

**Gartner  
Lee**

**DEVELOPMENT OF A NATURAL  
HERITAGE SYSTEM FOR  
THE COUNTY OF SIMCOE**

**PREPARED FOR:**  
*COUNTY OF SIMCOE*

**PREPARED BY:**  
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## 1.0 INTRODUCTION

### 1.1 BACKGROUND

Effective January 1, 1994, the County of Simcoe was formally restructured. Through a combination of amalgamations, annexations, boundary revisions and name changes the original number of member municipalities comprising the County was reduced from 30 to a total of 18 (seven towns, nine townships and two separated cities - Barrie and Orillia). The names and geographical locations of the County's present municipal structure are shown on Figure 1.

As a condition of restructuring, the Ontario Ministry of Municipal Affairs and Housing (OMMAH) has required the County of Simcoe to prepare an Official Plan in accordance with Section 3 of *The Planning Act*. It is anticipated that this Official Plan, the first of its kind for Simcoe County, will be completed and presented to County Council for adoption in 1997, prior to submission to OMMAH for provincial approval.

Three background studies have been commissioned by the County in support of this Official Plan exercise: a "Population, Housing and Employment Projections Study", an "Infrastructure/ Servicing Capacity Study" and an "Environmental Study".

In October 1994, the environmental consulting firm of Gartner Lee Limited (GLL), in association with Malone Given Parsons Limited (MGP), urban planners, was retained by the County of Simcoe to undertake the "Environmental Study". This report presents the results of the study.

## 2.0 STUDY PURPOSE AND OBJECTIVES

In September 1992 the County of Simcoe initiated a strategic planning process, the purpose of which was to create a future vision for the County that incorporated the views of its citizens, other interest groups and local municipal staff. Many residents expressed concern about future growth and development and the impact that this would have on the County's natural environment and resource base. This strategic planning exercise culminated in the release of "*Future Directions for Simcoe County*" (County of Simcoe Planning Committee 1993), a document which outlines the following objectives and recommended actions related to Environmental Protection:

- a) to conserve natural features such as wetlands, forests and watersheds and to enhance water quality;
- b) to provide for the environmentally sound utilization and management of natural resources; and
- c) to support the County's objectives in environmental protection through the preparation of a County Official Plan.



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### STUDY AREA

Simcoe County

FIGURE

**1**

Project 94-281

Given the above, it is clear that the inventory and assessment of Simcoe's natural and physical environment will constitute a vital component of the County's Official Plan process. The development of a natural heritage (or greenlands) system will assist the County in developing a long-term vision for resource protection, while contributing to wise land use decisions over the 20-year horizon of the Plan.

There are four major objectives of this study:

- a) to define the elements of a natural heritage system that recognizes their significant/sensitive features, functions and linkages at a regional (i.e., County-wide) level;
- b) to delineate this system on appropriate base mapping of the County;
- c) to ensure that the elements comprising the natural heritage system and their treatment are consistent with new Provincial Policy Statements; and
- d) to provide recommendations regarding appropriate environmental policies and designations to be incorporated into the County's Official Plan that will ensure the long-term protection and management of ecologically important features and functions.

While the focus of this study is on the identification of a Natural Heritage System within the geographical limits of the County of Simcoe, it is important to acknowledge that these natural systems extend beyond political boundaries.

## **2.1 DEFINITION OF NATURAL HERITAGE**

Over the past few decades the concept of "ecosystem planning" has gained considerable popularity among ecologists and land use planners. An integral component of this philosophy is the notion of a "Natural Heritage System", also commonly referred to as a "Greenlands System". The Ontario Ministry of Natural Resources (OMNR 1992) has defined natural heritage systems in very broad terms as including "geological features and landforms; associated terrestrial and aquatic ecosystems; their plant species, populations and communities; and all native animal species, their habitats and sustaining environment". For the purposes of this study we have defined a "Natural Heritage System" to include natural areas that perform important ecological functions, contain significant attributes, and support linkages within and between other systems. While not as all-encompassing as the OMNR's definition, our definition still embodies the fundamental idea of interdependencies among system components and the integration of physical and biological processes, but is focused on identifying the most significant elements of the ecosystem from a regional perspective.

In the settled portions of southern Ontario, natural heritage systems can also:

- a) serve as examples of the remaining types of ecosystems found in the area;
- b) maintain populations of most remaining native species of flora and fauna, albeit at levels of abundance and in distributions much reduced from pre-settlement times;
- c) conserve ecosystems documented as having been particularly reduced in extent since settlement (e.g., wetlands, woodlands, prairies, etc.);
- d) set priorities for habitat restoration and replacement; and
- e) maintain most fine-scaled ecological processes such as disturbance regimes, hydrological processes, nutrient cycles and biotic interactions.

### **2.1.1 Natural Heritage Planning in Ontario**

There are several recent, and in some cases ongoing provincial planning initiatives that will have a very profound effect on the future evolution of Simcoe County. The concept of "greenlands" and "natural heritage systems" has received considerable attention in Canada and internationally since the release of seminal papers on landscape ecology by Noss (1983, 1987) and Noss and Harris (1986). Widespread acceptance of the regional approach advocated by Noss soon followed and many of his ideas are embodied in several of the key ecosystem planning documents produced in Ontario in the early 1990s. These include: the Royal Commission on the Future of the Toronto Waterfront (Crombie Commission), the Greater Toronto Area (GTA) Greenlands Strategy (Kanter Report), the Oak Ridges Moraine Planning Strategy (Ontario Ministry of Natural Resources), and the Sewell Commission on Planning Reform. A thorough review of the principles of conservation ecology as they apply to the settled landscape of southern Ontario was recently carried out by Riley and Mohr (1994). The product of their research provides an excellent "primer" on both the scientific and land use planning concepts which form the basis for our understanding of natural heritage systems. This trend towards the adoption of the principles of landscape ecology into land use planning is evident in several recent municipal planning initiatives across southern Ontario.

The Regional Municipality of York (Gartner Lee Limited 1994), the Town of Markham (Gore & Storrie Limited 1992), and the Township of Tay (Gartner Lee Limited 1995) are all examples of municipalities that have embraced this new way of thinking when preparing or updating their Official Plans. It is the intent of Simcoe County to follow a similar philosophy in the formulation of its first Official Plan.

### 2.1.2 Provincial Policy

In March 1995, a comprehensive set of provincial policy statements pertaining to the identification and protection of a wide spectrum of natural heritage resources, arising out of Bill 163, brought about a profound change to the role and responsibilities of municipalities with respect to environmental protection. Little more than a year later, in May 1996, this Comprehensive Set of Policy Statements (CSPS) underwent a further revision under Bill 20 and was replaced by a new Provincial Policy Statement (PPS)(OMMAH 1996).

While not as prescriptive as the CSPS in terms of the direction it gives to municipalities with respect to natural heritage protection, a fundamental principle of the PPS is to promote "development and land use patterns which stimulate economic growth and protect the environment" and to protect "resources for their economic use and/or environmental benefits".

The specific policies in the PPS relating to Natural Heritage protection (Policy 2.3) are consistent with the CSPS to the extent that development is still prohibited in Provincially Significant Wetlands "*south and east of the Canadian Shield*" and in the "*significant* portions of the habitat of endangered and threatened species" (2.3.1 a)). Other "*significant*" areas/features (e.g., fish and wildlife habitat, woodlands, valleylands, etc.) may be determined by a municipality based on criteria such as have been followed in this study. These include consideration of ecological functions, attributes, representation, quality, quantity, diversity and linkage, all of which are elaborated upon in the following section.

## 3.0 STUDY APPROACH

### 3.1 FUNCTIONAL ASSESSMENT APPROACH

From a technical perspective, the scientific community has recognized that the foundation of the ecosystem approach lies not only in understanding the various components of the ecosystem, but more importantly, in recognizing how these components interact with, and are influenced by one another. The Functional Assessment Approach provides a methodological framework for integrating the many components of the environment into a working model.

The key environmental features in Simcoe County that were examined within the context of the Functional Assessment Approach are listed below:

- a) Landform Structures
  - \* physiography
  - \* soils
  - \* bedrock geology



- \* steep slopes and areas susceptible to erosion
- \* floodplains and coastal zones
- \* stream corridors and ravines

b) Landform Functions

- \* aquifers
- \* ground water recharge/discharge areas
- \* erosion control
- \* flood storage and conveyance

c) Natural Features

- \* creeks, rivers and lakes
- \* forested areas
- \* wetlands
- \* significant wildlife species and their habitats
- \* wildlife corridors
- \* Areas of Natural and Scientific Interest (ANSIs)
- \* Environmentally Significant Areas (ESAs)

The elements listed above were then assessed to determine the particular function(s) they perform, the special attributes they possess, and how each is linked to the others.

"Functions" are the natural processes, products, or services that species and non-living environments provide or perform within or between ecosystems and landscapes. For example:

- a) recharge areas function to infiltrate surface water into the ground water system, that in turn recharges aquifers;
- b) vegetation bordering a stream or pond provides shade that cools water temperatures, controls erosion through bank stabilization, acts as a migration corridor for wildlife and provides a food source for aquatic life; and
- c) forested areas function to provide critical wildlife habitat, promote biotic diversity, conserve soil and help to moderate temperatures.

"Attributes" are unique or special characteristics (such as a limited distribution, small population size, or a specific habitat condition) which an area or feature may possess. Examples would include areas where rare, vulnerable, threatened or endangered species of plants or animals are known to occur during critical stages of their life cycle, areas of mature, old growth forest, and poorly represented habitat types such as fens or alvars. The absence of an "attribute" in an area does not, however, diminish the area's function within the ecosystem. Rather, attributes offer an additional degree of importance to an area.

"Linkages" describe the way in which components of the ecosystem are connected. These linkages may be aquatic, such as stream corridors that allow the movement of surface water and associated aquatic life, or terrestrial, such as a series of small woodlots separated by narrow distances that collectively acts as a corridor promoting the movement of wildlife and plant propagules (e.g., seeds, stems and root fragments), or subsurface, such as the relationship between permeable soils that promote the infiltration of ground water and the recharging of aquifers.

### **3.2 METHODOLOGY**

In general, the methodology followed by this study involved the collection and analysis of existing information regarding the physical and biological resources of the County of Simcoe and its adjoining lands and waters. There exists a considerable body of literature that not only documents the area's rich geologic history but also provides a good understanding of the important role Simcoe plays in the biogeography of south-central Ontario.

Key information pertaining to Simcoe's physical and natural environment were analyzed and mapped on a base map at a scale of 1:100,000. This map was prepared from digital data files compiled by the County of Simcoe Land Information Network Cooperative (LINC) and portrayed the following information as taken from 1982-83 Ontario Base Mapping (OBM): major roads, watercourses/waterbodies and forest cover.

Upon completion of the mapping exercise, specific areas within Simcoe County that contain significant features, functions and linkages were identified. These form the elements of a natural heritage system for the County. The environmental setting of the County and functionally important features/areas are described in Section 4.2 in the context of the 10 major physiographic terrain units that comprise the study area.

The results of the functional assessment and the identification of a Natural Heritage System for Simcoe County are documented in this report.

The specific methodological steps that were undertaken to complete this study are described in greater detail in the following sections.

