



GUIDING SOLUTIONS IN THE
NATURAL ENVIRONMENT

Environmental Impact Study Meaford Highlands Resort Meaford, Ontario

Prepared For:

Meaford A2A Developments Inc.

Prepared By:

Beacon Environmental

Date: *Project:*

May 2013 211348

Table of Contents

	page
1. Introduction	1
2. Policy Context	1
2.1 Federal Fisheries Act	2
2.2 Provincial Policy Statement.....	2
2.3 County of Grey Official Plan.....	3
2.4 Municipality of Meaford Official Plan	6
2.5 Grey Sauble Conservation Authority Regulations and Policies	8
2.6 Endangered Species Act.....	8
3. Methodology	10
3.1 Background Review	10
3.2 Field Investigations	10
3.2.1 Vegetation Surveys	11
3.2.2 Amphibian Surveys	11
3.2.3 Breeding Bird Surveys	12
3.2.4 Reptiles	13
3.2.5 Aquatic Habitat Assessment	13
3.3 Natural Heritage Assessment	13
3.4 Constraint Analysis	13
3.5 Impact Assessment.....	15
4. Results	15
4.1 Landscape Context	15
4.2 Physical Resources.....	16
4.2.1 Bedrock Geology.....	16
4.2.2 Surficial Geology	16
4.2.3 Topography	16
4.2.4 Soils.....	16
4.2.5 Groundwater.....	17
4.2.6 Surface Drainage	17
4.3 Biological Resources.....	17
4.3.1 Vegetation Communities	17
4.3.1.1 Terrestrial.....	18
4.3.2 Flora	25
4.3.3 Amphibians.....	25
4.3.4 Reptiles	26
4.3.5 Mammals.....	27
4.3.6 Breeding Birds.....	27
4.3.7 Significant Wildlife	28
4.3.8 Aquatic Habitat Assessment	29
4.4 Landscape Connectivity	35
4.5 Winter Habitat	36

5. Natural Heritage Assessment	36
5.1 Significant Wetlands.....	36
5.2 Significant Habitat for Threatened and Endangered Species	36
5.3 Significant Areas of Natural and Scientific Interest (ANSI)	37
5.4 Fish Habitat.....	37
5.5 Significant Woodlands.....	37
5.6 Significant Valleylands	37
5.7 Significant Wildlife Habitat.....	38
5.8 Permanent/Intermittent Watercourses	38
5.9 Threatened and Endangered Species	39
6. Constraints and Opportunities.....	41
7. Description of the Proposed Development.....	42
7.1 Development Concept.....	42
7.2 Storm Water Management	43
8. Impact Assessment and Proposed Mitigation.....	43
9. Environmental Management and Monitoring Plan	48
10. Policy Conformity Assessment	58
11. Conclusions.....	59
12. Literature Cited.....	62

Figures

Figure 1. Site Location	after page 2
Figure 2. Existing Conditions	after page 15
Figure 3. Preliminary Constraints Analysis	after page 41
Figure 4. Preliminary Development Concept Plan	after page 42

Tables

Table 1. Summary of Field Investigations.....	11
Table 2. Amphibian Survey Detail	12
Table 3. Results of Nocturnal Amphibian Call Surveys	26
Table 4. NHIC Records of Species of Conservation Concern in Vicinity of Study Area	28
Table 5. Area of Proposed Land Uses.....	42
Table 6. Impact Assessment Matrix.....	44
Table 7. Potential Ecological Indicators for Monitoring Long Term Ecological Integrity	49
Table 8. Proposed Ecological Integrity Monitoring Framework	51
Table 9. Recommended Environmental Management Strategies and Mitigation Measures	53
Table 10. Performance Monitoring Framework for Meaford Highlands Development.....	56
Table 11. Conformity with Natural Heritage Policies and Legislation	58

Appendices

- A. EIS Terms of Reference
- B. Plant List
- C. Bird List
- D. Karst Study – Karst Solutions Inc. 2010

1. Introduction

Beacon Environmental Limited (Beacon) was retained by Meaford A2A Developments Inc. to prepare an Environmental Impact Study (EIS) for a 153.9 ha parcel of land located east of 3rd line and south of Hwy. 26 in the southeastern corner of the Municipality of Meaford, Ontario. The legal description for the subject property is part of Lots 9 and 10, Concessions 1 and 2, Municipality of Meaford, Grey County. The southern portion of the subject lands (south of the unopened road allowance for the 10th Sideroad) lies outside the municipal limits (**Figure 1**). The lands are hereafter referred to as the subject property.

The subject property is generally characterized as an agricultural landscape, with cultivated fields and pasture covering most of the southern and central portions of the site. This tableland slopes from south to north towards Georgian Bay, with a fall of about 30 m from its southern limit to the edge of a steep shorecliff bluff, the base of which abuts Highway 26. This bluff, which for the most part is densely wooded, marks the old shoreline of glacial Lake Algonquin (now Georgian Bay). The subject property is also traversed by a number of watercourses and wooded valleylands that convey drainage to the bluff where they terminate in a series of gullies.

The applicant is proposing to develop the subject property to create a fully integrated mix of resort, residential and commercial land uses that will incorporate best practices for sustainable development. Approximately one half of the subject property is proposed for development. The remainder of the subject property will be retained as open space comprised of golf course, parkland and environmental areas.

This EIS has been prepared to satisfy the environmental policies of the Grey County and Municipality of Meaford Official Plans as well as the Grey Sauble Conservation Authority (GSCA) regulations. Terms of Reference (TOR) were prepared for this EIS and were approved by the GSCA on March 9, 2012. A copy of the EIS TOR is included in **Appendix A**.

A partially completed EIS report was previously submitted to the Municipality of Meaford in May 2012; however it did not include the findings of summer biological inventories and hydrogeological investigations, detailed impact assessment or environmental management plan. This EIS has been updated with this supplementary information to meet the requirements of the TOR.

2. Policy Context

This following section provides an overview of various environmental legislation, regulation and policy at the provincial, regional and local level that may be applicable to development of the subject property. The purpose of this section is to identify environmental policy requirements related to this project to ensure that the project design is effectively in compliance with applicable legislation, regulation, and policy. A project conformity assessment is provided in **Section 8**.

2.1 Federal Fisheries Act

Subsection 35(1) of the Federal Fisheries Act (1985) is a general prohibition of Harmful Alteration, Disruption or Destruction (HADD) of fish habitat. This means that any work or undertaking proposed as part of the development process that results in a HADD represents a contravention of Subsection 35(1). The only relief from this general prohibition is when a Subsection 35(2) Authorization is issued for the HADD. The Grey Sauble Conservation Authority is responsible for administering this authorization on behalf of Fisheries and Oceans Canada (DFO).

2.2 Provincial Policy Statement

The proposed development is subject to the Provincial Policy Statement (PPS) (MMAH 2005) issued under Section 3.0 of the Planning Act. Decisions concerning planning matters must be consistent with the policy statements issued under the PPS. Section 2.1 of the PPS provides direction to regional and local municipalities regarding planning policies related to the protection of natural heritage resources. The PPS includes policies that address the following natural heritage system components: habitat of endangered and threatened species, wetlands, woodlands, valleylands, wildlife habitat, Areas of Natural and Scientific Interest (ANSI), and fish habitat.

Under Section 2.1 of the PPS, no development and site alteration is permitted within:

- a) significant habitat of endangered and threatened species;
- b) significant wetlands south of the Canadian Shield; and
- c) significant coastal wetlands

For the remaining features, listed below:

- a) Significant wetlands north of the Canadian Shield;
- b) Significant woodlands south and east of the Canadian Shield;
- c) Significant valleylands south and east of the Canadian Shield;
- d) Significant wildlife habitat; and
- e) Significant Areas of Natural and Scientific Interest (ANSI's)

Development and site alteration is not permitted within the features (listed above) unless it has been demonstrated (typically through an Environmental Impact Study or a comparable technical study) that there will be no negative impacts on the natural features or their ecological functions.

The PPS also states that development and site alteration are not permitted in fish habitat except in accordance with provincial and federal requirements.

Some of these features (i.e., provincially significant wetlands and ANSIs) are identified by the Ontario Ministry of Natural Resources (OMNR), while others are to be identified by the local area municipalities or planning authorities (i.e., significant woodlands, significant valleylands, significant wildlife habitat). Threatened and endangered species are designated at the provincial level, but their habitat is typically not identified or verified until site-specific studies are completed, and if present, confirmed by OMNR. It is expected that even where features have been identified at the provincial,



Legend

— Subject Property

Site Location

Figure 1

Meaford A2A Developments Inc.

First Base Solutions Web
Mapping Service 2006

UTM Zone 17 N, NAD 83

0 220 440 880 Meters



1:24,000



Project 211348
January 2013

regional or local levels that verification and some level of refinement will be required at the site-specific level.

2.3 County of Grey Official Plan

The County of Grey Official Plan was approved by the Ontario Municipal Board on June 25, 2012 and is in force. Schedule A of the County of Grey Official Plan identifies the subject property as having split land use designations of *Rural* and *Hazard Land*. Portions of the subject property corresponding with the agricultural areas are designated *Rural*, while the shorecliff and valleyland features are designated *Hazard Land*.

Policy 2.3.2.1 of the County of Grey Official Plan states that: *“the Rural designation on Schedule A shall mean that the predominant use of the lands shall be for agriculture and forestry and uses connected with the conservation of water, soil, wildlife and other natural resources. In addition to the uses permitted under Section 2.1.2(1) of this Plan, other uses also permitted within the Rural designation shall include low density non-farm residential, garden suites, small scale commercial and industrial uses, institutional and resource based recreational uses, sand and/or gravel operations proposed within Aggregate Resource Areas identified on Schedule B, licensed aggregate operations identified as Mineral Resource Extraction on Schedule B, and wayside pits and quarries in accordance with Section 2.7.2 of this Plan”.*

Hazard Lands are defined as “property or lands that could be unsafe for development due to naturally occurring processes. Along the shorelines of the Georgian Bay, this means the land, including that covered by water, where applicable, and the furthest landward limit of the flooding hazard, erosion hazard or dynamic beach hazard limits. Along river, stream and small inland lake systems, this means the land, including that covered by water, to the furthest landward limit of the flooding hazard or erosion hazard limits”.

Policy 2.8.2 of the County of Grey Official Plan relates to the *Hazard Land* designation and states:

- (1) *The Hazard Lands designation as shown on Schedule A identifies those lands having inherent environmental hazards such as flood susceptibility, erosion susceptibility, and dynamic beach hazards, and hazardous sites that exhibit instability, or poor drainage, or any other physical condition which is severe enough to pose a risk for the occupant, property damage or social disruption if developed.*
- (2) *Permitted uses in the Hazard Lands designation are forestry and uses connected with the conservation of water, soil, wildlife and other natural resources. Other uses also permitted are agriculture, passive public parks, public utilities and resource based recreational uses. The aforementioned uses will only be permitted where site conditions are suitable and where the relevant hazard impacts have been reviewed.*
- (3) *In the Hazard Lands designation buildings and structures are generally not permitted. Minor extensions or enlargements of existing buildings and structures may be permitted subject to the policies of Section 2.8. Non-habitable buildings connected with public parks, such as picnic shelters, may be permitted.*
- (4) *Development and site alteration shall not be permitted within the floodway portion of the floodplain or defined portion of the dynamic beach. The floodway is the entire flood plain, unless the Two-Zone Concept is in use.*

- (5) Implementation of the Two-Zone Concept or Floodplain Special Policy Area shall be by official plan amendment and subject to the following:
- a. The Two-Zone Concept shall continue to be used for the Saugeen River floodplain on Lot 56 to 59 inclusive, Concession 2 E.G.R., (Glenelg Township) Municipality of West Grey, with the floodway being the 100 Year flood plain and the flood fringe being the outer portions of the Regional Storm flood plain. Appropriate development may be permitted in the flood fringe provided suitable flood damage reduction measures are undertaken to protect against Regional Storm flooding. Development and site alteration within the floodway, flood fringe or Regulated Area requires the approval of the Conservation Authority, in addition to any other applicable approvals.
- (6) Placing, removing or re-grading fill material of any kind, whether originating on the site or elsewhere, is not permitted without written approval of the appropriate Conservation Authority in Hazard Lands.
- (7) Certain public or private works which, by their nature, must locate within Hazard Lands shall be permitted to do so. These works include flood and erosion control, drainage, water works, those directly required for the management or maintenance of the natural environment, and other necessary works of approved design.
- (8) Replacement of existing buildings or structures may be permitted if the hazard risk does not increase from the original condition, and the feasibility of re-locating the buildings or structures outside of the hazard areas has been assessed.
- (9) In the Hazard Lands designation new development and site alterations will only be considered if all of the following can be satisfied:
- 1) The hazards can be safely addressed and new hazards are not created or existing ones aggravated;
 - 2) No adverse environmental impacts will result, The County, in consultation with the Conservation Authority, may require an Environmental Impact Study to be prepared at the proponent's expense, in accordance with this Plan;
 - 3) Vehicles and people have a way of safely entering and exiting at all times;
 - 4) The development does not include;
 - a) institutional uses including hospitals, nursing homes, pre-school, school nurseries, day care and schools, where there is a threat to the safe evacuation of the sick, the elderly, persons with disabilities or the young during an emergency as a result of flooding, failure of flood proofing measures or protection works, or erosion; or
 - b) emergency services such as that provided by fire, police and ambulance stations and electrical substations, which would be impaired during an emergency as a result of flooding, the failure of flood proofing measures and/or protection works, and/or erosion; or
 - c) involve hazardous substances, and their disposal, manufacture, treatment or storage of, and;
 - 5) The advice or approval where required, of the appropriate Conservation Authority shall be obtained. The County and the Conservation Authority will consider the mitigation of effects on vegetation, wildlife and fishery resources and the natural features of the site.
 - 6) There is no feasible location for the development outside of the Hazard Lands designation.
- (10) Where new development is proposed on a site, part of which is Hazard Lands, then such lands shall not be necessarily be acceptable as part of the five per cent dedication for parkland. All lands dedicated to the municipality shall be conveyed in a condition satisfactory to Council.

The County of Grey Official Plan also includes a *Natural Environment* land use designation that includes *Hazard Lands* and *Provincially Significant Wetlands*. It is the objective of the County to protect new development from natural hazards and to direct development to areas outside natural features.

Policy 2.8.3 relates to the Provincially Significant Wetland designation and states:

- (1) *No development or site alteration is permitted within the Provincially Significant Wetlands designation. Except where such activity is associated with forestry and uses connected with the conservation of water, soil, wildlife and other natural resources but not including buildings and will not negatively impact of the integrity of the wetland.*
- (2) *No development and site alteration may occur within the adjacent lands of the Provincially Significant Wetlands designation unless it has been demonstrated through an Environmental Impact Study, as per section 2.8.7 of this Plan, that there will be no negative impacts on the natural features or their ecological functions.*
- (3) *Development and site alteration within the adjacent lands of the Provincially Significant Wetlands designation will require a permit from the appropriate conservation authority as per the conservation authority's generic regulations.*
- (4) *(3) Changes to the Provincially Significant Wetlands designation or the adjacent lands requires the approval of the Ministry of Natural Resources or its delegated authority.*

There are also additional natural features and environmental constraints that are subject to the *Natural Environment* policies of the County of Grey Official Plan such as significant woodlands, significant valleylands, significant wildlife habitat, significant habitat of endangered and threatened species, areas of natural and scientific interest, and fish habitat. Mapping for such features is generally not available or is too coarse and inaccurate and such features are not identified as a land use designation, but they can be represented as overlays on the Plans scheduled. For example, Significant Woodlands and ANSI's are identified as an environmental constraint overlay on Appendix B – Map 1.

Policy 2.3.4 of the County of Grey Official Plan relate to *Significant Woodlands* and states:

- (1) *No development or site alteration may occur within Significant Woodlands or their adjacent lands unless it has been demonstrated through an Environmental Impact Study, as per section 2.8.7 of this Plan, that there will be no negative impacts on the natural features or their ecological functions. The adjacent lands are defined in section 6.19 of this Plan. Notwithstanding the above, projects undertaken by a Municipality or Conservation Authority may be exempt from the Environmental Impact Study requirements, provided said project is a public work or conservation project.*
- (2) *Notwithstanding paragraph (1), where it can be proven that a woodland identified as significant has ceased to exist, or ceased to exhibit characteristics of significance, prior to November 1, 2006, an Environmental Impact Study will not be required. Site photographs or a site visit by a qualified individual may be necessary to determine that a woodland no longer exists.*
- (3) *Notwithstanding paragraph (1), tree cutting and forestry will be permitted in accordance with the County Forest Management By-law.*
- (4) *Notwithstanding paragraph (1) and (3), fragmentation of significant woodlands is generally discouraged.*

While the County of Grey Official Plan does not include specific policies related to the protection and permitted uses within significant valleylands, significant wildlife habitat, significant habitat of endangered and threatened species, areas of natural and scientific interest, and fish habitat, it is assumed that such features are subject to the requirements outlined in the PPS and other applicable environmental regulations or legislation (i.e. Endangered Species Act, Federal Fisheries Act, Conservation Authorities Act and Regulations).

The entire property is also identified as Special Policy Area (Karst) in Appendix A – Constraint Map 1 of the County of Grey Official Plan. The Special Policy Area is a development constraint overlay that corresponds with areas of potential karst topography. Karst is a distinctive topography that is indicative of landscapes that are shaped by the dissolving action of water on carbonate bedrock. The Special Policy Area overlay was applied to areas with shallow overburden less than a metre in depth over fractured bedrock. In such areas, there is an increased potential for karstic features (i.e., caves, sinkholes and springs).

Policy 2.8.5 of the County of Grey Official Plan relates to *Special Policy Areas* and states:

In areas identified as Special Policy Area on Appendix A, it will be necessary for the proponent of any planning application to address the need of providing an Environmental Impact Study. The objective of the Environmental Impact Study shall be twofold; to determine if in fact that the Special Policy Area (shallow overburden with karst topography) does exist. This may be accomplished simply by on-site test holes.

The proponent shall dig two test holes in the location of a proposed dwelling or business (e.g. in the northwest and southeast corners), one test hole in the location of the proposed sewage system and one test hole in the proposed location of each accessory structure. The test holes shall be inspected by a qualified municipal official or qualified third party consultant capable of determining karst topography. A brief report of the findings shall then be prepared and submitted to the County of Grey and the local Municipality. If the Special Policy Area does exist, a study by a qualified individual shall be prepared to assess the impacts and mitigation measures on the surface and groundwater supply of the planning application. This study will also address the potential hazard associated with unstable bedrock conditions as a result of karst features. The study shall be to the satisfaction of the County of Grey, the local municipality and the appropriate authority designated under the Ontario Building Code for sewage systems.

Notwithstanding the requirements of Section 2.8.5, in areas where full municipal water and sewer services are already installed, the special policy area requirements shall not apply for new fully serviced development.

It should be noted that a review of the subject property for karst features was undertaken by Karst Solutions (2010).

2.4 Municipality of Meaford Official Plan

The Municipality of Meaford Official Plan was approved and modified by the County of Grey on December 15th, 2005. A five year review process is presently ongoing and the existing Official Plan remains in force.

Land Use Schedule (Schedule A-1) of the Municipality of Meaford Official Plan identifies the portions of the subject property to the north of the unopened road allowance of 10th Side Road as being contained within the municipal urban boundary and the portions of property to the south as outside the existing urban boundary.

Schedule A-1 identifies land use designations on the subject property as *Rural* and *Environmental Protection*. Portions of the subject property corresponding with the agricultural areas are designated *Rural*, while the shorecliff and valleyland features are designated *Environmental Protection*.

Section B3.1.2 of the Meaford Official Plan defines the Environmental Protection designation as including any of the following components that comprise the Municipality's Natural Heritage System:

- *All wetlands evaluated by the Ministry of Natural Resources;*
- *Provincially Significant Areas of Natural and Scientific Interest (ANSIs);*
- *Floodplains;*
- *Hazardous slopes;*
- *Significant wildlife habitat and wildlife core areas;*
- *Significant portions of habitat of endangered, threatened or vulnerable species; and*
- *Any other areas that have been determined to be environmentally significant as a result of a development review process or detailed land use study, such as a Secondary Plan.*

Policy B3.1.3 specifies permitted uses within *Environmental Protection* designated areas as follows:

Permitted uses on lands designated Environmental Protection are limited to conservation and passive recreational uses. For the purposes of this section, a golf course or similar land use is not a passive recreational use. No buildings or structures are permitted nor is any site alteration permitted in this designation. Nothing in this section is intended to limit the ability of agricultural uses to continue on lands that are designated Environmental Protection.

