

**RECOMMENDED TERMS OF REFERENCE**

**COMPREHENSIVE BROADER SCALE  
ENVIRONMENTAL STUDY FOR  
TOWN OF CALEDON  
AGGREGATE RESOURCE AREA 9-A**

January 13, 2004  
Revised January 23, 2004

Prepared jointly by:  
Town of Caledon  
Region of Peel  
Credit Valley Conservation

**INTRODUCTION..... 1**

**PART A – BACKGROUND INFORMATION..... 6**

1. INTRODUCTION TO THE STUDY AREA ..... 6

2. BACKGROUND INFORMATION ..... 6

3. BASELINE MONITORING..... 6

4. EXISTING CONDITIONS CHARACTERIZATION AND INITIAL CONSTRAINT MAPPING..... 6

5. PART - A REPORT..... 7

**PART B – DETAILED STUDIES ..... 7**

6. LAND USE SCENARIOS AND IMPACT ASSESSMENT.....7

7. DETAILED STUDIES.....8

    a) *Surface Water and Groundwater Resources Study*..... 8

    b) *Aquatic Resources and Water Quality Study*..... 9

    c) *Stream Morphology Study*..... 10

    d) *Terrestrial Resources Study* ..... 10

8. PART - B REPORT ..... 10

**PART C – IMPLEMENTATION..... 10**

9. CONCLUSIONS, RECOMMENDATIONS, STRATEGIES AND MANAGEMENT MEASURES..... 11

10. LONG TERM MONITORING PLAN ..... 10

11. ADAPTIVE MANAGEMENT PLAN ..... 11

12. POLICY CONFORMITY ASSESSMENT AND RECOMMENDATIONS.....12

13. GUIDELINES FOR SITE SPECIFIC ENVIRONMENTAL STUDIES.....12

14. EXECUTIVE SUMMARY ..... 12

15. FINAL REPORT AND REPORTING FORMAT ..... 13

**LIST OF FIGURES**

Figure 1: Study Area.....4

**LIST OF TABLES**

Table 1: Contents of a Comprehensive Broader Scale Environmental Study ..... 5

## **RECOMMENDED TERMS OF REFERENCE FOR A COMPREHENSIVE BROADER SCALE ENVIRONMENTAL STUDY FOR TOWN OF CALEDON AGGREGATE RESOURCE AREA 9-A**

### **Introduction**

In 1998, James Dick Construction Limited (JDCL) submitted an Official Plan Amendment (OPA) application and a Rezoning (RZ) application to the Town of Caledon to permit the establishment of a limestone quarry. This application, known as the Rockfort Quarry, is located at the northeast corner of the intersection of Olde Base Line Road and Winston Churchill Boulevard and affects an area of approximately 89 hectares.

JDCL has appealed both the OPA and RZ applications to the Ontario Municipal Board (OMB) and a number of pre-hearing conferences have been held in order to, among other things, seek OMB direction on a variety of matters leading up to the commencement of the full hearing.

In a decision dated November 25, 2003, the Board ruled that "the policies of Official Plan Amendment 161 to the Town of Caledon Official Plan are not only admissible and relevant but that they should be made to apply in this case and that the planning merits of the Rockfort application by James Dick Construction Limited should be evaluated on the basis of OPA 161 policies as adopted and approved by this Board."

The Rockfort Quarry application is identified on Schedule L to OPA 161 as CHPMARA (Caledon High Potential Mineral Aggregate Resource Area) and is located within Resource Area 9-A. Section 5.11.2.4.4 b) of OPA 161 states the following:

*5.11.2.4.4 The Town of Caledon will consider an amendment to this Plan to redesignate lands for a new extraction operation or an expansion to an existing operation as extractive industrial purposes on lands identified as CHPMARA Aggregate Reserve Lands on Schedule L subject to Section 5.11.2.1.2 and subject to the following requirements:*

