Beech) over 60 years old.

The Greenbelt Plan identifies significant woodlands as one of the KNHFs that are part of the Natural Heritage System. New mineral aggregate operations are not permitted in significant woodlands, unless these areas are determined to be young plantation or early successional habitat. The very northern part of the site and lands within 120 m are within the Natural Heritage System with only a small section of the lands within 120 m overlapping with the woodland (see Figure 2). The woodland would meet the definition of significant woodlands based on the Technical Paper 2.

5.6 Significant Valleylands

The designation of Significant Valleylands is usually undertaken by the planning authority and/or the Conservation Authority. Criteria recommended by the Province for significant valleyland designation include prominence as a distinctive landform, extent of naturalness, and importance of its ecological functions, restoration potential, and historical and cultural values.

No significant valley lands occur on or within 120 m of the site.

5.7 Provincially Significant Areas of Natural or Scientific Interest

There are two types of ANSIs: life science and earth science. Life science ANSIs are based on biological and ecological characteristics. Earth science ANSIs are based on geological landform characteristics.

The selection criteria used by the MNR to define ANSIs are:

1. Representation;
2. Diversity;
3. Condition;
4. Ecological function; and
5. Special features.

ANSIs can be designated within one of three levels of significance: local, regional and provincial. These three levels are not based on jurisdictional boundaries but rather are based on ecoregions and
ecodistricts. Provincial significance relates to the whole province, regional significance is assigned at the ecoregional level, and local significance is assigned at the ecodistrict level. ANSIs are identified and determined by the OMNR.

There are no ANSIs found on or within 120 m or the site.

5.8 Significant Wildlife Habitat

The Greenbelt Plan defines wildlife habitat as areas where plants animals and other organisms live, and find adequate amounts of food, water shelter and space needed to sustain their populations. Specific wildlife habitats of concern may include areas whether species concentrates at a vulnerable point in their annual life cycle; and areas that are important to migratory and non-migratory species. To be deemed significant these areas must be ecologically important in terms of features, functions, representation or amount and contributing to the quality and diversity of the Natural Heritage System. Significance of wildlife habitat is difficult to appropriately determine at the site-specific level, as the assessment must incorporate information from a wide geographic area and consider other factors such as regional resource patterns and landscape effects. The planning authorities (i.e., County and Township) have the responsibility to identify Significant Wildlife Habitat (SWH) within their Official Plans. With the exception of wintering deer yards, which could be, and often are, considered SWH, the detailed identification and designation of SWH has not been completed for Dufferin County or the Township of East Garafraxa.

There are four principal components of SWH as described in the Significant Wildlife Habitat Technical Guide (OMNR 2000). These are:

a) Seasonal Concentrations of Animals;
b) Animal Movement Corridors;
c) Rare Vegetation Communities or Specialized Habitats; and
d) Habitats of Species of Conservation Concern.

Although a screening for each of these categories was completed as part of this scoped EIS, it must be recognized that not every type of potential significant wildlife habitat as described in the Significant Wildlife Habitat Technical Guide (OMNR 2000) has been assessed, as this is a municipal undertaking and beyond the scope of this project. Based on background information no features have been identified or mapped on or adjacent to the site by the OMNR, the County or Township.

The following paragraphs provide an assessment of existing natural features against the four component parts of SWH.

Seasonal Concentrations of Animals

Some species of animals gather together from geographically wide areas at certain times of year. This could be to hibernate or to bask (e.g., some reptiles), over-winter (e.g., deer yards) or to breed (e.g., amphibians). Maintenance of the habitat features that result in these concentrations can be critical in sustaining local or sometimes even regional populations of wildlife. This category includes:
• areas where animals occur in relatively high densities for the species at specific periods in their life cycles and/or in particular seasons
• seasonal concentration areas, which tend to be localized and relatively small in relation to the area of habitat used at other times of the year

Some species of animals gather together from geographically wide areas at certain times of year. This could be to hibernate or to bask (e.g., some reptiles), over-winter (e.g., deer yards) or to breed (e.g., Bullfrog breeding and nursery areas). Maintenance of the habitat features that result in these concentrations can be critical in sustaining local or sometimes even regional populations of wildlife.

There are no significant concentrations of animals, including no concentrations of amphibians (e.g., bullfrogs), found on the property based on the study. The seasonal concentration criterion is not met by any habitat features or functions on the site or adjacent lands.

**Animal Movement Corridors**

Landscape connectivity (often referred to as “wildlife corridors”) has become recognized as an important part of natural heritage planning and a wide range of benefits have been attributed to the maintenance or re-connection of the natural landscape. Corridors allow animals to move between areas of high habitat importance. Conservation of distinct habitat types to protect species is not effective unless the corridors between them are also protected. In the fragmented landscape of southern Ontario, connectivity functions range from low, where major development features (e.g., highways, railways) fragment a pathway, to high, where natural features dominate the landscape and are more or less contiguous.

This category includes:

• habitats that link two or more wildlife habitats that are critical to the maintenance of a population of a particular species or group of species
• habitats with a key ecological function to enable wildlife to move, with minimum mortality, between areas of significant wildlife habitat or core natural areas

Given the largely open, agricultural character of the study area with adjacent active aggregate operations there are limited movement corridor opportunities for wildlife. A wildlife corridor of potential local importance may be associated with the tributary of Shaw’s Creek at the north end of the property. The riparian corridor and connection along the tributary of the woodland to natural areas further to the east, including components of the Caledon Lakes PSW, provides some function for wildlife movement. However, it is our opinion that this would not qualify as significant wildlife habitat.

**Rare Vegetation Communities or Specialized Habitats**

Rare vegetation communities apply to the maintenance of biodiversity and of rare plant communities (rather than individual rare species) and may include communities such as alvar, tall-grass prairie or rare forest types. Specialized habitat conditions can include those for species of breeding birds that are associated with large blocks of wetland (generally >25 ha) that also include area sensitive habitat.
Large forested areas support habitat opportunities for breeding forest birds with area sensitive requirements (i.e., that which is more than 100 m from an edge).

This category includes:

**Rare vegetation communities include:**

- areas that contain a provincially rare vegetation community
- areas that contain a vegetation community that is rare within the planning area

**Specialized wildlife habitats include:**

- areas that support wildlife species that have highly specific habitat requirements
- areas with exceptionally high species diversity or community diversity
- areas that provide habitat that greatly enhances species’ survival

The site and adjacent lands are not represented by any rare vegetation community and this criterion would not be met. There is some interior forest habitat for area-sensitive birds with representation of four area-sensitive forest birds recorded during the breeding bird surveys (see Table 2). Based on the extent of edge habitat (e.g., within 100 m of the forest edge), there is a relatively small amount of area sensitive habitat available, which in our opinion would not warrant SWH designation. There is no other specific habitat for a wildlife group, no representation of high species diversity, and no specific habitat that greatly enhances species’ survival. This criterion would not qualify.

**Habitats of Species of Conservation Concern**

This category is potentially complex and includes species that may be locally rare or in decline, but that have not reached the level of rarity that is normally associated with Endangered or Threatened designations. The Significant Wildlife Habitat Technical Guide (OMNR 2000) suggests that the highest priority for protection be provided to habitats of the rarest species (on a scale of global through to local municipality); and that habitats that support large populations of a species of concern should be considered significant. An additional eight criteria under the Species of Concern category are found in Appendix Q (OMNR 2000), with 28 guidelines within these criteria. The determination of SWH under this category (and under other categories) is a comparative process that must extend across the jurisdiction of the planning authority to be considered definitive.

This category:

- includes the habitat of species that are rare or substantially declining, or have a high percentage of their global population in Ontario
- includes special concern species identified under the ESA on the SARO List, which were formally referred to as “vulnerable” in the Significant Wildlife Habitat Technical Guid;
- includes species identified as nationally endangered or threatened by the Committee on the Status of Endangered Wildlife in Canada, which are not protected in regulation under Ontario’s ESA
Habitats of endangered and threatened species covered under the ESA are excluded from this category.

**Review of Species of Special Concern**

As part of the request for background information, MNRF identified (G. Findlay, pers. Comm. 2014) four species of Special Concern that could potentially be associated with the habitats on or adjacent the site, these included: Canada Warbler (*Wilsonia canadensis*), Milksnake (*Lampropeltis triangulum*), Snapping Turtle (*Chelydra serpentine*) and Monarch Butterfly (*Danaus plexippus*). An additional species of Special Concern that was identified during breeding bird surveys was the Eastern Wood-Pewee (see Table 2).

**Canada Warbler** (not recorded from property) breeds in a range of deciduous and coniferous, usually wet forest types. Forests that it is typically found in often have a dense shrub layer that help to conceal its nests that are usually located on or near the ground on mossy logs or roots, along stream banks or on hummocks. The shrub layer within the woodlot at the site was fairly sparse so the habitat at the site is not considered suitable for this species.

**Milksnake** (not recorded from property) can be found in a wide variety of habitats including rocky outcrops, fields and forest edges. In southern Ontario it is often found in old farm fields and farm buildings where there is an abundance of mice. It hibernates underground, in rotting logs or in the foundations of old buildings. While this species was not observed, there are potential habitat opportunities associated with the unoccupied farmhouse and out buildings on the east side of the property.

**Snapping Turtle** (not observed from property) are most commonly associated with shallow, slow flowing or stagnant waters with soft muddy substrate and vegetative cover. They spend the majority of their lives in the water, with the exception of the nesting season when females travel overland in search of gravelly or sanding areas to lay their eggs. The ponds located to the east of the site could provide habitat for this species. No suitable aquatic habitat for this species was identified on the site or adjacent lands.

**Monarch Butterfly** (not recorded from property) use three different types of habitat throughout there life cycle. Caterpillars feed on Milkweed plants and are confined to meadows and open areas where Milkweed grows. Adult butterflies can be found in a variety of habitats where they feed on nectar from a variety of wildflowers. In the winter Monarchs migrate to central Mexico. While some milkweed and wildflowers were present on the site, there were no large areas supporting these plants found on the property.

**Eastern Wood-Pewee** is most commonly found in the mid-canopy layer of forest clearings and edges of deciduous and mixed forests. It is most abundant in intermediate to mature forest stands with little understory vegetation. The woodland at the site contains suitable habitat for this species and it was documented during breeding bird surveys.

Based on the information that is available for the site, the presence of Eastern Wood Pewee in the woodlot would potentially be described as habitat for a Species of Conservation Concern. No other habitat for Species of Conservation Concern was identified.
Other Species of Conservation Concern

Records obtained from the NHIC and correspondence with the OMNR Midhurst Office (G. Findlay, pers. Comm. 2014) included records from the general area (i.e., not confirmed from the site or adjacent lands) of two rare vascular plants (Sranks of S1, S2 or S3), Rugulose Grapefern (*Botrychium rugulosum*) and Carey’s sedge (*Carex careyana*).