#### **3.2.1 Literature Review and Data Collection**

The first task in carrying out this study was to review and evaluate existing information. The majority of the data relied upon were obtained from the following sources:

- a) the County of Simcoe LINC data base;
- b) Official Plans, planning documents, and various consultant reports, prepared on behalf of the 18 local municipalities that comprise the County;

- c) the Midhurst District office of the Ontario Ministry of Natural Resources (Forest Resource Inventory [FRI] mapping; wetland evaluations; Areas of Natural and Scientific Interest [ANSI] files; rare, threatened and endangered species mapping; fish collection records; fish and wildlife management plans; aggregate/mineral resources; administrative lands, etc.);
- d) Environmentally Significant Area (ESA) reports and mapping and various watershed plans prepared by the Lake Simcoe Region Conservation Authority (LSRCA) and Nottawasaga Valley Conservation Authority (NVCA);
- e) the Lake Simcoe Environmental Management Strategy (LSEMS), Remedial Action Plan (RAP) reports for the Collingwood Harbour and Severn Sound watersheds, and the Couchiching Conservancy Natural Heritage Action Plan;
- f) preliminary maps describing the elements of a Georgian Bay Ecosystem prepared for Parks Canada (Georgian Bay Islands National Park) and reports prepared in support of a proposed Natural Heritage System for the Lake Couchiching-southern Georgian Bay area;
- g) geology, hydrogeology and soils maps; and
- h) other miscellaneous published and unpublished information regarding the natural and physical environment of Simcoe County and its environs.

A complete list of the data sources consulted during this study are cited in Section 7.0 of this report (References).

### 3.2.2 **Mapping**

Given the very large size of Simcoe County (approximately 4300 km<sup>2</sup>), mapping at a scale of 1:25,000 or 1:50,000 would involve many individual map sheets and create logistical problems with respect to report presentation. As an alternative, maps were prepared at a scale of 1:125,000, using the County of Simcoe's Arc Info Geographic Information System (GIS) mapping as a base. This scale allows for recognition of both prominent features such as large, contiguous forest tracts, major river valleys, and extensive wetlands, as well as less prominent areas such as headwater tributaries, small isolated woodlots, and spot locations of MNR "Sites of Interest". Although a 1:125,000 scale map of Simcoe County is still quite large, it is still a more appropriate scale at which to present information for reporting purposes.

At a scale of 1:125,000 there is some loss of detail with respect to defining absolutely precise boundaries around specific Natural Heritage units, however, this scale still allows one to gain an appreciation for the distribution of environmentally important lands within the study area and their spatial interrelationships.

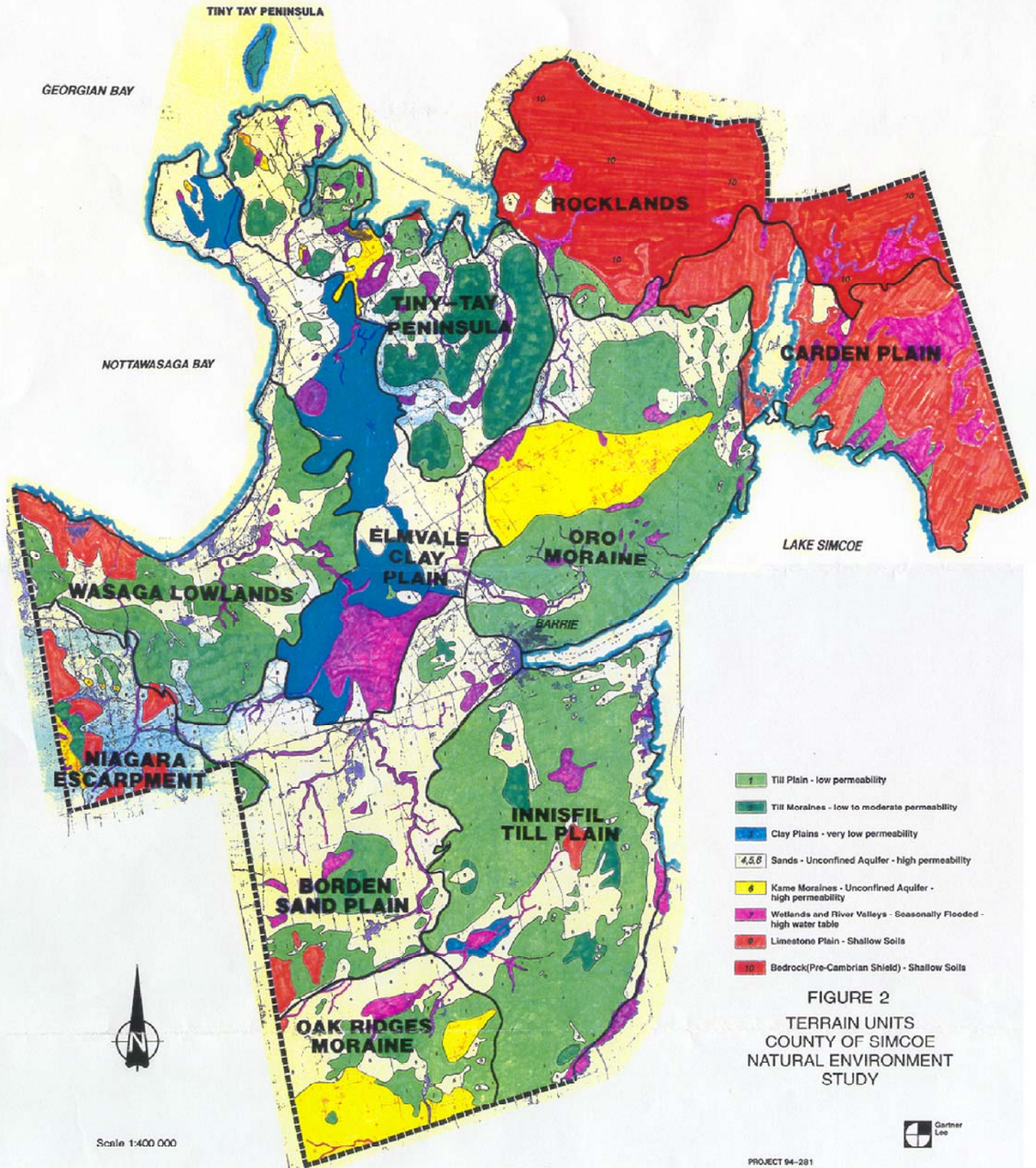
### 3.3 EARTH SCIENCE FEATURES

Since the geologic conditions of an area are the underpinnings of any natural ecosystem, a thorough understanding of terrain conditions within Simcoe County was required prior to any mapping of surficial features such as forests and wetlands. The geologic setting of the area is the single-most important factor influencing the existing character of the County, since topography and soil have had a direct effect upon patterns of human settlement, the types of vegetation present, and the extent and location of certain land uses such as agriculture, aggregate extraction, and outdoor recreational activities.

A detailed terrain evaluation of Simcoe County was carried out that focused on classifying the study area into 10 broadly defined terrain units. Each terrain unit represents a different landform or geologic condition that exists within the County. Although several different terrain types may be present within a given unit, the names given to each (e.g., Borden Sand Plain or Elmvale Clay Plain) reflect the dominant landform feature or geologic condition that exerts the greatest influence on the entire unit and differentiate each from the others.

Simcoe County is one of the most geologically diverse areas in Ontario, containing a wide array of prominent physiographic features. Two areas of high topographic relief, the Niagara Escarpment and the Oak Ridges Moraine, form much of the County's western and southern boundaries, respectively. The Oro Moraine (also known as the Bass Lake Kame Moraine [Deane 1950]) is the dominant landform west of Lake Simcoe, while on the east side of the lake there is an extensive limestone plain. Granitic bedrock at surface occupies the northeast quadrant of the County. The interior is characterized by a mix of till plains south of the City of Barrie, and sand plains, till plains and clay plains to the north of Barrie. Several of the larger river systems that drain north into Georgian Bay, notably the Nottawasaga and the Wye, occupy wide, flat valleys underlain by extensive beds of silt and organic deposits which in turn give rise to several large wetlands such as Minesing Swamp and Wye Marsh.

The geology and physiography of Simcoe County has been well documented in reports and mapped at a variety of scales by the Ontario Geological Survey (Chapman and Putnam 1984) and the Geological Survey of Canada (Deane 1950). These major sources were reviewed and resulted in the preparation of a 1:100,000 scale working map denoting the 10 terrain units (reproduced in Figure 2 at a scale of 1:400,000). These units are grouped together on the basis of similarities in soil type, landform structure and physiographic function. The Oro Moraine, for example, is identified as one of



**FIGURE 2**  
**TERRAIN UNITS**  
**COUNTY OF SIMCOE**  
**NATURAL ENVIRONMENT**  
**STUDY**





these terrain units. Within the general boundaries of this unit one finds similar geological characteristics (hummocky terrain, kettle lakes, deep deposits of sand and gravel) and significant functions (ground water recharge to the regional aquifer and the headwater source for watercourses draining to Lake Simcoe, Severn Sound and Nottawasaga Bay).

A total of 10 distinct and functionally important terrain units were identified within the study area (Figure 2).

### 3.4 LIFE SCIENCE FEATURES

Not only is Simcoe County characterized by a complex mix of physiographic features and functions, it ranks among the most ecologically significant and diverse regions in all of Ontario. For example:

- a) Due to its diversity of habitat types, Simcoe County is home to over 1,500 species of vascular plants, over 150 species of nesting birds (Devitt 1967; Cadman *et al.* 1987), 50 mammals (Dobbyn 1994), and 33 reptiles and amphibians (Weller and Oldham 1988);
- b) It supports specialized vegetation communities adapted to unique habitats such as coastal plains (e.g., Matchedash Lake [Sharp and Keddy 1993]), prairies and savannas (e.g., DeGrassi Point), alvars (e.g., Carden Plain), bogs and fens, the Great Lakes (Georgian Bay) shoreline (Guire and Voss (1963), and Niagara Escarpment cliff faces and talus slopes;
- c) Simcoe County contains a total of 66 provincially significant wetlands, 21 provincially significant ANSIs and at least 64 species of plants and animals considered to be Vulnerable, Threatened or Endangered (VTEs) in Ontario and/or Canada (Riley *et al.* 1992) have been recorded within its borders;
- d) The extensive tracts of undisturbed forest that occur in the northeast corner of Simcoe are important habitats for a number of forest interior bird species as well as for mammals such as Black Bear, Marten and Fisher which have large home ranges; and
- e) Because the county is situated at the contact zone between the Precambrian Shield and till plain/morainal deposits to the south it has elements of both Boreal Forest and Great Lakes-St. Lawrence Forest represented together. This results in an unusual mix of northern species of plants and animals at the southern edge of their ranges coexisting with southern species at or near their northern limits.

The following section provides a brief discussion of the importance of the natural resources of Simcoe's ecosystem and how they make an important contribution to the definition of a natural heritage system.

### Forest Analysis

Present forest cover within Simcoe County was determined from the LINC data base, which was originally derived from OBM mapping produced in 1982-83. This data base "captures" all forested areas greater than about 5 ha in size and thus provides a very detailed assessment of the pattern and distribution of forest cover in Simcoe County.