- b) a Subwatershed Study has been completed and appropriate policies are incorporated into this Plan and the application conforms thereto. Alternatively, the applicant may undertake a comprehensive broader scale environmental study as described in Section 5.11.2.4.17 which is to be considered in conjunction with the EIS (Environmental Impact Study) required in support of the pit or quarry.*
-

Section 5.11.2.4.17 of OPA 161 states:

*5.11.2.4.17 Where the comprehensive broader scale environmental study is required by Section 5.11, it shall be completed on a resource area basis and include any areas functionally connected with the resource area and shall comply with the requirements of Sections 5.7.3.7.2. and 5.7.3.7.6.*

Section 5.7.3.7.6 of the Caledon Official Plan states:

*5.7.3.7.6 Proposed large scale development applications, amendments to this Plan, or settlement area expansion proposals, which include, or are adjacent to EPA, and which may have a substantive impact on broader ecosystems, may be required to complete a comprehensive, broader scale environmental study...prior to any planning and development approvals. Such broader scale investigations may be necessary to assess the carrying capacity of affected ecosystem and the potential cumulative environmental effects of the proposal, within an appropriate environmental framework. The need for and scope of such studies shall be determined jointly by the Town and other relevant agencies.*

These terms of reference have been developed by the Town of Caledon, jointly with the Region of Peel and Credit Valley Conservation, and reflect the recommended scope and content of a comprehensive broader scale environmental study (CBSES) prepared under Section 5.11.2.4.4. b). These terms of reference have been prepared on the basis that Resource Area 9-A is appropriately identified as Aggregate Reserve Lands.

### **Preparation of a Detailed Workplan**

These terms of reference provide overall guidance and a framework for carrying out a CBSES as required by OPA 161. It is intended that the applicant prepare a detailed workplan that will describe, in a more specific technical manner, how the applicant will fulfill the requirements of the terms of reference. The detailed workplan shall identify all necessary tasks, including but not limited to: a preliminary listing of all literature and background data to be relied upon; detailed methodology for carrying out environmental characterization, monitoring and technical studies, including required technical expertise; proposed approach to modeling land use scenarios and related impact assessments; identification of anticipated deliverables; methods of consulting with relevant agencies, stakeholders and the public; and, timelines related to all key steps in the process. The detailed workplan is to be approved by the Town of Caledon, Region of Peel and Credit Valley Conservation prior to the commencement of the work.

The workplan shall also respond to Section 5.11.2.4.13 of OPA 161, which requires any impact studies required by the Caledon Official Plan to include, where appropriate, an assessment of social impacts.

It is anticipated that one of the products of the CBSES will be guidelines for carrying out future site specific environmental studies, including site specific Environmental Impact

Study & Adaptive Management Plans (EIS & AMP) and site specific Water Resources Studies, to be prepared by individual applicants in support of development proposals. The site specific EIS & AMP requirements will address Section 5.7.3.7 of the Caledon Official Plan, and in particular Section 5.7.3.7.2, and will conform to, and implement the findings, strategies and recommendations contained in the approved CBSES.

### **Consultation**

The three lead review/approval agencies with respect to the CBSES are the Town of Caledon, Region of Peel and Credit Valley Conservation. It is, however, expected that the detailed study workplan prepared by the applicant will also identify appropriate methods of consulting with other relevant groups, such as other relevant review agencies, including the Niagara Escarpment Commission, parties and participants to the Rockfort Quarry hearing and the general public within the study area.