**Rugulose Grape Fern** (not recorded from property) is most commonly associated with old pastures, lightly grazed areas, meadows and successional hardwood forests. No suitable habitat for this species was identified.

**Carey’s Sedge** (not recorded from property) habitat includes hilly woodlands, the bases of wooded slopes, shaded areas along the banks of streams, rocky ravines, water run-off areas in rocky woodlands, and areas along woodland paths. It is a conservative species that is found in high quality natural areas. The NHIC database record for this species is from 1977. Potentially suitable habitat for this species may be present in the woodland community to the north of the site and 120 m adjacent lands. The woodland is outside of the site and will be protected.

5.9 **Key Natural Heritage and Hydrologic Features (Greenbelt Plan)**

Based on the Greenbelt Plan and review associated technical papers, there are KNHFs and KHF s found within 120 m of the site (i.e., outside of the proposed licenced area, but within 120 m of the licenced boundary). These consist of a deciduous forest woodland, unit 5 (KNHF), two marsh wetlands, units 6 and 7 (KNHF/KHF), and an intermittent tributary of Shaw’s Creek (KHF). A third marsh wetland along the watercourse (unit 4), does not meet the definition of KNHF/KHF.

Significant habitat of Endangered and Threatened species and fish habitat are addressed in the preceding Sections (5.3 and 5.4).

The following KNHFs are **not** found on the site or adjacent lands:

- ANSIs;
- Significant valleylands;
- Significant wildlife habitat;
- Sand barrens, savannahs and tall grass prairies; and,
- Alvars.

The following KHF s are **not** found on the site or adjacent lands:

- Lakes; and,
- Seepage areas and springs.
5.10 Level 1 Screening Summary

Table 7 summarizes the occurrence of natural environment features on, and within 120 m, of the proposed Tri-County Pit property that will be taken forward in a Level 2 Assessment.

**Table 7. Summary of Level 1 Screening (ARA)**

<table>
<thead>
<tr>
<th>Natural Environment Feature</th>
<th>On-Site (within proposed licenced site area)</th>
<th>Within 120 m (of proposed licenced site boundary)</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Significant Wetland</td>
<td>None</td>
<td>None</td>
<td>No action required</td>
</tr>
<tr>
<td>• Significant Habitat of Endangered or Threatened Species</td>
<td>Barn Swallow – unit 10 Bobolink – unit 12</td>
<td>Bobolink – unit 12</td>
<td>Level 2 assessment required</td>
</tr>
<tr>
<td>• Fish Habitat</td>
<td>None</td>
<td>Coolwater/Warmwater direct fish habitat, one pond on adjacent property</td>
<td>Level 2 assessment required</td>
</tr>
<tr>
<td>• Significant Woodlands</td>
<td>None</td>
<td>FOD 5-2 (Unit 5), north of site</td>
<td>Level 2 assessment required</td>
</tr>
<tr>
<td>• Significant Valleylands</td>
<td>None</td>
<td>None</td>
<td>No action required</td>
</tr>
<tr>
<td>• Significant Wildlife Habitat</td>
<td>None</td>
<td>None</td>
<td>No action required</td>
</tr>
<tr>
<td>• Provincial Areas of Natural and Scientific Interest</td>
<td>None</td>
<td>None</td>
<td>No action required</td>
</tr>
</tbody>
</table>

Based on the Level 1 screening, a Level 2 Assessment is required for significant habitat of threatened species within the proposed licenced area and within 120 m of licenced area boundary; and, for the presence of fish habitat and significant woodland within 120 m of the licenced area boundary.

In addition to the above, and with the exception of significant habitat of endangered and threatened species (which is being addressed through the Provincial ESA), the proposed licenced area is within 120 m of Greenbelt Plan KNHF (wetlands, significant woodland) and KHF (wetlands and intermittent stream).

6. Project Description

The proposed sand and gravel operation will be 1.5 m above the groundwater table with an annual production of 1 million tonnes that will consist of 900,000 to of extracted sand and gravel and 100,000 to of concrete imported for recycling. The Operational Concept Plan is provided on Illustration 19 of the Draft Planning Report (Long Environmental September 2014) and shows the locations of the screening berms, and approximate direction and sequence of excavation. Stage 1 of the extraction is proposed to start in the north central part of the site where a wash pond will be constructed. Stage 2 of extraction will move southeast to the site limit, then east toward 18th Line for stage 3, with the final stage 4 then being extracted west to within 200 m of 17th Line.
The wash pond will consist of a 0.8 ha source pond with a similar sized temporary silt pond. Through an application for a PTTW it is proposed that the wash pond be supplied with water from the shallow aquifer system as described by Groundwater Science (2014). The wash pond and water taking is planned to be initiated in June and used until the end of November (approximately 26 weeks/182 days).

The proposed wash pond will be left as a wetland as part of the Rehabilitation Plan with approximately 55 ha of the floor of the pit rehabilitated for agricultural use (see Figure 4).

7. Natural Environment Level 2 Assessment

Based on the Natural Environment Level 1 analysis provided in Section 5.0, a Natural Environment Level 2 assessment is required in accordance with the Ontario Provincial Standards.

7.1 Significant Habitat of Endangered and Threatened Species on or within 120 m and the Endangered Species Act

As discussed in the preceding Section 5.3 and the Level 1 screening in Section 5.10, there is habitat for two Threatened species (Barn Swallow and Bobolink) that has been identified from the proposed licensed area and within 120 m of the licenced boundary (see Figure 2). Both species were confirmed to be nesting on the site.

For the purposes of the Greenbelt Plan (MMAH 2005) significant portions of the habitat is defined as “the habitat as approved by the Ontario Ministry of Natural Resources, that is necessary for the maintenance, survival, and/or the recovery of naturally occurring or reintroduced populations of endangered or threatened species, and where those areas of occurrence are occupied or habitually occupied by the species during all or any part(s) of its life cycle” (OMNR 2008a). Habitat under the Provincial ESA is discussed in Section 3.7.

7.1.1 Bobolink

The OMNR has provided technical guidelines to assist in the determination of the significant habitat of Bobolink (McCracken et al. 2013). Under Section 9 and 10 of the provincial ESA this species receives protection of the individual and its habitat.

Under these guidelines habitat protection for these species focus on breeding habitat, as this is the period that they are most vulnerable to habitat alteration in Ontario. Regulated habitat is described as open country habitats that consist of natural and semi-natural grassland (including but not limited to tallgrass prairie, alvar grasslands, beaver meadows, and grass peatlands), hay fields, pastures, grassland habitat restoration sites, and cultural meadows (abandoned fields) where Bobolink has been confirmed to breed or probably has bred during the current or previous three years (McCracken et al. 2013).
As previously described in Sections 5.3.4, Bobolink were recorded as breeding on lands within 120 m of the site and observed flying over suitable habitat within the site in the hay field identified as unit 12, see Figure 2.

Based on the proposed licenced boundary, there are potential impacts to areas of hay field adjacent to where Bobolink were recorded that provide habitat opportunities for this species. Additional surveys are proposed to be completed in 2015 to confirm the extent of use of the hay field (unit 12, see Figure 2) by this species.

The *Endangered Species Act* prohibits the destruction or disturbance of the habitat of Bobolink as this species has General Habitat protection under Section 10 of the Act (see Section 3.5 above). While agricultural operations are currently exempt from the Act (set to expiry or be otherwise changed), it does apply to *Aggregate Act* applications. The application to remove Bobolink habitat can be pursued through a Permit process under Section 17.2(c) of the ESA, subject to approval by the MNR. This involves submission of the survey data and analysis completed for the project and consultation with the MNR for achieving “net benefit” for the species, in this case Bobolink. A mitigation plan is developed and the terms of the Permit include the specific details of how and when the habitat will be removed (i.e., not during the breeding bird season, May to July), the timing and extent of restoration and replacement of habitat and monitoring for typically a five year period.

In summary, potential for impacts related to Bobolink includes the harm and harassment of individuals and loss of breeding/rearing habitat associated with the hayfield on the west side of the site and adjacent lands (see Figure 2).

The location of the hay field is within Stage 4 of the operations which is not anticipated to be extracted for 10 years or more.

### 7.1.2 Barn Swallow

The OMNR has provided technical guidelines to assist in the determination of the significant habitat of Barn Swallow (Heagy *et al.* 2013).

As previously described in Sections 5.3.3, a single Barn Swallow nest was recorded on the old farm house on the site, see Figure 2. Barn Swallow habitat needs include foraging habitat, nest sites and nests and nocturnal roost sites. Across Ontario Barn Swallows forage over a wide range of open country habitats including farmland, lakeshore and riparian habitats, road right-of-ways, clearings in wooded areas, parkland, urban and residential areas, wetlands and tundra. Nests are commonly situated inside or outside of buildings, under bridges and in road culverts (Heagy *et al.* 2013).

Nests are key features in the reproduction process for Barn Swallow and will be considered to have the lowest level of tolerance to alteration. The area within 5 m of the nests represents the area defended by male Barn Swallows during the breeding season and has a moderate tolerance to alteration (see Figure 2). The area between 5 m and 200 m of the nest has a high tolerance to alteration. Barn Swallows depend on this area to rear their young, feeding and rest.

In summary, potential for impacts related to Barn Swallow includes the harm and harassment of individuals, direct loss of nesting habitat (single nest on existing house, see Figure 2) within the site,
and loss of foraging habitat (open habitat, meadows, marsh, considered Category 3 habitat) adjacent to the nest.

### 7.1.3 ESA Permit

Under Section 17 of the *Endangered Species Act* the Minister of Natural Resources may issue a permit to authorize a person to carry out an activity that would otherwise be prohibited by Section 9 and 10 of the Act. Tri-County Aggregates Ltd. will pursue such a permit(s) at the time required as stages of the operations are planned to proceed. Additional field investigations will be completed prior to the permit application to have current information on the presence/absence and locations of Bobolink and Barn Swallow. The specific permit that would be required is described under Section 17.2(c) of the Act and states:

**17(2) The Minister may issue a permit under this section only if,**

(c) the Minister is of the opinion that the main purpose of the activity authorized by the permit is not to assist in the protection or recovery of the species specified in the permit, but,

(i) the Minister is of the opinion that an overall benefit to the species will be achieved within a reasonable time through requirements imposed by conditions of the permit,

(ii) the Minister is of the opinion that reasonable alternatives have been considered, including alternatives that would not adversely affect the species, and the best alternative has been adopted, and

(iii) the Minister is of the opinion that reasonable steps to minimize adverse effects on individual members of the species are required by conditions of the permit.

For each Bobolink and Barn Swallow, there are provisions under Ont Reg. 248/08 (based on the most recent consolidated) that may allow a person to carry out an activity that would otherwise be prohibited under Section 9 or Section 10. These options will be examined as the project staging proceeds with the appropriate consultation and approval with the OMNR.