### Forest Cover

The role of forest cover as wildlife habitat has been the subject of considerable scientific research in recent years throughout North America. Much of the recent literature (e.g., Ambuel and Temple 1983; Blake and Karr 1987) point to the importance of large, contiguous blocks of woodland in the maintenance of healthy populations of "forest interior" bird species, high numbers of which occur in Simcoe County. These species have become the focus of greater interest than the more ubiquitous "edge" species, since in southern Ontario they are generally far less common. Their numbers have been reduced in Ontario and elsewhere because they tend to be more sensitive to disturbance (e.g., predation, parasitism), their habitat is being altered or fragmented by various intrusions and their tropical wintering grounds are being deforested at an alarming rate. This disturbing trend is echoed by Riley and Mohr (1994), who note that "across southern Ontario, woodland losses have exceeded those of almost any other major ecosystem." (p.27).

The degree of importance of woodland for forest interior species depends upon a variety of considerations, including species composition, stand age and quality, patch size, shape, topography, width of interior-edge, and proximity to other woodland areas. The optimal size of a forest patch required to support some of the more sensitive forest interior bird species is the subject of considerable debate within the scientific community; estimates of what constitutes a minimum block of "forest interior" ranges from as little as 4 ha to upwards of 100 ha. In southern Ontario, there is evidence to suggest that rectilinear woodlots at least 40 ha in size and no less than 200 m wide in any direction, and that do not exhibit much evidence of past human disturbance make a significant contribution to the maintenance of biotic and landscape diversity (Riley and Mohr 1994). This number is consistent with the definition of significant woodland provided in the CSPS (OMMA 1995), since superseded by the current PPS (OMMAH 1996). The CSPS suggested that in a municipality such as Simcoe County, which has over 15% forest cover, the minimum forest size to be considered as significant is 40 ha. Although this minimum size criterion is no longer explicit in the PPS, there is a considerable body of evidence in support of this number (Riley and Mohr 1994) and accordingly, all woodland areas 40 ha or greater were identified and mapped as part of this study.

However, not all forest blocks 40 ha or more in size were necessarily considered significant at a regional level or automatically included as an element of Simcoe's Natural Heritage System. In the

southern and northwestern portions of the County (i.e., west of Highway 27 and south of a line roughly defined by Highway 90 and Kempenfelt Bay), the predominant land use is agricultural and as a result much of the native forest has been cleared and converted to fields. Therefore, existing forest cover in the southern and western tier municipalities of Simcoe is in the order of 10-15%, with these forests exhibiting a pattern of smaller-sized blocks more widely distributed throughout the area. Accordingly, some forest blocks less than 40 ha in size were included as elements of the County's Natural Heritage System, particularly if these areas lie in relatively close proximity to larger woodland areas or have been designated as ESAs, ANSIs, critical wildlife habitat and/or locally significant wetlands.

By contrast, the most northerly and easterly municipalities in Simcoe, particularly Severn and portions of Ramara and Tiny townships are still occupied by vast tracts of dense forest. These areas are extremely important as large core woodlands, and probably represent ideal candidates for inclusion in a Natural Heritage System since they represent the last vestiges of what the southern Ontario landscape looked like in pre-settlement times. Unlike much of southern Ontario, where the original woodlands have become highly fragmented, north and northeast Simcoe has escaped widespread forest clearing. This landscape pattern is due to the general unsuitability of the soil for agricultural purposes, the absence of municipal infrastructure (roads, sewers, water supply systems, etc.) in some areas and the fact that development is generally confined to small, widely separated rural communities. Although a considerable amount of the unbroken forest blocks in northern and northeastern Simcoe were included as part of the Natural Heritage System, they were not necessarily included solely on the basis of being greater than 40 ha in size. Other important ecological considerations, such as those mentioned below, contributed to the ultimate decision as to whether an area was included as part of the overall Natural Heritage System or not.

#### Other Variables

Forest patch size was not the only indicator used to determine significant woodland areas. Other important variables, as determined from FRI mapping, included the shape of the forest and its proximity to other woodland areas, the age and health of its trees, and species composition/representativeness.

Furthermore, in order to maintain genetic diversity within wildlife populations, and to a lesser extent plant populations, it is important that those populations remain functionally connected. By providing refuges from predation, foraging habitat and diversity in the landscape, they help to maintain wildlife population sizes. These forested corridors also help to control soil erosion, contribute to the aesthetics, and provide recreational opportunities (Riley and Mohr 1994).

Regardless of size, special significance was given to forest patches of great age. Therefore, forest patches in excess of 100 years old were mapped and considered significant.

It is generally accepted that, as wildlife habitat, conifer plantations are less important than comparably sized areas of indigenous forest cover. Because many plantations are comprised of a



monoculture (single-species), even-aged stand, they typically support a much less diverse wildlife community. Much of the present forest cover existing in a band stretching from Minesing Swamp northeast to Orillia is conifer plantation, planted over the past half-century to stabilize the highly erodible sandy soils that predominate this area. Many of these plantations are owned and managed by Simcoe as County forests. Nevertheless, since plantations succeed to more diverse vegetation communities over time and provide excellent opportunities for restoration through management, they were incorporated into Simcoe's Natural Heritage System in a number of cases, especially where they provided "in-fill" to large patches of native forest, provided primary corridors linking core areas, provided erosion protection on steep slopes, or occurred in areas of high recharge where the presence of tree cover promotes infiltration.

It is also important to recognize that many smaller wooded areas exist in the landscape. While these forests can also perform an ecological function or may contain attributes, at a county-wide (or regional) level they do not make as significant a contribution to the overall natural heritage system as the larger, more contiguous and connected woodlands. In many cases, it was determined that these smaller woodland units do not fulfill the criteria for significance described above and thus are not included as elements of the Natural Heritage System.

### Wetlands

Wetlands are extremely important elements of the natural environment. They contribute to the overall physical and biological diversity and productivity of the landscape; they perform very important hydrological functions such as flow attenuation, erosion control and ground water discharge; they provide critical habitat for wildlife with very specialized life history requirements (e.g., amphibians); and they support a wide array of significant attributes such as rare species of plants and animals and unique vegetation associations. Wetlands are also recognized as fulfilling a vital social function, whether as a passive recreational area, the subject of scientific research, or in terms of its exploitable natural resources (e.g., timber, fish, furbearers, etc.).

The relationships between wetlands and adjacent upland habitats are not yet well understood. It is recognized that there are wildlife species that depend upon upland situations for portions of their life cycles and wetlands for others (e.g., deer, some waterfowl and amphibians). This relationship (or linkage) between upland wetland habitat was carried forward in the identification of system boundaries, which often encompassed adjacent wooded areas that extend beyond the wetland limits identified by the OMNR in its mapping of Simcoe County's wetlands.

All provincially significant wetlands (PSWs) in Simcoe County that have been evaluated and classified by OMNR, plus most of the locally significant wetlands, have been included as components of the Natural Heritage System. Under Bill 20, PSWs south of the Canadian Shield (which in Simcoe roughly follows a line extending southeast from Severn Sound across the top end of Lake Couchiching to upper Lake Dalrymple in Victoria County) will be recognized in the County's Official Plan and "will be protected from incompatible development".

### Areas of Natural and Scientific Interest (ANSIs)

ANSIs are defined by the OMNR (1987) as "areas of land and water containing natural landscapes or features which have been identified as having values related to protection, natural heritage appreciation, scientific study or education". Areas identified under the OMNR's ANSI program are considered to be the best examples of natural features not already represented within the existing Provincial Park system (although some ANSIs in Simcoe, e.g, Awenda, do possess park status) and contribute to the Ministry's protection objective. There are two types of ANSIs: Life Science and Earth Science.

Life Science ANSIs are selected to protect outstanding landscapes, environments and biotic communities. Earth Science ANSIs are selected to protect outstanding examples of rock types, fossil localities, landform associations and ground water resources.

All provincially significant and most regionally significant ANSIs that occur in Simcoe County have been included in the Natural Heritage System.

### Rare Species

The OMNR began a Rare Species Mapping Project in its former Central (now Southern) Region, which includes Simcoe County, in 1989 (Riley *et al.* 1992). This project has compiled information on both the recent and historical occurrence of 185 rare, vulnerable, threatened and endangered species (VTEs) of plants, animals and fish in Southern Region (which includes all of Simcoe County) and known locations of these species have been plotted on a series of 1:50,000 topographic maps. Because of extreme sensitivity on the part of OMNR in protecting these species, information regarding the identity of the species and their locations is considered confidential and is not released to the public. For this study, OMNR staff at Midhurst District provided Gartner Lee Limited with access to the maps with the understanding that specific locality data would not be disclosed.

Generally speaking, however, many of the locations of significant species in Simcoe County that are known to the OMNR and mapped are associated with provincially and locally significant (i.e., classified) wetlands, ANSIs, ESAs, large forest tracts and major creek, river or lake systems. While not all known spot locations of VTEs are necessarily "captured" within the County's Natural Heritage System, the majority have been included within the context of a larger area with many attributes and which performs multiple functions. Although there are undoubtedly more VTEs occurring in Simcoe County than are portrayed by OMNR's current mapping, it is expected that most of the habitat areas used by these plants and animals already form part of the Natural Heritage System by virtue of already having been identified as significant woodlands, wetlands, valleys, shorelines, etc.

### Special Wildlife Habitats

Special wildlife habitats include areas such as deer wintering yards, waterfowl production and staging areas, and fish spawning and nursery areas. The OMNR has mapped the distribution of important deer wintering and feeding areas in Simcoe County and these data were considered when identifying significant areas.

Significant wildlife habitats in Simcoe are usually associated with areas that have already been included as important elements of the County's Natural Heritage System on the basis of other functions and attributes (e.g., wetlands, ANSIs or large woodland blocks).

### Linkage and Rehabilitation Areas

Linkages between natural areas can provide opportunities for the secure movement of wildlife and opportunities for the dispersal of some plant propagules (e.g., seeds, stem and root fragments). Areas within the County that provide important physical/ecological connections to other areas (e.g., major river valleys, woodland tracts, shorelines, ridges/escarpments and other topographic highs, etc.), both within and external to the study area, have been included as integral components of the system. This is consistent with Natural Heritage Policy 2.3.2 of the PPS (OMMAH 1996), which promotes the maintenance of natural connections between natural features.

In several of these important linkage areas, however, the "strength" of the physical connection or the long-term viability of a wildlife migration corridor has been compromised as a result of some past land use activity (e.g., forest clearing or major highway construction). As a result, there are a number of areas that, on a regional scale, present obvious opportunities for enhancing or rehabilitating these "weak links", actions that are promoted by Natural Heritage Policy (2.3.2) of the PPS (OMMAH 1996). These are discussed further within the descriptions of the linkages associated with each of the individual natural heritage units described in Section 4.2.

## **4.0 STUDY FINDINGS**

### **4.1 NATURAL HERITAGE UNITS**

Simcoe County has been grouped into 10 major terrain units based on soils, physiography and drainage patterns (Figure 2). Each major terrain unit is briefly described, followed by an overview of the individual natural heritage areas identified within each. The 53 individual units that comprise the proposed Natural Heritage System for Simcoe County are depicted in Figure 3 (back pocket).

A table accompanies each terrain unit section below which summarizes the functions, attributes, linkages and status designations associated with each greenland unit.