Policy B3.1.4.3 specifies the requirements for development on *Adjacent Lands* to *Environmental Protection* features as follows:

Adjacent lands are the lands adjacent to a natural heritage feature within which impacts must be considered and within which the compatibility of the development proposal must be addressed. For the purposes of this Official Plan, adjacent lands are defined as all lands within:

- *120 metres (393.7 feet) of the boundary of a wetland that has been evaluated by the Ministry of Natural Resources;*
- *50 metres (164 feet) from the boundary of a Provincially Significant Area of Natural and Scientific Interest;*
- *50 metres (164 feet) of a significant portion of the habitat of an endangered or threatened species;*
- *50 metres (164 feet) from the boundary of a significant woodland;*
- *50 metres (164 feet) from a significant wildlife habitat area;*
- *50 metres (164 feet) from the boundary of a significant valleyland; and*
- *50 metres (164 feet) from the boundary of a significant fish habitat area*

No development shall be permitted on these adjacent lands unless an Environmental Impact Study and/or a subwatershed study and/or a geotechnical study is completed and approved by Council, subject to the comments of the appropriate agencies. The requirements for an Environmental Impact Study are contained in Section C6 (Requirements for an Environmental Impact Study) of this Plan.

The scale and the contents of the required studies shall be determined at the time the development is proposed. The width of the adjacent lands may be increased / decreased, depending on the feature and the nature of the proposed development. This determination shall be made in consultation with the appropriate agencies at the time the development is proposed.

Policy B3.1.4.4 does not permit major reductions to the spatial extent and/or the function of a significant natural heritage feature within the *Environmental Protection* designation. It does however allow for minor refinements to the boundaries of natural features based on more detailed site specific investigations.

Schedule B – Environmental and Resource Features also identifies the subject property as an area of Karst Topography similar to the Special Policy Area overlay in the County of Grey Official Plan.

2.5 Grey Sauble Conservation Authority Regulations and Policies

The Grey Sauble Conservation Authority (GSCA) regulates hazard lands, including streams, valleylands, shorelines, and wetlands, under Ontario Regulation 151/06 (GSCA 2006). Development is generally not permitted within a regulated feature valleyland, floodplain, wetland, or hazard land. Any development proposed within the regulated area (i.e., within 15 m of a watercourse or 120 m of a Provincially Significant Wetland (PSW), or within 30 m of any other wetlands) requires a permit from GSCA. The permit application typically requires the support of an EIS. GSCA generally requires that all watercourses remain in their natural state and that they be protected from adjacent development by a vegetative buffer that will be measured from the annual high water mark.

2.6 Endangered Species Act

The Ontario Ministry of Natural Resources (MNR) provides oversight of the *Endangered Species Act* (ESA) for the regulation of species at risk in Ontario. The Act applies to native species that are in danger of becoming extinct or extirpated from the province. Under the Act, protection is provided to listed species and their habitat, as well as providing stewardship and recovery strategies for species. Permitting is required to conduct activities within habitat regulated for a species at risk.

If a species is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened species, it receives protection under the ESA.

Subsection 9(1) of the ESA states that:

“No person shall,

- (a) *kill, harm, harass, capture or take a living member of a species that is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened species;*
- (b) *possess, transport, collect, buy, sell, lease, trade or offer to buy, sell, lease or trade,*
 - i. *a living or dead member of a species that is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened species,*
 - ii. *any part of a living or dead member of a species referred to in subclause (i),*
 - iii. *anything derived from a living or dead member of a species referred to in subclause (i); or*
- (c) *sell, lease, trade or offer to sell, lease or trade anything that the person represents to be a thing described in subclause (b) (i), (ii) or (iii).*

Clause 10(1)(a) of the ESA states that:

“No person shall damage or destroy the habitat of a species that is listed on the Species at Risk in Ontario list as an endangered or threatened species”.

The ESA also enables the Minister of Natural Resources to issue permits or enter into agreements with proponents in order to authorize activities that would otherwise be prohibited by subsections 9(1) or 10(1) of the Act, provided the legal requirements of the Act are met.

The type of permit that is relevant to this guidance document is the “overall benefit permit” that may be issued under clause 17(2)(c) of the Act. This type of permit may be issued where the following legal requirements are satisfied:

“17(2)(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.”*

An overall benefit permit may be issued only where the legal requirements set out in clause 17(2)(c) of the ESA have been satisfied. MNR is not obligated to issue an overall benefit permit to a proponent.

A permit holder must fulfil the conditions of the overall benefit permit issued to it. Failure to do so could result in a contravention of the ESA and could lead to a prosecution under the Act. Where a

permit holder uses a third party to fulfil the conditions of the permit, the permit holder remains responsible for ensuring the permit conditions are satisfied.

There is also a federal *Species at Risk Act* (SARA) that applies to birds and fish on private property. However, at this time the ESA is the more restrictive Act.

3. Methodology

Information pertaining to natural heritage resources on the subject property was obtained through a review of available background studies, databases, and field investigations.

3.1 Background Review

Background information was gathered and reviewed at the outset of the project. This included checking the Ontario Ministry of Natural Resources' Natural Heritage Information Centre on-line database for records of species of conservation concern on or adjacent to the study area. Other sources of information, such as; the regulation mapping of the Grey-Sauble Conservation Authority, colour aerial photography and topographic maps were also consulted prior to commencing field work.

The following information sources were reviewed to obtain background planning policy information and natural heritage data for the study area:

- Natural Heritage Information Centre (NHIC) database;
- Consultation with GSCA ecologists;
- Ontario Breeding Bird Atlas;
- historic and current aerial photography;
- topographic mapping;
- landform/physiography reports and mapping;
- soil reports and mapping;
- natural heritage resources mapping;
- MNR/GSCA fisheries data;
- Karst Investigation (Karst Solutions 2010);
- Functional Servicing Plan (Cole Engineering Group Ltd. 2012a);
- Hydrogeological Investigation (Cole Engineering Group Ltd. 2012b); and
- Geotechnical Investigation (Terraprobe 2012).

3.2 Field Investigations

A number of ecological surveys were completed on the subject property and environs to; obtain characterize natural heritage features and ecological functions, identify significant and sensitive resources that may represent constraints or opportunities to future development, and establish ecologically appropriate limits to the proposed development. A summary of site visitations is provided in **Table 1**.

Table 1. Summary of Field Investigations

General Site Reconnaissance	October 26, 2010; December 13, 2011
Amphibian Surveys	April 10, 2012; May 22, 2012, June 21, 2012
Vegetation Communities and Flora	March 19, April 10, May 22, and August 15, 2012
Breeding Bird Surveys	June 10, 11, 28, 30, and July 2, 2012
Winter Wildlife Use	January 13, 2013
Stick Nest Survey	March 19, 2012
Aquatic Survey	April 28, 2012

3.2.1 Vegetation Surveys

Vegetation resources on the subject property were documented by Beacon ecologists on March 19, April 10, May 22, and August 15, 2012. Vegetation communities were mapped on 2010 aerial photography and described according to the Ecological Land Classification (ELC) system for Southern Ontario (Lee *et al.*, 1998). A list of all vascular plant species encountered was compiled.

It should be noted that farming activities on the subject property changed between the spring and fall of 2012. The ELC mapping provided in this report has been updated to reflect these changes.

3.2.2 Amphibian Surveys

There are several wetland and aquatic features on the subject property that could support breeding habitat for local amphibian populations. To verify the extent to which these features support amphibian breeding functions, nocturnal call surveys were conducted in the spring and early summer of 2012. The surveys were completed by generally following Marsh Monitoring Program Protocols (Bird Studies Canada 2009). The surveys were focused on potential amphibian breeding sites such as ponds, wetlands, and other low lying areas where surface water ponding may occur. Surveys were conducted at three different periods in the spring of 2012 to correspond with the breeding periods of early and late breeding species. Surveys were completed after dusk during appropriate weather conditions. Weather details (i.e., air temperature, precipitation, wind speed, and cloud cover) at the time of survey were recorded.

Surveys were conducted using the point count method whereby the surveyor stands at a set point for a specific period of time and records all species that can be heard calling from the location and indicates the approximate location of each species on an air photo of the site. A total of 9 point count sampling stations were established in the vicinity of potential breeding habitats. The locations of the point count sampling stations are illustrated on **Figure 2**. Each survey station was surveyed for three minutes. Calling activity for each species detected was assigned a call code as follows:

- 0.....no calls;
- 1.....individuals of one species can be counted, calls not simultaneous;
- 2.....some calls of one species simultaneous, numbers can be reliably estimated; and,
- 3.....full chorus, calls continuous and overlapping.

For call codes 1 and 2, the estimated number of calling individuals was recorded.

The first round of nocturnal call surveys was completed on April 10, 2012 to coincide with the breeding periods of Wood Frog (*Rana sylvatica*), Northern Spring Peeper (*Pseudacris crucifer*) and Western Chorus Frog (*Pseudacris triseriata*). The second round was conducted on May 22, 2012 to coincide with the breeding period of American Toad (*Bufo americana*) and Gray Treefrog (*Hyla versicolor*). The third survey was conducted on June 21, 2012 to detect later breeding species such as Green Frog (*Rana clematins*) and Bullfrog (*Rana catesbeiana*).

It should also be noted that calling amphibians were also recorded during the daytime visits on March 19 and May 22, 2012 while conducting stick nest and vegetation surveys.

Amphibian survey details including the date and time of the surveys and weather conditions at the time of survey are summarized in **Table 2**.

Table 2. Amphibian Survey Detail

	Survey 1	Survey 2	Survey 3
Date	April 10, 2012	May 22, 2012	June 21, 2012
Start time	20:15	21:00	21:45
Temp (°C)	8	16	20
Wind (km/h)	2	2	10-15
Cloud cover (%)	100	90	70
Precipitation	None	None	None

3.2.3 Breeding Bird Surveys

The subject property supports breeding habitat types for a variety of bird species. To determine the composition of the breeding bird communities associated with the site and confirm the presence/absence of any habitat for significant bird species (i.e. SAR and Species of Conservation Concern), three surveys were conducted on the subject property during the breeding season. Surveys were conducted during the early mornings of June 10, 11, and 28, 2012 with survey start times of 05:30, 05:00, and 05:00 respectively. A roving survey was used in which the entire property was walked to within approximately 50 m and all birds heard or observed on the property for which suitable habitat existed were recorded as breeding. Weather conditions for all the surveys were ideal with temperatures within 5°C of normal, with no rain or excessively wind.

Additional bird surveys were also conducted for several threatened species at risk. Surveys of potentially suitable habitat for Henslow's Sparrow were conducted during the afternoon and early

evening of June 30, 2012. A nocturnal survey (specifically for Whip-poor-will and Common Nighthawk) was completed in the early morning of July 2, 2012 under a full moon.

3.2.4 Reptiles

Reptiles were surveyed incidentally during other survey visits. When suitable cover objects such as logs, rocks and refuse piles were encountered, efforts were made to search for snakes. Pond habitats were surveyed for basking turtles from a distance using binoculars.

3.2.5 Aquatic Habitat Assessment

All aquatic features on the subject property were assessed in terms of their flow and habitat characteristics, as well as their potential to support fish populations on April 28, 2012. Drainage features were assessed using principles from the Ontario Stream Assessment Protocol (Stanfield 2005) and the Headwater Drainage Feature Assessment, (TRCA and CVC 2009), where appropriate.

3.3 Natural Heritage Assessment

As discussed in **Section 2**, the PPS includes policies regarding the protection of natural heritage systems and their component features. These include:

- significant habitat of endangered and threatened species;
- significant wetlands;
- significant coastal wetlands;
- significant woodlands;
- significant valleylands;
- significant wildlife habitat;
- significant Areas of Natural and Scientific Interest (ANSI); and
- fish habitat.

The findings of the background review and field investigations have been used to confirm whether the subject property supports any of the natural heritage components recognized under the PPS. Where information is lacking, the Natural Heritage Reference Manual (MNR 2010) was consulted. A conservative approach was used for the evaluation.

3.4 Constraint Analysis

To assist in establishing ecologically appropriate limits to the proposed development, a constraint analysis was undertaken to identify environmentally sensitive features and their priority for conservation. The constraint analysis was applied to a combination of physical features (landforms such as bluffs, well defined valleys, and watercourses) as well as biological features (vegetation, fish and wildlife habitat) to assist with the spatial identification of potentially sensitive natural heritage features.

It should be noted that Beacon Environmental identified constraints associated with valleyland and bluffs on a preliminary basis using topographic mapping. These landform features were also evaluated from a geomorphological and geotechnical perspective by Terraprobe Inc. (2012). The reader should refer to the Terraprobe Inc. (2012) for discussion of additional constraints associated with slope stability, erosion, weathering and access allowance requirements. Hydrogeological constraints were identified in the Functional Servicing Study prepared by Cole Engineering (2012a). Watercourse related constraints were established using flow regimes, general channel morphology, and contribution to fish habitat.

The following section describes the criteria used to assign constraint categories to the various natural heritage features on the subject property. The constraint ratings are intended to inform the plan and its design by directing development to areas of low to moderate constraint. The assignment of a high constraint rating to a particular feature does not necessarily preclude development within the identified feature; however it does indicate that limited development should occur in such areas and that the design ensure that any potential impacts can be mitigated.

Low Constraint Areas

A low constraint rating was assigned to features that support basic ecological functions and do not contribute significantly to the natural heritage system. Such features typically have been degraded by past or ongoing land uses and/or activities and would require intensive management to restore and enhance them to a natural state that would contribute significantly to the natural heritage system. The ecological functions of such features can generally be replicated by incorporating Best Management Practices (BMP's) into the development. Development can generally occur in such areas without mitigation and/or compensation.

On the subject property, a low constraint rating has been assigned to areas supporting non-natural vegetation communities that are not associated with bluffs, defined valleys, intermittent and permanent watercourses or floodplains.

Moderate Constraint Areas

A moderate constraint rating was assigned to features that support a moderate level of ecological function and contribute functionally to the natural heritage system. Such features typically exhibit a moderate set of ecological functions (habitat, water quality improvement, linkages) that are typically impaired due to past and ongoing anthropogenic disturbances. Moderate constraint features generally provide supportive functions to the natural heritage system and require minimal management to restore and enhance. The integration and enhancement of moderate constraint features is encouraged. Where integration of these features within the development is not feasible, restoration and enhancement of other features should be considered to achieve a functional net gain.

On the subject property, a moderate constraint rating has been assigned to areas supporting natural and non-natural vegetation communities that are situated adjacent to bluffs, defined valleys, intermittent and permanent watercourses or floodplains.

High Constraint Areas

A high constraint rating was assigned to features that support a high level of ecological function and are integral to the natural heritage system. Such features typically exhibit a high level of ecological function (habitat, water quality improvement, linkages) and often support rare species (e.g., Species at Risk) and/or specialized vegetation and habitat cover. High constraint features generally require protection and minimal management and are typically regulated and protected by provincial, municipal, and regional policies.

Development is generally discouraged within high constraint features unless it can be demonstrated that the features and functions can be maintained with no adverse impact. For example, road crossings through high constraint features may be possible, provided appropriate mitigation measures are applied. Also, some land uses such as storm water management ponds and open space (i.e. trails and golf course) may be complimentary to the high constraint feature provided that they can be designed to enhance the feature.

On the subject property, a high constraint rating has been assigned to high quality natural vegetation features, or lands that include bluffs, defined valleys, intermittent and permanent watercourses or floodplains.

3.5 Impact Assessment

To assess potential impacts associated with the various components of the proposed development and to evaluate their effect on the physical and biological environment, an impact assessment matrix was developed. The impact assessment matrix describes potential impacts of the development on the natural heritage features by identifying the development activity, mitigation requirements, net impact and any additional management or monitoring requirements.

4. Results

4.1 Landscape Context

The subject property is situated on the shale plains of the Beaver Valley physiographic region, within the Nottawassaga Bay watershed. The property is situated about 1 km south of Georgian Bay in a predominantly rural area. Agricultural lands and a small low density residential area lie to the west of the property. The property is bounded to the north by steep forested bluffs, which descend to Hwy 26. The bluffs extend beyond the property to the east and west. Agricultural lands and woodlands lie to the south and east.

There are seven drainage features on the subject property. Three of these flow west into Workman's Creek located approximately 0.6 km west of the property, which flows north and enters Nottawasaga Bay approximately 1.5 km northwest of the subject property. The four remaining flow directly into Nottawasaga Bay approximately 1 km north of the subject property.



Existing Conditions

Figure 2

Meaford A2A Developments Inc.

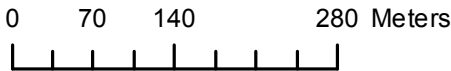
Legend

- Subject Property
- ELC Communities
- Amphibian Survey Locations
- Culverts
- Threatened Bird Species
 - Bobolink
 - Eastern Meadowlark
- Drainage Features
 - Permanent/Intermittent
 - Ephemeral

Unit	Ecosite/Vegetation Type	ELC Code
1	Dry-Moist Old Field Meadow/Cultural Thicket	CUM1-1/CUT1
2	Cultural Woodland/Cultural Savannah	CUW1/CUS1
3	Cultural Thicket	CUT1
4	Hedgerow	H
5	Coniferous Plantation	CUP3
6	Clay Barren	CBO1
7	Open Bluff	BLO
8	Dry-Fresh Sugar Maple - White Birch - Poplar Deciduous Forest	FOD5-10
9	Dry-Fresh White Cedar Coniferous Forest	FOC2-2
10	Dry-Fresh Sugar Maple - Ironwood Deciduous Forest	FOD5-4
11	Fresh-Moist Sugar Maple - Ash Deciduous Forest	FOD6-1
12	Fresh-Moist Sugar Maple - Hardwood Deciduous Forest	FOD6-5
13	White Elm Mineral Deciduous Swamp	SWD2-2
14	Red-osier Dogwood Mineral Thicket Swamp	SWT2-2
15	Cattail Mineral Shallow Marsh	MAS2-1
16	Open Water Aquatic	OAO1
17	Unvegetated (dirt and gravel roads)	UV
18	Agricultural fields	AG
19	Dry-Fresh Oak-Hardwood Deciduous Forest	FOD2-4

First Base Solutions
Web Mapping Service 2006
MAPCON 2010

UTM Zone 17 N, NAD 83



1:6,500



Project 211348
April 2013

4.2 Physical Resources

4.2.1 Bedrock Geology

Bedrock geology mapping indicates that most of the property is underlain by the Queenston Formation with the northern edge of the property and lower bluff being underlain by the Georgian Bay Formation. The contact elevation between the two units is approximately 310 m a.s.l. Both formations consist primarily of shale but also contain thin inter-beds of siltstone, sandstone and limestone. Ontario Geological Survey drilling evidence (Armstrong and Sergerie 2002), identified the Queenston Formation as consisting primarily of shale with minor siltstone inter-beds, and the Georgian Bay Formation to consist of shale with thin inter-beds of siltstone, sandstone and limestone.

The hydrogeological investigation by Cole Engineering (2012b) indicates that the Queenston Formation Shale is predominantly comprised of thinly bedded, reddish brown calcareous shale with grey/green bands of inter-bedded argillaceous limestone. While limestone inter-beds were observed in the Georgian Bay Formation which may be susceptible to karstification, the beds are generally thin and separated by relatively thick intervals of low-permeability shale. For additional information, please refer to the letter report prepared by Karst Solutions (2010) (**Appendix D**).

4.2.2 Surficial Geology

The subject property is located in the Beaver Valley physiographic region, approximately 4 km north of the Niagara Escarpment. Chapman and Putnam (1984) characterize the surficial geology of the study area as a shale plain with an adjacent shore bluff. The regional topography slopes north towards Georgian Bay. Armstrong and Sergerie (2002) and Armstrong (2001), report that the bedrock is overlain by a thin (less than 1 m thick) layer of glacial drift. Field investigations undertaken for the Hydrogeological Investigation by Cole Engineering (2012 b), indicate that the overburden materials on the site is relatively thin (2.0 m to 5.3 m) and generally consist of red silt with some clay to clayey silt.

4.2.3 Topography

The regional topography slopes north towards Georgian Bay. Site elevations on the tablelands range from approximately 355 masl in the south portion of the site to approximately 320 masl near the northern edge of the table land, prior to the steep descent at the shorecliff bluff. The elevation drops approximately 85 m to an elevation of 235 masl at the bottom of the shorecliff bluff, near Highway 26 at the northern portion of the property.

4.2.4 Soils

According to Gillespie and Richards (1954), the bluffs along the northern portion of the subject property consist of Vincent Silty Clay Loam – Eroded Phase, which developed on fine textured greyish brown till. The eroded phase of the Vincent soils occurs mainly along the steep slopes of the Beaver Valley. The tableland of the subject property consists of Dunedin Clay, which developed on residual red shale of the Queenston formation. This soil is shallow, relatively well-drained and highly susceptible to erosion.