### 7.2 Fish Habitat within 120 m

As identified above in section 5.4 there is one intermittent watercourse found within 120 m of the site that provides direct, seasonal fish habitat during seasonally high water flow (spring and fall) and potential indirect fish habitat during the drier summer months. The fish species were all identified as coolwater species that are common and tolerant to environmental perturbations. The fish species that occupy the tributary move to downstream reaches during the drier summer months and winter months to find refuge, likely in the on-line ponds to the east of the site.

Based on the existing conditions of the watercourse and functional contribution to fish and fish habitat (as described in Section 4.3), it appears that the four coolwater fish species that were recorded access and occupy the watercourse likely for about four to five months of the year. This is expected to
be from March through April (high flows) and into late May or early June when there are adequate flows for access. In wetter, high flow years it is possible that fish can occupy the watercourse for a longer period. The starting period and duration of habitat access when fish can move from downstream refuge areas into the watercourse likely depends on factors that include the extent of snow pack and duration of the spring freshet, timing of the onset of spring, and seasonal precipitation. Based on the hydrological analysis of the system completed by Groundwater Science (2014), the rapid infiltration of streamflow results in the diminishment of fish habitat access and opportunities typically in June when flows decrease and then stop periodically until the late fall (November). During the winter months from December to February, frozen conditions would limit surface flow and access. Access during these months may only be possible when there are baseflow contributions that are sufficient enough to permit access by fish. It is important to note that the habitat in the study area is not limiting to the fish species identified in the tributary. These species can spawn from April to July in a range of temperatures from 8ºc to 27ºc depending on the species. If conditions are not suitable within the study area, they will move downstream to suitable spawning grounds.

As part of the analysis of potential impacts to fish habitat, Beacon collaborated with Groundwater Science to compare the periods of fish habitat access under existing conditions versus during the proposed operation of the sand and gravel pit. The proposed operations include a wash pond that will be located in the north central part of the site (see Figure 4). Dewatering associated with the wash pond will have a drawdown zone of influence within the shallow aquifer that extends into the 120 m adjacent lands of the site, including the area of the tributary of Shaw's Creek.

In addition to the timing considerations for fish accessing habitat related to surface water flows, an analysis by Groundwater Science predicted the drawdown of the shallow aquifer system during the wash pond operation period (June 1st to November 30th) in order to assess potential impacts. This analysis was completed to predict drawdown at a 100 m distance to the watercourse, as well as for a 235 m distance to the woodland wetland (Unit 7) and greater than 400 m (see Table 8 below).

**Table 8. Groundwater Drawdown Prediction Results (Groundwater Science 2014)**

<table>
<thead>
<tr>
<th>Date</th>
<th>Predicted Drawdown (m)</th>
<th>2014 Observed Water Table Depth Below Stream Bed (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100 m distance to watercourse</td>
<td>235 m distance to woodland marsh</td>
</tr>
<tr>
<td>June 1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>July 1</td>
<td>0.10</td>
<td>0</td>
</tr>
<tr>
<td>August 1</td>
<td>0.25</td>
<td>0</td>
</tr>
<tr>
<td>September 1</td>
<td>0.40</td>
<td>0.05</td>
</tr>
<tr>
<td>October 1</td>
<td>0.55</td>
<td>0.10</td>
</tr>
<tr>
<td>November 1</td>
<td>0.65</td>
<td>0.15</td>
</tr>
<tr>
<td>November 30</td>
<td>0.80</td>
<td>0.20</td>
</tr>
</tbody>
</table>

From Table 8 it can be seen that under existing conditions for 2014 the observed water table depth was below the bed of the stream/watercourse from June 1st to at least November 1st, ranging from...
0.11 m to >0.6 m below. Therefore, there was no interaction of the groundwater with the watercourse at this location during the June to November period. The predicted drawdown for supplying the wash pond in the 100 m zone of influence is therefore not anticipated to have an impact to the watercourse during the operation period as the groundwater is already below the stream bed.

In summary, the potential impacts to the tributary of Shaw’s Creek and fish habitat relate to the timing of active use of the watercourse. The proposed dewatering activity and associated drawdown of the shallow aquifer system will be a graduated effect (i.e., an increasing drawdown) over the 26 week period from June to November. This corresponds to the period under current conditions when fish are moving downstream out of the reach as surface water flows decrease and the intermittent watercourse flow becomes very low to dry (see discussion in Section 4.3.5).

### 7.3 Significant Woodlands within 120 m

Based on the Greenbelt Plan with woodland in the northern part of the property is considered significant. The area would also meet the definition of significant forest area under the environmental policies of the Township’s OP.

The important ecological features and functions of this woodland include mid-aged to mature forest, habitat for a range of flora and fauna including Butternut, area-sensitive forest birds and Eastern Wood-Pewee, a species of Special Concern. The central wetland in the forest community supports standing water and breeding amphibian habitat for Spring Peepers. A tributary of Shaw’s Creek flows from west to east along the west and southern boundaries of the woodland.

The closest point of the woodland to the proposed licenced boundary is approximately 90 m from the southeast corner of the woodland (see Figures 2 and 4). The southern boundary of the woodland supports a well-defined, mid-aged to mature forest edge. The woodland is situated on well-drained soils and hydrological issues (e.g., changes to local hydrology that may negatively impact the woodland) are not a concern given the extent of setback to the proposed operations. The primary objective of the mitigation measures is to prevent intrusion into the woodland, which is unlikely to occur based on the setback as well as signage and potential fencing to be installed. Therefore, there will be no physical disturbance of direct impact to the woodland as a result of the proposed pit activities. No indirect impacts from intrusion into edge tree rooting zones, soil compaction or impacts, or changes in hydrology are anticipated to occur. A 30 m VPZ as required under the Greenbelt Plan will be implemented.

### 7.4 Greenbelt Plan

#### 7.4.1 Protection of Key Natural Heritage/Hydrologic Features

The KNHF (fish habitat, significant woodland, wetlands) and KHF (wetlands and intermittent stream) found on lands within 120 m and other lands owned by the proponent will be completely protected from direct impacts based on the proposed licenced area and boundary being well removed from these features. This includes no encroachment or direct impact to the 30 m VPZ of KNHF and KHF (see Figure 2 and 3).
Under the existing environmental conditions of the site and proposed location of the licenced area, there are no areas of connectivity between the identified KNHFs. The natural connectivity along the watercourse, wetland and woodland to other features on adjacent lands to the west and east will be maintained with no intrusion.

7.4.2 Vegetation Protection Zones

As described in the preceding sections of this report, the KNHFs and KHF found in the north end of the property will be protected by a 30 m VPZ. The width of the VPZ is based on the requirements of the Greenbelt Plan. With the implementation of VPZ, there is still an additional 30 m of setback at the closest point from the licenced area to the intermittent tributary and wetland unit 6; and, an additional 60 m of setback to the significant woodland (unit 5).

Due to the lack of hydrological connection (e.g., surficial connection via watercourse or wetland) between the licenced area and the KNHF/KHF, these features will be adequately protected from potential negative impacts. See VPZ on Figure 2.

From Table 8 and the analysis in Section 7.2, it can be seen that under existing conditions the observed water table depth was below the bed of the watercourse and therefore also below the surface of the wetland found along the watercourse (Unit 6, see Figure 2). During the most active growing period for wetland plants (June to August) the existing drop in the water table is 0.11 m to 0.51 m which represents the natural drawdown for the wetland as the feature becomes drier. The effects of the drawdown for supplying the wash pond over the June to August period range from approximately 0.0 m in early June to 0.25 m in early August. While there appears to be some groundwater contribution to wetland Unit 6 likely in May and into June, the contribution diminishes over the balance of the summer and into the fall.

8. Summary of Preventative, Mitigation and Remediation Recommendations

8.1 Aggregate Resource Act

The key natural environment recommendations to be incorporated into the Site Plan include:

- topsoil shall be stripped and stored separately and may be stored in berms as outlined on the site plan; used during progressive rehabilitation; and/or stored in temporary berms at the perimeter of the area to be extracted until needed for rehabilitation;
- surface drainage from any disturbed areas shall be directed into the pit. Silt fencing and/or straw bales shall be used as required to prevent sedimentation from leaving the site until vegetation is established;
- all berms shall be graded to a maximum of 2:1 slopes. Berms and all areas progressively rehabilitated shall be vegetated with a perennial native grass mixture planted in the fall or spring season and shall be maintained and reseeded until self-sustaining cover is established; and
• the 30 m VPZ adjacent to all KNHF and KHF shall be delineated and staked on-site for protection and allowed to regenerate with natural, self-sustaining vegetation.

8.2 Greenbelt Plan

The site is within the Protected Countryside designation with a small area in the northwest (about 0.6 ha) within the Natural Heritage System of the Greenbelt (see Figure 2). There are no KNHF or KHF within the site. To meet the rehabilitation requirements specific to this application the following Policies apply: 4.3.2.5 b) and e), and 4.3.2.6 a) and c) of the Greenbelt Plan, the following provisions will be implemented:

• The great majority of the site is within Protected Countryside but outside of the NHS (61.7 ha). The rehabilitation of the disturbed area of the site will be to a state of equal or greater ecological value with the long-term ecological integrity of the entire site maintained or restored with improvements where possible.

• The long-term land use of the general area is agricultural and this will comprise the final rehabilitation of the majority of the site. Upon completion the wash pond will be enhanced to provide wetland function.

• A net total of 35% of the licenced lands that are within the NHS, which is 0.21 ha, will be reforested to forest cover. This is an area of approximately 20 m x 100 m that will be reforested which is proposed to occur outside of the site, to the immediate northern on other lands owned by the proponent. The forest restoration plan will be completed through consultation with the CVC and MNRF.

• The 0.21 ha reforestation/rehabilitation will be located adjacent to the woodland and tributary of Shaw’s Creek. This will provide a localized enhancement of the ecological function of the feature through planting of native deciduous trees and contribution to the linkage function and forest cover on lands immediately to the north of the site.

8.3 Dufferin County

Under the current 2014 Dufferin County OP, Draft Appendix 1 – Natural Heritage Features identifies a woodland and watercourse to the north of the site. There are no other natural heritage features mapped from within or adjacent to the property.

In considering new mineral aggregate operations it will be required to be demonstrated that there will be no potential negative impacts on provincially significant natural features and natural heritage features and areas (Section 3.4.2.1).

In the absence of County OP criteria for the determination of significance of woodlands, other planning policies (Greenbelt Plan Township OP) have been used to identify the significant woodland to the north of the site.
With regard to the policies for fish habitat and watercourses, these features will be protected under the proposed aggregate development plan.

There is no direction provided in the OP regarding rehabilitation with respect to the natural environment.

### 8.4 Township of East Garafraxa

Schedule B of the Township’s OP identifies a watercourse in the north end of the property, which is the intermittent tributary of Shaw’s Creek. There are no other natural heritage features mapped from within or adjacent to the property.

The Development Criteria in Section 7.0 of the OP states that extractive operations shall satisfy the criteria of “the protection of sensitive ecological areas on, or adjacent to the proposed site”.