Terrain functions relate to topography, water flow and supply. Recharge refers to the infiltration of precipitation through soil to enhance the supply of ground water in the underlying aquifers. Discharge involves the emergence of ground water at surface through springs and seepage areas that feed wetlands, creeks and rivers. Units with large wetlands provide a flood storage function by retaining some of the surface water during storm events, thereby reducing the intensity of floods. Conveyance function is performed by river and creek channels which facilitate the flow of surface water.

Vegetation functions include the reduction of erosion on steeply sloping terrain, maintaining cool water temperature in creeks in summer through shading and enhancing water quality in agricultural areas by immobilizing nutrients and sediments. Flora and fauna are obviously highly dependent on the availability of suitable aquatic or terrestrial habitat to sustain their critical life processes.

Attributes are special features that may be present due to abiotic functions, unique terrain conditions or a lack of human disturbance. Fish habitat consisting of well oxygenated lakes and creeks with low summer water temperatures and ample riparian cover supports self-sustaining populations of cold water fish communities (e.g., trout, salmon and associated species). Warm water fish communities such as those dominated by northern pike, smallmouth bass and yellow perch, have adapted to warmer water temperatures and can tolerate moderate fluctuations in water quality conditions. Deer concentration areas are locations where large groups of White-tailed Deer congregate together in winter or find adequate food and shelter at other times of the year. These areas have been identified and mapped by the OMNR. Similarly, waterfowl concentrations areas consist of shallow bays and marshes regularly used by large numbers of staging ducks and geese during migration. The presence of provincially rare plant and animal species is derived from rare species mapping, mammal, bird and herpetofaunal atlases, wetland evaluations, and biophysical inventories carried out by consultants, government agencies and amateur naturalists. Many sites which may contain significant species, however, have not been examined in detail. Uncommon vegetation communities are native plant associations which are of infrequent occurrence in Simcoe County and may include bogs, fens, sand dunes, alvars, rock barrens, and old growth forests.

Linkage relates to the presence of natural corridors which connect greenland units to one another. The value of such corridors are to allow movement of wildlife and plant propagules between units. This allows genetic mixing between populations and provides opportunities for recolonization if local extinctions occur. Large core areas are contiguous areas of habitat of at least 1000 ha that are large enough to support species with large home ranges and those requiring substantial blocks of forest interior habitat for breeding.

The number of linkages noted in the summary tables refers to the number of connections between a given unit and adjacent corridors and units. The greater the number of links, the greater the opportunity for animals (and even some plants) to move freely between areas. Linkages can be either aquatic (e.g., connections across lakes or linearly along river and creek systems) or terrestrial. Riparian/lowland links are often manifested as narrow, sparsely vegetated corridors through floodplains or wetlands, while upland links may consist of broad belts of unbroken forest. In some cases, the greenland units may provide the only habitat corridors that exist in largely agricultural landscapes. These are referred to as "narrow links" on the tables and denoted with the symbol "N". Units located near the boundaries of Simcoe County are often connected with natural core areas situated in adjacent municipalities. Finally, examples of areas in which it would be desirable to restore lost or severed corridors (through natural succession and/or supplementary plantings) have been identified. Priority linkage areas within the County's overall system are identified in Figure 1.

#### **4.1.1 Oak Ridges Moraine (Table 1)**

The Oak Ridges Moraine, located in the southwest corner of the County, is a highly permeable kame moraine composed of sands and gravels. It is very important as a ground water recharge zone and forms a drainage divide between the Lake Ontario and Lake Simcoe watersheds along much of its length. Within Simcoe County, the moraine forms the headwaters for the Nottawasaga River, while a small area at the extreme southwest corner drains south into the Humber River system.

##### ORM 1 - Upper Bailey Creek

This unit, located west of Tottenham, consists of undulating terrain which forms the source for numerous headwater streams for Bailey Creek. It lies within the Oak Ridges kame moraine and therefore numerous springs are present throughout. The natural forest cover in this unit provides ample shading to maintain coldwater conditions.

##### ORM 2 - Beeton Creek Forest

Another forested site located on undulating terrain, this unit is situated on an isolated disjunct block of the kame moraine. Ground water discharge feeds the headwater streams of Beeton Creek. Although the tributaries are well shaded, the downstream portion of Beeton Creek has been straightened and flows through an intensively cultivated landscape. The forest is isolated from other natural areas.

##### ORM 3 - Bailey Creek Swamp

Located several kilometres downstream from ORM 1 on a flat lowland area just north of the kame moraine, this unit includes the locally significant Bailey Creek wetland and is also considered an OMNR Site of Interest (Lindsay 1984). It is important for its surface water storage and discharge functions.

##### ORM 4 - Upper Nottawasaga River

This unit contains the upper portion of the Nottawasaga River within Simcoe County but its actual headwaters lie further to the southwest. A well defined, U-shaped valley with rather steep valley walls and a level bottomland is present. Immediately north lies Sheldon Creek, which is also confined to a prominent valley. Sheldon Creek empties into the Nottawasaga River south of Alliston. An upland forested corridor joins the two valleys. The Pinery, a remnant White Pine forest situated south of Alliston on the Nottawasaga River, is considered a provincially significant Life Science ANSI (Hanna 1984a).

##### ORM 5 - Humber River Headwaters

The headwaters of the Humber River are located within this unit, making it the only part of Simcoe County that lies within the Lake Ontario drainage basin. Some rather steep undulating terrain is

present but much of this unit is level. The sandy soils provide both a recharge and discharge function. This unit has good corridor linkage to the south through the forested Humber Valley in the adjacent Regional Municipality of Peel.

<b>Table 1: Oak Ridges Moraine</b>		<b>ORM1</b>	<b>ORM2</b>	<b>ORM3</b>	<b>ORM4</b>	<b>ORM5</b>
<b>Terrain Functions</b>	Recharge	X	X		X	X
	Discharge	X	X	X	X	X
	Flood Storage			X		
	Conveyance	X		X	X	X
<b>Vegetation Functions</b>	Erosion Protection	X	X		X	X
	Temperature Control	X	X	X	X	X
	Water Quality Enhanc.			X		
	Aquatic Habitat	X	X	X	X	X
	Terrestrial Habitat	X	X	X	X	X
<b>Attributes</b>	Coldwater Habitat	X	?		X	X
	Warmwater Habitat					
	Fish Spawning				X	
	Deer Concentrations	?	?	X	X	X
	Waterfowl Concent.					
	Prov. Rare Animals					
	Prov. Rare Plants Uncommon Vegetation					
<b>Linkage</b>	Large Core Area					
	Number of Links	N	0	N	3	2
	Aquatic	X	X	X	X	X
	Riparian/Lowland				X	
	Upland					
	Narrow Link in Agric. Linkage Beyond Simcoe Restoration Opportunity	X		X	X	X X
<b>Status Designations</b>	Provincial ANSI				1	
	Regional ANSI					
	Site of Interest			1		
	ESA					
	Prov. Sig. Wetland			1		
	Local Sig. Wetland Prov. Park / Cons. Area				2	

ORM1 Upper Bailey Creek  
 ORM2 Beeton Creek Forest  
 ORM3 Bailey Creek Swamp  
 ORM4 Upper Nottawasaga River  
 ORM5 Humber River Headwaters

X = function, attribute or linkage occurs  
 N = links exist but are narrow

#### **4.1.2 Innisfil Till Plain (Table 2)**

Most of the Innisfil Till Plain is an area of low permeability but there are sand deposits along the Lake Simcoe shoreline and the Innisfil Creek valley. Most of the area is part of the Peterborough Drumlin Field (Chapman and Putnam 1984), consequently drumlins are a prominent feature. About half of the area drains into the Nottawasaga watershed via Innisfil Creek and the rest drains into Lake Simcoe. Lover's Creek is the largest of these. The other creeks are relatively short. The till plain is heavily cultivated and much of the remaining forest cover consists of small remnant woodlots.

##### *ITP 1 - Pottageville Swamp / Fraser Creek*

This narrow linear unit fringes an intensively cultivated portion of the Holland Marsh and is separated by a dike. The southern part is bottomland, consisting of marsh and wet forest that forms part of the provincially significant Pottageville Swamp wetland and ANSI (Hanna 1984b). The bulk of the Pottageville Swamp is situated in the adjacent Regional Municipality of York to the south. The northern part of this unit, known as the Dunkerron Forest, is an example of an upland forest on the ancient shoreline of glacial Lake Algonquin that now forms the slope of the Holland River valley. Both Pottageville Swamp and Dunkerron Forest have been identified as ESAs by the LSRCA (Ecologistics Limited 1982).

##### *ITP 2 - Holland Marsh*

Most of Holland Marsh is currently in cultivation but a sizeable remnant area remains near the mouth of the Holland River. It consists of several types of open marsh and swamp associations on deep organic soils. This unit also encompasses adjacent upland forest on valley slopes, including the Scanlon Creek Conservation Area. The Holland Marsh is the largest remaining marsh in Simcoe County which is recognized as a provincially significant wetland, a provincial ANSI (Hanna 1984b) and an ESA (Ecologistics Limited 1982).

##### *ITP 3 - Innisfil Creek / Cookstown Hollows*

This unit includes a linear corridor of natural vegetation associated with the Innisfil Creek valley. It is largely surrounded by agricultural land. Cookstown Hollows (bisected by Highway 400 east of Cookstown) consists of a core area of swamp forest and adjacent rolling upland. This provincially significant wetland is considered to be one of the most important deer habitats in the entire County. This unit forms a link between Lover's Creek and the Nottawasaga River valley.

##### *ITP 4 - Little Cedar Point / DeGrassi Point*

A linear strip of swamp forest (a locally significant wetland) occurs just inland from the shoreline cottage development along Lake Simcoe between Little Cedar and DeGrassi Points. This unit also

contains an ESA (Ecologistics Limited 1982) and an OMNR Site of Interest (Hanna 1984b), both of which contain remnant pockets of pine-oak savanna and rare prairie flora. This unit is neither overly large nor well connected to other greenspace units, but does provide a block of natural habitat in an area where there is otherwise very little.

<b>Table 2: Innisfil Till Plain</b>		<b>ITP1</b>	<b>ITP2</b>	<b>ITP3</b>	<b>ITP4</b>	<b>ITP5</b>	<b>ITP6</b>
<b>Terrain Functions</b>	Recharge			X			
	Discharge	X	X	X		X	X
	Flood Storage	X	X	X		X	
	Conveyance	X		X	X	X	
<b>Vegetation Functions</b>	Erosion Protection	X		X		X	
	Temperature Control	X		X		X	
	Water Quality Enhan.		X	X	X	X	X
	Aquatic Habitat		X	X		X	X
	Terrestrial Habitat	X	X	X	X	X	X
<b>Attributes</b>	Coldwater Habitat			?	X	X	
	Warmwater Habitat		X	X			
	Fish Spawning		X	?		X	
	Deer Concentrations	X	X	X?		X	
	Waterfowl Concent.		X				
	Prov. Rare Animals		X				
	Prov. Rare Plants				X		
	Uncommon Vegetation		X		X	X	
<b>Linkage</b>	Large Core Area		X	X			
	Number of Links	1		2		1	
	Aquatic	X	X	X	X	X	X
	Riparian/Lowland		X		X		
	Upland						X
	Narrow Link in Agric.			X		X	
	Linkage Beyond Simcoe Restoration Opportunity	X	X	X		X	
<b>Status Designations</b>	Provincial ANSI		1				
	Regional ANSI						
	Site of Interest					1	
	ESA	2	1		1	3	
	Prov. Sig. Wetland	1	1	1		1	
	Local Sig. Wetland				3	2	
Prov. Park / Cons. Area		X					

ITP1 Pottageville Swamp / Fraser Creek  
 ITP2 Holland Marsh  
 ITP3 Innisfil Creek / Cookstown Hollow  
 ITP4 Little Cedar Point / DeGrassi Pt.  
 ITP5 Lover's Creek Valley  
 ITP6 Big Bay Point

X = function, attribute or linkage occurs  
 N = links exist but are narrow



### ITP 5 - Lover's Creek Valley

Lover's Creek valley forms a north-south corridor extending from Innisfil Creek north to Kempenfelt Bay. Lover's Creek (Stroud) Swamp is a provincially significant wetland and ESA (Ecologistics Limited 1982) and forms a core area in the south. Further north, however, the valley forms a rather narrow linear corridor surrounded by agricultural land. Lover's Creek supports a cold water fishery. The unit includes a portion of the Kempenfelt Bay Estates ESA (Ecologistics Limited 1982) along the south side of Kempenfelt Bay. This ESA which contains both mixed and deciduous old growth forest. The Tenth Concession Tributary is another ESA (Ecologistics Limited 1982), which forms a westward extension of greenspace that almost establishes a connection with the Allandale Bluffs (BSP 4).