4.2.5 Groundwater

Three rounds of groundwater level monitoring were completed as part of the Hydrogeological Investigation undertaken by Cole Engineering between early spring and summer 2012. Groundwater levels observed on the site are a subdued reflection of the local topography. In general, the groundwater levels in the bedrock overburden interface fluctuate slightly above ground surface to 4.1 m below ground surface; however, lower groundwater levels (up to a maximum depth of 9 m) were observed in deeper monitoring wells. Groundwater in the bedrock overburden interface flows from the local topographic high at the south central portion of the site towards the local topographic low at north and west (Cole Engineering 2012b).

4.2.6 Surface Drainage

The north and east portion of the site is located in the Beaver River/Clarksburg Subwatershed and the southwest portion of the site is located within the Bighead River Subwatershed. The total drainage area for the site is approximately 186 ha. The site is generally divided into six (6) major drainage areas. Based on topographic information for the site, drainage is predominantly from the southeast to the northwest. There are a total of seven (7) watercourses that are wholly or partially located within the boundary of the study area. The majority of the drainage generated from the site is conveyed by four (4) of the seven (7) watercourses which discharge through a steep, densely wooded shorecliff bluff which abuts Highway 26 and eventually towards Georgian Bay. The discharge through these watercourses has resulted in several deeply incised gullies in the face of the bluff. Pre-development drainage areas for the site are illustrated on Figure DAP-1 of the Functional Servicing Study (Cole Engineering 2012a).

The seven (7) drainage features have been numbered for the purposes of this assessment and are illustrated on **Figure 2**. During visits to the property, many of the drainage features were observed to have flowing water, suggesting that flow regimes are intermittent. Most of the onsite tributaries showed little to no flow during the monitoring period. Groundwater contribution to the onsite streams is expected to be low due to the downward vertical hydraulic gradients observed at most stream bank mini piezometers (Cole Engineering 2012b). Additional discussion on the flow regimes and hydrology of the drainage features is provided in **Section 4.3.8**.

4.3 Biological Resources

4.3.1 Vegetation Communities

Much of the subject property is used for agricultural purposes (**Photograph 1**). The agricultural fields were mostly ploughed by the end of 2012 (indicated as Unit 18 row crop on **Figure 2**); it is likely that most of them will be in bean, corn or small grain in the future. An area of active pasture is located in the eastern third of the property (Unit 18 pasture on **Figure 2**).



Photograph 1. Much of the property is used for row crops

Vegetation communities associated with the bluff and valley features consist primarily of natural deciduous forest. Several valley features are comprised of conifer plantations. These areas are subjected to frequent natural disturbances related to slope erosion.

Vegetation communities on the tableland portions of the property have been largely influenced and modified by historic and ongoing agricultural activities. These areas are now primarily agricultural (row crop and pasture) with some areas of old field meadow, cultural thicket and hedgerows. The locations of individual vegetation units as they are currently constituted are illustrated on **Figure 2**.

4.3.1.1 Terrestrial

Cultural Meadow CUM 1-1 and Cultural Thicket (CUT 1)

This community occurs across the property (Unit 1) and is characterized as old field meadow with varying amounts of woody shrub regeneration (CUT1, Unit 3). Woody regeneration in this community consists predominantly of Common Buckthorn (*Rhamnus cathartica*), Common Apple (*Malus pumila*), Green Ash (*Fraxinus pennsylvanica*), and occasionally hawthorns (*Crataegus* spp). Ground flora is comprised of ruderal species typical of disturbed lands and old fields, notably various European cool season grasses, Knapweed (*Centaurea* sp.), Canada Goldenrod (*Solidago canadensis*), Bird's Foot Trefoil (*Lotus corniculatus*), and Tufted Vetch (*Vicia craca*), among others.

Cultural Meadow and Cultural Savannah (CUW 1/ CUS1)

In addition to the cultural meadow and thickets, there are several cultural woodland/savannah features on the property (Unit 2). These features are primarily young to mid-aged successional treed

communities that have canopy cover ranging from 25% to 60%. Canopy cover consists predominantly of White Elm and White or Green Ash, often mixed with tall shrubs such as Common Buckthorn and Common Apple. Herbaceous vegetation is comprised largely of old field species similar to those in Unit 1. Several of these features, notably units 2a and 2b, are heavily grazed and trampled by cattle.

Hedgerow (H)

There is one poorly developed hedgerow (Unit 4) dominated by Common Buckthorn (**Photograph 2**).



Photograph 2. Hedgerow and agricultural field at southern end of the property

Cultural Plantation (CUP-3)

Much of the vegetation in the valleylands on the subject property consists of conifer plantation (Units 5a and 5b) (**Photograph 3**). Unit 5a, which is situated within the valley along Tributary 3, consists of a mix of White Pine (*Pinus strobus*), White Spruce (*Picea glauca*), European Larch (*Larix decidua*), and White Cedar (*Thuja occidentalis*). Hardwood trees including Common Apple, Green Ash, and White Elm are intermixed among the conifers. Canopy cover ranges from very dense to relatively open. Under dense canopy, there is little understory or ground flora; however, where the canopy is more open, old field species tend to dominate, including Smooth Brome Grass (*Bromus inermis*), Knapweed, Canada Goldenrod, and common Milkweed (*Asclepias syriaca*).

Unit 5b, situated along Drainage Feature 4, is comprised of a patchwork of mid-aged conifers including European Larch, White Pine, and White Cedar. Understory trees, shrubs and groundcover occurs in areas where the conifer canopy is less dense. Understory species include; Common Buckthorn, Common Apple, and Green Ash. Dense patches of Red-osier Dogwood (*Cornus sericea*

spp. *sericea*) occur immediately along the drainage feature. Similar to unit 5c, the ground flora in this community is comprised mostly of non-native old field meadow species.

Unit 5c, 5d, and 5e are small tableland conifer plantations situated adjacent to the shorecliff at the north end of the property. Unit 5c and 5e are dominated by young to mid-aged White Cedar and Unit 5d is comprised of Norway Spruce. Ground flora in these communities consists of old field species, notably Knapweed, Canada Goldenrod, Smooth Brome Grass, and Timothy grass (*Phleum pratense*).



Photograph 3. CUP3 – Larch plantation at northern end of the property

Clay Barren (CBO-1)

Unit 6 includes a number of small barren areas characterized by exposed clay soils with minimal vegetation cover (**Photograph 4**). These features support sparse herbaceous vegetation including; Knapweed, Canada Goldenrod, Heath Aster (*Symphyotrichum ericoides*), Queen Anne's Lace (*Daucus carota*), and Ivory Sedge (*Carex eburnea*).



Photograph 4. CB0-1, the bluff at the northern part of the subject property.

Open Bluff (BLO)

There are a number of large open bluffs situated along the north end of the subject property (Unit 7) (**Photograph 5**). Similar to the clay barrens described above (Unit 6), these bluff communities consist of exposed mineral soils on steep slopes with sparse and patchy vegetation cover, including occasional old field species such as; Canada Goldenrod, Knapweed, Queen Anne's Lace, and Ivory Sedge. Woody species cover is very low, but include occurrences of Green Ash, Trembling Aspen (*Populus tremuloides*), Buffaloberry (*Shepherdia canadensis*), and Common Juniper (*Juniperus communis*).



Photograph 5. BLO, the bluff at the northern part of the subject property.

Dry-Fresh Sugar Maple - White Birch - Poplar Deciduous Forest (FOD 5-10)

This community (Unit 8) is situated on the shorecliff at the north end of the property. This mid-aged deciduous forest community has a canopy comprised of Sugar Maple (*Acer saccharum* var. *saccharum*), White Ash (*Fraxinus americana*), White Birch (*Betula papyrifera*), Trembling Aspen, and Ironwood (*Ostrya virginiana*). There is very little understory or ground layer development. Occasional ground flora includes; Field Horsetail (*Equisetum arvense*), Poison Ivy (*Toxicodendron radicans*), Marginal Wood Fern (*Dryopteris marginalis*), and Canada Mayflower (*Maianthemum canadensis*), among others.

Dry-Fresh White Cedar Coniferous Forest (FOC 2-2)

This is a coniferous forest consisting of dense stands of White Cedar, which also occur along the steep shorecliff (Unit 9).

Dry-Fresh Sugar Maple – Ironwood Deciduous Forest (FOD 5-4)

The forested valley along the length of Drainage Feature 5 (Unit 10) (**Photograph 6**) on the east end of the property is a native, mid-aged to mature hardwood forest dominated by Ironwood and White Ash, in association with Sugar Maple, Red Oak (*Quercus rubra*), American Beech (*Fagus grandifolia*), and Eastern Hemlock (*Tsuga canadensis*). Much of this forest understory has been degraded by cattle grazing. Groundcover is sparse, but includes occurrences of spring ephemerals such as; Yellow Trout-lily (*Erythronium americanum* ssp. *americanum*), Wild Leek (*Allium tricoccum*), White Trillium (*Trillium grandiflorum*), and Broad-leaved Toothwort (*Cardamine diphylla*), as well as other forbs such as Wild Strawberry (*Fragaria virginiana*), Herb Robert (*Geranium robertianum*), Common Dandelion (*Taraxacum officinale*), and Common Speedwell (*Veronica officinalis*).



Photograph 6. FOD5-4 on south eastern part of the subject property.

Fresh-Moist Sugar Maple – Ash Deciduous Forest (FOD 6-1)

This is a small deciduous forest patch (Unit 11) which is contiguous with a larger forest block situated south of the subject property. Canopy dominants include; Sugar Maple, Green Ash, White Elm, and Basswood. Like Unit 10, the understory of this community has been heavily degraded by cattle grazing and trampling.

Fresh-Moist Sugar Maple – Hardwood Deciduous Forest (FOD 6-5)

A small patch of mid-age forest situated along Drainage Feature 6 this is identified as Unit 12. Canopy dominants include; Sugar Maple, American Basswood (*Tilia americana*), and Green Ash. Understory vegetation is comprised predominantly of Common Buckthorn and Choke Cherry (*Prunus virginiana*). Groundcover is generally sparse in this area, but includes; Field Horsetail (*Equisetum arvense*), Yellow Trout-lily, Common Dandelion, Wild Strawberry, and mosses. This forest contains a thicket swamp inclusion along the drainage course, which is dominated by Red-osier Dogwood (*Cornus sericea* spp. *sericea*).

Dry-Fresh Oak-Hardwood Deciduous Forest (FOD 2-4)

This is a small remnant deciduous forest patch (Unit 19) associated with the valleylands along Drainage Feature 5. Canopy dominants include; Red Oak, American Basswood, Ironwood, and Sugar Maple. The understory is comprised mostly of Choke Cherry. Ground flora diversity and cover is low, but includes Yellow Trout-lily, Heart-leaved Aster, Knapweed, and grasses.

Wetlands

There are several very small wetland features associated with the subject property's surface drainage features, including ELC units 13, 14, and 15. All of them are low function.

White Elm Mineral Deciduous Swamp (SWD 2-2)

Unit 13 is a narrow band of White Elm swamp (SWD2-2) situated along Drainage Feature 2. White Elm is abundant in association with Green Ash, Common Buckthorn, Common Apple, and Hawthorn species. The understory is comprised of Red-osier dogwood. The ground flora consists mostly of old field meadow species.

Red-osier Dogwood Mineral Thicket Swamp (SWT 2-5)

Unit 14 is a patch of Red-osier Dogwood thicket swamp which is situated on Drainage Feature 3-2 (**Photograph 9**).



Photograph 9. SWT2-5 adjacent to drainage feature 3.

Cattail Mineral Shallow Marsh (MAS 2-1)

There are also two cattail marsh features on the subject property (Units 15 and 15b), which are dominated by Narrow-leaved Cattail (*Typha angustifolia*) and Red-osier Dogwood.

Open Water Aquatic (OAO 1)

The property contains two on-line dug ponds (Units 16a and 16b) situated on Drainage Features 3 and 5, which appear to be used as cattle watering holes (**Photograph 10**). No aquatic vegetation was observed in either pond.



Photograph 10. OAO-1 – Cattle pond at south end of property.

4.3.2 Flora

A total of 112 vascular plant species were documented from the subject property. A plant list is presented in **Appendix B**; nomenclature follows Newmaster and Regupathy (2012). Of the 112 plant species recorded, 42 species (38%) are ranked SE by the Natural Heritage Information Centre (NHIC), indicating that they are considered to be non-native to Ontario. The 64 native species identified on the property all ranked S5 by the NHIC, indicating that the species are common and secure in the province. The other six plants were only identified to genus level and, thus, they have not been assigned an S-Rank.

The overall low plant diversity (given the size of the site) and preponderance of species that are non-native and/or common to Ontario is a reflection of the disturbed nature of the property having resulted primarily from historic land clearing and ongoing agricultural activity.

4.3.3 Amphibians

Over the course of the surveys, amphibians were heard calling from only two locations on the subject property, including ELC unit 16a and 16b. The results of the surveys are summarized in **Table 3**,

which indicates the call levels and abundance of each species present in each location on the property.

Table 3. Results of Nocturnal Amphibian Call Surveys

Species	Round 1 April 10, 2012	Round 2 May 22, 2012	Round 3 June 21, 2012
ELC Unit 16a			
Spring Peeper	0	0	0
Green Frog	0	1(2)	1(5)
Grey Tree Frog	0	2(2)	0
ELC Unit 16b			
Spring Peeper	0	2(2)	0
Green Frog	0	0	1(4)

Code 0 - No calling

Code 1 - Individuals can be counted; calls not simultaneous. Number of individuals indicated in brackets

Code 2 - Calls distinguishable; some simultaneous calling. Estimated number of individuals indicated in brackets

Exceptionally mild weather conditions in early 2012 resulted in amphibians calling about one month earlier than normal. To ensure early calling species were detected, a daytime survey was completed on March 19, 2012 during warm conditions at a time when amphibians were audible from the surrounding landscape. Numerous full choruses of Chorus Frog were heard from north of the subject property near the base of the shorecliff and in wetlands north of Highway 26. No calling amphibians were detected from the subject property; however, a number of Green Frogs were visually observed in several ponds (ELC units 16a and 16b).

No calling amphibians were detected from anywhere on the property during the first round of nocturnal amphibian call surveys conducted on April 10, 2012.

During the second round of surveys conducted on May 22, 2012, two Gray Tree Frogs and two Green Frogs were heard calling from ELC unit 16a. Two Spring Peepers were heard calling from ELC unit 16b. In addition, numerous Spring Peepers, Grey Tree frogs, and American Toads were heard calling north of the property beyond the shorecliff. Spring Peepers were also calling from a pond situated off the subject property to the west.

Two Green Frogs were also observed in a small pool situated on a Drainage Feature 3-1 in ELC unit 2c during vegetation surveys on May 22. During surveys conducted on June 21, approximately five Green Frogs were heard calling from ELC Unit 16a and four Green Frogs were heard in ELC unit 16b.

Habitat conditions are impeded by cattle use of the ponds and otherwise a lack of suitable breeding ponds.

4.3.4 Reptiles

Despite many hours spent by various ecologists on the subject property, no reptiles at all were observed on the property during field investigations.

4.3.5 Mammals

Incidental wildlife observations include; White-tailed Deer (*Odocoileus virginianus*), Coyote (*Canis latrans*)/Coyote hybrid, Raccoon (*Procyon lotor*), Gray Squirrel (*Sciurus carolinensis*) and Red Squirrel (*Tamiasciurus hudsonicus*). Other species tolerant of the agricultural landscape can be expected to occur.

4.3.6 Breeding Birds

The breeding bird list is presented for the communities that were not converted to row crop. In some row crop areas, existing habitats were removed in favour of agricultural activities.

A total of 51 species was recorded as likely breeding on the subject property; nine of which are considered area-sensitive (woodland and open country) and three species are listed as Threatened in Ontario. An additional four species were recorded foraging on or over the property or on the adjacent property, as suitable breeding habitat is not present on the subject property. Three main breeding bird communities were identified: woodland; successional and open country. A list of species observed on the site is presented in **Appendix C**.

There is a woodland bird community associated with the bluff woodland and associated valleyland extensions that are treed, either with natural forest or with planted trees. This community is dominated by Black-capped Chickadee (*Poecile atricapillus*) and Red-eyed Vireo (*Vireo olivaceus*) with other species such as Wood Thrush (*Hylocichla mustelina*), Eastern Wood Pewee (*Contopus virens*) and Great Crested Flycatcher (*Myiarchus crinitus*) present in lower densities. A Merlin (*Falco columbarius*) was nesting within this general area, but likely foraging over much of the site. Four area-sensitive woodland bird species were recorded: Least Flycatcher (*Empidonax minimus*), Red-breasted Nuthatch (*Sitta canadensis*), Black-and-white Warbler (*Mniotilta varia*) and American Redstart (*Setophaga ruticilla*).

Late successional communities such as thickets, though not a major component on the property, are also present and support a number of successional specialists, dominated by American Goldfinch (*Carduelis tristis*), but included; Alder Flycatcher (*Empidonax alnorum*), Gray Catbird (*Dumetella carolinensis*), and Indigo Bunting (*Passerina cyanea*).

The most well developed community was open country habitat. This is a wide habitat descriptor that includes farmland, fallow fields and early successional grasslands and thickets. Each of these habitat types supports different species at different densities. However, on this property the two open country bird communities were those associated with pasture and old field habitats. Here, the bird community was dominated by sparrows: Clay-colored Sparrow (*Spizella pallida*), Field Sparrow (*S. pusilla*), Savannah Sparrow (*Passerculus sandwichensis*), Grasshopper Sparrow (*Ammodramus savannarum*), and Song Sparrow (*Melospiza melodia*). Other species occurred in lower densities such as: Eastern Kingbird (*Tyrannus tyrannus*), Eastern Bluebird (*Sialia sialis*), and Brown Thrasher (*Toxostomum rufum*). Two additional open country specialists that are listed as Threatened in Ontario were also present: Bobolink (*Dolichonyx oryzivorus*) and Eastern Meadowlark (*Sturnella magna*). A third species Barn Swallow (*Hirundo rustica*) which is also listed as Threatened, does not nest on the subject property, but will use barns on adjacent properties; it was observed foraging over the subject property. Details regarding the three species of Threatened birds are presented in **Section 5.9**.

Upland Sandpiper, Savannah Sparrow, Grasshopper Sparrow, Bobolink and Eastern Meadowlark are considered area sensitive species, generally requiring large open areas (i.e., more than 20 ha) in which to breed.

Four species were observed flying over, or foraging on or over the subject property, but not breeding: Ring-billed Gull (*Larus delawarensis*), Horned Lark (*Eremophila alpestris*), Cliff Swallow (*Petrochelidon pyrrhonota*) and Barn Swallow (*Hirundo rustica*). There is no suitable nesting habitat for Ring-billed Gull, Cliff Swallow or Barn Swallow on the subject property. Suitable habitat was present for Horned Lark, but it was not recorded as breeding.

4.3.7 Significant Wildlife

A review of the MNR's Natural Heritage Information Centre database revealed historical records of seven sensitive species (**Table 4**) from the 1 km² grid squares corresponding overlapping with the subject property and adjacent lands.

Table 4. NHIC Records of Species of Conservation Concern in Vicinity of Study Area

Common Name	Scientific Name	S-Rank	COSEWIC Status	COSSARO Status	Last NHIC Record
Northern Myotis (Long-eared) Bat	<i>Myotis septentrionalis</i>	S3?			24/12/1939
Milksnake	<i>Lampropeltis triangulum</i>	S3	SC	SC	01/06/1940
Eastern Ribbon Snake	<i>Thamnophis sauritus</i>	S3	SC	SC	07/09/1938
Massasauga Rattlesnake	<i>Sistrurus catenatus</i>	S3	THR	THR	1975
Shrubby St. John's Wort	<i>Hypericum prolificum</i>	S2			19/08/1943
Scarlet Beebalm	<i>Monarda didyma</i>	S3			201/07/1942
Smith's Bulrush	<i>Scoenoplectus smithi</i>	S3			19/08/1943

COSEWIC = Committee on the Status of Endangered Wildlife in Canada

COSSARO = Committee on the Status of Species at Risk in Ontario

END = Endangered, THR = Threatened, SC = Special Concern

S-RANK (Provincial status from NHIC): S1 (extremely rare), S2 (very rare), S3 (rare to uncommon), S4 (common), S5 (very common) and SE (exotic, i.e., introduced)

Three of these species, all snakes, are considered Species at Risk in Ontario. Eastern Ribbon Snake (*Thamnophis sauritus*) and Milksnake (*Lampropeltis triangulum*) are Special Concern and Massasauga Rattlesnake (*Sistrurus catenatus*) is designated as Threatened. The precise locations for these records are deliberately not provided by NHIC so as to protect the species; therefore, these records may not correspond with the subject property itself, although given the habitat requirements of these snakes they are likely associated with the shorecliff environment.