With regard to the policies for fish habitat and forest areas, these features will be protected under the proposed aggregate development plan.

There is no direction provided in the OP regarding rehabilitation with respect to the natural environment.

### 8.5 Endangered Species Act

Under Section 17 of the *Endangered Species Act* the Minister of Natural Resources may issue a permit to authorize a person to carry out an activity that would otherwise be prohibited by Section 9 and 10 of the Act. For each Bobolink and Barn Swallow, there are provisions under Ont Reg. 248/08 that provide the exemption provisions to Section 9 or Section 10. There may also be the option of a registry of activities for exemptions to Section 9 and 10 for certain species, depending on the activity and number of species or area of habitat.

**Bobolink**

Through a number of amendments to the ESA General Reg 242/08, there are many provisions and definitions regarding Bobolink that must be followed to ensure compliance to the ESA. The specific sections pertaining to Bobolink (as well as Eastern Meadowlark which is also a threatened grassland species that shares ESA policies but is a species that was not recorded from the site and adjacent lands) of General Reg 242/08 are found in the most current. This includes what the requirements are to allow a person to carry out an activity that would otherwise be prohibited under Section 10 (see further discussion in Section 6.2.1 below), much of which is specific to land development for example, in designated settlement areas. There are provisions relating to development activities that are allowed but not between May 1 and July 31 provided specific conditions are met which may include enhancement or creation of specific grassland habitat (need to confirm updates).
Unlike habitat for some rare species, habitat restoration, replacement or enhancement for Bobolink, which is a grassland bird, can be completed quite successfully and in a relatively short period of time given the habitat consists of open grassland/meadow. There are criteria specific to the creation and maintenance of habitat that include the types of grass species and percent cover of each grass species to be planted and the methods for maintain the habitat (e.g., mowing, removal of shrubs) over typically a five year period.

The staging and progress of the pit can been designed to allow for replacement of the hayfield habitat through the active rehabilitation prior to the removal of the hayfield community area along the west side of the site. The extent of habitat replacement would be negotiated with the MNR through the Permit process and typically would be a minimum of 1:1 habitat replacement.

**Barn Swallow**

The habitat categorization for Barn Swallow includes the nest (Category 1), the area within 5 m of the nest (Category 2) and the area between 5 m and 200 m of the nest (Category 3). As an application for a Permit is pursued that habitat categories will be mapped for associated analysis of impact.

In some cases, activities that can occur in Barn Swallow habitat can continue as long as the function of the areas for the species is maintained and individuals of the species are not killed, harmed, or harassed. The proposed aggregate operation would, however, result in disturbance to this species based on the removal of the building and foraging habitat.

There would likely be requirements for the preparation of a mitigation and restoration record that includes the number, location and description of Barn Swallow nests located on it. The number and locations of nests must be determined.

Other requirements may include the need for the amount of habitat created by constructing or modifying a building be greater than the habitat that was lost. This replacement can be completed by constructing a new structure within 1 km the original structure (see Photograph 1).
Photograph 1. Example of artificial nesting structures for Barn Swallows.

8.6 Summary of Impact Assessment, Mitigation and Net Effects

Table 9 provides a summary of the potential impacts and recommended protection, mitigation and rehabilitation efforts and tasks for the Tri-County Pit.

Table 9. Summary of Impact Assessment, Mitigation and Net Effects

<table>
<thead>
<tr>
<th>Natural Heritage Feature</th>
<th>Location (on site or within 120 m)</th>
<th>Possible Impacts (Direct or Indirect)</th>
<th>Mitigation and Rehabilitation</th>
<th>Net Effects</th>
<th>Monitoring Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significant Habitat of Endangered or Threatened Species</td>
<td>-On and within 120 m of site</td>
<td>-Potential harm or harassment of species -Potential damage or destruction of habitat</td>
<td>-minimize adverse effects from activity consistent with ESA and consultation with MNR</td>
<td>-no net effects -provide an overall benefit consistent with ESA and consultation with MNR</td>
<td>-follow up surveys in 2015 -monitoring requirements as per ESA</td>
</tr>
<tr>
<td>Fish Habitat</td>
<td>-Within 120 m of site</td>
<td>-reduction in water quality (sedimentation) -reduction in surface water contribution -reduction in groundwater input</td>
<td>-standard BMPs to be implemented for sediment and erosion control (will be attached to site boundary fence), protection of VPZ</td>
<td>-no net loss of fish habitat or function -water quality to be maintained during berm construction, no effects during extraction</td>
<td>-continued monitoring of surface and groundwater levels, streamflow, waterlevel</td>
</tr>
<tr>
<td>Natural Heritage Feature</td>
<td>Location (on site or within 120 m)</td>
<td>Possible Impacts (Direct or Indirect)</td>
<td>Mitigation and Rehabilitation</td>
<td>Net Effects</td>
<td>Monitoring Protocol</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------------------</td>
<td>--------------------------------------</td>
<td>-------------------------------</td>
<td>-------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Significant Woodland / Greenbelt Plan KNHF</td>
<td>-Within 120 m of site</td>
<td>due to drawdown for wash pond</td>
<td>and watercourse - restore surface flow from site to watercourse through overflow at wash pond. - shallow aquifer use during June-November, or mitigation with bedrock well if needed - 0.21 ha reforestation next to woodland/wetland, riparian zone</td>
<td>-approximately 10% decrease in annual contribution of surface flow to stream may affect fish movement during low flow periods. However, habitat is not limiting as downstream habitat is available. - no net effects to groundwater function</td>
<td>hydrograph and temperature</td>
</tr>
<tr>
<td>Wetland (non-PSW) – Greenbelt Plan KNHF and KHF</td>
<td>-Within 120 m of site</td>
<td>- inadvertent encroachment during berm construction, operations - reduction in surface water contribution - reduction in groundwater input due to drawdown for wash pond</td>
<td>- Standard BMP’s with effective delineation of work area to protect woodland and VPZ - 0.21 ha reforestation next to woodland/wetland, riparian zone</td>
<td>- no net loss of feature or function</td>
<td>continued monitoring of surface and groundwater levels</td>
</tr>
</tbody>
</table>
8.7 Monitoring

A monitoring program through 2015 will be implemented that builds on the collection of baseline information collected during 2013-2014. This will allow for further confirmation and characterization of features and functions. The monitoring program will include the following:

- Follow-up breeding bird surveys of the two SAR birds that have been screened to the Level 2 assessment (Bobolink and Barn Swallow).
- Breeding amphibian surveys of the identified Site #1 and #2.
- Seasonal variation in stream flows and timing of fish migration.
- Temperature monitoring of surface flows of the tributary of Shaw’s Creek at two locations.
- Monitoring of the surface and groundwater interaction and indicator features of wetland Units 6 and 7.

9. Conclusions and Recommendations

In conclusion, the results of the Level 1 and 2 Natural Environment Assessment indicate that the proposed Tri-County Pit is feasible from an environmental perspective provided that the preventive, mitigation and remediation measures recommended in this report are implemented as outlined in Section 8.0.

Under the Aggregate Resources Act the natural environment recommendations outlined in Section 8.1, 8.2 and 8.5 will be incorporated into the Site Plan include.

To meet the rehabilitation requirements specific to this application under Policies 4.3.2.5 b) and e), and 4.3.2.6 a) and c) of the Greenbelt Plan, the provisions outlined in Section 8.2 will be implemented.

Tri-County Aggregates Ltd. will pursue a permit(s) under Section 17.2(c) to carry out activities that would otherwise be prohibited by Section 9 and 10 of the ESA prior to extraction being permitted in any relevant Stage Areas. Additional field investigations may be needed prior to the permit application to have current information on the presence/absence and locations of Barn Swallow and Bobolink.

The following specific Site Plan notes have been provided:

- An area of 0.21 ha of reforestation cover will be located on lands immediately north of the site, adjacent to the woodland and tributary of Shaw’s Creek. This represents a total of 35% of the licenced lands that are within the Greenbelt NHS. The restoration plan will be completed through consultation with the CVC and MNRF.

- Prior to any site disturbance within Bobolink habitat on site, the Licensee will apply for and obtain any necessary authorization pursuant to the Endangered Species Act.

- Prior to any site disturbance within Barn Swallow habitat on site, the Licensee will apply for and obtain any necessary authorization pursuant to the Endangered Species Act.
10. References

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Appendix A

List of Vascular Plants Recorded from the Site, Lands within 120 m and Other Lands
## Appendix A. Master Plan List