### ITP 6 - Big Bay Point

A fairly large block of lowland deciduous forest, Big Bay Point is generally isolated from other greenspace units. However, a narrow linkage exists between this unit and the mouth of Lover's Creek (ITP 5) along the south shore of Kempenfelt Bay. This upland forest linkage is interrupted by several shoreline developments. The Big Bay Point area has a high water table, which supplies ground water discharge to several small streams which flow into Lake Simcoe.

#### **4.1.3 Borden Sand Plain (Table 3)**

As its name implies, this terrain unit consists primarily of sand deposits which were laid down on the floor of glacial Lake Algonquin. The entire terrain unit forms part of the Nottawasaga River watershed. Several major watercourses that discharge to the main branch of the Nottawasaga River converge here, including the Boyne, Mad and Pine Rivers and Bear Creek. Each of these watercourses is considered coldwater habitat with self-sustaining fish populations. The Borden Sand Plain provides important recharge and discharge functions. Much of the sand plain is forested (or reforested with conifer plantations) because of the presence of droughty soils that are generally unsuited to agriculture (Chapman and Putnam 1984). More extensive cropland occurs in the southern portion of the unit, reflecting the presence of till soils.

### BSP 1 - Middle Nottawasaga Valley

The Nottawasaga River crosses the sand plain from south to north and forms a prominent corridor of greenspace. Forest cover is largely confined to the immediate valley in the south but this widens near the mouth of Thornton Creek, which acts as a core area.

Two provincially significant life science ANSIs occur in this unit. The provincially significant Nottawasaga River ANSI (Hanna 1984a), encompassing most of this section of the valley, has been recognized for its high quality riparian habitat. Three locally significant wetlands also occur within this unit.

*BSP 2 - Boyne River Valley*

The headwaters of the Boyne River lie within an undulating landscape where ground water discharges into tributary streams that combine to form this major tributary of the Nottawasaga River. The Boyne flows through a well defined valley in an agricultural landscape to its confluence with the Nottawasaga River.

<b>Table 3: Borden Sand Plain</b>		<b>BSP1</b>	<b>BSP2</b>	<b>BSP3</b>	<b>BSP4</b>	<b>BSP5</b>
<b>Terrain Functions</b>	Recharge		X	X	X	X
	Discharge	X	X	X	X	X
	Flood Storage	X		X	X	X
	Conveyance	X	X	X	X	X
<b>Vegetation Functions</b>	Erosion Protection	X	X	X	X	
	Temperature Control	X	X	X	X	X
	Water Quality Enhan.	X	X	X	X	X
	Aquatic Habitat	X	X	X	X	X
	Terrestrial Habitat	X	X	X	X	X
<b>Attributes</b>	Coldwater Habitat	X	X	X	X	X
	Warmwater Habitat					
	Fish Spawning	X	X	X	X	X
	Deer Concentrations	X	X	X	X	
	Waterfowl Concent.			X	X	
	Prov. Rare Animals					
	Prov. Rare Plants				X	
	Uncommon Vegetation				X	
<b>Linkage</b>	Large Core Area			X	X	X
	Number of Links		1	3	2	
	Aquatic	X	X	X	X	X
	Riparian/Lowland	X	X	X	X	X
	Upland	X			X	
	Narrow Link in Agric.	X	X			
	Linkage Beyond Simcoe Restoration Opportunity		X	X	X	X
<b>Status Designations</b>	Provincial ANSI	1			1	
	Regional ANSI			2		2
	Site of Interest				1	
	ESA					
	Prov. Sig. Wetland				1	1
	Local Sig. Wetland	3		1		3
	Prov. Park / Cons. Area	X	X	X	X	X

- BSP1 Middle Nottawasaga River
- BSP2 Boyne River
- BSP3 Pine River Valley
- BSP4 Allandale Bluffs / Bear Creek
- BSP5 Mad River Valley

X = function, attribute or linkage occurs  
 N = links exist but are narrow

### BSP 3 - Pine River Valley

This is a relatively undisturbed valley, with few road crossings. The headwaters occur on forested hilly terrain, while the lower stretch through Camp Borden consists of riparian forest. In the south part of Camp Borden, a large wooded wetland (locally significant) is an important water storage area. The valley itself is a regionally significant ANSI, identified for its high quality, undisturbed habitat.

### BSP 4 - Allandale Bluffs / Bear Creek

Located just west of Barrie, this unit includes the steep slopes of the glacial Lake Algonquin shoreline and the bottomlands associated with Bear Creek. It is a diverse mix of upland and lowland habitats. Allandale Bluffs is a provincially significant ANSI (Hanna 1984b), noted for its representative mature forest and the presence of a number of rare plants present (Varga 1988a), while the bluffs on the north side are identified as an ESA (Ecologistics Limited 1982). Much of the unit is comprised of a large swamp forest of the provincially significant Bear Creek Wetland, which provides storage, flood attenuation, and discharge functions for the Nottawasaga River downstream.

### BSP 5 - Mad River Valley

This unit includes the Mad River from Creemore to its confluence with the Nottawasaga River. Between Creemore and Glencairn the valley forms a narrow fringe of greenspace among an area of intensive agriculture. Downstream it comprises part of a large core area that includes the provincially significant Lisle Swamp and the locally significant Coates Creek wetland. The lower section of the Mad River through Camp Borden is a regionally significant ANSI (Hanna 1984a) identified for its large (600 ha) undisturbed riparian forest.

#### **4.1.4 Niagara Escarpment (Table 4)**

The Niagara Escarpment enters the extreme western portion of Simcoe County. Here the escarpment is characterized by a high steep sloping ridge but does not manifest itself as a sheer cliff face unlike its appearance in other parts of the province. Nonetheless, the Niagara Escarpment has the highest elevations and most rugged terrain in the County. The soils are quite variable, ranging from sands and shallow loam over limestone to till. Most of the unit drains through the Mad River subwatershed, which has formed within deep and steep-sided, V-shaped valleys.

### NE 1 - Noisy River Valley

The Noisy River flows turbulently through a rugged valley. Although the terrain is steep, the landscape is not heavily forested beyond the limits of the immediate valley. Erosion is a major concern in this area and the maintenance of dense forest cover is essential to minimize soil loss. This unit forms a corridor of natural habitat linking it with other areas to the west in adjacent Grey County.

<b>Table 4: Niagara Escarpment</b>		<b>NE1</b>	<b>NE2</b>
<b>Terrain Functions</b>	Recharge		
	Discharge	X	X
	Flood Storage		
	Conveyance	X	X
<b>Vegetation Functions</b>	Erosion Protection	X	X
	Temperature Control	X	X
	Water Quality Enhan.	X	X
	Aquatic Habitat	X	X
	Terrestrial Habitat	X	X
<b>Attributes</b>	Coldwater Habitat	X	X
	Warmwater Habitat		
	Fish Spawning	X	X
	Deer Concentrations	X	X
	Waterfowl Concent.		
	Prov. Rare Animals		
	Prov. Rare Plants	X	X
Uncommon Vegetation	X	X	
<b>Linkage</b>	Large Core Area		
	Number of Links	3	4
	Aquatic	X	X
	Riparian/Lowland		
	Upland	X	X
	Narrow Link in Agric.	X	X
	Linkage Beyond Simcoe	X	X
Restoration Opportunity			
<b>Status Designations</b>	Provincial ANSI	2	1
	Regional ANSI	1	2
	Site of Interest		
	ESA		
	Prov. Sig. Wetland		
	Local Sig. Wetland		
	Prov. Park / Cons. Area		X

NE1 Noisy River  
 NE2 Devil's Glen

X = function, attribute or linkage occurs  
 N = links exist but are narrow

NE 2 - Devil's Glen

The main branch of the Mad River descends the escarpment through a steep sided gorge known as Devil's Glen. The forest cover here plays an important role in reducing erosion. This unit is contiguous with other natural areas northwestward along the Niagara Escarpment in adjacent Grey County.

#### 4.1.5 Wasaga Lowlands (Table 5)

The shoreline and adjacent lowlands surrounding Nottawasaga Bay contain a mix of sand deposits and till plain. In the vicinity of Collingwood, limestone bedrock may be exposed in places or is overlain with shallow loams. Extensive sand deposits have been laid down by the Nottawasaga River to form the well known beaches and sand dunes at Wasaga Beach. Nottawasaga River is the dominant drainage feature here. Several smaller creeks flow into Georgian Bay further west on the Wasaga Lowlands, including the Black Ash, Batteaux and Silver Creeks, and the Pretty River.

##### WL 1 - Collingwood Shores

Located in the extreme northwest corner of the County, this unit contains the provincially significant Collingwood Shores Complex wetland. The soil is very calcareous (underlain with limestone), resulting in the presence of rich fen shoreline communities that harbour a number of unique plant species, several of which are considered provincially rare. The mouth of Silver Creek also falls within this unit. This unit is disjunct from other greenlands in Simcoe County due to the presence of the Town of Collingwood and associated shoreline developments.

##### WL 2 - Stayner Swamp

Stayner Swamp consists of several discontinuous blocks of wetland and woodland located due south of the village of Stayner. This provincially significant wetland provides surface water storage and baseflow to Warrington Creek. It is largely surrounded by agricultural lands. Unit WL 2 also includes a narrow belt of largely second-growth forest situated on the south side of Highway 26 that links the mouths of Batteaux Creek and McIntyre Creek.

##### WL 3 - Lower Nottawasaga River / Jack's Lake Complex

This complex unit includes the lower stretch of the Nottawasaga River from north of the Minesing Swamp downstream to its mouth, as well as Marl Lake, Jack's Lake oxbows, Wasaga dune forest and surrounding forested lands. Much of this area has been classified as provincially significant wetland. The Wasaga Beach Dunes are a provincially significant life science ANSI (Hanna 1984a), identified for its active sand dunes, sand barrens and associated flora, several members of which are provincially rare species. Marl Lake, a forested bog community, is an OMNR Site of Interest characterized by calcareous soil and geologic conditions (Hanna 1984a).