### **Study Area**

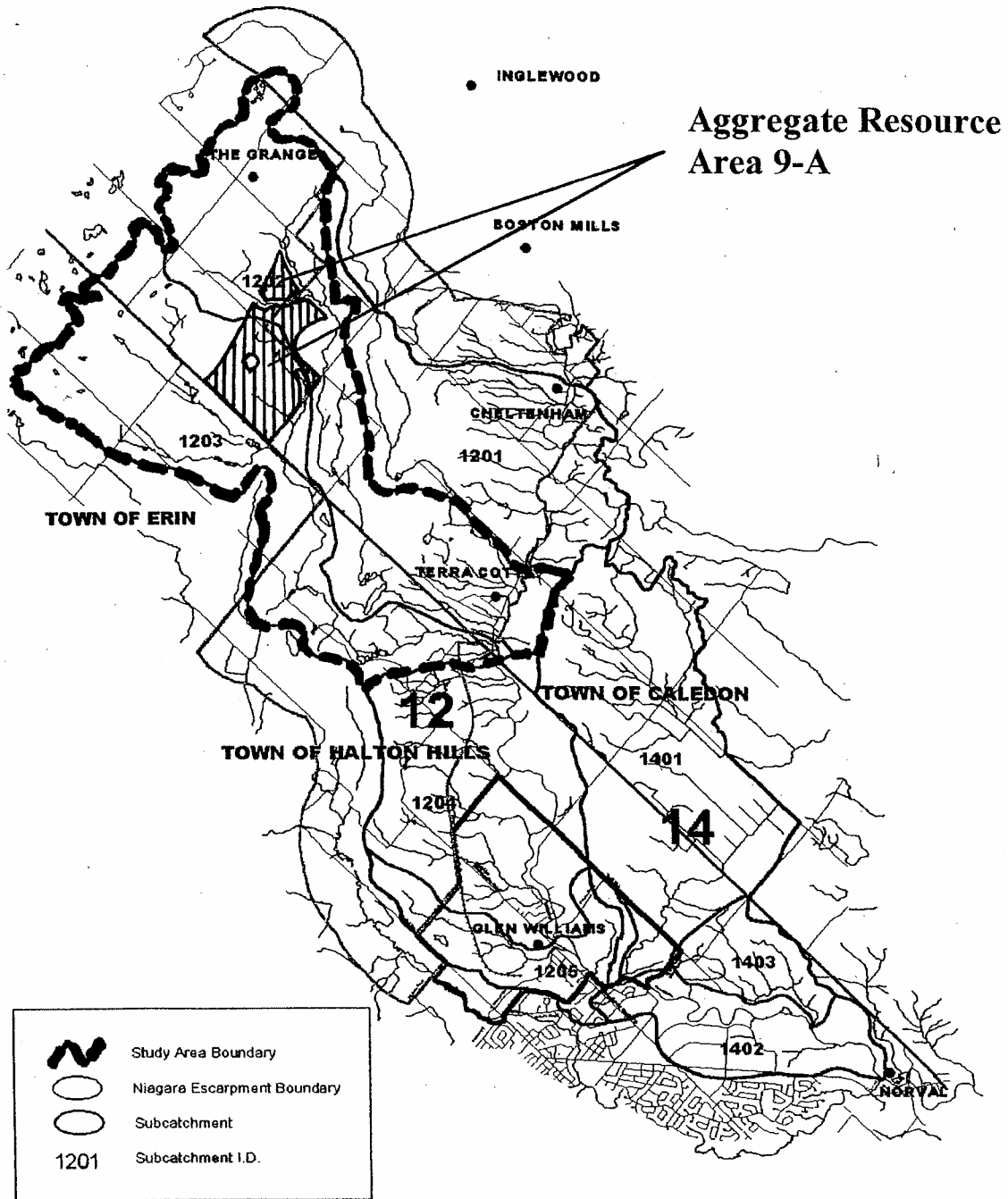
As required by Section 5.11.2.4.17 of OPA 161, the CBSES is to be completed on a resource area basis and include any areas functionally connected with the resource area. The recommended study area is identified on Figure 1 to these terms of reference. Resource Area 9-A falls within subcatchments 1202 and 1203 of Credit River Subwatershed 12 and it is recommended that these subcatchments be used to delineate the study area. It should be noted that there may be other lands outside of these subcatchments that may have functional connections to Resource Area 9-A. It is the responsibility of the applicant to identify such lands through Parts A and B of the study and include them within a refined study area. Any refinements to the study area boundary are to be approved by the Town, Region of Peel and Credit Valley Conservation.