<table>
<thead>
<tr>
<th>Family Name</th>
<th>New Scientific Name (FOIBIS 2008)</th>
<th>Tri-County</th>
<th>Old Scientific Name (OPL 1998)</th>
<th>Common Name (FOIBIS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aceraceae</td>
<td>Acer negundo</td>
<td>x</td>
<td>Acer negundo</td>
<td>Manitoba Maple</td>
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<td>Aceraceae</td>
<td>Acer rubrum</td>
<td>x</td>
<td>Acer rubrum</td>
<td>Red Maple</td>
</tr>
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<td>Aceraceae</td>
<td>Acer saccharum var. saccharum</td>
<td>x</td>
<td>Acer saccharum ssp. saccharum</td>
<td>Sugar Maple</td>
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<td>x</td>
<td>Amaranthus sp</td>
<td>Amaranth Species</td>
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<td>Aegopodium podagraria</td>
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<td>Apiaceae</td>
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<td>Bristly Bristle Grass</td>
</tr>
<tr>
<td>Ranunculaceae</td>
<td>Actaea pachypoda</td>
<td>x</td>
<td>Actaea pachypoda</td>
<td>White Baneberry</td>
</tr>
<tr>
<td>Ranunculaceae</td>
<td>Actaea rubra</td>
<td>x</td>
<td>Actaea rubra</td>
<td>Red Baneberry</td>
</tr>
<tr>
<td>Ranunculaceae</td>
<td>Ranunculus abortivus</td>
<td>x</td>
<td>Ranunculus abortivus</td>
<td>Kidney-leaved Buttercup</td>
</tr>
<tr>
<td>Ranunculaceae</td>
<td>Thalictrum dioicum</td>
<td>x</td>
<td>Thalictrum dioicum</td>
<td>Early Meadowrue</td>
</tr>
<tr>
<td>Rosaceae</td>
<td>Fragaria virginiana</td>
<td>x</td>
<td>Fragaria virginiana</td>
<td>Wild Stawberry</td>
</tr>
<tr>
<td>Rosaceae</td>
<td>Malus sp.</td>
<td>x</td>
<td>Malus sp</td>
<td>Apple Species</td>
</tr>
<tr>
<td>Rosaceae</td>
<td>Prunus serotina</td>
<td>x</td>
<td>Prunus serotina</td>
<td>Wild Black Cherry</td>
</tr>
<tr>
<td>Rosaceae</td>
<td>Prunus virginiana var. virginiana</td>
<td>x</td>
<td>Prunus virginiana ssp. virginiana</td>
<td>Choke Cherry</td>
</tr>
<tr>
<td>Rosaceae</td>
<td>Rosa multiflora</td>
<td>x</td>
<td>Rosa multiflora</td>
<td>Rambler Rose</td>
</tr>
<tr>
<td>Rosaceae</td>
<td>Rubus idaeus ssp. strigosus</td>
<td>x</td>
<td>Rubus idaeus ssp. melanolasius</td>
<td>Wild Red Raspberry</td>
</tr>
<tr>
<td>Salicaceae</td>
<td>Populus grandidentata</td>
<td>x</td>
<td>Populus grandidentata</td>
<td>Large-tooth Aspen</td>
</tr>
<tr>
<td>Salicaceae</td>
<td>Populus tremuloides</td>
<td>x</td>
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<td>Quaking Aspen</td>
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<tr>
<td>Salicaceae</td>
<td>Salix eriocephala</td>
<td>x</td>
<td>Salix eriocephala</td>
<td>Heart-leaved Willow</td>
</tr>
<tr>
<td>Scrophulariaceae</td>
<td>Verbascum thapsus</td>
<td>x</td>
<td>Verbascum thapsus</td>
<td>Common Mullein</td>
</tr>
<tr>
<td>Family Name</td>
<td>New Scientific Name (FOIBIS 2008)</td>
<td>Tri-County</td>
<td>Old Scientific Name (OPL 1998)</td>
<td>Common Name (FOIBIS)</td>
</tr>
<tr>
<td>-------------</td>
<td>----------------------------------</td>
<td>------------</td>
<td>---------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Solanaceae</td>
<td>Solanum dulcamara</td>
<td>x</td>
<td>Solanum dulcamara</td>
<td>Climbing Nightshade</td>
</tr>
<tr>
<td>Tiliaceae</td>
<td>Tilia americana</td>
<td>x</td>
<td>Tilia americana</td>
<td>American Basswood</td>
</tr>
<tr>
<td>Ulmaceae</td>
<td>Ulmus americana</td>
<td>x</td>
<td>Ulmus americana</td>
<td>American Elm</td>
</tr>
<tr>
<td>Urticaceae</td>
<td>Pilea fontana</td>
<td>x</td>
<td>Pilea fontana</td>
<td>Springs Clearweed</td>
</tr>
<tr>
<td>Urticaceae</td>
<td>Urtica dioica ssp. dioica</td>
<td>x</td>
<td>Urtica dioica ssp. dioica</td>
<td>Stinging Nettle</td>
</tr>
<tr>
<td>Violaceae</td>
<td>Viola canadensis</td>
<td>x</td>
<td>Viola canadensis</td>
<td>Canada Violet</td>
</tr>
<tr>
<td>Violaceae</td>
<td>Viola sp.</td>
<td>x</td>
<td>Viola sp</td>
<td>Violet Species</td>
</tr>
<tr>
<td>Vitaceae</td>
<td>Vitis riparia</td>
<td>x</td>
<td>Vitis riparia</td>
<td>Riverbank Grape</td>
</tr>
</tbody>
</table>
Appendix B

Qualifications of Beacon Environmental Ecologists
Profile

2008 – Present Senior Ecologist, Beacon Environmental
2006 – 2008 Senior Ecologist, Gartner Lee Limited
2002 – 2006 Terrestrial Ecologist, Gartner Lee Limited
1999 – 2002 Terrestrial Ecologist, ESG International
Summer 2001 Endangered Species Habitat Surveyor, University of Guelph
1994 – 1997 Herbarium Technician, University of Guelph

Education

1997 Bachelors of Science, Pure and Applied Ecology (Honours); University of Guelph

Expertise

Dirk has more than sixteen years of experience as an ecologist and environmental consultant with a broad range of project experience in both the public and private sectors. His work regularly involves obtaining regulatory approvals from agencies and municipalities for provincial and federal legislative requirements. Projects include natural heritage studies, forestry, biophysical and Species at Risk inventories, wetland evaluations, environmental impact studies for development projects, Environmental Assessments for roads, utility corridors, and aggregate resources, and natural heritage and land use planning. Dirk’s approach to projects is based on thorough background research, strong ecological skills and data analysis, and use of the current science, environmental policies and natural heritage planning.

Dirk provides expertise in the characterization and assessment of terrestrial ecosystems. He is a trained botanist and a certified wetland evaluator under the Ontario Wetland Evaluation System. He is highly proficient in conducting forest and vegetation inventories, wetland assessments/evaluations, habitat characterization and associated analysis of environmental significance/sensitivity for the identification of site-specific constraints and opportunities for development. He regularly conducts Species at Risk inventories and habitat analysis for a range of flora and fauna species throughout southern and central Ontario. Dirk has provided expert testimony at the Ontario Municipal Board and has been an instructor for the Ecological Land Classification (ELC) System for Southern Ontario for the Ministry of Natural Resources. He has also been certified by the MNR as a Butternut Health Assessor (BHA).

Selected Project Experience

Environmental Assessments and Regulatory Approvals

- **TRI-County Aggregates Sand and Gravel Level 1 and 2 Environmental Assessment (2013-ongoing)**
  Project manager for the natural environment assessment and ongoing completion of detailed natural heritage features assessment and a full analysis of conformity to both the Aggregate Resources Act and the Greenbelt Plan. Site sensitivities include coolwater fisheries and wetlands in close proximity to proposed extraction limit.

- **Olympia Sand and Gravel Level 1 and 2 Environmental Assessment (2003-ongoing)**
  Principal investigator for the natural environment assessment. Required a detailed natural heritage features assessment and a full analysis of conformity to both the Aggregate Resources Act and the Greenbelt Plan. Project requires multi-species approvals under the Endangered Species Act and...
agency approvals for 35 ha reforestation plan. Multiple approval authorities including the MNR, conservation authority, regional and local municipalities.

- **Earl Sand and Gravel Level 1 and 2 Environmental Assessment (2012-2014)**
  Project manager and principal investigator for the natural environment assessment. Required a detailed natural heritage features assessment and analysis of conformity to the Aggregate Resources Act and municipal official plans. Project included specialized surveys for several species at risk including two bats species (Little Brown Myotis and Northern Myotis).

- **Highway 407 East Route Selection E (2002-2004)**
  Principal field investigator and coordinator for terrestrial ecology component of the study. Included the design and implementation of field investigation methodology, aerial photo interpretation, significant natural features compilation, and identification of database parameters.

- **Muskoka Road 18 Gravenhurst Sewer Expansion EA and Muskoka Road 25 Class EA (2005)**
  Project manager and principal investigator for these Schedule B Class EA's. Developed the natural heritage features evaluation matrix for route and design alternatives.

- **Bracebridge West Transportation Corridor Class EA (2003-2004)**
  Principal field investigator for this Schedule C Environmental Assessment. Developed the natural heritage features evaluation matrix for route alternatives, carried out discussions with Ontario Ministry of Natural Resources, and participated in public information meetings for the natural environment component of the study.

- **Mosport Pit Level 1 and 2 Environmental Assessment and Natural Heritage Evaluation (2003)**
  Project manager and principal investigator for a proposed pit expansion on the Oak Ridges Moraine. Required a detailed natural heritage features assessment and a full analysis of conformity to both the Aggregate Resources Act and the Oak Ridges Moraine Conservation Plan.

**Species at Risk Assessments and Endangered Species Act Compliance**

  Completed EIS for redevelopment of interpretive camp centre to a residential development. Confirmed and potential habitat for several SAR including Blanding’s Turtle, Eastern Hog-nosed Snake, Whip-poor-will, and Barn Swallow requires MNR approval and a Permit under the ESA.

  Ongoing implementation of the Agreement requirements under the Endangered Species Act for the construction of the golf course, residential and marina components of the development. Includes conducting training and awareness for contractors, regular inspection for ESA compliance for species including Blanding’s Turtle, Eastern Hog-nosed Snake, Eastern Foxsnake and Musk Turtle.

- **Bernadette Island EIS and Species at Risk Assessment (2011-2013)**
  Completing EIS for proposed severance along coast of Georgian Bay that involves habitat screening and assessment numerous SAR fauna and flora with interpretation of regulated foxsnake habitat.

- **Webber Island EIS and Species at Risk Assessment (2006-2007 and 2010)**
  Completing EIS for proposed severance along coast of Georgian Bay that involves habitat screening and assessment numerous SAR fauna and flora including Eastern Foxsnake, Massasauga Rattlesnake, Eastern Hog-nosed Snake, Five-lined Skink, and Map Turtle.

**Environmental Impact Studies**

- **Big Bay Point Resort Development EIS, Lake Simcoe, Town of Innisfil (2003-ongoing)**
  Provision of all required natural heritage studies (e.g., existing conditions, impact assessment and mitigation plans) for the proposed mixed use development on this 240 ha parcel on the shores of Lake Simcoe. Environmental monitoring program and completion of draft plan conditions ongoing.
• **Oak Bay Development EIS and Species at Risk compliance (2005-ongoing)**
  Project manager and principal investigator for this large development on Georgian Bay; project involves complex planning and policy issues relating to significant natural heritage features that include: a provincially significant coastal wetland, habitat for threatened species, significant wildlife habitat, and fish habitat. Species at Risk compliance and monitoring on going.

• **Huntsville Haven Development EIS (2010-2013)**
  Project manager for this large 190 unit proposed development in the Town of Huntsville; project involves issues relating to sensitive headwater reach for a productive coldwater watercourse supporting Brook Trout and design of mitigation measures.

• **Devonleigh Development EIS (2012)**
  Project manager for this development in the Town of Huntsville; project involves issues changes to the original draft plan approved site plan and required DFO approvals relating to a relocated access road crossing of a watercourse.

• **Environmental Impact Assessment for the G8 Summit in Huntsville (2010)**
  Completion of an EIA to identify preventative and mitigative actions related to anticipated impacts of the G8 Summit in Huntsville on the local terrestrial and aquatic ecosystems, and the Species at Risk within them. The project included landscape level and site-specific assessment of impacts.

• **Webber Island EIS and Species at Risk Assessment (2007-2008, 2010)**
  Project manager and principal investigator for this proposed development in the Township of Georgian Bay; project involves complex planning and policy issues relating to significant natural heritage features that include: habitat for threatened species, significant wildlife habitat, and fish habitat.

• **Brook Valley Development Natural Heritage Evaluation (2005-2007)**
  Project manager for this 75 residential subdivision on the Oak Ridge Moraine; undertook a detailed Natural Heritage and Hydrologically Evaluation following requirements of and conformity to the Oak Ridg Moraine Conservation Plan.

• **Downer’s Corner Provincially Significant Wetland EIS (2003-2004)**
  Key project member for this comprehensive impact study for identifying future development constraints, opportunities, and mitigation for the City of Peterborough. Detailed characterization and integration of terrestrial, aquatic and hydrological features for ecosystem evaluation.