Furthermore, all of these records are historical. The last known observation of a Massasauga Rattlesnake from this area dates from 1975, while the Eastern Ribbonsnake and Milksnake were last reported in 1938 and 1940, respectively. Therefore, the likelihood of these species occurring in the study area is low, particularly the Massasauga Rattlesnake, whose range in this part of Ontario is now restricted to the eastern shore of Georgian Bay, the Bruce Peninsula and southwestern Ontario.

The four other species listed in **Table 4**, include three plant species and one mammal species, which are ranked as S2 or S3 in Ontario are not subject to either the *Endangered Species Act, 2007* or the

PPS. As with the Milksnake and Eastern Ribbon Snake discussed above, all of these records date from the 1930s and 1940s. Furthermore, two of the three plant species are typically associated with shorelines and wet areas and were likely recorded along the shoreline of Nottawasaga Bay. It is improbable that these species would occur on the subject property due to lack of suitable habitat.

Subsequent to the field program the Northern Myotis became listed in Ontario as Endangered. In the unlikely event that this nocturnal species occurred on the subject property it would most likely be found in the forested bluff; and area that will not be affected by the proposed development.

The three threatened bird species recorded on the subject property (section 4.3.6) are subject to the *Endangered Species Act* and are discussed in greater detail in **Section 5.8**.

4.3.8 Aquatic Habitat Assessment

There are seven drainage features associated with the subject property. These have been numbered for the purposes of this assessment and are illustrated on **Figure 2**. Drainage features 1 through 6 originate on the subject property as headwater features. Drainage features 2 through 5 flow toward the shorecliff to the north, and drainage features 1, 6 and 7 drain west towards 3rd Line. During visits to the property many of the drainage features were observed to have flowing water, suggesting that flow regimes may be intermittent or permanent. Stream flow monitoring and daily rain gauge data confirms that runoff from precipitation events is the dominant contribution of flow to the drainage features on the subject property (Cole Engineering Group Ltd. 2012b).

The shorecliff and steep incline of the drainage features precludes any potential for fish to access the property from Nottawasaga Bay. As such the headwaters on the subject property were not assumed to provide direct fish habitat and fish community sampling was not considered necessary.

Each of the drainage features on the subject property are discussed in the text below and are illustrated on **Figure 2**. Some drainage features have ephemeral swales, rills or headwaters which confluence with the main reaches.

Drainage Feature 1

The upper reach of this feature is ephemeral and originates in an old field meadow and flows along a coniferous plantation through a poorly defined channel approximately 20 cm wide (**Photograph 11**). At the time of assessment, there was no water present in the upper reach, but where the feature becomes more defined, some flow was evident as it passes through a denser thicket at the base of a small valley feature. The drainage feature then passes through a small, perched culvert under a laneway road and flows off property to the west where it reaches a confluence with Workman's Creek and eventually outlets to Nottawasaga Bay. The downstream reach of this feature has intermittent flow and was dry in July 2012. Hydrogeological investigations noted that there may be some seasonal groundwater inputs to this feature (Cole Engineering Group Ltd. 2012b).



Photograph 11. Drainage Feature 1 – view looking south (March 19, 2012).

Drainage Feature 2

This drainage feature is located near the northern property boundary. It is an ephemeral feature where it originates near an existing road and flows down a decline to a deciduous swamp (SWD2-2). Within this swamp, the drainage feature was flowing at the time of assessment and is contained in a poorly defined channel approximately 15 cm wide and a water depth of <5 cm. Within the treed swamp, the intermittent drainage feature had no in-stream vegetation and had a sandy substrate.

Drainage Feature 3

Drainage Feature 3 traverses the entire property from south to north. At the southern property boundary it is an undefined ephemeral feature collecting run-off from the shallow valley, where it enters an online pond. The pond feature has eroding slopes with very little vegetation surrounding it and at the time of assessment contained algae at the upstream end. The drainage feature exits the pond through a pile of boulders and continues through a highly eroding channel to a wide floodplain where the channel is poorly defined and has intermittent flow (**Photograph 12**). The drainage feature then passes through cultural woodland and a closed bottom culvert before continuing through a coniferous plantation and out-letting under Highway 26 to the Nottawasaga Bay. Hydrogeological investigations noted that there may be some seasonal groundwater inputs to this feature (Cole Engineering Group Ltd. 2012b).

Drainage Feature 3 has two ephemeral headwater features, Drainage Feature 3-2 from the east and Drainage Feature 3-1 from the west. Drainage Feature 3-2 is a large ephemeral swale that conveys flows from the surrounding old field meadow to Drainage Feature 3 and eventually to the

Nottawasaga Bay. It was dry on the day of assessment. Drainage Feature 3-1 bisects two existing roads. It is poorly defined through most of the reach and contained within a field of terrestrial grasses where it is also considered ephemeral (**Photograph 13**). The substrate was wet on the date of assessment. It passes through a small patch of cattails and then continues in a roadside ditch until it reaches the second culvert. The downstream end of this culvert had a considerable amount of pooled water in it and likely receives run off from both sides of the road. This downstream reach is considered intermittent. Drainage Feature 3-1 continues as a series of pools and runs through cultural woodland and into the coniferous plantation (CUP3) where it reaches a confluence with the Main Drainage Feature 3.



Photograph 12. Drainage Feature 3 – near southern portion of property (April 28, 2012).



Photograph 13. Drainage Feature 3-1 – looking north (April 28, 2012).

Drainage Feature 4

Drainage Feature 4 is an intermittent feature and almost fully contained within the pine plantation (CUP3) (**Photograph 14**). There are three small ephemeral agricultural swales that are headwaters to the main feature. These features convey water to the main feature during heavy rains and after spring freshet. Soils were damp at the time of assessment, but no flowing water nor was vegetation present.



Photograph 14. Drainage Feature 4 – near central portion of property (March 19, 2012).

Drainage Feature 5

This the most well-defined channel on the subject property. It is an intermittent watercourse in a valley feature (**Photograph 15**). Streamflow assessments showed minimal flow ($<1\text{L/s}$) in this feature in July, however, additional site visits in the summer of 2012 confirmed the feature goes dry. The valley consists mainly of a deciduous forest which provides cover for the watercourse. Drainage Feature 5 originates at the southern property boundary through a poorly defined and eroding channel in an agricultural field. On the date of assessment, the substrate in the uppermost portion of this reach was damp, but no flow was present.

As the drainage feature flows toward the forest valley, channel definition becomes greater and at the time of assessment there was visible flow. Starting at this reach and continuing downstream through the valley, the watercourse has intermittent flow. There are several ephemeral rills that convey water from the surrounding tablelands to the valley on both sides of the drainage feature. There is also an online pond (unit 16a, on **Figure 2**) that was likely dug to provide livestock or agricultural irrigation. The fill from this pond blocks much of the flow of water through the drainage feature. The drainage feature, approximately 1 m to 3 m wide within the valley continues to the shorecliff where it then flows under Highway 26 and to Nottawasaga Bay.



Photograph 15. Drainage Feature 5, July 02 2012 (note dry stream bed).

Drainage Feature 6

Two reaches of Drainage Feature 6 are located on the subject property. The ephemeral headwater is undefined and contained within cultural thicket (**Photograph 16**). The feature then flows intermittently through a swale in an old field meadow off property to the west. The drainage feature re-enters the property through a cultural thicket and a small patch of deciduous forest where it is intermittent or permanent and it flows through a small, closed-bottom culvert under the main entrance road off of 3rd Line and eventually flows off property to where it reaches a confluence with Workman's Creek. At the time of assessment there was approximately 5 cm of water at the upstream end of this culvert and the downstream end was partially blocked with vegetation causing a pooling of stagnant water as the drainage feature enters a small patch of cattails within a cultural thicket at the bottom of a small valley. There is an ephemeral side channel that flows along the south side of the existing road and confluences with the main drainage feature within the deciduous forest. It was dry on the date of assessment.



Photograph 16. Drainage Feature 6 – near western limit of property (March 19, 2012).

Drainage Feature 7

Drainage Feature 7 is contained within a valley at the southwest corner of the subject property. This intermittent feature is poorly defined as it flows through an old field meadow/cultural thicket, and then flows through a culvert under a driveway and outlets to a pool in a neighbouring agricultural field.

4.4 Landscape Connectivity

The subject property contains portions of forested shorecliff habitat that extend off-site to both the east and the west of the study area. These forested bluffs likely function as a regionally significant corridor for wildlife.

There are a number of valley features extending inland across the property that provide secondary connection to the regional corridor. Most of these valley features are relatively short and do not connect to natural areas further inland. As such, their connectivity functions are limited to supporting the primary corridor along the bluff. The eastern most valley feature associated with Watercourse 5 is the exception. It is forested and connects to a larger woodland block to the south of the subject property. As such, it provides for local scale connectivity between the forested habitats on the bluff and the large inland forest patch. While the valley supports native forest communities, it has been degraded by pasturing which had removed the understory vegetation and compacted the forest soils.

4.5 Winter Habitat

The site primarily comprises open agricultural lands with little or no winter cover (**Photograph 17**). Species observed included Common Raven, Snow Buntings and Common Redpoll. Winter cover is confined to the valleys and bluff forest where conifers and snags provide shelter.



Photograph 17. Winter cover is confined to the valley areas and bluff

5. Natural Heritage Assessment

5.1 Significant Wetlands

Provincially Significant Wetlands (PSW) are identified and mapped by MNR. A review of the MNR databases indicates there are no PSW's on the or in the vicinity of the property. The property does contain several very small low function wetland features.

5.2 Significant Habitat for Threatened and Endangered Species

Two species of birds listed as threatened were recorded during the breeding bird survey: Bobolink and Eastern Meadowlark. An additional threatened species, Barn Swallow was observed foraging over the site and is known to nest in barns on adjacent properties. Generally, resolution of this aspect of the PPS is determined through resolving any *Endangered Species Act* requirements (**Section 5.9**).

5.3 Significant Areas of Natural and Scientific Interest (ANSI)

Provincially significant ANSIs are identified by MNR. There are no ANSIs on or adjacent to the subject property. There is an earth science ANSI (East Meaford Creek Shales) situated along Workman's Creek valley approximately 0.6 km to the west of the subject property.

5.4 Fish Habitat

To date, no fish were observed in any of the watercourses on the property. The gradient of the shorecliff at the north end of the property is far too steep for fish originating in Nottawasaga Bay to move upstream much beyond Highway 26. The drainage features on site provide varying levels of indirect fish habitat to downstream reaches at Highway 26 and the Nottawasaga Bay through nutrient inputs and flow.

5.5 Significant Woodlands

The identification of significant woodlands is the responsibility of planning authorities. The Natural Heritage Reference Manual (NRHM) (MNR 2010) provides criteria and guidance for municipalities to identify significant woodlands. Criteria for assessing the significance of woodlands include: size, woodland interior habitat, proximity to other woodlands, linkages, water protection, diversity, unique characteristics, and economic and social values. The Municipality of Meaford has not identified significant woodlands on its land use planning schedules. The new County of Grey Official Plan does however identify significant woodlands on Appendix B – Map 1.

The County of Grey Official Plan identifies significant woodlands using the following criteria:

For woodland to be considered significant it must be:

- i. greater than or equal to 40 hectares in size outside of settlement areas; or
- ii. greater than or equal to 4 hectares in size within settlement area boundaries; or
- iii. meet at least two of the following criteria:
 - a. the woodland is within 30 metres of another significant woodland;
 - b. the woodland overlaps with other natural heritage features and areas;
 - c. the woodland supports at least 8 hectares of interior habitat.

The subject property supports a number of woodland features. These are associated primarily with the shorecliff bluff and valleyland features. For the purpose of this study, we have applied the above significance criteria to the woodlands on the property and depicted those woodlands as meeting the criteria as high constraint features. The resultant mapping is generally consistent with the significant woodland mapping reflected in Appendix B - Map of the County of Grey Official Plan.

5.6 Significant Valleylands

As with woodlands, the identification of significant valleylands is the responsibility of planning authorities. The NHRM outlines criteria to assist municipalities in identifying significant valleylands,

including surface and groundwater functions, landform prominence, distinctive landforms, degree of naturalness, diversity, unique communities and species, habitat value, linkage function, and restoration potential.

It is our understanding that neither the Municipality of Meaford nor the County of Grey have undertaken an exercise to identify significant valleylands. However, the GSCA regulates all hazard lands, including valleylands, and these features have been mapped on the property (**Figure 2**).

For the purpose of the study the hazard lands on the subject property, which includes the valleylands and areas of slope instability, were mapped as high constraint features. The development limit has been determined either through the application of the stability, erosion and weathering, and access allowance setback as determined by Terraprobe Inc. (2012), or through determination of top-of-slope using topographic mapping. Where important natural features extend beyond the top-of-slope or geotechnical setback, the greater extent has been identified as the feature limit.

5.7 Significant Wildlife Habitat

According to the NHRM, there are four categories of significant wildlife habitat, which include:

1. Habitats of seasonal concentrations of animals;
2. Rare vegetation communities or specialized habitat for wildlife;
3. Habitat for species of conservation concern; and
4. Animal movement corridors.

Neither the Municipality of Meaford nor the County of Grey have identified significant wildlife habitat on the subject property.

Based on the background review and field investigations completed for this EIS, there are no habitats of seasonal concentrations of animals or rare vegetation communities. Area sensitive species do occur on the subject property, in open country habitat, and this could be considered specialized habitat. However, these are primarily associated with active pasture lands which do not constitute significant wildlife habitat.

The habitat for species of conservation concern does not apply to species covered by the ESA. Declining species do occur in the active pasture lands but other habitat areas outside of the valleys and bluff are minimal in extent and provide limited habitat for potentially declining species such as Field Sparrow and Savannah Sparrow. No provincially rare species were encountered.

As previously discussed, the forested bluffs likely qualify as an animal movement corridor and could be recognized as significant wildlife habitat. The smaller valleys in our opinion provide a local connectivity function that would not meet this test of significance.

5.8 Permanent/Intermittent Watercourses

The Grey Sauble Conservation Authority (GSCA) regulates hazard lands, including streams, valleylands, shorelines, and wetlands, under Ontario Regulation 151/06 (GSCA 2006). There are

seven drainage features on the subject property, each of which has reaches which are considered intermittent or permanent (see **Figure 2**). These reaches will remain *in situ* and protected from adjacent development by a 15 m vegetated buffer measured from the annual high water mark. The upper headwaters and several side tributaries have only ephemeral flows. These features are considered complex or simple contributing features and may be removed from the landscape provided flow conveyance and overall function is replicated.

5.9 Threatened and Endangered Species

Three bird species were recorded on the subject property that trigger the *Endangered Species Act* and these will be addressed with MNR, in the first instance to determine if an overall benefit permit is required under the *Endangered Species Act*, and secondarily to determine and appropriate benefit for the permit that may be required. Each species is discussed in the following paragraphs.

Barn Swallow

The Barn Swallow is a recently designated Threatened species under the *Species at Risk Act*. During field investigations birds were observed foraging (feeding) over the subject property. It is likely that barn and other structures in the general area support nesting Barn Swallows.

The Barn Swallow is an aerial insectivore. 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 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.

A permit may be required from the MNR under the ESA for the removal of foraging habitat for this species that is adjacent to a known nesting area. However, in this case it is not certain that MNR would require a permit as foraging habitat is not limited in the general area, whereas nesting structures may be limiting but are absent from the subject property.

Bobolink

Breeding Bobolinks were numerous in fields that were previously cropped in hay. These fields were converted to row crops through normal farming practices and the Bobolink habitat was legally removed. Agricultural activities that have a reasonable expectation of reward or gain are currently exempt from the Act with regards to this species. Nevertheless, approximately eight territories exist around the subject property (**Figure 2**), mostly in pasture lands that would be subject to the ESA should the proposed development proceed.

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.

The species was listed as Threatened by both the Committee on the Status of Species At Risk in Ontario (COSSARO) and the Committee on the Status of Endangered Wildlife In Canada (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 use of the subject property by this species in areas planned for development will trigger the need for a permit under the *Endangered Species Act*.

Eastern Meadowlark

Five pairs of Eastern Meadowlark were located in suitable breeding habitat that is proposed to be developed (**Figure 2** and **Photograph 18**).



Photograph 18. Pasture in the east that supports meadowlark and Bobolink

The Eastern Meadowlark is a songbird that also breeds in extensive agricultural grasslands or old fields with tall lush forb vegetation, and has a greater tolerance for some shrubs. Historically in the east, the species benefited from human alteration of the landscape, however, like many species of open country habitats, populations in Ontario and other jurisdictions are thought to have declined.

The putative declines are thought to be due to similar reasons to that of Bobolink. This too is still a common species in southern Ontario. The species was newly listed as Threatened by COSEWIC in May of 2011 and was declared Threatened by COSSARO and listed under the ESA in January 2011.

Preferred breeding habitat in eastern North America is usually expansive dry open country habitats various grass heights, prefers 10 to 30 cm, usually with elevated singing perches, some forbs, good litter cover; pasture, savanna, also in hay fields and alfalfa fields, orchards, shrubby old fields, fallow fields; may also use small grain crop fields. Individual territories are 1 ha to 6 ha, in habitat patches >10 ha in area, therefore it may not be particularly area sensitive. Nesting densities typically range from three to five nests and/or territorial males per 10 ha.

Agricultural activities that have a reasonable expectation of reward or gain are currently exempt from the Act with regards to this species. Approximately five pairs (four pairs in the southeastern corner and one pair in the north-central area) were found during the breeding bird surveys. The proposed development of the subject property will trigger the need for a permit under the *Endangered Species Act* to address this species.

6. Constraints and Opportunities

Natural heritage constraints and opportunities associated with the subject property and environs were identified using information obtained through a review of background resources, technical studies and field investigations. Constraints and opportunities were evaluated using criteria described in **Section 3.4**. The preliminary findings of the constraint analysis are presented below and depicted graphically on **Figure 3**.

Low Constraint Areas

On the subject property, a low constraint rating has been assigned to areas supporting non-natural ecological communities that are not directly associated with: bluffs, defined valleys, intermittent and permanent watercourses or floodplains.

Moderate Constraint Areas

On the subject property, a moderate constraint rating has been assigned to areas supporting natural and non-natural ecological communities that are situated immediately adjacent to, or are contiguous with: bluffs, defined valleys, intermittent and permanent watercourses or floodplains.

High Constraint Areas

On the subject property, a high constraint rating has been assigned to significant natural ecological communities or area directly associated with: bluffs, defined valleys, intermittent and permanent watercourses.



Constraints

Figure 3

Meaford A2A Developments Inc.

Legend

— Subject Property

Constraints

High

Medium

Low

15 m Watercourse Buffer*

Watercourses

— Permanent/Intermittent

- - - Ephemeral

*Other buffers to be added as per recommendations in the EIS

First Base Solutions
Web Mapping Service 2006
MAPCON 2010

UTM Zone 17 N, NAD 83

0 70 140 280 Meters



1:6,500



Project 211348
April 2013

7. Description of the Proposed Development

7.1 Development Concept

The proposed land uses on the subject property include; a resort and associated residential and commercial development, a golf course and open space. The resort portion of the property is comprised of villas, an inn, a retail outlet, an aquatic centre, a wellness centre, and amphitheatre. Residential development on the property is a mixture of single family, semi-detached, and townhouse dwellings. A 9-hole golf course and nine parks are also proposed for the area.

The approximate area of land dedicated the different land uses are described in **Table 5**.

Table 5. Area of Proposed Land Uses

Land Use	Approximate Area (ha)
Gross Site Area	154
Meaford Highlands Inn (incl. spa, retail, aquatics and wellness centre)	16.5
Low Density Resort Residential (net area, not including roads)	21.5
Resort Residential (net area, not including municipal roads)	24.0
Environmental Area	40.0
Park	5.0
Open Space / Buffer / Trails	1.7
Stormwater Management	6.0
Executive Nine Hole Golf Course (incl. Practice Facility & club house)	19.5
Roads	19

The proposed concept plan is presented in **Figure 4**. It should be noted that the development limits that are reflected on the concept plan do not correspond exactly with those recommended through this EIS and presented on the environmental constraint map (**Figure 3**). It is recommended that when a Site Plan or Draft Plan of Subdivision is prepared, that the limit of development be adjusted to correspond directly with the development limits (i.e. high constraint areas) recommended through this EIS. The impact assessment section of the EIS is based on these recommended development limits.

To accommodate the proposed development will require amendments to the County of Grey and Municipality of Meaford Official Plans and Zoning By-laws. Applications to amend the plans and by-laws have been filed with the County and local municipality.