### **Policy Conformity Assessment and Recommendations**

It is intended that the CBSES not only address the policy requirements of the Caledon Official Plan, including OPA 161, but also the applicable policies and requirements of other relevant agencies, as applicable, including the Region of Peel, Credit Valley Conservation and the Niagara Escarpment Commission. In preparing the detailed workplan and the CBSES itself, the applicant must be aware of and address all other relevant policy, guidelines, technical requirements and legislation.

In addition, because the CBSES is being carried out on a broader scale, and is intended, among other things, to assist in determining if lands within Resource Area 9-A should be redesignated to permit a new aggregate extraction operation, the CBSES should identify any recommended policy/designation revisions flowing from the results of the study.

**Figure 1 - Study Area\***



\* Note: The study area boundary may be refined through the detailed workplan to incorporate other lands determined to be functionally connected to Resource Area 9-A through Parts A and B of the study.

**Study Approach and Structure**

The recommended structure of the CBSES consists of fifteen steps structured into three parts as outlined in Table 1 (these steps are described in more detail later the terms of reference). This approach incorporates relevant aspects of the subwatershed planning model and the principles of passive adaptive management planning.

Part A characterizes the environmental resources of the study area. Background and supplemental field data is assessed within each discipline (hydrology/hydraulics, hydrogeology, water quality, stream morphology, aquatics and terrestrial and wildlife) and across disciplines. Key deliverables of Part A include refinement of the study area, identification of data gaps and resultant detailed studies required in Part B, and the establishment of initial goals and objectives.

Part B identifies and evaluates the potential impacts of land use scenarios within the study area, with a particular emphasis on potential aggregate extraction within Resource Area 9-A. Required detailed studies identified in Part A will be carried out to fill data gaps. Further refinement of the study area may result from the impact assessment and detailed studies. Goals and objectives will be finalized and key targets and strategies for meeting the finalized goals and objectives will be developed.

Based on the results of Parts A and B, Part C identifies all necessary components of an implementation strategy which will ensure that all goals, objectives, targets and other related recommendations and management measures are implemented. This will include the establishment of guidelines for the preparation of required site specific environmental studies, including but not limited to site specific Environmental Impact Study & Adaptive Management Plans (EIS & AMP's).

**Table 1: Contents of a Comprehensive Broader Scale Environmental Study**

<p><b>Part A Background Review</b></p>	<ol style="list-style-type: none"> <li>1. Introduction to the Study Area</li> <li>2. Background Information</li> <li>3. Baseline Monitoring</li> <li>4. Existing Conditions Characterization and Initial Constraint Mapping</li> <li>5. Part A Report</li> </ol>
<p><b>Part B Impact Assessment and Detailed Studies</b></p>	<ol style="list-style-type: none"> <li>6. Land Use Scenarios and Impact Assessment</li> <li>7. Detailed Studies</li> <li>8. Part B Report</li> </ol>
<p><b>Part C Implementation</b></p>	<ol style="list-style-type: none"> <li>9. Conclusions, Recommendations, Strategies and Management Measures</li> <li>10. Long Term Monitoring Plan</li> <li>11. Adaptive Management Plan</li> <li>12. Policy Conformity Assessment and Recommendations</li> <li>13. Guidelines for Site Specific Environmental Studies</li> <li>14. Executive Summary</li> <li>15. Final Report and Reporting Format</li> </ol>

---

## **PART A – BACKGROUND INFORMATION**

### **1. Introduction to the Study Area**

This purpose of this section is to provide a general introduction and overview of the study area to provide context for readers of the document. This shall include but not be limited to textual description and relevant base mapping.