• **EIS for CNIB and BMCC Sewer Servicing Expansion (2002-2008)**
  Undertook an EIS for a sanitary sewer upgrade and expansion for lands within the Burke Brook Ravine Environmentally Sensitive Area. Required extensive dialogue and negotiation with the Toronto Region Conservation Authority and City of Toronto for permitting and approvals.

**Natural Heritage System and Secondary Plan Studies**

• **Southwest Georgetown Integrated Subwatershed Study and Secondary Plan (2013-ongoing)**
  This large natural heritage planning and policy development project is for the future urban expansion of Georgetown. Project involves the integration of the subwatershed study to guide the land use planning and secondary plan policy including the identification of a natural heritage system and management strategy.

• **Green Lane Secondary Plan and Lake Simcoe Protection Plan Comparative Analysis (2011-ongoing)**
  Project manager for this natural heritage planning and policy development project for the Green Lane corridor in the Town of East Gwillimbury. Project involves confirmation of the study areas natural heritage system and a comparative analysis of the core area designations with the criteria of the Lake Simcoe Protection Plan key natural heritage and key hydrological feature designations.
• **Township of Severn Natural Heritage System (2011-ongoing)**
  A municipal wide study for the identification of the natural heritage system in both settlement and rural areas. Project involves development of the NHS through background review, field investigation, provincial and municipal environmental policies and a landscape level GIS analysis. Project includes development of natural heritage policies and background report for the future official plan update.

• **City of Vaughan Block 34W Natural Heritage Review (2011-ongoing)**
  Project manager for this natural heritage land use planning study and constraints and opportunities assessment for a Block Plan area in the City of Vaughan. Project involves assessment of natural heritage features and functions and development opportunities on lands outside of the designated natural heritage system.

• **Town of Angus Settlement Expansion, Tesmar and Mann Lands EIS (2010-ongoing)**
  Project manager for this landscape level study for proposed settlement area expansion in the Town of Angus, Township of Essa. Field survey, policy review and completion of environmental constraints and opportunities.

**Natural Heritage Policy Review**

• **South Canadian Shield Guidelines for Habitat Protection (2011-2012)**
  Comprehensive literature review of development pressure on natural heritage features including wildlife habitat, woodlands, species at risk and wetland along the southern region of the Canadian Shield. Included comprehensive review of provincial and federal status of species at risk and recommendations for habitat protection to maintain ecosystem function in this region.

• **Wetland Policy Effectiveness in the Greenbelt, Ducks Unlimited Canada (2010-2011)**
  Directed and undertook a desktop review of nine case studies to evaluate the effectiveness of wetland protection policies in the Greenbelt as they relate to various types of development (i.e., municipal infrastructure, residential and recreational development, aggregate).

• **Wetland Mitigation Policy Review, Ducks Unlimited Canada (2010)**
  Completed a review of policies related to wetland protection and mitigation currently in place at the federal and provincial levels, as well as select examples at the regional and municipal levels.

**Biophysical Inventories**

• **Ecological Land Classification for Southwestern Ontario Provincial Parks and Conservation Reserves (2012)**
  Project Manager for this desktop review project that involved completing aerial photo interpretation for nine different provincial parks and conservation reserves for southwest Ontario region Ontario Parks. Included parklands along the north shore of Lake Erie and the Bruce Peninsula.

• **Bala Wetland Evaluation (2009-2010)**
  Project Manager and principal evaluator for the completion of a wetland evaluation under the Ontario Wetland Evaluation System. Project located in the District of Muskoka and involved identification of a many significant species of flora and fauna include Eastern Ribbonsnake, Milksnake and Branched Bartonia.

• **Carling Township Wetland Evaluation (2008-2009)**
  Project Manager and principal evaluator for the completion of four separate wetland evaluations under the Ontario Wetland Evaluation System. Project located along Georgian Bay coast and involved identification of many significant species of flora and fauna include Massasauga Rattlesnake, Blanding’s Turtles and other species at risk. Combined area of the four separate provincially significant wetlands was over 900 hectares.
Queen Elizabeth II Wildlands Provincial Park Species at Risk Inventory (2005)
An inventory for Ontario Parks for species at risk and other significant features within this recently designated park in Central-Southern Ontario.

An inventory for Ontario Parks for species at risk and identification of associated critical wildlife habitat within this provincial park.

Environmental Monitoring, Inspections and Restoration Ecology

Big Bay Point Environmental Monitoring (2010-ongoing)
Detailed environmental monitoring and compliance for a range of species, feature protection, and restoration. Includes monitoring of include protected Butternut trees, Butternut saplings planted through an Agreement under the ESA.

Snively Street Environmental Monitoring (2002-2008)
Project manager for this comprehensive five-year monitoring project of a provincially significant wetland adjacent to a large development in the Town of Richmond Hill. Design of the terrestrial ecology monitoring program, and integration of surface/groundwater functional contributions to the wetland for the baseline analysis.

Environmental Inspection for Burke Brook Ravine Sewer Expansion (2004-2007)
Project Manager for a construction project in and adjacent to sensitive environmental features over past three years. Dealing with challenging issues relating to construction access, directional drilling technology, fish habitat protection, slope restoration, and multiple agency permitting and involvement (TRCA, DFO, OMNR, and MOE).

A monitoring program for fulfilling the fish and wetland habitat restoration conditions of a Department of Fisheries and Oceans Authorization for in water works. Project manager and responsible for obtaining required permits from the DFO, Nottawasaga Region Conservation Authority, and OMNR.

Forest Resource Inventories

Slokker Developments (2004)
Woodland survey and classification following the Forestry Act definitions for identification of Key Natural Heritage Features under the Oak Ridges Moraine Conservation Program.

Forestry technician for completion of standard forest resource inventories and forest ecosystem classification. Involved detailed forestry sampling for forest age, species composition, productivity, and yield.

Forestry technician for completion of standard forest resource inventories and forest ecosystem classification. Involved detailed forestry sampling for forest age, species composition, productivity, and yield.

Peer Review

Bak Property EIS Peer Review (2012)
A peer review of natural heritage features for a proposed lot severance with waterfront access on Lake Rosseau, Township of Seguin. Primary issues related to potential species at risk, rare plants and their habitats.

Huntsville Downs EIS Peer Review (2011)
A peer review of natural heritage features for a large subdivision development in the Town of Huntsville. Primary issues relate to breeding bird surveys and species at risk.
• **Stonewater Development EIS Peer Review (2011)**
  A peer review of natural heritage features for a high density development in the Town of Bracebridge. Primary issues relate to development encroachment into top of bank and ravine area of Beaver Creek, a coldwater watercourse.

• **Port Severn EIS Natural Heritage Peer Review (2007)**
  A peer review of natural heritage features for a large subdivision development in Port Severn. Required complex technical and policy review related to several species at risk.

**Expert Witness Statements and Testimony**

• **Porcupine Lake OMB, Township of Muskoka Lakes (2014)**
  provided expert testimony on natural heritage features

• **Six Mile Lake OMB, Township of Georgian Bay (2006-2007)**
  provided expert testimony on natural heritage features

• **Robinson Lake EIS OMB, Town of Huntsville (2005)**
  provided expert testimony on natural heritage features

• **Miller Island Environmental Review OMB (2005)**
  provided expert testimony on natural heritage features

• **Bidwell Road EIS OMB (2005)**
  provided an expert witness statement on natural heritage features

• **House Quarry OMB (2006)**
  provided an expert witness statement on natural heritage features

**Selected Publications**

  Vascular Plant Taxonomic Key for Plant Ecology. University of Guelph, Department of Botany.


**Certifications and Skills Development**

2013  *Butternut Health Assessor Workshop ESA Update*, Ontario Ministry of Natural Resources
2009  *Butternut Health Assessor Workshop*, Ontario Ministry of Natural Resources
2008  *Ontario Road Ecology Stewardship Symposium*, Toronto Zoo
2007  *Cumulative Impact Assessment Training Course*, Gartner Lee Limited
2003  *Ontario Wetland Evaluation Training Course*, Ontario Ministry of Natural Resources
2002  *Ecological Land Classification Training Course*, Ontario Ministry of Natural Resources
2001  *Temperate Wetland Restoration Course*, Centre for Watershed Science
2000  *Prescribed Burns for Conservation Management Workshop*, Tallgrass Ontario and Ontario Ministry of Natural Resources
1998  *FRI/Ecosite Photo Interpretation for Northwest Region*, Ontario Ministry of Natural Resources
1998  *Introduction to Aerial Photo Interpretation in Northwest Ontario*, R&B Cormier Inc.
Sarah Aitken, B.Sc.
Aquatic Ecologist

Profile

2013 - Present  Aquatic Ecologist, Beacon Environmental
2008 - 2013  Aquatic Ecologist, AECOM
Summer 2007  Fisheries Technician, Kawartha Lakes Conservation Authority
2004 – 2006  Environmental Technician, Gartner Lee Limited

Academic Qualifications

2008  B.Sc. (Honours) Environmental Resource Science – Trent University, Peterborough Ontario
2004  Environmental Technologist Diploma - Sir Sandford Fleming College, Lindsay, Ontario
2003  Environmental Technician Diploma - Sir Sandford Fleming College, Lindsay, Ontario

Expertise

Ms. Aitken is an Aquatic Ecologist with Beacon Environmental with over seven years of experience in the environmental field in both the public and private sector. Sarah has developed a multidisciplinary background and applies these skills at the ecosystem level to inform and guide environmental approvals with a focus to date on land development activities. Sarah has experience in environmental assessments, environmental impact studies and Renewable Energy Approvals. She is comfortable guiding projects through municipal, provincial and federal policies, including the Fisheries Act, Endangered Species Act, and has worked closely with Conservation Authorities to obtain permits under the Development, Interference, and Alterations Regulation. Sarah has a strong background in collecting benthic invertebrates, fish community sampling, water quality monitoring, stream assessments, lake profile sampling and lake sediment sampling. Sarah has developed a sound understanding of the techniques and protocols used to evaluate and assess the aquatic environment and has a thorough understanding of aquatic species and their life processes.

Selected Experience

Aggregates and Mining

Participated in several studies for proposed mining and aggregate projects. Key tasks included fish community surveys, streamflow monitoring, stream temperature analysis, fish habitat and spawning surveys and water quality assessments. Select projects include:

- Mill Creek Pit – Environmental Monitoring, Aberfoyle, 2008-2010
- Borden Lake Environmental Baseline Survey, Chapleau, 2011 - 2013
- Kirkland Lake Gold, Kirkland Lake, 2008

Environmental Assessments

Conducted field investigations to document existing aquatic habitat, completed assessment of project alternatives, identified potential impacts and developed mitigation measures to address potential impacts.