The Nottawasaga River provides an important greenspace corridor along its entire length. Near its mouth this corridor branches to the northeast along the shoreline of Georgian Bay as well as to the southwest following McIntyre and Warrington Creeks. The wetlands associated with the lower reaches of the river also provide an important floodwater storage role.

<b>Table 5: Wasaga Lowlands</b>		<b>WL1</b>	<b>WL2</b>	<b>WL3</b>	<b>WL4</b>	<b>WL5</b>	<b>WL6</b>
<b>Terrain Functions</b>	Recharge						
	Discharge	X	X	X		X	
	Flood Storage		X	X		X	X
	Conveyance		X	X		X	X
<b>Vegetation Functions</b>	Erosion Protection			X		X	X
	Temperature Control	X	X	X		X	X
	Water Quality Enhanc.		X	X		X	X
	Aquatic Habitat			X		X	X
	Terrestrial Habitat	X	X	X	X	X	X
<b>Attributes</b>	Coldwater Habitat		X	X		X	X
	Warmwater Habitat		X	X			
	Fish Spawning	X		X		X	X
	Deer Concentrations			X			
	Waterfowl Concent.			X			
	Prov. Rare Animals			X			
	Prov. Rare Plants	X		X			
	Uncommon Vegetation	X		X			
<b>Linkage</b>	Large Core Area			X			
	Number of Links	1	2	3	N	N	N
	Aquatic		X	X			X
	Riparian/Lowland	X	X	X			X
	Upland						
	Narrow Link in Agric.		X	X			
Linkage Beyond Simcoe	X					X	
Restoration Opportunity		X			X	X	X
<b>Status Designations</b>	Provincial ANSI			1			
	Regional ANSI						
	Site of Interest			1			
	ESA						
	Prov. Sig. Wetland	1	1	2			
	Local Sig. Wetland			1	1		
Prov. Park / Cons. Area			1				

WL1 Collingwood Shores  
 WL2 Stayner Swamp / McIntyre Creek  
 WL3 Lower Nottawasaga  
 WL4 East Nottawasaga Bay  
 WL5 Pretty River  
 WL6 Batteaux Creek

X = function, attribute or linkage occurs  
 N = links exist but are narrow

#### WL 4 - East Side of Nottawasaga Bay

Virtually the entire shoreline of Nottawasaga Bay is presently lined with cottage developments. Inland from the cottages, however, a remnant band of forest still occurs on ridges of sandy soils (relict beaches from glacial Lake Algonquin) which run parallel to the shore. The forest is somewhat

discontinuous because of development but these woodland blocks are still close enough to the shore of Georgian Bay to function as corridors for fairly mobile animals and plant propagules. Several small creeks also flow through this unit, originating on the till plain to the east

#### WL 5 - Pretty River

The Pretty River originates on the Niagara Escarpment in Grey County to the west of Simcoe, flowing through largely agricultural land before discharging into Georgian Bay at Collingwood. In its upper tributaries abundant ground water discharge supports a cold water fishery (rainbow and brook trout), while further downstream intensive farming has removed riparian vegetation and caused severe stream bank erosion. Through its middle reaches the Pretty River passes through several moderately-sized wooded areas, but its lower section (downstream of Nottawa) is very narrow and channelized in places, thereby performing a minor corridor function.

#### WL 6 - Batteaux Creek

Like the previous unit, the Batteaux supports spawning runs of rainbow trout as well as a highly diverse warm water fish community. However, since most of the creek flows along a flat gradient through a plain dominated by agricultural land it lacks riparian cover and is subject to heating. Upstream of the Collingwood Airport there is a block of forest associated with several small tributaries of the Batteaux. Where the creek empties into Georgian Bay there is a woodland linkage to the east connecting to unit WL 2.

### **4.1.6 Elmvale Clay Plain (Table 6)**

The Elmvale Clay Plain was formed from glaciolacustrine clay deposits laid down under Lake Algonquin. This terrain unit also includes the extensive Minesing Swamp to the south. Three distinct areas dominated by clay deposits are present, and all have been almost completely cleared of vegetation and replaced by agricultural fields. Sandier portions of this terrain unit possess a considerably greater amount of forest cover. The southern section of the Elmvale Clay Plain forms part of the Nottawasaga River watershed, while the middle section drains northeast through the Wye River system. A number of smaller creeks also occur within this unit and empty directly into Georgian Bay.

#### ECP 1 - Minesing Swamp

The Minesing Swamp is the largest wetland in Simcoe County. Because of its vast expanse, it plays a very important flood storage function for the Nottawasaga River watershed. Although the surrounding clay plains are intensively cultivated, most of the swamp is densely wooded and has remained in a relatively undisturbed state since the onset of European occupation. Ecologically speaking, the Minesing Swamp is highly significant, being both a provincially significant wetland and

a provincially significant life science ANSI (Hanna 1984a). It is a major deer wintering area and several provincially rare plant and animal species are known to inhabit this unit. Minesing Swamp also supports a significant walleye spawning run when the Nottawasaga River floods its bank in the spring.

The Minesing Swamp is centrally located within Simcoe County and is a core natural area that acts as a hub for an extensive network of greenspace corridors which extend to the north, northeast, south and southwest. The northeast extension of the unit roughly coincides with the Matheson//Willow Creek Valley Biological Corridor identified by OMNR.

<b>Table 6: <i>Elmvale Clay Plain</i></b>		<b><i>ECP1</i></b>	<b><i>ECP2</i></b>	<b><i>ECP3</i></b>	<b><i>ECP4</i></b>
<b><i>Terrain Functions</i></b>	Recharge	<i>X</i>	<i>X</i>		
	Discharge	<i>X</i>	<i>X</i>	<i>X</i>	
	Flood Storage	<i>X</i>	<i>X</i>	<i>X</i>	
	Conveyance	<i>X</i>			
<b><i>Vegetation Functions</i></b>	Erosion Protection	<i>X</i>	<i>X</i>		<i>X</i>
	Temperature Control	<i>X</i>	<i>X</i>		
	Water Quality Enhan.	<i>X</i>			
	Aquatic Habitat	<i>X</i>		<i>X</i>	
	Terrestrial Habitat	<i>X</i>	<i>X</i>	<i>X</i>	<i>X</i>
<b><i>Attributes</i></b>	Coldwater Habitat		<i>X</i>		
	Warmwater Habitat	<i>X</i>			
	Fish Spawning	<i>X</i>			
	Deer Concentrations	<i>X</i>			
	Waterfowl Concent.	<i>X</i>		<i>X</i>	
	Prov. Rare Animals	<i>X</i>		<i>X</i>	
	Prov. Rare Plants	<i>X</i>			
	Uncommon Vegetation	<i>X</i>			
<b><i>Linkage</i></b>	Large Core Area	<i>X</i>	<i>X</i>	<i>X</i>	
	Number of Links	5	3	<i>N</i>	1
	Aquatic	<i>X</i>	<i>X</i>	<i>X</i>	<i>X</i>
	Riparian/Lowland	<i>X</i>	<i>X</i>		
	Upland		<i>X</i>		
	Narrow Link in Agric.				
	Linkage Beyond Simcoe Restoration Opportunity			<i>X</i>	?
<b><i>Status Designations</i></b>	Provincial ANSI	1			
	Regional ANSI				1
	Site of Interest	4			
	ESA				
	Prov. Sig. Wetland	1		2	1
	Local Sig. Wetland		2	1	
Prov. Park / Cons. Area	<i>X</i>		<i>X</i>		

*ECP1* Minesing Swamp  
*ECP2* Upper Marl Creek  
*ECP3* Tiny Marsh / Balm Beach  
*ECP4* Thunder Beach

*X* = function, attribute or linkage occurs  
*N* = links exist but are narrow



### ECP 2- Upper Marl Creek

This unit consists of two locally significant wetlands which are linked by surrounding upland forest to form a greenspace corridor extending across the drainage divide separating the Nottawasaga River and the Severn Sound watersheds.

### ECP 3 - Tiny Marsh /Balm Beach

Tiny Marsh itself consists of a provincially significant wetland that is also designated as a Provincial Wildlife Area. It is an extensive marsh and swamp complex which provides an important breeding and staging area for waterfowl and other marsh birds. A sizeable block of upland forest extends north from the park linking to the shoreline of Georgian Bay at Balm Beach. The provincially significant Balm Beach wetland occurs at the north end of this unit.

### ECP 4 - Thunder Beach

This unit consists of a large block of mostly upland forest surrounding Thunder Bay and the area west of Awenda Provincial Park. One provincially significant wetland, Thunder Bay Swamp, occurs on the south side of the bay, but otherwise no permanent creeks are present here. Slopes are fairly steep close to the shore of Georgian Bay. Cottage development lines much of the immediate shoreline. From an ecological perspective this unit is very similar to the adjacent Awenda area (TTP 6), but has been grouped within the Elmvale Clay Plain terrain unit since a large clay deposit occurs due south of Thunder Bay.

#### **4.1.7 Tiny-Tay Peninsula (Table 7)**

The eastern half of the Tiny-Tay (Midland-Penetang) Peninsula is considered part of the Simcoe Uplands (Chapman and Putnam 1984) and much of the area is underlain with glacial till. A series of inlets characterize the shoreline of Severn Sound and a river or creek valley terminates in each of these bays. These include the Sturgeon River, Hogg Creek, Wye River and Copeland Creek. A number of small to medium-sized communities (e.g., Midland, Penetanguishene, Victoria Harbour and Port McNicoll) have built up along this stretch of shoreline.

### TTP 1 - Orr Lake

This unit lies in the headwater area for Hogg Creek, Sturgeon River and Wye River and therefore performs an extremely important recharge and discharge function. Orr Lake itself is a kettle lake surrounded by a provincially significant wetland. It supports a warmwater fish community and provides important spawning habitat. The Fergusonvale North provincially significant life science

ANSI (Hanna 1984a) has been identified as a representative example of glacial Lake Algonquin shorecliff and sand plain, and the presence of a large (750 ha) undisturbed mixed forest. This unit is well linked to adjacent natural areas via several forest/riverine corridors.