### **2. Background Information**

This section shall list all literature, background reports, mapping, technical data and all other information sources to be relied upon in the study.

### **3. Baseline Monitoring**

The purpose of the baseline monitoring is to establish the baseline conditions within the study area and existing environmental trends against which future monitoring results will be compared. This will allow the projected impacts of future land use scenarios to be monitored as land uses change over time and will link to the adaptive management plan.

Information to be collected shall include but not be limited to:

- Surface water quality and quantity;
- Fisheries;
- Hydrology;
- Surface water - groundwater interconnections;
- Groundwater quality, quantity and flow patterns;
- Water budget;
- Stream morphology; and
- Terrestrial resources – woodlots, wetlands, wildlife, Environmentally Sensitive Areas, Areas of Natural or Scientific Interest.

When preparing a baseline monitoring plan, it is important to ensure that many different disciplines are being monitored at the same sampling site where possible and appropriate. For example, fisheries and water quality monitoring should take place at the same site.

The monitoring plan should include an explanation of how the indicator parameters were established, e.g. what criteria were used when deciding what to monitor. This is especially important if the Adaptive Management Plan is to be utilized appropriately.

### **4. Existing Conditions Characterization and Initial Constraint Mapping**

Field work should be carried out to better define the existing ecosystem forms, functions, and linkages within the study area shown on Figure 1. Any areas identified as having

potential functional connections to Resource Area 9-A that are outside the limits of the study area shown on Figure 1 shall be included in all subsequent steps of the study, and the study area boundary refined accordingly. Detailed constraint mapping (1:5,000 min. specified in step 15) will be prepared which highlights the environmental resources within the study area, as well as agency and municipal constraints (i.e. Fisheries Act, Official Plan designations, valley land setbacks). A key deliverable of this work will be to confirm the area that is functionally connected to Resource Area 9-A. Initial goals and objectives will be developed based on the information and data inferences.

The mapping shall include but not be limited to:

- All hydrologic features including watercourses, swales, ponds, depression areas, springs, seepage areas and existing stormwater management facilities;
- Regulatory flood plain as per the CVC Flood Plain Management Policies;
- Present day land use;
- Wetlands, woodlots and other terrestrial and riparian communities;
- Terrestrial corridors (existing and potential);
- Water quality;
- Aquatic communities and habitat, and appropriate setbacks;
- Fill lines, valley slopes, top of bank, ecological considerations and geotechnical hazard areas as per the CVC Watercourse and Valleyland Protection Policies;
- Groundwater recharge and discharge areas, and the linkages between them;
- Groundwatersheds (extending outside the study area – if applicable);
- Stream morphology, channel sensitivity and setbacks required to allow natural channel functions (migration, flooding);
- Preliminary channel classifications (i.e. identify LIKE reaches);
- Refined municipal constraint limits (e.g. Town of Caledon EPA and Supportive Natural Systems and Linkages, Region of Peel Greenlands System components).

Data deficiencies and information gaps need to be summarized and a workplan developed for filling gaps through detailed studies to be carried out in Part B. It is anticipated that this will include the development of initial surface and groundwater models that will be further refined in Part B.

## **5. Part A Report**

Once the requirements of steps 1 to 4, have been fulfilled, a Part A report will be submitted to the Town of Caledon, Region of Peel and Credit Valley Conservation for review and approval prior to proceeding to Part B of the CBSES.

## **PART B – IMPACT ASSESSMENT AND DETAILED STUDIES**

### **6. Land Use Scenarios and Impact Assessment**

In order to conduct an assessment of the potential impacts of future land use changes within the study area and develop related management and implementation strategies, it

will be necessary for the CBSES to incorporate and model appropriate future land use scenarios. The proposed approach/assumptions to generating scenarios and modeling impacts are to be outlined in the detailed workplan to be prepared by the applicant in order to ensure that there is general agreement prior to commencement of the study. Scenarios will likely include geographical and temporal assumptions with respect to future land uses.