- New Coronation Road and CP Rail Crossing Class EA – Town of Ajax
- Squirrel Island Bridge Replacement, Walpole Island
- Bracebridge North Transportation Corridor Environmental Assessment, Bracebridge
- Ottawa Road 174/Prescott-Russell County Road 17 Environmental Assessment, Ottawa
- Schneider Creek Remediation Class Environmental Assessment Addendum, Kitchener
- Chatham Kent Slope Stabilization Schedule B Class Environmental Assessment, Chatham
- Peterborough Parkway Transportation Corridor Environmental Assessment, Peterborough

Permitting and Approvals
Acted as agency liaison to obtain necessary permits under the Endangered Species Act, Fisheries Act and the Conservation Authorities Act – Development, Interference and Alteration Regulations for individual Conservation Authorities.

- Major Mackenzie Road Widening Design Build and Permitting, Vaughn
- Redside Dace Permitting for Aitken Circle Pond Stormwater Pond Rehabilitation, Markham
- Redside Dace Permitting for Birchmount Road Extension, Markham
- DFO Emergency Works Permit for GO Transit – Highland Creek Crossing, Toronto
- GO Transit Highland Creek Crossing Letter of Intent, Toronto
- York Downs Golf and Country Club Reconfiguration, Markham

Environmental Monitoring
Completed long-term monitoring for large-scale dewatering projects including groundwater levels, surface water quality and quantity and monitored for impacts to aquatic biota.

- Monora Creek Brook Trout Biomass Survey, Orangeville
- Arkell Springs Creek AMP Monitoring, Eden Mills
- York Region Sanitary Sewer Installation – 16th Avenue, Markham
- York Region Sanitary Sewer Installation – 9th Line, Stouffville

Certifications and Skills Development
- Royal Ontario Museum Species at Risk Workshop
- MTO/DFO/OMNR Fisheries Protocol Training for Consultant Fisheries Specialists
- Ontario Benthos Biomonitoring Network Certification Course, Ministry of the Environment
- Electrofishing Certification Level II Backpack
- Royal Ontario Museum Fish Identification Workshop
- Pleasure Craft Operator
- Standard First Aid with CPR Level A
- CISEC
- The Ontario Freshwater Mussel Identification Workshop
Profile

2014 – Present  Ecologist, Beacon Environmental
2012 - 2014  Ecologist, AECOM
2010 - 2012  Ecologist, Aboud & Associates
2008 - 2010  Environmental Scientist, Conestoga Rovers & Associates
Summer 2007  Conservation Intern, Nature Conservancy of Canada
Summer 2006  Field Technician, Watershed Science Centre – Trent University
Summer 2005  Greening Co-op Student, York Region Forestry Department
Summer 2004  Environmental Technician, Conservation Halton
Summer 2003  Environmental Technician, St. Clair Region Conservation Authority
Summer 2001  Resources Management Technician, Pinery Provincial Park

Education

2008  Honours B.Sc. Environmental Resource Science & Biology, Trent University
2006  Environmental Technologist Diploma, Sir Sandford Fleming College
2004  Natural Resources Law Enforcement Certificate, Sir Sandford Fleming College
2003  Ecosystem Management Technician Diploma, Sir Sandford Fleming College

Expertise

Mr. Aitken is a Terrestrial Ecologist with over six years of experience in the environmental field. He has participated in a variety of environmental studies in both terrestrial and aquatic ecosystems including environmental impact studies, environmental assessments, sub-watershed studies, natural heritage studies for renewable energy applications, and tree inventory and management plans. His areas of expertise include: breeding bird surveys, terrestrial species at risk surveys, habitat assessments, wildlife tracking, botanical inventories, ecological land classification (ELC), wetland delineation and evaluation, and tree assessments. He has also provided support for electrofishing surveys, aquatic invertebrate surveys, hydraulic stream flow monitoring, and water quality monitoring. Mr. Aitken regularly compiles background research, conducts data analyses, contributes to report writing and provides GIS mapping for ecological studies of various scales throughout Ontario.

Selected Experience

Aggregates and Mining

• **Borden Lake Environmental Baseline Survey, Chapleau, 2013 - 2014**
  Completed a baseline survey and report documenting the existing conditions of the terrestrial features within the study area. Tasks included the completion of detailed botanical inventories and mapping of representative vegetation communities within the study area, breeding bird surveys, wildlife tracking surveys and the evaluation of wetland habitat using the Ontario Wetland Evaluation System.

• **Butler Pit Expansion Environmental Monitoring, Cambridge, 2013**
  Developed and implemented an annual monitoring program to monitor the effects of the pit expansion on regionally rare bird, plant and amphibian species, which included completed annual breeding bird, vegetation and amphibian call monitoring surveys.

• **Mill Creek ELC & Breeding Bird Survey, Aberfoyle, 2012**

MARKHAM
144 Main St. North, Suite 206
Markham, Ontario  L3P 5T3
T) 905.201.7622  ☏  F) 905.201.0639

BRACEBRIDGE
126 Kimberley Avenue
Bracebridge, Ontario  P1L 1Z9
T) 705.645.1050  ☏  F) 705.645.6639

GUELPH
337 Woolwich Street
Guelph, Ontario  N1H 3W4
T) 519.826.0419  ☏  F) 519.826.9306

OTTAWA (Soteira Solutions)
470 Somerset Street West
Ottawa, Ontario  K1R 5J8
T) 613.238.3232
Completed a survey of the existing conditions of natural features within the study area for a proposed pit expansion. Tasks included the completion of detailed botanical inventories and mapping of representative vegetation communities within the study area, breeding bird surveys, crepuscular surveys and amphibian call surveys.

Residential and Municipal Development

- **Riverbend Subdivision Housing Development, London, 2013**
  Completed a variety of wildlife studies at the site including breeding bird surveys, winter wildlife tracking, and amphibian call surveys. Information was compiled and used to assist in the preparation of an EIS.

- **Kitchener Waste Water Treatment Plant, Kitchener, 2013**
  Completed breeding bird surveys as part of an Environmental Impact Study. Information was compiled and used to assist in the preparation of an EIS.

- **Kiwanis Trail Extension, London, 2013**
  Completed breeding bird surveys as part of an Environmental Assessment for the extension of the existing trail through a wetland. Information was compiled and used to assist in the preparation of an EIS.

- **Summit Park Breeding Bird, Snake and Snake Hibernacula Surveys, Hamilton, 2011**
  Completed breeding bird surveys and snake cover board surveys to confirm the presence of significant wildlife habitat at the site. Once these features were confirmed habitat compensation measures for Northern Rough-winged Swallow were developed and implemented to provide additional nesting habitat for these species at the site. A snake relocation program was also implemented to remove snakes from the site prior to development.

- **Mill Pond Park Botanical Inventory, ELC Assessment & Breeding Bird Surveys, Richmond Hill, 2011**
  Completed breeding bird, ELC and botanical surveys to document the existing conditions at the park providing information for enhancements, constraints and potential improvements to the trail systems within the park.

Renewable Energy Infrastructure

- **NextEra Energy Canada, Summerhaven Wind Energy Centre, Nanticoke, 2013 - 2014**
  Managed the annual monitoring programs for the Bald Eagle platforms and bobolink habitat that was created as part of permit agreements obtained from the Ministry of Natural Resources. Tasks included monitoring installed nest platforms and grassland habitat and the preparation and submission of an annual report to the Ministry of Natural Resources.

- **NextEra Energy Canada, Bluewater, Goshen and Jericho Wind Energy Centres, Grand Bend, 2012 - 2014**
  Assisted with several aspects of the natural assessments for the Bluewater, Goshen and Jericho Wind Energy Centres, including breeding bird surveys, winter raptor surveys, waterfowl surveys species at risk surveys, botanical inventories, classification of vegetation communities using the Ecological Land Classification for Southern Ontario, the evaluation of wetland communities using the Ontario Wetland Evaluation System and species at risk permitting.

- **ENS Poultry Renewable Energy Application Natural Heritage Assessment, Elora, 2011**
  Completed field surveys and reporting for a Natural Heritage Assessment under the Renewable Energies Act for a proposed Biogas facility. Tasks included botanical inventories, mapping of
representative vegetation communities within the study area, incidental wildlife observations and the preparation of the documents associated with the Natural Heritage Assessment.

**Transportation Infrastructure**

- **Albert Street Bridge Replacement, Strathroy, 2013 - 2014**
  Completed a preliminary inventory and assessment of the vegetation communities located within the proposed transit corridor as part of an Environmental Assessment. Tasks included detailed botanical inventories and mapping of representative vegetation communities within the study area, incidental bird and wildlife observations and Species at Risk Permitting.

- **East Gwillimbury Transit Corridor, East Gwillimbury, 2013**
  Completed a preliminary inventory and assessment of the vegetation communities located within the proposed transit corridor as part of an Environmental Assessment to identify the most suitable location for the proposed highway. Tasks included detailed botanical inventories and mapping of representative vegetation communities within the study area and incidental bird and wildlife observations.

- **Highway 11 Nest Survey & Vegetation Inventory, Orillia, 2013 - 2014**
  Completed surveys for nests and documenting existing vegetation community's adjacent 4 bridges and 1 culvert along the Highway 11 Corridor north of Orillia Ontario as part of Ministry of Transportation monitoring requirements. Tasks included nest surveys, detailed botanical inventories and mapping of representative vegetation communities within the study area. This information was then compiled and used to prepare a report to satisfy the terrestrial environment requirements under the Environmental Reference for Highway Design.

- **Highway 17 Planning & Class EA Study, Bonfield, 2013 - 2014**
  Completed a preliminary inventory and assessment of the vegetation communities located within the proposed transit corridor as part of a Class Environmental Assessment to identify significant environmental features that could potentially be negatively impacted by the proposed works. Tasks included detailed botanical inventories and mapping of representative vegetation communities within the study area, breeding bird surveys, amphibian call surveys, species at risk surveys and incidental wildlife observations. This information was then compiled and used to prepare a Terrestrial Ecosystems Report to satisfy the terrestrial environment requirements under the Environmental Reference for Highway Design.

- **Highway 401 Bridge Repair/Enhancement, Milton, 2013 - 2014**
  Completed a preliminary inventory and assessment of the vegetation communities within 120m of 6 bridges that were included in this study to identify any significant environmental features that could potentially be negatively impacted by the proposed works. Tasks included detailed botanical inventories and mapping of representative vegetation communities within the study area and incidental bird and wildlife observations. This information was then compiled and used to prepare a report to satisfy the terrestrial environment requirements under the Environmental Reference for Highway Design.

- **Peterborough Parkway, Peterborough, 2013**
  Completed a preliminary inventory and assessment of the vegetation communities located within the proposed transit corridor as part of an Environmental Assessment to identify the most suitable location for the proposed highway. Tasks completed as part of this study included detailed botanical inventories and mapping of representative vegetation communities within the study area and incidental bird and wildlife observations.

- **Bracebridge Transit Corridor, Bracebridge, 2012**
Completed a preliminary inventory and assessment of the vegetation communities located within the proposed transit corridor as part of an Environmental Assessment to identify the most suitable location for the proposed highway. Tasks completed included detailed botanical inventories and mapping of representative vegetation communities within the study area and incidental bird and wildlife observations.