<b>Table 7: Tiny Tay Peninsula</b>		<b>TTP1</b>	<b>TTP2</b>	<b>TTP3</b>	<b>TTP4</b>	<b>TTP5</b>	<b>TTP6</b>	<b>TTP7</b>
<b>Terrain Functions</b>	Recharge	X	X	X			X	
	Discharge	X	X	X	X	X	X	
	Flood Storage	X	X	X	X			
	Conveyance		X	X	X	X		
<b>Vegetation Functions</b>	Erosion Protection	?	X	X	X	?	X	X
	Temperature Control	X	X	X	X	X		
	Water Quality Enhan.		X	X	X			
	Aquatic Habitat	X	X	X	X	X	X	X
	Terrestrial Habitat	X	X	X	X	X	X	X
<b>Attributes</b>	Coldwater Habitat		X	X	X	X		
	Warmwater Habitat	X	X	X	X			
	Fish Spawning	X	X	X	X	X		
	Deer Concentrations		X					
	Waterfowl Concent.	X			X			
	Prov. Rare Animals		X		X		X	X
	Prov. Rare Plants				X		X	X
	Uncommon Vegetation		X		X		X	
<b>Linkage</b>	Large Core Area	X	X				X	
	Number of Links	3	4	2	2	2	2	0
	Aquatic	X	X	X	X	X	X	X
	Riparian/Lowland	X	X	X	X	X		
	Upland	X	X				X	
	Narrow Link in Agric. Linkage Beyond Simcoe Restoration Opportunity			X		X		
<b>Status Designations</b>	Provincial ANSI	1				1	3	1
	Regional ANSI		1	1			2	
	Site of Interest					1		
	ESA							
	Prov. Sig. Wetland	1	2	2	2	2	4	
	Local Sig. Wetland	1	1		1			
Prov. Park / Cons. Area				X		X	X	

- TTP1 Orr Lake  
TTP2 Sturgeon River Valley  
TTP3 Hogg Creek Valley  
TTP4 Wye River Valley  
TTP5 Copeland Creek  
TTP6 Awenda  
TTP7 Giants Tomb

X = function, attribute or linkage occurs  
N = links exist but are narrow

### TTP 2 - Sturgeon River Valley

The Sturgeon River is one of the principal surface water systems that drain into Severn Sound. It flows through a fairly broad forested valley with rather steep valley walls. This sand bottomed valley provides significant discharge and recharge, while the wetland at its mouth acts as a nutrient trap. The Sturgeon River is also recognized as an important rainbow trout spawning area. The valley exhibits a more complete forest cover than the other small river systems that drain into Severn Sound. One provincially significant wetland occurs at the mouth in Sturgeon Bay and another in the headwaters (Craig's Swamp, part of the Copeland Forest Complex), while locally significant wetland (Guthrie Swamp) occupies much of its middle reaches.

### TTP 3 - Hogg Creek Valley

Unlike the previous unit, the lower portion of Hogg Creek flows through a narrow riparian corridor bordered by active farmland, while the upper section is more extensively forested. Nonetheless, existing vegetation in the lower reaches of the creek helps to enhance the water quality before it enters Severn Sound. The creek valley occupies a fairly narrow plain between till moraines that contribute significant ground water discharge to the Hogg and maintains a cold water fishery in its headwater tributaries. One provincially significant wetland occurs near the creek mouth (Hogg Bay), and another (Vasey Swamp) is found in its upper reaches.

### TTP 4 - Wye River Valley

Much of the central and upper parts of the Wye River flows through open agricultural land with only discontinuous cover of riparian woodland. The downstream reaches, however, are characterized by a greater percentage of forest cover. Wye Marsh, situated just above the mouth of the river, is a provincially significant wetland, a regionally significant life science ANSI (Hanna 1984a) and, as a heavily used environmental education centre, performs a significant function as a recreational amenity. The lower section of the Wye River plays an important ground water discharge and nutrient attenuation function.

### TTP 5 - Copeland Creek

Copeland Creek empties into Penetang Harbour. It is accompanied by a wide forested valley along most of its length. It is considered a good quality coldwater stream which, in addition to its important fish spawning and migration route function, also acts as a significant recharge/ discharge area. This unit contains two provincially significant wetlands, including Lolligan Lake, which is also a regionally significant ANSI (Hanna 1984a). The Copeland Creek valley forms an unbroken corridor of habitat linking Awenda Provincial Park (TTP 6) and the forested creek valleys to the south (TTP 4).

#### TTP 6 - Awenda

This large forested core area situated at the tip of the Tiny-Tay Peninsula contains Awenda Provincial Park and also includes adjacent lands and a portion of the Tay Point peninsula to the south. Four nature reserve zones (provincially significant life science ANSIs) are included within the provincial park holdings (Hanna 1984a). Two provincially significant wetlands (Second Lake and Awenda Shoreline Fen) occur within the park, while the provincially significant Macey Lake Bog lies just to the west but is included within unit TTP 6. Despite Awenda's large size and the general absence of development in the area, there are relatively few permanent streams present. Because the coarse till soils of the area function to promote ground water recharge, much of the surface expression of water occurs as discharge (springs, seeps) along the high bluffs overlooking Georgian Bay.

#### TTP 7 - Giant's Tomb Island

This offshore island in Georgian Bay is a provincially significant life science ANSI (Hanna 1984a) and forms part of the land holdings of Awenda Provincial Park, situated on the nearby mainland. Giant's Tomb Island is virtually uninhabited, with the exception of scattered cottage development. Extensive upland deciduous forest habitat on high, rolling hills of glacial till characterizes this unit. Several species of provincially significant flora and fauna inhabit the island.

#### **4.1.8 Oro Moraine (Table 8)**

The Oro Moraine (also referred to as the Bass Lake Kame Moraine [Deane 1950]) is a rolling kame moraine. It is quite similar to the Oak Ridges Moraine in terms of form and function but its soils are less calcareous (Chapman and Putnam 1984). It is both a highly significant recharge and discharge area that supplies flow to Severn Sound (via the Sturgeon, North and Coldwater Rivers), Lake Simcoe (via Allingham, Bluffs, Shelswell's and Hawkestone Creeks) and the Nottawasaga River (via Willow Creek) watersheds. In addition to the kame moraine where deep tills promote infiltration, a number of provincially significant wetlands occur along its southern and northern flanks and act as discharge areas. The soils on top of the moraine are characterized by coarse sands and gravels, which generally pose a major limitation for agriculture but are also very important aggregate resources. This terrain unit is less intensively cultivated than adjacent areas of the County situated to the west and south and consequently the amount of forest cover is high (over 50%), augmented by extensive conifer plantations (County Forests). Natural linkage between the Oro Moraine and surrounding terrain units is good.

#### OM 1 - Willow Creek Valley

This unit contains two provincially significant wetlands: the Dalston Lake Complex and Little Lake Wetland, both of which supply essential baseflow contributions and storage capacity to the Willow Creek system. Little Lake contains a warm water fish community and important spawning habitat, while downstream of this lake the creek supports a productive cold water fishery.

### OM 2 - Copeland Forest

Copeland Forest is a large swamp forest that has been classified as a provincially significant wetland. It is owned and managed by the OMNR. The area immediately to the south of the forest forms part of the Oro Moraine proper, which is typified by undulating topography and very sandy soils. Ground water recharge occurs throughout the moraine, a portion of which subsequently makes its way to the deep regional aquifer, while some discharges into wetland (bottomland) forests situated at the base of the moraine, which in turn provide baseflow to the Coldwater and Sturgeon Rivers. Three provincially significant wetlands occur within this unit: the Copeland Swamp Complex and the Coulson East and West Wetlands. Baseflow contributions to the headwaters of these systems promote cold water fisheries. This unit contains adjacent upland and lowland habitat and is unsuitable for agriculture due to a combination of poor drainage and steep slopes. Both a provincially significant life science ANSI (Rugby West), noted as a prime example of an undisturbed upland deciduous forest situated on rolling kame hills, and a regionally significant life science ANSI (Copeland Forest) make up parts of this unit (Hanna 1984a). One of the significant habitat functions performed by the Copeland Forest is as a winter deer concentration area. A 130 ha area of semi-mature forest on moderately rolling kame hills known as Martin Farm South is considered an OMNR Site of Interest (Hanna 1984a).

### OM 3 - Bass Lake

This is another wetland site which receives much of its hydrologic input in the form of ground water originating as recharge from the adjacent Oro Moraine. Three provincially significant wetlands surround the lake: Marchmont Swamp, Langman Marsh and the Bass Lake wetlands. In combination with Bass Lake itself, these wetlands provide an important flood storage function and discharge flows to the North River system. Bass Lake is also identified by Hanna (1984a) as an OMNR Site of Interest.

### OM 4 - Hawkestone Creek Valley

Fairly level lands occur on the till plain south of the Oro Moraine, which drain via Hawkestone Creek to Lake Simcoe. The provincially significant Hawkestone Creek wetland and the locally significant Allingham Creek wetland occupy this valley. The valley provides one of only a few well defined greenspace corridors linking the Oro Moraine with a belt of forested lands found inland from the northwest shore of Lake Simcoe.

### OM 5 - Bluffs Creek Valley

This unit lies parallel to unit OM 4 and functions in a very similar manner. Bluffs Creek Valley contains a provincially significant wetland and supports a remnant brook trout (coldwater) community. A coastal wetland (the locally significant Carthew Bay Wetland) occurs at the mouth of the creek.

<b>Table 8: Oro Moraine</b>		<b>OM1</b>	<b>OM2</b>	<b>OM3</b>	<b>OM4</b>	<b>OM5</b>	<b>OM6</b>	<b>OM7</b>	<b>OM8</b>
<b>Terrain Functions</b>	Recharge	X	X				X	X	
	Discharge	X	X	X	X	X	X	X	X
	Flood Storage	X	X	X					
	Conveyance	X	X	X	X	X	X		
<b>Vegetation Functions</b>	Erosion Protection	X	X		X	X	X	X	
	Temperature Control	X	X	X	X	X	X		
	Water Quality Enhan.	X	X		X	X			
	Aquatic Habitat	X	X	X		X	X		
	Terrestrial Habitat	X	X	X	X	X	X	X	X
<b>Attributes</b>	Coldwater Habitat	X	X	?	X	X	X		
	Warmwater Habitat	X		X					
	Fish Spawning	X	X	X	X	X			
	Deer Concentrations	X	X	X				X	X
	Waterfowl Concent.	X		X					
	Prov. Rare Animals		X						
	Prov. Rare Plants Uncommon Vegetation								
<b>Linkage</b>	Large Core Area		X				X	X	
	Number of Links	2	6	3	5	2	4	2	3
	Aquatic	X	X	X	X	X	X		
	Riparian/Lowland	X	X	X	X	X	X		X
	Upland		X		X		X	X	
	Narrow Link in Agric. Linkage Beyond Simcoe Restoration Opportunity	X			X				
<b>Status Designations</b>	Provincial ANSI		1					1	
	Regional ANSI		2						
	Site of Interest		1	1					
	ESA								
	Prov. Sig. Wetland	2	3	3	1	3	2		
	Local Sig. Wetland Prov. Park / Cons. Area	1	1	X	1	1		2	1

OM1 Willow Creek Valley

OM2 Copeland Forest

OM3 Bass Lake

OM4 Hawkestone Creek Valley

OM5 Bluffs Creek Valley

OM6 North River Headwaters

OM7 Moonstone Hill

OM8 Northwest Lake Simcoe

X = function, attribute or linkage occurs

N = links exist but are narrow

### OM 6 - North River Headwaters

This unit is an east-west forested corridor located on till plain north of Bass Lake. It includes the north-facing slope and bottomland associated with the Purbrook Creek valley, in addition to a number of small tributaries of the North River. Two provincially significant wetlands (Purbrook Creek Swamp and Marchant Swamp) are found within this unit.

### OM 7 - Moonstone Hill

A wide forested corridor along the west-facing slope of the sand ridge known as Moonstone Hill extends north of Orillia. Many small headwater tributaries of the North River originate on this slope and flow down to it. There are two locally significant wetlands found in this unit, as well as the provincially significant Ardtrea Island earth science ANSI.

### OM 8 - Northeast Shore of Lake Simcoe

A band of more or less continuous forest extends between Oro Lea Beach and Eight Mile Point, south of Orillia. The immediate shoreline of Lake Simcoe is built up with cottage development. A mosaic of small wetlands and upland forest occur on gently sloping terrain extending down to the lake. Although the forest component of this unit is fragmented by roads, a railway line and shoreline development, it provides a long wildlife habitat corridor running parallel to the Lake Simcoe shoreline.