Given that the CBSES has been triggered by a quarry application in Resource Area 9-A, the land use scenarios and related impact assessment will likely place an emphasis on the anticipated impacts of potential aggregate development within the resource area.

It is expected that an iterative relationship will exist between steps 6 and 7, and this relationship is to be addressed in the detailed workplan. .

## **7. Detailed Studies**

Detailed studies are to be prepared if it is determined through completing Part A that insufficient information exists to complete the constraint mapping, confirm the areas functionally connected to Resource Area 9-A, carry out required detailed impact assessments and/or develop protection, restoration and enhancement plans for the area. In addition, the future land use scenarios and impact assessment described in step 6 above may provide direction regarding detailed study requirements. The need for, and scope of the detailed studies are to be confirmed with the Town of Caledon, Region of Peel and CVC at the conclusion of Part A. Detailed studies may include but are not limited to:

- Surface Water and Groundwater Resources study;
- Aquatic Resources and Water Quality study;
- Stream Morphology study; and,
- Terrestrial Resources study.

The following subsections outline the potential contents of the above-referenced detailed studies, if it is determined they are required.

### **a) Surface Water and Groundwater Resources Study**

The initial constraint mapping will have identified known hydrologic features within the study area, however the overall hydrologic system must be described and features/functions confirmed. The components of the system to be addressed by the detailed studies include but are not limited to:

- Identification of flow characteristics of watercourses and swales, and a description of the water balance within the study area;
- Characterization of all hydrologic features (watercourse, swales, natural areas providing flood storage/attenuation, depression storage, recharge areas, seepage areas and springs);

- Identification of volume and distribution patterns of the major discharge areas and a representative location used for monitoring; and
- Description of the relationship and dependencies between these features and the surrounding terrestrial, wetland and aquatic resources.

Since the land use scenarios to be generated in Step 6 above will likely include scenarios involving aggregate extraction below the water table, a detailed hydrogeological impact assessment will likely be required. This would include but not be limited to:

- The general groundwater setting and linkages between the local and surrounding groundwater system;
- Sensitivity of the natural environment and the function of the groundwater related to natural features such as the fishery, terrestrial resources, geomorphology, surface water, water quality, etc.;
- Approximate high water table location;
- Regional groundwater flow and direction and the general geologic setting;
- Potential recharge and discharge areas within the study area;
- Local groundwater resource usage within the study area;
- Location and usage of water wells within 1 km of the study area;
- Detailed description of the local geologic conditions and the function of the geologic units from a hydrogeologic perspective;
- Detailed assessment of the groundwater flow system, local flow direction, linkages to surface water and the regional groundwater flow system;
- Detailed local and regional water budget related to the groundwater system. The emphasis should be on estimating recharge to the study area, groundwater flux outside of the study area to the local system, regional system and local and regional discharge. The water budget should be evaluated on a sensitivity perspective to potential change in groundwater movement on a sub-catchment and subwatershed scale;
- Delineate major and local aquifers in the area and interpret the connection to the study area; and,
- Studies on springs, surface water courses or discharge to surface water that focus on groundwater/surface water interaction, determining linkages to recharge and discharge areas through baseflow assessment, vertical gradients, and water table location. This information should be incorporated into the water balance.

#### **b) Aquatic Resources and Water Quality Study**

The initial constraint mapping will have identified fish habitat and water quality classification for the tributaries. The detailed study is to provide the following information in support of the habitat classifications and planned land use change conditions:

- Confirm the fish habitat and water quality classifications of all watercourses and fish habitat within the study area;

- The direct and indirect physical impacts on water bodies and water quality of the land use scenarios;
- The fish species present, and the direct and indirect biological impacts of the physical impacts;
- The life stages of aquatic organisms supported by the impacted habitat; and
- Whether the impacted habitat represents a limiting factor for the land use scenarios .