- NOTES:
1. The concept has not been updated based on geotechnical studies, borehole data or hydrogeological information. To be confirmed by a qualified professional.
 2. The concept is based on a Karst Assessment completed by Karst Solutions.
 3. Concept boundaries and topographic information is based on surveys completed by JD Barnes & Associates.
 4. The concept has not been updated with results of any field work and/ or environmental analysis completed by Beacon Environmental in Spring of 2012.
 5. Top-of-bank and other environmental constraints boundaries have not been confirmed.
 6. Environmental Area boundaries are based on Beacon Environmental Preliminary Environmental Constraints Mapping dated November 2010 and include medium and high constraint areas.
 7. Stormwater management pond location and sizing is based on the servicing information prepared by Cole Engineering, dated April 2012.
 8. Proposed water supply and sanitary methods are based on servicing information prepared by Cole Engineering, dated April 2012.
 9. Permits will be obtained for development on lands that fall within the Regulated Areas of GSCA under O.Reg. 151/06. Based on Environmental Impact Study prepared by Beacon Environmental.
 10. Exiting Right-of-way width is assumed to be twice the distance from property line to hard surface centerline as shown on the topographic survey.
 11. Areas are approximate between different land uses.

DEVELOPMENT CONCEPT
MEAFORD HIGHLANDS RESORT
LOTS 9 & 10 3RD LINE
MEAFORD
COUNTY OF GREY



DEVELOPMENT STATISTICS

RESORT	
Meaford Highlands Inn and Villas	16.53 ha
Spa / Retail/ Aquatic & Wellness Centre	
Golf Course and Club House	19.37 ha
RESORT RESIDENTIAL	
Low Density Resort Residential	21.57 ha
Resort Residential	24.26 ha
Roads	18.79 ha
Environmental Area	40.42 ha
Open Space / Buffer / Trail	1.76 ha
Park	5.14 ha
Storm Water Management	6.06 ha
TOTAL SITE AREA	153.90 ha

ROAD LENGTH

26m ROW:	985 m
20m ROW:	3,295 m
18m ROW:	4,560 m
14m ROW:	540 m

LEGEND

- Property Boundary
- Meaford Highlands Resort and Villas
- Low Density Resort Residential (21m)
- Low Density Resort Residential (18.3m)
- Resort Residential Single Family (15.2m)
- Resort Residential Single Family (12.2m)
- Resort Residential Semi Detached (9m)
- Resort Residential Townhomes(7m)
- Resort Golf Course
- Environmental - High Constraint Area
Source: Beacon Environmental, Nov. 2010
- Environmental - Medium Constraint Area
Source: Beacon Environmental, Nov. 2010
- Park / Parkette
- Trail block / Buffer
- Storm Water Management

REVISIONS LIST

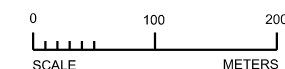
DATE	REVISION
2012 APR 11	REVISE NW SWMP, REMOVE CUL-DE-SAC, REMOVE N SWMP.
2012 APR 5	REVISE LOCATION OF AMPHITHEATRE

WESTON CONSULTING GROUP INC.

Vaughan Office:
201 Midway Avenue, Unit 19,
Vaughan, Ontario, L4K 5K8
Phone: (905) 738-9080
1-800-363-3558 Fax: (905) 738-6637 www.westonconsulting.com

Oakville Office:
1660 North Service Road E., Suite 114,
Oakville, Ontario, L6H 7G3
Phone: (905) 844-8749

File Number: 5305-1	Drawing Number: 4
Date Drawn: 2012 MAR 27	
Drawn By: SB	
Planner: RG	
Scale: see scale bar	
CAD: 5305-1/concepts/C10rev for sub Apr 26, 12.dgn	



7.2 Storm Water Management

The Functional Servicing Report (FSR) for the subject property, prepared by Cole Engineering (2012a), proposes that storm water will be managed by a dual drainage system designed to convey flows during major and minor storm events. A network of road side ditches will convey minor storm water runoff with the capacity to convey a five-year storm event. A major drainage system will convey the 100-year storm event via the road network. Based on calculations presented in Cole Engineering (2012a), the roads have the capacity to convey the peak flows from a 100-year storm event.

All rooftop drainage will be conveyed to the front of the lots to be intercepted by the roads and roadside ditches. Where development backs on to a watercourse, drainage from the rear lots will be conveyed directly to the watercourse.

Drainage from the roads will be directed to storm water management (SWM) ponds. Four SWM ponds will be created, including three dry ponds and one wet pond. The dry ponds do not contain a permanent pool and provide quantity control only, while the wet pond will provide both quality and quantity control. The quality of the storm water runoff will be managed via a combination of the wet SWM pond and oil/grit separators.

For details regarding grading and servicing refer to the FSR prepared by Cole Engineering (2012a).

8. Impact Assessment and Proposed Mitigation

The following section provides a description of impacts anticipated as part of the proposed concept plan and identifies mitigation and compensation measures to be utilized to avoid and minimize effects of the project. As discussed in the preceding section, the proposed development has been designed to limit impacts to natural features by restricting development to portions of the property support features of low and moderate ecological constraint. Areas of high constraint will largely remain undeveloped and protected.

To assess potential impacts associated with the various components of the proposed development and to evaluate their effect on the physical and biological environment, an impact assessment matrix as described in **Section 3.5**.

The matrix is presented in **Table 6** includes a description of the various anticipated impacts by identifying the development activity, mitigation requirements, the net impact and any additional monitoring or management needs.

Table 6. Impact Assessment Matrix

Environmental Parameter(s)	Development Activity	Potential Impact to Natural Features & Functions	Recommended Mitigation & Enhancement	Residual Effect
PHYSICAL RESOURCES				
Bedrock Geology	Grading and servicing	Grading and servicing is not anticipated to affect the bedrock resources. Bedrock consists of weathered shale and is generally greater than 3.0 m below ground surface. There may be some areas of the site, depending on final grades, that will require some minor excavation into bedrock; however this will generally be avoided.	<ul style="list-style-type: none"> None 	Neutral
Surficial Geology/ Physiography/ Topography	Grading and servicing	Due to the rolling topography, grading requirements will be moderate. Finished grades will match existing grades at the limits of development. In areas where grades cannot be matched through slopes, retaining walls will be utilized. Preliminary grading plans suggest that the cutting and filling in the order of 1-2 m will generally be required across much of the property. Maximum cuts will be -10m and will be limited to the northwest corner of the site where road access to 3 rd Line is required.	<ul style="list-style-type: none"> Match grades at limit is development. Restrict grading to areas outside the high constraint natural features. 	Neutral
Soils	Site preparation and grading	Site preparation and grading activities will remove existing topsoil resources. This activity will result in the loss of soil resources, soil horizons and soil structure.	<ul style="list-style-type: none"> Stockpile topsoil resources for reuse in post-construction landscaping Follow best management practices for handling and storing topsoil Implement sediment and erosion control measures throughout the construction phase to minimize loss of topsoil from erosion Monitor topsoil stripping and re-application to ensure topsoil resources are conserved. 	Neutral
Water Balance	Grading and development	<p>Development of the site will increase the overall impervious area of the site and result in an increase in surface water runoff and decrease in infiltration to the underlying aquifer units. The long-term impact of development is increased runoff to downstream watercourses and a reduction in groundwater recharge to the aquifer units.</p> <p>A water balance for the site was prepared by Cole Engineering (2012b) and estimates that infiltration presently accounts for 20% of the total precipitation, while runoff and evapotranspiration comprises 30% and 50% of the total precipitation respectively. It is estimated that development will reduce infiltration approximately 15% of the total precipitation, increase runoff to approximately 47% of the total precipitation, and reduce evapotranspiration to approximately 38% of the total precipitation. It is estimated that development will result in a 25% reduction in infiltration (approximately 88,592 m³). The estimated reduction in infiltration is relatively small since areas near the shorecliff bluff and onsite tributaries are not being developed, and majority of the development will consist of low density residential dwellings and golf courses.</p> <p>The introduction of overburden material with different hydraulic properties or alterations to the local topography can affect the existing groundwater system. Installation of site services could potentially introduce preferential pathways for contaminants to the groundwater and alter the natural groundwater levels.</p> <p>Local groundwater quality may be affected by the application of road salt along the public roadways and fertilizer/pesticides applied on the golf course. Due to the relatively thin overburden material covering the bedrock, limited attenuation and retardation of the contaminant to the underlying bedrock aquifer is expected.</p>	<ul style="list-style-type: none"> Various Best Management Practices (BMPs) and Low Impact Development (LID) measures should be incorporated into the proposed development to promote infiltration and decrease runoff in order to help preserve the existing groundwater flow regime. Any deficits in infiltration should be reduced by incorporating mitigation measures that direct roof runoff towards lawns. The proposed storm water management (SWM) facilities will capture the storm runoff and provide water quality treatment, including temperature and flow moderation prior to discharging to the watercourse. Combined with various best management practices, the SWM facilities will assist in mitigating the impact to onsite and nearby water courses. In addition, buffer zone outside of the flood boundary, required by GSCA and Municipality will further protect the water quality and quantity at onsite and nearby tributaries. Collars or other methods to restrict the preferential movement of groundwater along the subsurface infrastructure corridors should be considered during the development. Furthermore, the shallow groundwater table may result in groundwater seepage into basement, proper design considerations should be put into effect to address this issue. A long term groundwater level and groundwater quality monitoring program should be developed and implemented throughout and after the development to identify potential impacts. 	Neutral
Groundwater Flow Patterns	Grading and development	<p>Often, grading and servicing can affect shallow groundwater resources by interfering with natural groundwater flow patterns. Evidence of seepage or discharge conditions on the site was not observed; therefore, the impact due to the lowering of groundwater table and reduction of groundwater contribution is likely minimal.</p> <p>Shallow groundwater flows generally follow the surface topography from high points to low points in the landscape towards the bluff and valleys. Groundwater monitoring by Terraprobe (2012) suggests a downward gradient for the overburden to bedrock based on the differential observed in borehole water level monitors. Evidence of localized</p>	<ul style="list-style-type: none"> Evaluate opportunities to implement LID measures during design. Use trench plugs or anti-seepage collars along installed services. An Environmental Management Plan (EMP) should be developed to identify and reduce possible short-term impacts during construction. a PTTW will likely be required during construction dewatering and the PTTW application package will include estimate of the required dewatering rate, estimate of the zone of influence and identify mitigation measures 	Neutral

Environmental Parameter(s)	Development Activity	Potential Impact to Natural Features & Functions	Recommended Mitigation & Enhancement	Residual Effect
		artesian conditions was detected in borehole 9. Dewatering may result in a lowering of the groundwater levels in the aquifer, thereby reducing the available groundwater for nearby groundwater takers. Such impacts would be short-term and localized.	(Environmental Management Plan) to minimize the dewatering impact.	
Surface Water Features	Grading and servicing	There are seven watercourses on the subject property. Most of these watercourses are associated with valley systems and will be retained in their current form. The features do not support fish habitat. The proposed development has in most cases been designed around the intermittent and ephemeral features along with 15 m buffers. All watercourses within a defined valley landform are being retained in a natural state under the current proposal except the crossing of the valley and watercourse (3) by a golf hole. Only portions of the uppermost reaches of drainage features 1, 2, 3-1 and 5 where they are ephemeral will be affected by the proposed development.	<ul style="list-style-type: none"> 15 m buffers have been built into the design. The development limits on the concept plan should be adjusted to meet the above buffer requirements. Maintain pre-development drainage patterns to the extent possible to ensure flow regimes are maintained. Maintain low out-of-bounds vegetation along watercourse (15 m either side) where the golf course crosses the valleyland. 	Neutral
Water Quantity	Servicing and development	The proposed development will introduce impervious surfaces to the subject property and increase overall runoff volumes to areas that are external to the development. This can potentially increase the quantity of water requiring treatment in the stormwater management facility. It also has the potential to increase or decrease the quantity of runoff that presently flows to the valleys and associated natural features. A review of the pre-development and post development drainage areas, as illustrated in the FSR prepared by Cole Engineering (2012a), suggests that the differential in catchment areas is nominal. The Stormwater Management Plan included in the FSR has been developed with the objective of matching pre-development flow conditions to satisfy GSCA and MOE criteria.	<ul style="list-style-type: none"> The stormwater management facilities have been sized to accommodate runoff from the site as per GSCA requirements. Post development runoff volumes can be reduced if necessary by infiltrating clean roof runoff to lawns and other open space areas to retain flows from larger events. Where feasible, post development runoff volumes to natural features should be maintained at pre-development levels. This will help maintain hydrological conditions in adjacent natural areas. Refer to Table 7.10 in the FSR for additional recommendations for lot level conveyance BMP's. 	Neutral
Water Quality	Grading, servicing and development	Site preparation activities such as grading can increase the risk of erosion and sedimentation to the adjacent natural areas. Under the post-development scenario, contaminants such as oil, sand, salt and other debris may also affect the water quality of surface runoff.	<ul style="list-style-type: none"> Implement sediment and erosion control plans to ensure that sediments are contained on the site. Direct clean roof runoff to pervious surfaces and to valleys via roof leader collection system (see FSR, Cole Engineering 2012a). Runoff from roads and driveways will be directed to the stormwater management facilities for treatment. Chemical use on the proposed golf course should be managed to reduce potential chemical inputs to the bedrock aquifer. (see Cole Engineering 2012b). Refer to Table 7.10 in the FSR for additional recommendations for lot level conveyance BMP's. 	Neutral
BIOLOGICAL RESOURCES				
Woodlands	Grading, servicing and development	The proposed development has been designed to mostly avoid natural features such as woodlands and valleylands. No natural forest communities or significant woodlands will be affected by the proposed plan. Some development will occur adjacent to forested features, however the land uses selected are considered to be relatively compatible (i.e. SWM, Open Space, Park). One golf course crossing of the valleyland is proposed, through a cultural plantation.	<ul style="list-style-type: none"> Where residential or resort development flanks natural forested features, a buffer of 10 m from the dripline of trees should be established and the buffer area maintained in a natural state. Where adjacent land uses include golf course, park or stormwater management, a 5 m buffer to the dripline should be applied. The development limits on the concept plan should be adjusted to meet the above buffer requirements. Detailed design should address and mitigate the crossing of the valleyland by the golf course. 	Neutral
Wetlands	Grading, servicing and development	There are no PSW's on or adjacent to the property. There are only several small wetland features that have been identified on the property. None are evaluated and all are less than 0.5 ha. All are regulated by GSCA. Unit 13 is a small Elm dominated swamp feature associated with the upper reaches of Tributary 2. Its functions are limited primarily to storage and conveyance. The ephemeral portion of the associated watercourse and wetland will be	<ul style="list-style-type: none"> Same as for Water Quantity and Quality. No buffer to wetland thicket in golf course required. 15 m buffer should be applied to other retained wetlands. The development limits on the concept plan should be adjusted to meet the above buffer requirements. 	Neutral

Environmental Parameter(s)	Development Activity	Potential Impact to Natural Features & Functions	Recommended Mitigation & Enhancement	Residual Effect
		<p>removed to facilitate development.</p> <p>Unit 14 is a red osier dogwood thicket swamp situated along tributary 3-2. Its functions are conveyance and habitat for wildlife. This feature will be retained within the golf course.</p> <p>Unit 15 is a small cattail marsh situated along the upper reaches of tributary 3-1. Its functions are limited to storage. It will be also removed to facilitate development.</p>		
Tree Resources	Grading, servicing and development	There are no significant tree resources associated with the portions of the site to be developed. Most of the tableland vegetation is successional and dominated by exotic species. Hedgerows mainly comprised of buckthorn, ash, elm and hawthorn which are generally poorly suited to integration as they are under threat from disease and pests.	<ul style="list-style-type: none"> None Required 	Neutral
Aquatic Resources		<p>All seven drainage features on site have reaches that are considered permanent or intermittent, contributing seasonally to downstream fish habitat. The reaches are generally contained within a valley system and the proposed development has been designed around these features.</p> <p>All watercourses within a defined valley landform are being retained in a natural state under the current proposal other than the golf course crossing of feature 3.</p> <p>Only the uppermost ephemeral reaches of drainage features 1, 2, 3-1 and 5 will be affected by development.</p>	<ul style="list-style-type: none"> Permanent and intermittent drainage features will remain <i>in situ</i> and will be buffered 15 m from the edge of the high water mark. For ephemeral features that will be removed, pre-development drainage patterns should be maintained to the extent possible to ensure maintenance of flow regimes. Function should be replicated by lot level conveyance measures as feasible and/or Low Impact Development (LID) stormwater options On-site flows and outlet flows could be replicated at the top end of vegetated swales. The development limits on the concept plan should be adjusted to meet the above buffer requirements. 	Neutral
Wildlife Resources - Amphibians	Grading, servicing and development	Amphibians have been noted as being associated primarily with the cattle ponds which represent the only suitable breeding habitats. The diversity and abundance of species observed does not suggest that the site supports significant amphibian breeding functions. None of the ponds supporting amphibians will be affected by the proposed development other than being potentially improved.	<ul style="list-style-type: none"> None Required 	Neutral or gain
Wildlife Resources - Birds	Grading, servicing and development	<p>As development will generally not occur within the woodlands, it is likely there will be little impact to the woodland species.</p> <p>There will be some loss of successional habitat, so there will likely be some loss of open country habitat and species, mostly agricultural lands.</p> <p>A permit for the loss of their habitat will be required from the MNR to address two species, and potentially for the third species (Barn Swallow).</p>	<ul style="list-style-type: none"> A permit from the MNR is required to allow development and site alteration within the existing habitat of species for which the ESA applies. Should it be determined that an Overall Benefit Permit is required, compensation for the loss of habitat to the satisfaction of the MNR will be required. A permit may be required from the MNR under the ESA for the removal of foraging habitat for the Barn Swallow that is adjacent to a known nesting area. However, in this case it is not certain that MNR would require a permit as foraging habitat is not limited in the general area, whereas nesting structures may be limiting. 	<p>Loss of open country habitat</p> <p>Net Gain for Bobolink and Eastern Meadowlark should a permit under the ESA be required</p>
Linkages	Grading, servicing and development	<p>The subject property supports linear natural features that represent significant linkages at the local and regional scale. These include the shorecliff bluff that extends east-west across the northern portion of the site. This area will remain in its natural state under the proposed development, so no impacts are anticipated.</p> <p>Some of the valley features, and in particular the valley along drainage feature 5, provides a natural connection between a large woodlot to the south of the property and the bluff. This linkage will be retained, with the exception of a road crossing.</p> <p>Some minor impedance of local connectivity will be created by the golf course crossing of the valleylands.</p>	<ul style="list-style-type: none"> Ensure that all road crossings of watercourses and valley features are designed to minimize the footprint requirements and to retain the fullest extent of natural cover to provide for wildlife passage through detailed design. 	Low level impedance to local movements

PAGE INTENTIONALLY BLANK

9. Environmental Management and Monitoring Plan

Table 6 of this EIS includes recommendations for a number of protection and mitigation measure to avoid or minimize potential negative impacts of development on significant natural heritage features and hazard lands.

Key environmental management strategies recommended in the EIS, FSR and Hydrogeological Investigation include:

- Protection of the Natural Heritage System through establishment of development limits that protect high constraint features;
- Protection and Enhancement of the Natural Heritage System through establishment of buffers to key environmental features and linkages;
- Protection of surface water and groundwater resources through Stormwater Management Systems and Low Impact Development; and
- Protection of property by respecting Natural Hazards.

The effective implementation of these strategies should be implemented through an Environmental Management and Monitoring Plan (EMMP) that clearly details the recommended mitigation requirements, the stage in the project when these measures are to be implemented, the parties responsible for implementation, and the appropriate monitoring to verify the measures have been implemented and are performing as desired.

The main objectives of the EMMP will be as follows:

1. To provide a framework for monitoring changes to the ecological integrity of the Natural Heritage System during and following development;
2. To provide a framework for verifying compliance with the environmental management strategies recommended in the EIS and FSR; and
3. To provide a framework for evaluating the performance and effectiveness of the environmental management strategies recommended in the EIS and FSR.

To achieve all of the monitoring goals and objectives outlined above, we recommend that the EMMP be structured as three separate but inter-related components as follows:

1. Ecological Integrity Monitoring;
2. Compliance Monitoring; and
3. Performance Monitoring.

The purpose and rationale for each of these monitoring components is described in the following sections.

9.1 Ecological Integrity Monitoring

Monitoring the ecological integrity of natural heritage systems in urbanizing environments represents a significant technical challenge. There are numerous factors influencing the various ecosystems present on the subject property. Many of these factors operate at a regional level (i.e. climate change, air and water quality, forest pests and pathogens). Isolating regional scale effects from those related to urbanization at a local scale and attributing those effects directly to urbanization is not feasible without undertaking a broader regional scale study. Due in part to these challenges, we have proposed that monitoring of ecological integrity be focused on key ecological indicators and environmental parameter that can be attributed directly to local scale changes anticipated to occur as the lands experience urbanization.