- **GO Transit East Rail Maintenance Facility Nest Surveys, Whitby, 2012**
  Completed a survey of all natural features within the study area documenting any active/inactive bird nests and other incidental bird/wildlife observations prior to vegetation removal.

- **Highway 403 Nest Survey & Vegetation Inventory. Hamilton, 2012**
  Project Terrestrial and Wildlife Ecologist completing surveys for nests and documenting existing vegetation community’s adjacent 6 bridges along the 403 in Hamilton Ontario as part of Ministry of Transpiration monitoring requirements. Tasks included nest surveys, detailed botanical inventories and mapping of representative vegetation communities within the study area. This information was then compiled and used to prepare a report to satisfy the terrestrial environment requirements under the Environmental Reference for Highway Design.

- **Townline Road Wetland Monitoring, Cambridge, 2012**
  Established as wetland monitoring project to evaluate the impacts of adjacent dewatering from ongoing infrastructure improvement program. Tasks included a detailed inventory of the flora and fauna located within the study area and the weekly monitoring of the biological and structural health of 10 trees located adjacent the construction site to evaluate the impacts of the dewatering program.

- **Highway 407 East Extension Rare species surveys, Durham, 2011**
  Completed surveys for regionally rare flora within the footprint for the proposed Highway 407 east expansion. Works consisted of transects through natural features and recording the locations of regionally rare species.

- **Windsor Essex Parkway – Species at Risk surveys & Botanical Inventories, Windsor, 2011**
  Completed surveys for endangered and threatened flora within the footprint for the proposed Windsor Essex Parkway (now Rt. Hon. Herb Gray Parkway). Works consisted of transects through natural and cultural communities and recording the locations of regionally rare species to be transplanted. Also assisted with botanical inventories of remnant prairie habitat to identify and rank associate plant species and preferred soil conditions for species at risk flora that was used to evaluate the suitability of proposed planting sites.

**Tree Inventory/Management Plan**

- **Lotco II Landscape Plan Street Tree Inventory, Cambridge, 2011**
  Completed an inventory of street trees planted by the developer to assess their health and condition and identify ones that needed to be replaced prior to their transition to city ownership.

- **Street Tree Inventory for Infrastructure Improvement Projects, Cambridge, 2011**
  Completed an inventory of street trees adjacent proposed infrastructure improvements to assess their health and condition and identify potential hazard trees and impacts to the trees from the proposed works.

- **Lackner Boulevard Tree Management Plan, Kitchener, 2011**
  Completed an inventory of trees located along the edge of a planned apartment complex to assess their health and condition and identify potential hazard trees.

- **Jefferson Forest Edge Management & Tree Preservation Plan, Richmond Hill, 2011**
Completed an inventory of trees located along the edge of a planned subdivision development to assess their health and condition and identify potential hazard trees.

- **Block 12 Large Restore Buffer Vegetation Monitoring, Vaughan, 2010 – 2011**
  Completed annual monitoring of quadrats that had been established within the restorations plantings that were completed within the Block 12 Large Restore Buffer in Vaughan, Ontario.

- **Block 12 Phase 3 Trail Tree Inventory, Vaughan, 2010**
  Completed an inventory of trees located along a planned trail to assess their health and condition and identify potential hazard trees.

- **Kleinburg Tree Preservation Plan & Relocation Strategy, Vaughan, 2010**
  Completed an inventory of trees located on a golf course which was being transitioned into a subdivision development to identify trees that were suitable for relocation into a proposed green space/park.

- **Kleinburg Edge Management Plan, Vaughan, 2010**
  Completed an inventory of trees located along the edge of a planned subdivision development to assess their health and condition and identify potential hazard trees.

**Publications**


**Certifications and Training**

2013 Dragonflies and Damselflies Identification Workshop, University of Guelph Arboretum
2013 Warbler Identification Workshop, University of Guelph Arboretum
2013 Animal Tracking Workshop, University of Guelph Arboretum
2013 Owl Identification Workshop, University of Guelph Arboretum
2011 Natural Heritage Information Centre Data Sensitivity Training
2011 Class 2 Backpack Electro Fishing Certification
2011 Ontario Stream Assessment Protocol Certification
2011 MTO/DFO/MNR Protocol for Protecting Fish Habitat Workshop
2010 MNR Ecological Land Classification for Southern Ontario Certification
2010 Asters/Goldenrod Identification Workshop
2009 MNR Ontario Wetland Evaluation System Certification
2009 OSAP Level 1 Fish Identification Certification

**Professional Affiliations**

Field Botanist of Ontario
Ontario Field Ornithologist
GUIDING SOLUTIONS IN THE NATURAL ENVIRONMENT

Daniel S. Westerhof, B.Sc., MES
Terrestrial Ecologist

Profile

2010 – Present  Terrestrial Ecologist, Beacon Environmental
2009  Assistant Field Botanist, Toronto and Region Conservation Authority
2009  Tree Research and Monitoring Specialist, ReForest London
2008  Stream Inventory Technician, Lake Simcoe Region Conservation Authority
2007 – 2008  Stewardship Co-ordinator, Friends of the Rappahannock
2007  Assistant Field Botanist, Toronto and Region Conservation Authority
2005  Ecological Restoration Technician, City of Toronto
2004  Invasive Species Management Technician, The Nature Conservancy
2003  Forest Ecology Research Assistant, Michigan State University

Education

2007  Master’s in Environmental Studies, York University, Toronto, ON
2001  B.Sc. Biology, Calvin College, Grand Rapids, MI

Expertise

Dan is a field ecologist, botanist, and project manager with over a decade of professional experience in the environmental field, working in Ontario and the United States. His core areas of expertise include: botanical surveys, vegetation community classification, ecological monitoring, arborist assessments and tree preservation plans, and ecological restoration. Dan has strong plant identification skills, particularly concerning Ontario flora, and is certified and well-versed in the Ecological Land Classification (ELC) system and Ontario Wetland Evaluation System (OWES). Dan has contributed to numerous small and large scale ecological inventories and assessments in Ontario during his time with Beacon and while previously working as a field botanist for the Toronto Region Conservation Authority. Dan is also an ISA Certified Arborist and has completed the ISA Tree Risk Assessment Qualification (TRAQ). He regularly conducts tree inventories and prepares tree preservation plans for public and private sector clients. Dan has also contributed to numerous ecological restoration and invasive species management initiatives in Ontario, Virginia, Michigan, Iowa, and Nevada.

Selected Experience

Environmental Impact Studies and Environmental Assessments

Participate in numerous Environmental Impact Studies (EIS), Environmental Assessments, Natural Heritage Evaluations, and Due Diligence studies for land development and energy infrastructure projects. Key tasks include conducting ELC surveys and vegetation inventories, amphibian and reptile surveys, policy analysis, and impact assessment. Select project include:

- New Post Creek Hydroelectric EA, Abitibi Canyon, OPG, 2011-2013
- Natural Heritage Assessments for Wind Turbine Development, Woodstock and Ottawa, 2011-2013
- Southwest Georgetown Secondary Plan Study, Georgetown, 2013-2014
- Merton Tertiary Plan EIS, Town of Oakville, 2012-2013
- Evergreen EIS (Dundas and Tremaine), City of Burlington, 2012-2013
- Wingham Creek Due Dilligence and EIS, Town of Wingham, 2012-2013
- Argo Park EIS (Thomas St and 10th Line W), City of Mississauga, 2011
- Vaughan Block 27 EIS, City of Vaughan, 2011
- Optimal Use Study for the Child and Parent Resource Institute property, City of London, 2011
- Green Belt Drive Natural Heritage Impact Study, City of Toronto, 2012-2013
Leslie-Nymark Natural Heritage Impact Study, City of Toronto, 2011-2012
Four X Lands EIR, City of Brampton, 2011-2013
Brampton Block 48-2 EIR, City of Brampton, 2012-2013
Trafalgar Road Subwatershed Impact Study, Region of Halton, 2011
Vaughan Block 27 EIS, City of Vaughan, 2010-2011
North Leslie EIS, Town of Richmond Hill, 2010-2011

Ecological Research and Monitoring

City of London EIS Performance Monitoring, 2012-2013
City of Toronto Environmentally Significant Areas Study, 2010-2011
Nanticoke Generating Station Biological Surveys and Monitoring, OPG, 2012 & 2013
Little Abitibi Provincial Park Ecological Integrity Study, 2010
Desktop ELC analysis for Duclos Point, Springwater, and Bigwind Lake Provincial Parks, 2012
Biological Monitoring for Nestle Waters Canada, Aberfoyle, ON, 2010-2011
Urban Tree Research and Assessment (ReForest London), City of London, 2009
ELC, Flora Surveys, and Monitoring (Toronto and Region Conservation Authority), 2007 & 2009

Tree Inventory and Preservation Plans

Aurora 2C Tree Inventory and Conservation Plans (multiple sites), 2012-2013
Rexdale Blvd and Humberwood Dr Tree Inventory and Preservation Plan, City of Toronto, 2012
Eglington Crosstown LRT, Arborist Survey, City of Toronto, 2011
Brampton Block 48-1 and 48-2 Tabeland Vegetation Assessment, City of Brampton, 2012
Four X Lands Tabeland Vegetation Assessment, City of Mississauga, 2012
Oxford St and Bathurst St Tree Inventory and Preservation Plan, Town of Richmond Hill, 2012
Lots 107, 108, and 109 Fairport Road Tree Inventory and Preservation Plan, City of Pickering, 2012
Hurontario St. and Eglinton Ave Tree Inventory and Preservation Plan, City of Mississauga, 2012
Applewood Creek EA Tree Inventory and Preservation Plan, City of Mississauga, 2011-2012

Ecological Restoration and Enhancement Plans

Regularly prepare restoration and enhancement plans for natural heritage features and regulated environment areas. Provide oversight during implementation of restoration plans. Plans include site clean-up, invasive species management, buffer plantings, reforestation, native plant salvage, and edge management. Select projects include:

Cooksville Creek Restoration and Enhancement Plan and Monitoring, City of Mississauga, 2013-2014
Woodland Enhancement Plan and Monitoring, Thomas St. & 10th Line W., Mississauga, 2011-2013
Milton Heights Wetland Enhancement Plan, Town of Milton, 2013
Ravine Stewardship Plan, Albion Rd and Islington Ave, City of Toronto, 2011
Ravine Stewardship Plan, Valleywoods Rd, City of Toronto, 2010
Ravine Stewardship Plan, Park Lawn Rd and The Queensway, City of Toronto, 2011-2012

Certifications and Training

2013 ISA Tree Risk Assessment Qualification
2012 Ontario Wetland Evaluation System for Southern Ontario
2011 ISA Certified Arborist
2010 Ecological Land Classification
2013 Standard First Aid and Level C CPR
2010 Ontario Pleasure Craft Operator license