**c) Stream Morphology Study**

The study will describe the physical form of the watercourse. The following information will be included:

- Characterization of geomorphic features including sensitive reaches, areas of erosion and aggradation, channel migration, and
- Determine the relationship between geomorphology, hydrology of the system, aquatic resources and water quality.

**d) Terrestrial Resources Study**

The study will describe the physical form and function of the ecological features within the study area, and identify any functional relationships to broader systems (e.g. regional wildlife corridors), define what additional issues must be examined (i.e. buffers) and demonstrate how the land use scenarios will affect the ecological features and functions of the study area.

## **8. Part B Report**

Once the requirements of steps 6 and 7 have been fulfilled, a report on Part B will be submitted to the Town of Caledon, Region of Peel and Credit Valley Conservation for review and approval prior to proceeding to the following steps. Based on the results of Steps 6 and 7, the report will recommend finalized goals and objectives and key targets and strategies for meeting the finalized goals and objectives.

## **PART C – IMPLEMENTATION**

### **9. Conclusions, Recommendations, Strategies and Management Measures**

This section will synthesize the results of Parts A and B of the study and provide all related conclusions, recommendations, and management/mitigation strategies. This shall include but not be limited to:

- A comparative evaluation of alternative management options leading to the selection of the preferred option;
- Conclusions and recommendations; and

- Strategies and Management Measures – if impacts are expected or may occur, what plans are in place to maintain ecosystem features and functions.

It is expected that key components of Part C will include a long term monitoring program, an adaptive management plan, policy recommendations and guidelines for site specific environmental studies, as generally outlined in Steps 10 to 13 below.

## **10. Long Term Monitoring plan**

Monitoring is to continue after baseline conditions are established. The monitoring plan should be designed in such a way that impacts can be distinguished from natural trends at an early stage.

If impacts are detected:

- A more aggressive type of monitoring should take place that determines where, why and how fast the change is occurring;
- Establish cause-effect relationships between environmental resources and land use change;
- Be able to deal with change by proposing appropriate mitigative measures; and
- Focus on evaluating ongoing or proposed management practices.

Items that should be monitored over the long term include but are not limited to:

- Water quality
- Fisheries
- Hydrology
- Groundwater quality and quantity
- Stream morphology
- Terrestrial resources – woodlots, wetlands, wildlife, Environmentally Sensitive Areas, Areas of Natural or Scientific Interest

It is essential that long term monitoring be included in the detailed work plan to be prepared by the applicant, and that the costs and responsibilities for long term monitoring be addressed.

## **11. Adaptive Management Plan**

The Adaptive Management Plan (AMP) is a key deliverable of the CBSSES. It incorporates an action plan that integrates and reflects all conclusions, recommendations and monitoring identified in the analyses completed. It provides a process whereby changes on a site-specific scale will be analyzed, through completion of a site-specific EIS & AMP and Water Resources Study, within Resource Area 9-A.

The detailed workplan prepared in response to these terms of reference should contain a Table of Contents for the CBSES AMP. Key elements to be considered will include but not be limited to:

- Developing a Plan (e.g. Surface Water Management Plan, Groundwater Management Plan, Greenlands Plan)
- Designing key components
- Implementation
- Monitoring key targets
- Evaluating monitoring results to the Plan
- Adjusting the Plan where needed

## **12. Policy Conformity Assessment and Recommendations**

It is intended that the CBSES not only address the policy requirements of the Caledon Official Plan, including OPA 161, but also the applicable policies and requirements of other relevant agencies, as applicable, including the Region of Peel, Credit Valley Conservation and the Niagara Escarpment Commission. In preparing the detailed workplan and the CBSES itself, the applicant must be aware of and address all other relevant policy, guidelines, technical requirements and legislation. This step includes but is not limited to clearly referencing all applicable policy, legislative and technical requirements and describing how the CBSES meets or exceeds these requirements.