Since the objective of monitoring ecological integrity is to assess changes to the subject property over time using a suite of pre-defined ecological indicators, it is necessary to compare and contrast information gathered at different periods throughout the urbanization of the surrounding lands with available baseline data sets. As such, the assessment of any changes is restricted to the availability and suitability of existing baseline data for key ecological indicators.

The EIS represents a source of baseline data for the site's natural heritage resources and has been used to develop a list of ecological indicators that could potentially be utilized for monitoring ecological integrity. A list of potential indicators and rationale for their inclusion or omission is provided in **Table 7** below.

Table 7. Potential Ecological Indicators for Monitoring Long Term Ecological Integrity

Ecological Indicator	Rationale
Water Chemistry	Water quality is an important ecological indicator and can be used to identify problems with chemical contaminants and sediments in watercourses on the subject property. Long-term monitoring of water quality can assist in determining whether the ecological integrity of the watercourses is being improved or impaired by urbanization at the local scale. We believe that monitoring of benthic macro invertebrate communities represents a more appropriate measure for assessing water quality as it relates to ecological integrity. <u>Therefore it is recommended that water chemistry not be used to monitor long term ecological integrity.</u>
Water Temperature	Aquatic habitats are affected by changes in water temperature. It is anticipated that the proposed development could result in some minor changes to temperature regimes in the watercourses on the subject property. Monitoring of changes in water temperatures over time will allow for determination of net changes during and following development. <u>It is recommended that this indicator be used to monitor long term ecological integrity.</u>
Benthic Macroinvertebrates	Benthic Invertebrates are good indicators of water quality. Monitoring of Water Quality Index values (WQI) before, during and following development could be used to assess changes in community composition, diversity and water quality. <u>It is recommended that this indicator be used to monitor long term ecological integrity.</u>
Fish Community	Fish community composition is reflective of a watercourse's habitat

Ecological Indicator	Rationale
	characteristics, flow and temperature regime. None of the watercourses on the property support fish. Therefore, we do not recommended that this indicator be used to monitor long term ecological integrity.
Floristic Quality	Floristic quality is a good indicator of native diversity. Monitoring of these values could be used to assess changes in community composition and native species diversity over time within the Natural Heritage System. Changes in floristic composition and quality tend to occur over a very long period and on a localized scale. The ability of this indicator to confirm changes attributable to urbanization of the surrounding lands is questionable at best. For these reasons, we do not recommended that this indicator be used to monitor long term ecological integrity.
Breeding Birds	The composition of the breeding bird community is an important indicator that can be used to track ecosystem changes. Changes in community composition, and in particular specialized species, can be attributable to land use changes. It is anticipated that such changes will occur; however monitoring can assist in quantifying the extent of change and better inform management requirements. It is recommended that this indicator be used to monitor long term ecological integrity.
Amphibians	Amphibian populations are indicators of ecological integrity. The diversity and abundance of local amphibian populations has been documented from portions of the subject property that will be retained in the Natural Heritage System. Monitoring of these known amphibian breeding sites over time can help detect changes and types of species present and better inform any management requirements. It is recommended that this indicator be used to monitor long term ecological integrity.
Linkages and Connectivity	This ecological indicator is very important to the ecological integrity of the Natural Heritage System; however it is extremely difficult to assess and monitor. For these reasons, we do not recommended that this indicator be used to monitor long term ecological integrity.

Based on an evaluation of potential ecological indicators that could be monitored to evaluate changes to long term ecological integrity on the subject property, we recommend that the following indicators be considered:

- Water Temperatures in Drainage Features;
- Benthic Macroinvertebrates;
- Breeding Bird Communities; and
- Amphibian Breeding Sites.

A framework for monitoring ecological integrity for the recommended parameters is provided in **Table 8**. The framework outlines the specific monitoring protocols to be applied along with suggested monitoring timelines and possible management responses. Monitoring of ecological integrity should be the responsibility of the proponent for a period of three years following complete build out.

Table 8. Proposed Ecological Integrity Monitoring Framework

Parameter	Rationale	Protocols	Locations	Frequency/Duration	Potential Management Response
Water Temperature	<ul style="list-style-type: none"> To assess long-term changes to the thermal regimes watercourses on the subject property To identify sources of potential impacts to thermal regimes To identify opportunities for enhancing thermal regimes to benefit aquatic communities 	<ul style="list-style-type: none"> Install temperature loggers in select reaches of watercourses on the subject property 	<ul style="list-style-type: none"> Drainage features 1-7 	<ul style="list-style-type: none"> Monitor temperatures continuously at hourly intervals between March to and November Monitoring should commence prior to construction and be conducted annually until three years following 100% build out 	<ul style="list-style-type: none"> Identify sources of thermal impacts Retrofit SWM facilities and LID features to reduce impacts to thermal regimes
Benthic Invertebrates	<ul style="list-style-type: none"> To assess long-term changes and trends in benthic invertebrate communities in watercourses on the subject property To establish Water Quality and Biotic Indices for area watercourses and compare over time To identify water quality issues related to development of the property 	<ul style="list-style-type: none"> Collect samples from stations along select watercourses using Ontario Benthos Biomonitoring Network protocols. Calculate Water Quality Index (WQI) and Hilsenhoff Biotic Index (HBI) for each sampling location 	<ul style="list-style-type: none"> Drainage features 1-7 	<ul style="list-style-type: none"> Once prior to construction Once at 50-100% build out Once three years after 100% build out 	<ul style="list-style-type: none"> Identify sources of water quality impacts Retrofit SWM facilities to reduce potential impact on water quality
Breeding Birds	<ul style="list-style-type: none"> To assess long-term changes to the composition, diversity and species guilds of bird communities in the area To confirm whether the anticipated changes to the community have occurred 	<ul style="list-style-type: none"> Conduct surveys of representative habitats during the breeding season 	<ul style="list-style-type: none"> Representative habitats 	<ul style="list-style-type: none"> Once prior to construction Once at 50-100% build out Once at year three following 100% build out 	<ul style="list-style-type: none"> Identify potential issues or stresses on populations
Amphibians	<ul style="list-style-type: none"> To assess long-term changes to the composition, diversity and abundance of amphibian 	<ul style="list-style-type: none"> Conduct point counts surveys using Marsh Monitoring Program 	<ul style="list-style-type: none"> Known amphibian breeding sites 	<ul style="list-style-type: none"> Once prior to construction Once at 50-100% build out 	<ul style="list-style-type: none"> Identify potential issues or stresses on populations.\

Parameter	Rationale	Protocols	Locations	Frequency/Duration	Potential Management Response
	communities in the area • To confirm any changes to the community have occurred	Protocols • Daytime for egg masses		• Once at year three following 100% build out	

9.2 Compliance Monitoring

In addition to ecological integrity monitoring, it is recommended that compliance monitoring be undertaken to verify whether the various environmental management strategies recommended in the EIS's and FSR's have been implemented as specified. This is an important component of the EMMP as the environmental management strategies were developed for the purposes of protecting and enhancing the integrity of the Natural Heritage System.

A variety of environmental management strategies have been specified to mitigate the potential negative impacts to the Natural Heritage System on the subject property. These include recommendations for establishment of development limits, implementation of buffers and setbacks to natural features and natural hazards, naturalization of open space blocks, construction of stormwater management systems and low impact development, as well as conventional protection measures such as erosion and sediment controls and fencing.

To identify the various environmental management strategies that will require some level of compliance monitoring, we have generated a list of key management strategies and mitigation measures that should be subjected to compliance monitoring. **Table 9** below includes a listing of these along with rationale for inclusion in the monitoring plan.

Table 9. Recommended Environmental Management Strategies and Mitigation Measures

Groundwater Resources
A number of recommendations related to protection of groundwater resources are included in the Functional Servicing Report (Cole Engineering 2012a). Key recommendations are summarized below.
Increase the potential for infiltration in the post-development environment to mitigate any potential reductions to infiltration that can occur as part of land development.
Key recommendations are summarized below as follows:
<ul style="list-style-type: none"> • Design grades to direct roof runoff towards lawns, side and rear yards, boulevards, parks, and other open space areas throughout the development where feasible • Increase topsoil thickness where feasible to enhance storage and increase potential for infiltration. • Construct infiltration trenches where feasible to promote infiltration.\ • Direct roof leaders to soakaway pits or pervious third pipe system to promote infiltration • Construct rain gardens where feasible to promote rainwater harvesting and infiltration
Surface Water Resources
A number of recommendations related to protection of surface water resources are included in the Functional Servicing Report (Cole Engineering 2012a).
Key recommendations are summarized below as follows:
<ul style="list-style-type: none"> • Design and size stormwater management facilities to accommodate runoff as per GSCA requirements. Stormwater management systems should be designed to continue to direct clean surface water runoff to watercourses and wetland features • Runoff from roads and driveways is to be directed to the stormwater management facilities for treatment

- Maintain water balance at pre-development levels where feasible to maintain hydrological conditions in adjacent natural areas
- Reduce post development runoff volumes by infiltrating clean roof runoff to runoff to lawns and other open space areas to retain flows from larger events
- Implement sediment and erosion control plans to ensure that sediments are contained on the site.

Natural Environment

A number of recommendations related to protection of natural heritage resources are included in this EIS (see Table 6). Key recommendations are summarized below as follows:

- To refine the limits of the proposed developments, it was recommended that the limits of features be staked and surveyed in the field
- Install protective fencing at the limit of development adjacent to the natural heritage system
- Develop and implement an enhancement plan for the buffer and setback zones. The plan should specify the planting of compatible native tree and shrub species for each environment
- Permanent and intermittent drainage features will remain *in situ* and will be buffered 15 m from the edge of the high water mark
- Ensure that all road crossings of watercourses and valley features are designed to minimize the footprint requirements and to retain the fullest extent of natural cover to provide for wildlife passage through detailed design
- No buffer to wetland thicket in golf course required; 15 m buffer should be applied to other retained wetlands
- Where residential or resort development flanks natural forested features, a buffer of 10 m from the dripline of trees should be established and the buffer area maintained in a natural state
- Where adjacent land uses include golf course, park or stormwater management, a 5 m buffer to the dripline should be applied
- Detailed design should address and mitigate the crossing of the valleyland by the golf course
- The development limits on the concept plan should be adjusted at Site Plan or Draft Plan of Subdivision stage to respect feature limits and meet the above buffer requirements

It is recommended that compliance monitoring include field review, inspection of construction and as built drawings. It should be the responsibility of the Municipality and GSCA to confirm that drawings submitted at the detailed design stage are consistent with the recommendations of the various technical reports prepared for the individual developments. These documents should be reviewed at the detailed design stage prior to construction. Some field verification may be warranted during construction in certain cases.

9.3 Performance Monitoring

In addition to ecological integrity and compliance monitoring, it is also proposed that performance monitoring be undertaken to assess whether the various environmental management strategies recommended in the EIS's and FSR's are performing to the desired standards. This is an important component of the EMMP as it helps to verify the effectiveness of the specified environmental management strategies and mitigation measures in protecting and enhancing the Natural Heritage System. Performance monitoring can help identify, at an early stage, potential issues that may need to be addressed to mitigate negative impacts to the Natural Heritage System.

A variety of environmental management strategies have been specified to mitigate anticipated negative impacts to the Natural Heritage System. These were summarized in **Table 9**. Testing the performance and effectiveness of these strategies requires developing standardized monitoring procedures, establishing performance thresholds, and identifying adaptive management responses to ensure that the Natural Heritage System is being maintained and enhanced at levels that are consistent with the policy objectives.

Based on a review of the environmental management strategies and mitigation measures that were recommended for implementation on the subject property, we have identified those that should be subject to performance monitoring to evaluate whether the desired protection objectives for the Natural Heritage System are being satisfied. These include monitoring of Stormwater Management Systems, Low Impact Development Features, Buffer Plantings and Trail Systems. These systems have been recommended for the purposes of protecting and enhancing surface and ground water resources, terrestrial and aquatic ecosystems, and other important ecological functions that sustain the Natural Heritage System.

Details of a proposed performance monitoring program for the subject property are provided in **Table 10**.

Performance of the various environmental management systems and mitigation measures can be evaluated through the framework presented in **Table 10**. Performance monitoring should be the responsibility of the landowner until the assumption of the facilities by the Municipality.

Table 10. Performance Monitoring Framework for Meaford Highlands Development

Parameter	Rationale	Protocols	Locations	Frequency/Duration	Potential Management Response
Stormwater Management Systems	To verify that the SWM ponds have been constructed as designed and to obtain certification prior to the Acceptance for Maintenance. SWM ponds will be certified by the design engineer	<p>SWM Pond Permanent Pool Volume Survey of the pond bottom and slopes below the normal water level and calculations to confirm volume has been provided in accordance with the design (Survey to be of sufficient accuracy to allow 0.3 m contour interval)</p> <p>Survey of pond control structures and confirmation that the pond normal (permanent pool) water level is in accordance with the design and is being maintained</p> <p>Active Storage Volume Survey of the pond slopes above the pond normal water level and outlet structures, erosion and 100 year elevations and associated volume discharge calculations to confirm the required active storage volume and outlet discharge rates have been achieved</p> <p>Other Survey of pipe inverts and sizes, weir elevations and lengths, inlet elevations and sizes, etc. for all components of the outfall structure to confirm compatibility with the designed storage volumes and discharge rates achieved</p> <p>Verification that all inlets, outlets, and forebay/wet cell berm components of the SWM pond are in good repair, unobstructed by debris and that they have been installed in accordance with the SWM pond design</p> <p>Verification that the pond slopes and access roads are stable and per the design</p> <p>Verification that the pond planting is completed as per the design and is in good condition</p> <p>Verification that the outlet channel was constructed as per the design and is not showing signs of erosion</p> <p>Verification that all fencing and any safety features have been installed as per the design</p> <p>Visual inspection to confirm no oil sheen present on the water surface or the presence of visible contaminants or odours</p> <p>Verification that temporary sediment controls have been appropriately removed and disturbed areas stabilized</p>	All SWM Ponds	SWM pond to be certified prior to issuance of building permits and prior to Acceptance for Maintenance	<p>Clean out accumulated sediment from permanent pool and/or adjust pond grading below the normal water level to ensure the required volume is provided</p> <p>Adjust pond grading above the normal water level to ensure required volume is provided</p> <p>Adjust elevations, lengths, etc. of pipes, weirs and/or other outlet structures to ensure pond is operating as intended</p> <p>Remove debris and/or repair as necessary to ensure it is in accordance with the design</p>
	To verify that the SWM Facilities are functioning as designed prior to Assumption by the Municipality	<p>Visual inspection for evidence of sediment deposits in the SWM Pond permanent pool, the inlet structure, the outlet structure and the outfall channel</p> <p>Visual inspection to confirm no oil sheen is present on the water surface or the presence of visible contaminants or odours</p> <p>Confirm control orifice and inlet/outlet pipes are unobstructed and functioning as designed</p> <p>Confirm outfalls are unobstructed and functioning as designed</p>	All SWM Facilities	<p>During the period of guaranteed maintenance, semi-annual visual inspections will be conducted, including additional inspections immediately after a significant rainfall event (>10 mm) or immediately after an oil, fuel or chemical spill</p> <p>Inspection reports will be prepared, with a Final Report at the end of the maintenance period</p>	Remove debris and/or repair and restore as necessary to ensure it is in accordance with the design

Parameter	Rationale	Protocols	Locations	Frequency/Duration	Potential Management Response
		<p>Confirm the outfall channel and confluence with tributaries is stable and unobstructed</p> <p>Confirm the pond slopes and access road are stable</p> <p>Confirm the pond vegetation is surviving</p> <p>Summary of significant rainfall events based on Environment Canada readings from an appropriate local rain gauge location.</p> <p>Upon completion of the monitoring period and prior to Assumption, undertake maintenance if necessary in accordance with the following process and MOE criteria:</p> <ul style="list-style-type: none"> • Prepare a bathymetric and pond slope survey and calculate the associated permanent pool and active storage volume to confirm the design requirements have been maintained prior to and following the cleanout. (Survey to be of sufficient accuracy to allow 0.3 m contours) • SWM pond sediment accumulation to be cleaned out prior to Assumption if the sediment accumulation exceeds the MOE requirements (annual removal efficiency has been reduced by 5% below the design efficiency, or when the forebay volume has been reduced by 50%, whichever occurs first). If cleanout is necessary, sediment samples must be taken and analyzed to ensure that the quality of sediments is suitable for disposal on non-agricultural lands as per current MOE guidelines. If the sediment quality is not satisfactory, then the sediments deposited must be removed and disposed of according to the current MOE disposal guidelines and standards • If the sediment accumulation has not reached the full cleanout level prior to Assumption, the developer has the option of either cleaning out the partial sediment accumulation to restore the pond to the design wet storage volume, or to provide a cash in lieu payment of \$100/m3 for the pro-rata share of the future clean-out cost, based on the pro-rata share of accumulated sediment vs. the sediment clean-out threshold volume based on 75% TSS removal efficiency (i.e.: 80% less 5% reduction of removal efficiency) or 50% of the volume of the forebay (whichever governs) <p>Document any inspections, measurements, and maintenance completed, including the date and volume of sediment removed</p>			<p>Clean out accumulated sediment from permanent pool to ensure the required volume is provided</p>
Buffers	<ul style="list-style-type: none"> • To evaluate the effectiveness of prescribed buffers in reducing impacts to the adjacent Natural Heritage System • To identify potential management issues • To evaluate the performance of naturalization plantings in the buffer zones • To assess integrity of the fencing at the development limits 	<ul style="list-style-type: none"> • Record and photograph evidence of human related disturbances in buffer zones • Document observations according to type of disturbance, magnitude and frequency • Assess the condition of the buffer plantings by recording relative health and cover • Assess the condition of installed fencing and note encroachments. 	<ul style="list-style-type: none"> • In areas where buffers and edge management treatment have been prescribed. • Evaluations to be conducted according to buffer segments 	<ul style="list-style-type: none"> • Once at years one and at three years following 100% build out 	<ul style="list-style-type: none"> • Identify potential issues related to buffer integrity and recommend solutions

9.4 Reporting

It is recommended that monitoring reports be submitted to the Municipality and GSCA on an annual basis. The monitoring reports should outline the monitoring activities completed for that year, provide a summary of key findings, and include recommendations for any management actions that may be required to rectify any issues that have been identified. Any changes to the monitoring plan components, such as revised schedules or protocols should also be noted.

9.5 Responsibility

It is recommended that the compliance monitoring components of the Environmental Monitoring Plan be the responsibility of the Municipality and GSCA. The ecological integrity and performance monitoring components should however be assumed by the landowner for a period not to exceed three years following 100% build out.

10. Policy Conformity Assessment

A summary of how the proposed development and recommendations of the EIS conform to applicable environmental policies and legislation is presented in **Table 11**.

Table 11. Conformity with Natural Heritage Policies and Legislation

Applicable Policy/Legislation	Summary of Findings	Conformity Assessment
<i>Provincial Policy Statement (2005)</i>		
Habitat for Threatened and Endangered Species	Two species of birds that are listed as threatened are currently breeding on the property; a third species, Barn Swallow has been recorded as foraging on the site	Conformity is implied when in compliance with <i>Endangered Species Act</i> compliance; see below
Significant Wetlands	There are none on or adjacent to the property	In conformity; there are no significant wetlands on or adjacent to the property.
Significant Woodlands	None identified in OP's; the wooded bluffs and the natural forest communities associated with the valleylands potentially qualify as significant woodlands. These have been identified as high constraint features	In conformity; the proposed plan respects potentially significant woodland features with the exception of one proposed golf course fairway which will traverse a wooded valleyland.
Significant Wildlife Habitat	None identified in OP's; only animal movement corridors and qualify, along bluff; identified this area as a high constraint to development	In conformity; the proposed plan does not affect any Significant Wildlife Habitat attributes or functions
Significant Valleylands	None identified in OP's; we consider the well-defined valleys on the subject property as potentially significant. These features have been identified as high	In conformity; the proposed development plan generally respects these features with the exception of the proposed golf course crossing

Applicable Policy/Legislation	Summary of Findings	Conformity Assessment
	constraint areas	
Fish Habitat	No direct fish habitat is present	In conformity; the proposed plan will not impact on fish habitat and the functions of watercourses will be maintained through appropriate design and implementation of BMP's
Significant Areas of Natural and Scientific Interest	None present on or adjacent to the subject property	In conformity
County of Grey Official Plan	The proposed plan respects the environmental policies of the Grey County Official Plan	In conformity
Municipality of Meaford Official Plan	The proposed plan respects the environmental policies of Municipality of Meaford Official Plan	In conformity
Grey Sauble Conservation Authority Regulations	The proposed plan respects the regulated features on the subject property with one valley crossing by the golf course	In conformity, subject to necessary permits for work in regulated areas associated with hazards, watercourses and valley lands (and staking of feature limits)
<i>Endangered Species Act</i>	Two species breeding on site: Eastern Meadowlark and Bobolink. A third species foraging on site: Barn Swallow	A permit from the Ministry of Natural Resources under the <i>Endangered Species Act</i> may be required.

11. Conclusions

This report was prepared in accordance with EIS TOR established with GSCA (**Appendix A**). The EIS is based on information derived from review of available background resources, field assessments, analyses and supporting technical studies prepared by other members of the technical study team.

Existing land uses on the subject property are largely reflective of the site's long agricultural history. The majority of tableland on the subject property site consists of row crop and pasture. Natural heritage features are generally confined to the shorecliff bluff and larger valley features associated with the most prominent of the seven watercourses. These areas are generally forested. There are several small unevaluated wetland features associated with the valleylands and drainage features on the tablelands.

The background review did not identify any designated features such as PSWs or ANSIs on the property. The area has been identified as possibly containing karst geology; however an independent study by Karst Solutions (2010) has confirmed that there are no significant karst features associated with the subject property (see **Appendix D**). The watercourses, wetlands, valleylands and natural hazards associated with the shorecliff portions of the property are regulated by the GSCA under Ontario Regulation 151/06. Terraprobe Inc. undertook a slope stability assessment to define the extent of erosion hazards for the purposes of establishing safe development limits.

The EIS includes an assessment of all natural heritage features on the subject property to identify the presence of any significant or sensitive natural heritage resources. Ecological surveys have confirmed that the subject property supports candidate significant valleylands and significant woodlands. Field investigations have also confirmed that while the subject property does contain a number of watercourses, these do not support fish habitat. Portions of the subject property do provide habitat for threatened or endangered species and these areas are subject to the *Endangered Species Act*. A permit may be required from the MNR to develop these areas.

To identify which portions of the subject property contain significant natural heritage features and natural hazards that would preclude development opportunities, a constraint analysis was undertaken. The constraint analysis included an evaluation of the natural heritage features and hazards on the property and ranked them as high, moderate or low level constraints based on their significance, sensitivity. The results of the constraint analysis was used to inform which areas of the property should be protected in order to protect and maintain significant natural features and ecological functions in accordance with applicable environmental policies. High constraint areas were identified as areas where development should be avoided. The conceptual site plan included in this EIS generally restricts development to lands outside the high constraint areas identified in the EIS.

The EIS includes an impact assessment that considers the potential impacts of the proposed development activities the natural heritage features and functions. Impacts of site preparation (clearing, grubbing, grading), construction (servicing, roads, buildings), and post construction activities on natural heritage features and ecological functions are assessed. The results of the impact assessment are outlined in a comprehensive matrix that identifies impact sources, impact effects, recommended mitigation measures, net residual effect.

The proposed conceptual site plan was prepared to generally avoid areas of high environmental constraint. Since the conceptual plan was prepared prior to completion of this EIS and other technical investigations, it is recommend that the plan be modified at it next drafting to reflect a limit of development that is outside the high constraint areas and associated buffers and setbacks identified in the EIS and Slope Stability Report.

The impact assessment included in this EIS recognizes that there will be minor encroachments into high constraint features such as valleylands to accommodate the golf course and a road crossing. Additionally, there may also be some minor encroachment into the buffers to facilitate grading requirements specifically for the storm water management facilities. These minor encroachments will be mitigated by the fact that the road crossing will utilize an existing road crossing. The other encroachments can be mitigated by through naturalization plantings within buffers and open space blocks.

The environmental impacts of the proposed development are limited primarily to the loss of vegetation cover due to the removal of cultural meadow, cultural savannah and some small wetland features. None of the affected vegetation features are considered significant however some do support habitat for specialist and generalist wildlife species, including threatened bird species. The loss of these features and associated functions (i.e. diversity) can be partially mitigated by naturalizing agricultural lands in proximity to buffer zones.

To ensure that the mitigation and environmental management systems (i.e. SWM, LIDs, Buffers) recommended in this EIS and supporting technical studies are appropriately implemented and

performing to the desired standards to protect the natural heritage system, an Environmental Management and Monitoring Plan (EMMP) has been developed and is included in the EIS.

In summary, this EIS has:

- documented and described the site's natural heritage resources through information gathered during seasonal field inventories of key taxa;
- identified the relative significance and sensitivities of natural heritage features and functions of the site and identified constraints to development;
- established ecologically appropriate buffers and established development limits;
- provided a detailed policy review at various planning levels;
- provided input to other technical disciplines;
- assessed impacts associated with all aspects of the proposed development; and
- provided recommendations for avoiding or mitigating impacts.

In conclusion, it is our opinion that the proposed development is in compliance with applicable environmental policies and will not negatively impact on significant natural heritage features and ecological functions of the subject property, provided the recommendations contained in this EIS and the related technical studies are appropriately implemented.

Report prepared by:

Beacon Environmental



Ken Ursic, B.Sc., M.Sc.
Senior Ecologist



Brian Henshaw
Senior Ecologist

12. Literature Cited

- Armstrong, D.K., 2001.
A regional evaluation of the shale resource potential of the Upper Ordovician Queenston Formation, Southern Ontario. Ontario Geological Survey, Open File Report 6058, 148p.
- Armstrong, D.K. and Dodge, J.E.P., 2007.
Paleozoic geology of Southern Ontario. Ontario Geological Survey, Miscellaneous Release, Data 219. [Seamless geological map of Southern Ontario, ArcGIS-based publication available for download from www.geologyontario.mndmf.gov.on.ca]
- Armstrong, D.K. and Sergerie, P., 2002.
Data for the comparative resource evaluation of selected shale units, Southern Ontario. Ontario Geological Survey, Open File Report 6094, 160p.
- Bird Studies Canada, 2009.
Marsh Monitoring Program Participant's Handbook for Surveying Amphibians. 2009 Edition. Bird Studies Canada, Environment Canada, U.S. Environmental Protection Agency. February 2009.
- Brunton, F.R. and Dodge, J.E.P., 2008.
Karst of Southern Ontario and Manitoulin Island. Ontario Geological Survey, Groundwater Resources Study 5, 99p.
- Chapman, L.J. and Putnam, D.F., 1984.
The Physiography of Southern Ontario, Third Edition. Ontario Geological Survey, Special Volume 2, 270p. Accompanied by Map P.2715 (coloured), scale 1:600,000.
- Cole Engineering Group Ltd. 2012a.
Functional Servicing Report Meaford Highlands Resort. June 2012.
- Cole Engineering Group Ltd. 2012b.
Hydrogeological Investigation for the Meaford Highlands Resort. August 2012.
- Gillespie, J.E. and N.R. Richards. 1954.
Soils of Grey County. Report No. 17 of the Ontario Soil Survey. Experimental Farms Service, Canada Department of Agriculture and the Ontario Agricultural College. January 1954.
- Karst Solutions. 2010.
Memorandum re: Potential for the Occurrence of Karst at the Meaford Highlands Resort Property, Meaford, Ontario. Prepared for Friedman & Associates, December 14 2010. 4p.
- Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurray. 1998.

Ecological Land Classification for Southern Ontario: First Approximation and Its Application.
Ontario Ministry of Natural Resources. SCSS Field Guide FG-02. 225 pp.

Natural Heritage Information Centre (NHIC). Available online:
www.mnr.gov.on.ca/MNR/nhic/queries/nhic.mwf.>. Accessed on May 3, 2011.

Newmaster, S.G. and S. Ragupathy, 2012.
Flora Ontario –Integrated Botanical Information System (FOIBIS), Phase I. University of
Guelph, Canada. Available online: <http://www.uoguelph.ca/foibis/>.

Ontario Ministry of Municipal Affairs and Housing (MMAH). 2005.
Provincial Policy Statement. Toronto, Ontario.

Ontario Ministry of Natural Resources. 2010.
Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy
Statement, 2005. Second Edition. Toronto: Queen's Printer for Ontario. 248 pp.

Terraprobe Inc. 2012.
Draft Geotechnical Investigation – Proposed Residential Development, Meaford Highlands
Resort, 3rd Line, South of Highway 26, Municipality of Meaford, Ontario.

Appendix A

EIS Terms of Reference

Appendix A

EIS Terms of Reference

March 9, 2012

BEL 211348

Tim Lanthier, Environmental Planning Technician
Grey Sauble Conservation
237897 Inglis Falls Road, RR 4
Owen Sound, ON N4K 5N6
p: 519-376-3076 ext. 235
f: 519-371-0437

**Re: Final Terms of Reference for Environmental Impact Study (EIS)
Part of Lots 9 & 10, 3rd Line, Meaford, ON**

Dear Mr. Lanthier.

Beacon Environmental has been retained by Meaford A2A Developments Inc. to prepare an Environmental Impact Study (EIS) in support of a proposed development application on Part of Lots 9 & 10, 3rd Line, Municipality of Meaford, County of Grey. The purpose of this letter is to present Terms of Reference for the EIS for your consideration. Included in this letter is some background information relating to the site as well as an outline for the EIS.

Background

The subject property is located east of 3rd Line and south of Highway 26 (Figure 1). Schedule A – Land Use Designations (Map 2 – Northeast Quadrant) of the County of Grey Official Plan shows the open agricultural land in a Rural designation, with the major watercourse features and the shorecliff along the north side of the property designated Hazard Lands.

Appendix A – Constraint Mapping (Map 2 – Northeast Quadrant) of the County of Grey Official Plan does not identify the shorecliff as a constraint, but does assign this label to the watercourse that crosses through the extreme southwest corner of the study area (Lot 9, Concession 2). The entire tableland portion is identified as a Special Policy Area due to the presence of shallow (generally less than 1.0 m) overburden with karst topography. Under Section 2.8.4 of the Official Plan, the proponent of any planning application in a Special Policy Area is required to prepare an Environmental Impact Study.

On the Town of Meaford Land Use Schedule (Schedule A-1) of the Meaford Official Plan, the shorecliff and major watercourse features are designated Environmental Protection. These designations extend to the south onto that portion of the study area that falls outside the Town of

Meaford “urban” boundary (Schedule B – Environmental and Resource Features). The area of “Karst Topography” is also identified, consistent with that shown on Appendix A of the County Official Plan.

The watercourses and shorecliff features on the property are regulated by the Grey Sauble Conservation Authority. There are no MNR-evaluated wetlands or provincially significant ANSIs on the property.

Terms of Reference

The following EIS Terms of Reference have been prepared to be consistent with the Municipality of Meaford Official Plan policy C6.2 and County of Grey Official Plan policy 2.8.6. The Terms of Reference were developed based on our preliminary review of the site’s natural heritage resources and subsequent discussions with GSCA staff during a site visit on December 13, 2011. As you are aware, there are a number of environmental features associated with the subject property that could potentially be impacted by the proposed development. The key objective of the EIS is to demonstrate that sensitive environmental features and their associated ecological functions can be protected in the context of the proposed development and that any potential impacts associated with this development can be mitigated.

According to section C6.2 of the Meaford Official Plan, an EIS should include a description of:

- the proposed undertaking;
- the natural features and ecological functions of the area potentially affected directly and indirectly by the undertaking, and an assessment of their sensitivity to development;
- any lands that support environmental attributes and/or functions that may qualify the lands for designation within the Environmental Protection designation;
- the direct and indirect effects to the ecosystem that might be caused by the undertaking
- any environmental hazards (i.e. slope, flooding contaminants) that need to be addressed as part of the design and how they will be addressed;
- any monitoring that may be required to ensure that mitigating measures are achieving the intended goals;
- how the proposed use affects the possibility of linking core areas of the natural heritage system by natural corridors that may or may not be identified on the schedules to the Plan; and,
- a Management Plan (MP) identifying how the adverse effects will be avoided or minimized over the construction period and the life of the undertaking and how environmental features and functions will be enhanced where appropriate and describing the net effect of the undertaking after implementation of the MP. The MP shall also establish the limits of buffers and setbacks adjacent to watercourses, waterbodies, valleys, significant wetlands and vegetation to protect the natural feature and its attributes and/or function from the effects of development.

It has been our experience that EIS Terms of Reference can be effectively presented in the form of a report outline. This provides reviewing agencies with greater level of clarity on the scope of the study to ensure that their expectations are met. The following report outline contains description of the contents to be included for each report section.

Proposed EIS Report Outline

1.0 Introduction

The introductory section will include a description of the site (both historical and current), a discussion of its relationship to the broader natural heritage system, a summary of applicable environmental policies. The need for an EIS and the objectives of the EIS will also be described within the context of current policies.

2.0 Policy Framework

This section will describe and discuss current municipal, provincial and federal policies that apply to the subject property including:

- Federal Fisheries Act
- Provincial Policy Statement (PPS)
- County of Grey Official Plan
- Municipality of Meaford Official Plan
- Grey Sauble Conservation Authority Regulations and Policies

3.0 Methodology

This section of the report will describe the approach used to characterize the site's natural heritage features and functions. A list of background information sources consulted as well as details of all field work and assessment will be included.

Background information sources to be consulted will include, but not be limited, to the following:

- Natural Heritage Information Centre (NHIC) Database
- consultation with MNR ecologist
- consultation with GSCA ecologists
- Ontario Breeding Bird Atlas
- historic and current aerial photography
- topographic mapping
- landform/physiography reports and mapping
- soil reports and mapping
- hydrogeological investigations
- natural heritage resources mapping
- MNR/GSCA fisheries data

A summary of proposed field investigations to be undertaken as part of this assignment is presented in **Table 1** below. All field studies will be completed using standard protocols.

Table 1. Summary of Proposed Field Investigations and Meetings

Timing	Description	Status
October 2010	Site reconnaissance and preliminary assessment	Completed
December 2011	Review of regulated features with GSCA (1 visit)	Completed
March/April 2012	Stick nest survey	Pending
April – May 2012	Amphibian surveys (3 visits) (nocturnal as per MMP)	Pending
May to June 2012	Fish habitat assessment (2 visits)	Pending
May-July 2012	Breeding bird surveys (2 visits)	Pending
May-August 2012	Vegetation inventory and ELC # 3 (3 visits)	Pending

Amphibian surveys will be conducted three (3) times in the spring of 2012: early April (April 1-15), early May (May 1-15), and early June (June 1-15) to coincide with different breeding times of various frog and toad species. Surveys will be carried out after dusk under suitable weather conditions as outlined in the *Marsh Monitoring Participant's Handbook for Surveying Amphibians* (Environment Canada, 2008).

Two rounds of breeding bird surveys will be conducted between mid-May and mid-June 2012, at least two weeks apart. The surveys will be conducted in the early morning under suitable weather conditions (low wind, no rain). The surveys will consist of walking the property such that all parts of the site are surveyed to within 50 m to 100 m.

4.0 Characterization of Existing Conditions

This section will characterize existing biophysical resources on the subject property, including landform, topography, soils, surface and groundwater drainage patterns, terrestrial resources (vegetation communities, flora and fauna) and aquatic resources using available information from technical studies and supplemental field work. Information will be presented using summary text descriptions, tables, figures, and appended data.

Hydrogeological and geotechnical investigations will be conducted by other members of the consulting team in conjunction with the EIS. These investigations will determine if karst topography occurs on the subject property, assess the potential impacts of the proposed development on surface and groundwater resources, and recommend appropriate mitigation. We will combine the findings of these parallel investigations in the EIS report.

5.0. Environmental Constraint Analysis

This section will summarize the scope and nature of the ecological features and functions on site that are considered sensitive or significant. This will include consideration for features and functions in adjacent lands off site where appropriate. Natural heritage features on site will be evaluated in terms of their relative significance and sensitivity to development by assigning constraint ratings to individual vegetation units. Each feature will be evaluated in terms of its ecological and hydrologic functions as well as the linkages among them.

6.0 Development Proposal

This section will describe the various components of the proposed development as well as activities required to prepare and service the area for development. Draft plans, grading plans, servicing, stormwater management and other plans will be referenced to provide a comprehensive description of the proposal.

7.0 Impact Assessment / Avoidance, Mitigation and Enhancement

This section of the report will identify and describe potential impacts of the proposed development on existing natural heritage features and ecological functions on the subject property. Pre- and post-development impacts will be assessed and recommendations for impact avoidance and mitigation will be provided. Mitigation measures to be considered will include buffers, site water balance, stormwater management, sediment and erosion control, tree preservation and edge management, and seasonal restrictions on activities based on wildlife sensitivities. Opportunities for habitat enhancement will be explored and identified where feasible.

8.0 Environmental Management and Monitoring Plan

This plan will identify steps and procedures needed to ensure that the protection, mitigation, and enhancement measures recommended in the EIS are implemented as specified and monitored to assess their performance.

9.0 Policy Conformity

This section will include a discussion of how the proposed Draft Plan complies with relevant municipal, provincial and federal environmental policies and legislation including the:

- Federal Fisheries Act
- Provincial Policy Statement (PPS): the PPS defines seven natural heritage features and provides planning policies for each. We propose to use the *Natural Heritage Reference Manual* (OMNR 2010) to assess the significance of all PPS natural heritage components.
- County of Grey Official Plan
- Municipality of Meaford Official Plan
- Grey Sauble Conservation Authority Regulations and Policies

10.0 Summary

The findings of the EIS will be summarized in a report. A draft report will be prepared that builds upon our previous study by including an impact assessment component. The draft will be circulated to the municipality and agencies for review and comment prior to completion of the field inventories. Once the field studies are complete, a final report will be prepared and submitted for further review and comment.

We believe that the proposed EIS Terms of Reference addresses all of the requirements outlined in Meaford Official Plan Policy C6.2 and reflect our discussions. We appreciate any feedback that you may have on the proposed terms for the study. Should you have any questions or points for discussion, please do not hesitate to contact the undersigned at (519) 826-0419 x23.

Yours truly,
Beacon Environmental



Ken Ursic, M.Sc.
Senior Ecologist

c.c. S. Warsh (Friedman & Associates)
J. McFarlane (Weston Consulting)
Xin Xu (Cole Engineering Group Ltd.)