In addition, because the CBSES is being carried out on a broader scale, and is intended, among other things, to assist in determining if lands within Resource Area 9-A should be redesignated to permit a new aggregate extraction operation, the CBSES should identify any recommended policy and/or designation revisions flowing from the results of the study.

## **13. Guidelines for Site Specific Environmental Studies**

Once the CBSES is approved, it will still be necessary for individual applicants within the study area to prepare appropriate site specific environmental studies. Such studies will include but are not limited to a site specific Environmental Impact Study & Adaptive Management Plan and a site specific Water Resources Study. These site specific studies will assess the merits of the application and will apply findings, recommendations and strategies contained in the CBSES. In turn, the site specific studies may provide an opportunity to test, verify and, if necessary, modify the CBSES.

Establishing guidelines for the preparation of site specific environmental studies will assist future applicants in determining the scope and content of such studies.

## 14 Executive Summary

Include a summary at the front of the final report (step 15 below) that summarizes the results of Parts A, B and C, highlighting key findings, recommendations and strategies.

## 15 Final Report and Reporting Format

A complete description of all the work and conclusions involved in the CBSES (Parts A, B, and C) is to be included in the final report.

Reports should be submitted in hard copy along with an electronic copy in Word 7 or lower on a labeled 3.5 inch floppy disk, or CD, or via e-mail. Diskettes should be scanned for viruses and corruption prior to delivery. Six copies of the report, each with a full set of maps should be prepared, with two submitted to each of the Town of Caledon, the Region of Peel and Credit Valley Conservation.

### *Graphics*

Graphics will be submitted in Microsoft Powerpoint format, version 4 or lower. The graphic should be delivered on disk separately from the main document, although it should also be incorporated into the main document file.

### *Artwork*

Artwork should be provided in Corel Draw 5.0 or lower, and should also be delivered on 3.5 inch floppy disc, or CD as determined, by the Town of Caledon, separately from the main document, even though incorporated into the main document. If the artwork has been scanned, it may be delivered in GIF or TIF bitmat format.

### *Mapping*

Mapping should be in a scale of 1:5000 or less

It should be noted that ArcView 3.0 and Arc GIS 8.3 are the GIS software currently in the Town of Caledon, and as such, Arc/Info format coverages and ArcView shape files are required.

In general, digital graphic data:

- **must** be georeferenced in either UTM (preferred, using NAD 83) or latitude-longitude co-ordinates;
- **must** be clean, i.e. polygons should be closed, dangles eliminated, polygons with common borders should not overlap, etc.;
- should be packaged/organized into logical layers, for example, a soils layer, a wetlands layer, etc.;
- must be in vector as opposed to raster format, unless otherwise specified;

- should be in either uncompressed ASCII Arc/Export E00 format (preferred), ArcView Shapefile or AutoCAD exchange DXF format.

If provided in DXF format, the elements necessary to produce correct topology in Arc/Info should be included, such as feature codes and attributes. Peripheral graphics such as page borders and title boxes should be included only if they are stored in layers distinct and separate from the actual map graphic. All features should be in separate, named layers, and layers should be colour-coded; a single, unique, numeric label feature ID should be placed inside of polygons. Attributes may be provided in separate tables, although it should be ensured that a common variable exists between the attribute table and the map features, such as feature ID, to allow their association and/or joining.

#### *Tabular Attribute Data*

Attribute data should be provided in Microsoft Access 97 format files (preferred), dBase IV format files, or in formatted (i.e. with defined columns) ASCII files.

#### *Textual Data for Graphics*

Text should be provided in Word for Windows version 7.0, or in ASCII format. Please be aware that any tabular data to be referenced to actual map features should **not** be provided as tables in a Word document.

#### *Digital Photos*

Digital photos, whether they be scanned photographs or computer-generated artwork, should be provided in Corel DRAW 5.0 (i.e. for vector graphics), encapsulated postscript (EPS), or bitmap (either TIF or PCX) format for scanned graphics.