Appendix B

Plant List

Appendix B

Plant List

Family Name	Scientific Name	Common Name	S-Rank ¹
ACERACEAE (Maple family)	<i>Acer rubrum</i>	Red Maple	S5
	<i>Acer saccharum</i> var. <i>saccharum</i>	Sugar Maple	S5
ANACARDIACEAE (Cashew family)	<i>Toxicodendron radicans</i> ssp. <i>negundo</i>	Poison Ivy	S5
APIACEAE (Carrot family)	<i>Daucus carota</i>	Queen Anne's Lace	SE5
ASCLEPIADACEAE (Milkweed family)	<i>Asclepias syriaca</i>	Common Milkweed	S5
ASTERACEAE (Aster family)	<i>Symphyotrichum ericoides</i> var. <i>ericoides</i>	Heath Aster	S5
	<i>Centaurea</i> sp.	Knapweed Species	SE
	<i>Cichorium intybus</i>	Chicory	SE5
	<i>Cirsium arvense</i>	Creeping Thistle	SE5
	<i>Erigeron strigosus</i>	Daisy Fleabane	S5
	<i>Euthamia graminifolia</i>	Grass-leaved Goldenrod	S5
	<i>Hieracium</i> sp.	Hawkweed Species	SE
	<i>Inula helenium</i>	Elecampane	SE5
	<i>Solidago canadensis</i>	Canada Goldenrod	S5
	<i>Solidago canadensis</i> var. <i>scabra</i>	Tall Goldenrod	S5
	<i>Solidago gigantea</i>	Smooth Goldenrod	S5
	<i>Solidago juncea</i>	Early Goldenrod	S5
	<i>Sonchus arvensis</i> ssp. <i>arvensis</i>	Field Sowthistle	SE5
	<i>Symphyotrichum cordifolium</i>	Heart-leaved Aster	S5
	<i>Symphyotrichum lanceolatum</i> ssp. <i>lanceolatum</i>	Panicled Aster	S5
	<i>Symphyotrichum novae-angliae</i>	New England Aster	S5
	<i>Symphyotrichum puniceum</i> var. <i>puniceum</i>	Swamp Aster	S5
	<i>Taraxacum officinale</i>	Common Dandelion	SE5
BALSAMINACEAE (Jewelweed family)	<i>Impatiens capensis</i>	Spotted Jewel-weed	S5

Family Name	Scientific Name	Common Name	S-Rank ¹
BETULACEAE (Birch family)	<i>Betula papyrifera</i>	Paper Birch	S5
	<i>Ostrya virginiana</i>	Eastern Hop-hornbeam	S5
BORAGINACEAE (Borage family)	<i>Myosotis scorpioides</i>	True Forget-me-not	SE4
BRASSICACEAE (Mustard family)	<i>Alliaria petiolata</i>	Garlic Mustard	SE5
	<i>Hesperis matronalis</i>	Dame's Rocket	SE5
	<i>Cardamine diphyllo</i>	Broad-leaved Toothwort	S5
CAPRIFOLIACEAE (Honeysuckle family)	<i>Lonicera morrowii</i>	Morrow's Honeysuckle	SE3
	<i>Lonicera tatarica</i>	Tartarian Honeysuckle	SE5
CLUSIACEAE (St. John's-wort family)	<i>Hypericum perforatum</i>	St. John's-wort	SE5
CORNACEAE (Dogwood family)	<i>Cornus sericea</i> ssp. <i>sericea</i>	Red-osier Dogwood	S5
CUPRESSACEAE (Cyprus family)	<i>Juniperus communis</i>	Common Juniper	S5
	<i>Thuja occidentalis</i>	Northern White Cedar	S5
CYPERACEAE (Sedge family)	<i>Carex eburnea</i>	Ebony Sedge	S5
	<i>Carex flava</i>	Yellow Sedge	S5
	<i>Carex gracillima</i>	Graceful Sedge	S5
	<i>Carex granularis</i>	Meadow Sedge	S5
	<i>Carex pellita</i>	Woolly Sedge	S5
	<i>Carex stipata</i>	Stalk-grain Sedge	S5
	<i>Schoenoplectus tabernaemontani</i>	Soft-stemmed Bulrush	S5
DRYOPTERIDACEAE (Wood Fern family)	<i>Dryopteris marginalis</i>	Marginal Wood Fern	S5
ELAEAGNACEAE (Oleaster family)	<i>Shepherdia canadensis</i>	Canada Buffalo-berry	S5
EQUISETACEAE (Horsetail family)	<i>Equisetum arvense</i>	Field Horsetail	S5
FABACEAE	<i>Lotus corniculatus</i>	Bird's-foot Trefoil	SE5

Family Name	Scientific Name	Common Name	S-Rank ¹
(Legume family)			
	<i>Medicago sativa ssp. sativa</i>	Alfalfa	SE5
	<i>Melilotus alba</i>	White Sweet Clover	SE5
	<i>Melilotus officinalis</i>	Yellow Sweet Clover	SE5
	<i>Trifolium pratense</i>	Red Clover	SE5
	<i>Vicia cracca</i>	Tufted Vetch	SE5
FAGACEAE (Beach family)			
	<i>Fagus grandifolia</i>	American Beech	S5
	<i>Quercus rubra</i>	Northern Red Oak	S5
GROSSULARIACEAE (Gooseberry family)			
	<i>Ribes cynosbati</i>	Prickly Gooseberry	S5
JUNCACEAE (Rush family)			
	<i>Juncus effusus ssp. solutus</i>	Soft Rush	S5
LILIACEAE (Lily family)			
	<i>Allium tricoccum</i>	Wild Leek	S5
	<i>Erythronium americanum ssp. americanum</i>	Yellow Trout-lily	S5
	<i>Maianthemum canadense</i>	Wild-lily-of-the-valley	S5
	<i>Trillium grandiflorum</i>	White Trillium	S5
OLEACEAE (Olive family)			
	<i>Fraxinus americana</i>	White Ash	S5
	<i>Fraxinus pennsylvanica</i>	Green Ash	S5
ONAGRACEAE (Evening Primrose family)			
	<i>Epilobium sp.</i>	Willow-herb Species	
ORCHIDACEAE (Orchid family)			
	<i>Epipactis helleborine</i>	Eastern Helleborine	SE5
PINACEAE (Pine family)			
	<i>Larix decidua</i>	European Larch	SE2
	<i>Picea abies</i>	Norway Spruce	SE3
	<i>Picea glauca</i>	White Spruce	S5
	<i>Pinus nigra</i>	Black Pine	SE2
	<i>Pinus resinosa</i>	Red Pine	S5
	<i>Pinus strobus</i>	Eastern White Pine	S5
	<i>Pinus sylvestris</i>	Scotch Pine	SE5
	<i>Tsuga canadensis</i>	Eastern Hemlock	S5

Family Name	Scientific Name	Common Name	S-Rank ¹
PLANTAGINACEAE (Plantain family)	<i>Plantago lanceolata</i>	English Plantain	SE5
POACEAE (Grass family)	<i>Agrostis gigantea</i>	Redtop	SE5
	<i>Bromus inermis</i> ssp. <i>inermis</i>	Smooth Brome	SE5
	<i>Dactylis glomerata</i>	Orchard Grass	SE5
	<i>Glyceria striata</i>	Fowl Manna Grass	S5
	<i>Lolium pratense</i>	Meadow Fescue	SE5
	<i>Phalaris arundinacea</i>	Reed Canary Grass	S5
	<i>Phleum pratense</i>	Timothy	SE5
	<i>Poa compressa</i>	Canada Bluegrass	S5
	<i>Poa pratensis</i> ssp. <i>pratensis</i>	Kentucky Bluegrass	S5
POLYGONACEAE (Smartweed family)	<i>Rumex crispus</i>	Curly Dock	SE5
RANUNCULACEAE (Buttercup family)	<i>Ranunculus acris</i>	Tall Buttercup	SE5
	<i>Ranunculus repens</i>	Creeping Buttercup	SE5
RHAMNACEAE (Buckthorn family)	<i>Rhamnus cathartica</i>	Buckthorn	SE5
ROSACEAE (Rose family)	<i>Agrimonia gryposepala</i>	Tall Hairy Agrimony	S5
	<i>Amelanchier</i> sp.	Serviceberry Species	
	<i>Crataegus monogyna</i>	English Hawthorn	SE5
	<i>Crataegus punctata</i>	Dotted Hawthorn	S5
	<i>Crataegus</i> spp	Hawthorn Species	
	<i>Fragaria virginiana</i>	Virginia Strawberry	S5
	<i>Geum aleppicum</i>	Yellow Avens	S5
	<i>Geum</i> sp.	Avens Species	
	<i>Malus pumila</i>	Common Apple	SE5
	<i>Potentilla recta</i>	Sulphur Cinquefoil	SE5
	<i>Prunus serotina</i>	Wild Black Cherry	S5
	<i>Prunus virginiana</i>	Choke Cherry	S5
	<i>Pyrus communis</i>	Common Pear	SE4
RUBIACEAE (Bedstraw family)	<i>Galium mollugo</i>	White Bedstraw	SE5
	<i>Galium palustre</i>	Marsh Bedstraw	S5

Family Name	Scientific Name	Common Name	S-Rank ¹
SALICACEAE (Willow family)	<i>Populus tremuloides</i>	Quaking Aspen	S5
	<i>Salix discolor</i>	Pussy Willow	S5
SCROPHULARIACEAE (Figwort family)	<i>Veronica officinalis</i>	Common Speedwell	SE5
SOLANACEAE (Nightshade family)	<i>Solanum dulcamara</i>	Climbing Nightshade	SE5
TILIACEAE (Linden family)	<i>Tilia americana</i>	American Basswood	S5
TYPHACEAE (Cattail family)	<i>Typha angustifolia</i>	Narrow-leaved Cattail	S5
	<i>Typha latifolia</i>	Broad-leaf Cattail	S5
ULMACEAE (Elm family)	<i>Ulmus americana</i>	American Elm	S5
VIOLACEAE (Violet family)	<i>Viola conspersa</i>	American Bog Violet	S5
	<i>Viola pubescens</i>	Downy Yellow Violet	S5
VITACEAE (Grape family)	<i>Vitis riparia</i>	Riverbank Grape	S5

¹ S-Rank (Provincial Status - NHIC): **S5** = secure; **SE** = exotic/introduced.

Appendix C

Breeding Bird List

Appendix C

Breeding Bird List

Common Name	Scientific Name	Provincial S-Rank	Area-sensitive (MNR)	Endangered or Threatened	Max. No. Breeding Pairs
Merlin	<i>Falco columbarius</i>	S5			1
Wild Turkey	<i>Meleagris gallopavo</i>	S5			1
Ring-billed Gull	<i>Larus delawarensis</i>	S5			0 (over only)
Upland Sandpiper	<i>Bartramia longicauda</i>	S4	A		1
Killdeer	<i>Charadrius vociferous</i>	S5			1
American Woodcock	<i>Scolopax minor</i>	S4			1
Belted Kingfisher	<i>Megaceryle alcyon</i>	S4			1
Mourning Dove	<i>Zenaida macroura</i>	S5			5
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	S5			1
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	S5			1
Northern Flicker	<i>Colaptes auratus</i>	S4			2
Eastern Wood-Pewee	<i>Contopus virens</i>	S4			2
Alder Flycatcher	<i>Empidonax alnorum</i>	S5			1
Least Flycatcher	<i>Empidonax minimus</i>	S4	A		1
Eastern Phoebe	<i>Sayornis phoebe</i>	S5			2
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	S4			1
Eastern Kingbird	<i>Tyrannus tyrannus</i>	S4			2
Horned Lark	<i>Eremophila alpestris</i>	S5			0 (over only)
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	S4			0 (foraging only)
Barn Swallow	<i>Hirundo rustica</i>	S4		T	foraging
Blue Jay	<i>Cyanocitta cristata</i>	S5			2
American Crow	<i>Corvus brachyrhynchos</i>	S5			3
Common Raven	<i>Corvus corax</i>	S5			1
Black-capped Chickadee	<i>Poecile atricapillus</i>	S5			6
Red-breasted Nuthatch	<i>Sitta Canadensis</i>	S5	A		3
Eastern Bluebird	<i>Sialia sialis</i>	S5			1
Wood Thrush	<i>Hylocichla mustelina</i>	S4			2
American Robin	<i>Turdus migratorius</i>	S5			10
Brown Thrasher	<i>Toxostomum rufum</i>	S4			1
Gray Catbird	<i>Dumetella carolinensis</i>	S4			3
Cedar Waxwing	<i>Bombycilla cedrorum</i>	S5			5
European Starling	<i>Sturnus vulgaris</i>	SE			No count
Warbling Vireo	<i>Vireo gilvus</i>	S5			1
Red-eyed Vireo	<i>Vireo olivaceus</i>	S5			6
Yellow Warbler	<i>Setophaga petechial</i>	S5			1
Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>	S5			1
Black-and-white Warbler	<i>Mniotilta varia</i>	S5	A		1

Common Name	Scientific Name	Prov- incial S-Rank	Area- sensitive (MNR)	Endangered or Threatened	Max. No. Breeding Pairs
American Redstart	<i>Setophaga ruticilla</i>	S5	A		2
Common Yellowthroat	<i>Geothlypis trichas</i>	S5			2
Northern Cardinal	<i>Cardinalis cardinalis</i>	S5			2
Indigo Bunting	<i>Passerina cyanea</i>	S4			3
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	S4			5
Clay-colored Sparrow	<i>Spizella pallida</i>	S4			7
Field Sparrow	<i>Spizella pusilla</i>	S4			21
Savannah Sparrow	<i>Passerculus sandwichensis</i>	S4	A		24
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	S4	A		4
Song Sparrow	<i>Melospiza melodia</i>	S5			13
Bobolink	<i>Dolichonyx oryzivorus</i>	S4	A	T	8
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	S4			4
Eastern Meadowlark	<i>Sturnella magna</i>	S4	A	T	5
Common Grackle	<i>Quiscalus quiscula</i>	S5			2
Brown-headed Cowbird	<i>Molothrus ater</i>	S5			5
Baltimore Oriole	<i>Icterus galbula</i>	S4			2
Purple Finch	<i>Haemorhous purpureus</i>	S4			1
American Goldfinch	<i>Carduelis tristis</i>	S5			13

Appendix D

Karst Study – Karst Solutions Inc. 2010

December 14, 2010

Friedman & Associates
250 Ferrand Drive, Suite #802
Toronto, Ontario
M3C 3E5

Attention: Mr. Steven Warsh

**RE: Potential for the Occurrence of Karst at the Meaford Highlands Resort Property,
Meaford, Ontario.**

Dear Mr. Warsh,

Karst Solutions was retained to assess the potential for karst development at a property located approximately 5 km southeast of Meaford, Ontario. This area is identified by the County of Grey as a "Special Policy Area" indicating that there may be the occurrence of karst topography. The property is currently being considered for development as a residential-resort complex called Meaford Highlands Resort. The property is situated east of No. 3 Line and South of Highway 26.

Karst Solutions was provided with the following maps/drawings:

1. "Air Photograph, Lots 9 & 10 3rd Line, Meaford, County of Grey", prepared by Weston Consulting Group Inc., dated October 18, 2010.
2. "Figure 1, Preliminary Environmental Constraint Mapping", prepared by Beacon Environmental, dated November 2010.
3. "Drawing Number C2, Preliminary Development Concept, Meaford Highlands Resort", prepared by Weston Consulting Group Inc., dated November 18, 2010.

The first is an areal photograph of the subject lands illustrating the boundary of the subject lands. The second is a map illustrating areas identified as highly constrained (steep slope, wooded valleys containing watercourses), moderately constrained (open watercourses in agricultural fields) and not constrained (areas available for potential development). The third is a concept drawing for the proposed development.

Normally, a complete karst assessment would involve an inspection of the property. This was not possible given the amount of snow accumulated on the ground that would preclude direct observations. In lieu of a field investigation, the assessment will be based on available geological publications and communication with staff at the Ontario Geological Survey.

Site Geology

Three publications were reviewed regarding the bedrock geology of the area encompassing the property. The first is the “seamless geological map of Southern Ontario” (Armstrong and Dodge, 2007). The second and third publications are resource evaluations of selected shale units in Southern Ontario (Armstrong and Sergerie, 2002; Armstrong, 2001).

The seamless geology map shows that most of the property is underlain by the Queenston Formation. However, the Georgian Bay Formation underlies part of the property along the northern edge where a bluff drops steeply towards Highway 26 and Georgian Bay. The Georgian Bay Formation occurs along the lower portion of the bluff. The elevation of the contact between the units is at approximately 310 m a.s.l. Generally, both bedrock formations consist primarily of shale but also contain thin interbeds of siltstone, sandstone and limestone. An Ontario Geological Survey drill hole (OGS-01-04) was drilled adjacent to the property in 2001 within the No. 10 Sideroad right-of-way, east of No. 3 Line. The drill hole penetrated 13.82 m of the Queenston Formation and 47.26 m of the Georgian Bay Formation (Armstrong and Sergerie, 2002, Table 6-5). The Queenston Formation in the drill core consists primarily of shale with minor siltstone interbeds. The Georgian Bay Formation consists primarily of shale with thin interbeds of siltstone, sandstone and limestone. Although there are limestone interbeds in the latter unit that may be susceptible to karstification, the beds are generally thin (<20 cm thick) and are separated by relatively thick intervals of low-permeability shale. Another OGS drill hole (OGS-00-C1) located a few km to the west penetrated the entire thickness of the Queenston Formation (Armstrong, 2001, Figure 3 and p. 62). The thickness of the Queenston Formation there is approximately 70 m and this should provide a good approximation of the thickness of the Queenston Formation at the property southeast of Meaford. Since the lower contact of the Queenston Formation in the vicinity of the property is at an approximately elevation of 310 m a.s.l. and since the maximum elevation of the property is approximately 360 m a.s.l., therefore the entire thickness of rock above the contact within the property should be the Queenston Formation, and the Manitoulin Formation dolostone should not be present.

Armstrong (2001) noted the occurrence of limestone interbeds within the Queenston Formation in the drill hole located several km west of the property. While most of these interbeds are thin, there is one interval of limestone that is 2.6 m thick that occurs at a depth of approximately 40 to 42 m below the top contact (Armstrong, 2001, p. 62). This interval of limestone may or may not extend to the Meaford Highlands Resort property.

Chapman and Putnam (1984, Map P.2715) describe the area of the property as a shale plain with an adjacent shore bluff at the northern edge. Armstrong and Sergerie (2002) and Armstrong (2001) indicate that the shale plain is an area with a thin cover of glacial drift (less than 1 m thick) on top of the Queenston Formation shales.

Potential for Karst Development

In order for karst to develop, there must be soluble bedrock such as limestone, dolostone or gypsum, and the soluble bedrock must be subjected to the circulation of meteoric water over a sufficiently long period of time.

The Georgian Bay Formation does contain some thin interbeds of limestone but these beds are generally less than 20 cm thick and are separated by shale. The shale has low permeability that minimizes the circulation of groundwater thereby preventing any extensive development of solution channel networks within the limestone interbeds. While there may be minor dissolution of the limestone beds where they are exposed at the surface along the shore bluff at the northern edge of the property, and especially along the watercourses, the extent and depth of karstification will be negligible. Thus, any karstification of these limestone beds will only occur within the high constraint areas identified by Beacon Environmental.

Similarly, the Queenston Formation typically contains a few thin limestone interbeds and there may be one interval of limestone that is as much as 2.6 m thick. Dissolution of these limestone beds may occur where they are exposed to weathering at the top of the bedrock surface, since the overlying soils are thin, or where they are exposed directly at the surface along the watercourses. However, once again the limestone interbeds are separated by shale and the low permeability shale will prevent any extensive development of solution channel networks. Therefore, there is no reason to expect any significant development of karstic groundwater flow systems characterized by rapid flow along conduits. It is also noted that any limestone beds exposed along the watercourses will only be exposed for relatively short distances because the orientation of the beds are close to horizontal whereas the watercourses slope gently toward the north, with gradients of approximately 4 to 6 m per 100 m. The relatively short exposures along the watercourses will limit the horizontal extent of karstification within any individual limestone bed. Thus, there may be the localized development of solutional sculpturing (i.e., development of karren) of the limestone beds exposed along the watercourses but the karstification will be limited to the thickness of individual limestone beds and will be largely confined to short reaches along the watercourses.

Brunton and Dodge (2008) documented karst across Southern Ontario and generated a map illustrating known areas of karst and areas with the potential for karst development based on the analysis of karst development as a function of stratigraphy. The map does not indicate any potential for karst development in the area south and east of Meaford since the typical karst rocks of Ontario (e.g., dolostone and limestone) do not occur there.

Two geologists from the Ontario Geological Survey were questioned about the occurrence of karst within the Queenston and Georgian Bay Formations. Frank Brunton (pers. com., 2010) indicated that he is not aware of any karst development in the Queenston or Georgian Bay Formations but suggested contacting Derek Armstrong who has extensive experience with both formations. Derek Armstrong (pers. com., 2010) indicated that he has not noted karst development in the Queenston and Georgian Bay Formations anywhere in Ontario. Furthermore, he is familiar with the property in question as he has undertaken detailed geological investigations of the two formations in close proximity to the property.

Application of the Provincial Policy Statement (2005)

Within the Provincial Policy Statement (PPS, 2005), Section 3.1 applies to natural hazards including karst topography. In addition to the PPS, the development of karstic aquifers may lead to issues that need to be addressed during the planning process for land developments. Karst Solutions has extensive experience conducting detailed assessments of karst-related hazards as

December 13, 2010

Letter to Steven Warsh, Friedman & Associates

RE: Potential for the Occurrence of Karst at the Meaford Highlands Resort Property, Meaford, Ontario

they apply to the PPS and as well as assessing the hydrogeology of karst aquifers and any related implications to land development.

Conclusions

Given the very limited thicknesses of limestone interbeds that may occur beneath the Meaford Highlands Resort property, there is no reason to believe that there will be karst-related hazards at the property. Furthermore, the predominance of shale, and the interbedded nature of the limestone beds within the shale, will not permit the development of significant karstic aquifers on the property.

References Cited

- Armstrong, D.K., 2010 (personnal communication). Sedimentary Geoscience Section, Ontario Geological Survey, Sudbury, Ontario.
- Armstrong, D.K., 2001. A regional evaluation of the shale resource potential of the Upper Ordovician Queenston Formation, Southern Ontario. Ontario Geological Survey, Open File Report 6058, 148p.
- Armstrong, D.K. and Dodge, J.E.P., 2007. Paleozoic geology of Southern Ontario. Ontario Geological Survey, Miscellaneous Release, Data 219. [Seamless geological map of Southern Ontario, ArcGIS-based publication available for download from www.geologyontario.mndmf.gov.on.ca]
- Armstrong, D.K. and Sergerie, P., 2002. Data for the comparative resource evaluation of selected shale units, Southern Ontario. Ontario Geological Survey, Open File Report 6094, 160p.
- Brunton, F.R. and Dodge, J.E.P., 2008. Karst of Southern Ontario and Manitoulin Island. Ontario Geological Survey, Groundwater Resources Study 5, 99p.
- Chapman, L.J. and Putnam, D.F., 1984. The Physiography of Southern Ontario, Third Edition. Ontario Geological Survey, Special Volume 2, 270p. Accompanied by Map P.2715 (coloured), scale 1:600,000.

I trust this meets your current requirements. Should you have any questions regarding this letter, please do not hesitate to contact me.

Sincerely,



Marcus J. Buck, P.Geo. (Member No. 1373)

Karst Solutions, 11 San Marino Crescent, Hamilton, Ontario L9C 2B6

905-575-4759

mbuck@karstsolutions.com