#### **4.1.9 Rocklands (Table 9)**

The northeast corner of Simcoe County provides a distinct contrast to the rest of the study area because terrain conditions pose a severe limitation to agriculture and permanent human settlement generally. The Precambrian Shield dominates the landscape in this terrain unit, characterized by irregular undulating terrain of granite and gneiss outcrops. Soils are very shallow and drainage is primarily determined by the surficial bedrock configuration. Numerous small lakes, ponds and swamps are interspersed among bedrock outcrops. Both dry, open woodlands and bottomland swamps are comprised of a mix of deciduous and coniferous tree species.

The Rocklands terrain unit is almost entirely covered with forest and natural vegetation. Human occupation is sparsely scattered and roads are few, particularly in a vast area south of the Severn River extending from Sparrow Lake west to Georgian Bay. The western area of this terrain unit is drained mainly by the Severn and Matchedash Rivers, while the Head and Black Rivers drain the area to the east.

### R 1 - Matchedash Bay

This unit forms a wide swath of forested corridor extending through the western portion of the Precambrian Shield to similar habitat that occurs in the District of Muskoka to the north. Matchedash Bay, a provincially significant wetland and provincially significant life science ANSI (Hanna 1984a), is situated at the mouths of the North and Coldwater Rivers and comprises one of the largest and most significant cattail marshes in Simcoe County (Gartner Lee Limited 1990). Unlike many of Simcoe's other greenlands units, the corridor suggested here has not been delineated solely on the basis of topographic features or the existing pattern of remnant forest cover, but was chosen to reflect the most appropriate location for a broad mega-corridor that traverses an area of unspoiled terrain .

### R 2 - Middle North River

This unit lies partially on the shield and therefore forms a good link with natural areas to the north. It encompasses the forested middle section of the North River. Since the upper and lower reaches of the North River system lie on bottomland that has been largely cleared for cropland, this forested section plays a very important role in maintaining the water quality of the subwatershed.

### R 3 - Matchedash Lake / Severn River Corridor

This is a large core area, much of which is comprised of virtually uninhabited Crown land. It forms a link with other natural areas north of the Severn River in Muskoka District. The Severn River itself is a major waterway providing surface water conveyance for a huge portion of central Ontario, including the entire Lake Simcoe/Lake Couchiching watersheds.

The provincially significant Matchedash Lake life science ANSI contains one of the best examples of Atlantic coastal plain flora in Ontario (Sharp and Keddy 1993). In addition, the aquatic plant communities that are found in Deep Bay and Duck Bay on Sparrow Lake are extremely species rich (Kamstra 1992). Two provincially significant wetlands have been identified in this unit, while many other unevaluated wetlands also occur.

### R 4 - Matchedash River Corridor

The Matchedash River flows east to west through the southern edge of the Precambrian Shield and therefore acts as a distinct natural corridor. Little development is present in this unit due to the inhospitable terrain conditions. The regionally significant East Mordolphin life science ANSI (Macdonald 1986) is a good example of a relatively undisturbed forest situated on a mantle of till over granite bedrock.

Two provincially significant life science ANSIs are contained within this unit: Matchedash Crown Reserve (supporting a unique assemblage of Atlantic Coastal Plain flora at Burrows Lake [Macdonald 1986]) and Big Chute Rocklands (a good example of barrens vegetation exhibiting a high diversity of rare flora and fauna [Varga 1988b])

### R 5 - Black River / Head River Corridor

The Head River and Black Rivers converge within this unit. Together, the headwaters of these river systems, which originate in the bedrock of the Precambrian Shield, encompass a large watershed area in both adjacent Victoria County and Muskoka District. Consequently, this system provides very important water conveyance and storage functions. This latter function is performed by the many small wetlands that occur adjacent to the river. Wide belts of forest also follow these rivers, providing excellent habitat corridors for the unrestricted movement of wildlife.



<b>Table 9: Rocklands</b>		<b>R1</b>	<b>R2</b>	<b>R3</b>	<b>R4</b>	<b>R5</b>
<b>Terrain Functions</b>	Recharge					
	Discharge	X	X	X	X	X
	Flood Storage	X			X	X
	Conveyance	X	X	X	X	X
<b>Vegetation Functions</b>	Erosion Protection		X			X
	Temperature Control		X		X	X
	Water Quality Enhan.	X	X			
	Aquatic Habitat	X		X	X	X
	Terrestrial Habitat	X	X	X	X	X
<b>Attributes</b>	Coldwater Habitat	X	X		X	X
	Warmwater Habitat	X		X	X	X
	Fish Spawning	X	X	X	X	X
	Deer Concentrations		X			X
	Waterfowl Concent.	X		X		
	Prov. Rare Animals	X		X	X	
	Prov. Rare Plants	X		X		
	Uncommon Vegetation	X		X		
<b>Linkage</b>	Large Core Area	X	X	X		X
	Number of Links	3	3	5	5	
	Aquatic	X	X	X	X	X
	Riparian/Lowland	X			X	X
	Upland	X	X	X	X	X
	Narrow Link in Agric. Linkage Beyond Simcoe Restoration Opportunity	X		X		X
<b>Status Designations</b>	Provincial ANSI	1		1	2	
	Regional ANSI				1	
	Site of Interest					2
	ESA			4		
	Prov. Sig. Wetland	2		3		1
	Local Sig. Wetland	+		+	+	1+
Prov. Park / Cons. Area	X					

R1 Matchedash Bay  
R2 Middle North River  
R3 Matchedash Lake / Severn Corridor  
R4 Matchedash River  
R5 Black River / Head River

X = function, attribute or linkage occurs  
N = links exist but are narrow

**Note:** Numerous unevaluated/unclassified wetlands are present throughout this area.

#### 4.1.10 Carden Plain (Table 10)

Along the southern fringe of the Precambrian Shield, a broad plain characterized by shallow soils underlain by Ordovician limestone occurs. This formation is confined to a rather narrow band to the

west of Lake Couchiching, but to the east it broadens out substantially, forming what is commonly known as the Carden Plain. The soils are generally shallowest near the interface between the limestone and the Precambrian Shield, becoming progressively deeper as one moves toward Lake Simcoe. The southern part of this terrain unit is, in fact, quite intensively cultivated. The rockier northern section is sparsely inhabited and soil conditions make it suitable only for rough pasture.

The northern portion of this unit forms part of the Black River/Head River watershed. To the south, many smaller stream systems drain directly into Lake Simcoe.

#### CP 1 - Atherley Narrows

Three disjunct pieces comprise this unit: Chief's Island, Atherley Narrows and Victoria Point. The latter two are provincially significant wetlands, which include both open water marsh and swamp forest, and are important fish spawning areas. All three are isolated, although the north part of the Atherley Narrows wetland is linked to part of the Sucker Creek wetland to the north, which has been assigned to unit CP 2.

#### CP 2 - Lake St. John/Mud Lake Corridor

To the east of Lake Couchiching, a series of broad swamp forest wetlands (five of which are provincially significant) extend to the south of both Lake St. John and Mud Lake. Collectively, they provide a water storage function and a north-south corridor providing an important wildlife habitat linkage between the Precambrian Shield and the northeast shore of Lake Simcoe.

#### CP 3 - Lake Dalrymple

Several thousand hectares of provincially significant wetland occur south, west and northwest of Lake Dalrymple, providing major storage for the Head River watershed. Upland portions of this unit contain significant alvar vegetation associations. Alvars are rare habitats characterized by stunted vegetation growth and the presence of characteristic (often rare) plant species adapted to shallow calcareous soils.

#### CP 4 - Brechin/Barnstable Bay/Lagoon City Wetlands

Several shoreline swamps occur along the northeast shoreline of Lake Simcoe. The limits of this unit coincide closely with the boundaries of three provincially significant wetlands. The one locally significant and two provincially significant wetlands are surrounded by fairly intensive agricultural land use and therefore provide a water storage and quality enhancement function by filtering surface flow before it reaches the lake. The 200 ha McGinnis Point Swamp is also considered an OMNR Site of Interest (Hanna 1984a). Barnstable Bay is one of the least developed sections of shoreline remaining on Lake Simcoe.

<b>Table 10: Carden Plain</b>		<b>CP1</b>	<b>CP2</b>	<b>CP3</b>	<b>CP4</b>	<b>CP5</b>
<b>Terrain Functions</b>	Recharge					
	Discharge		X	X		
	Flood Storage		X	X	X	
	Conveyance		X		X	X
<b>Vegetation Functions</b>	Erosion Protection					
	Temperature Control		X			
	Water Quality Enhanc.	X	X		X	
	Aquatic Habitat	X	X	X	X	X
<b>Attributes</b>	Terrestrial Habitat	X	X	X	X	
	Coldwater Habitat					
	Warmwater Habitat	X	X	X	X	X
	Fish Spawning	X	X	X	X	X
	Deer Concentrations			X		
	Waterfowl Concent.	X			X	
	Prov. Rare Animals		X			
Prov. Rare Plants		X			X	
<b>Linkage</b>	Uncommon Vegetation		X	X		
	Large Core Area			X		
	Number of Links	0	3	4	1	1
	Aquatic	X	X	X	X	X
	Riparian/Lowland		X	X		
	Upland			X		
	Narrow Link in Agric. Linkage Beyond Simcoe Restoration Opportunity			X		X
<b>Status Designations</b>	Restoration Opportunity			X	X	X
	Provincial ANSI				1	1
	Regional ANSI				1	
	Site of Interest		1	3	1	
	ESA					
	Prov. Sig. Wetland	2	5	2	2	
	Local Sig. Wetland				1	
Prov. Park / Cons. Area						

- CP1 *Atherley Narrows*  
 CP2 *Lake St. John/Mud Lake Corridor*  
 CP3 *Lake Dalrymple*  
 CP4 *Brechin/Barnstable Bay/Lagoon City Wetlands*  
 CP5 *Talbot River*

X = function, attribute or linkage occurs  
 N = links exist but are narrow

### CP 5 - Talbot River

The Talbot River is connected to the Trent Canal along the southeastern edge of Simcoe County. The terrestrial link is discontinuous but it forms an important aquatic connection and is considered a significant fish migration/spawning area. The Gamebridge Quarry, a provincially significant earth science ANSI, occurs in this unit.

## 4.2 CRITICAL ELEMENTS

The descriptions of the natural heritage units described above in Section 4.1 provides an understanding of the functions, attributes and linkages associated with each of the 53 individual areas that make up Simcoe's greenlands. However, there are also some "critical elements" associated with the County's natural environment that are particularly influential in terms of maintaining the overall ecological integrity of the area. The primary goal of natural environment protection is to maintain a large network of lands and waters at a landscape level that represents a wide array of biological diversity, natural processes and viable populations of indigenous species. However, to achieve the desired level of protection it is important to have a set of general management guidelines for each of the critical elements that are represented within Simcoe's 10 major Terrain Units.

For example, the maintenance of forest cover limits erosion on steep slopes, provides temperature control in creeks and rivers through shading, promotes infiltration, and provides an important source of nutrients and organic matter to the aquatic communities. Therefore, the removal of forest cover, even if limited to a relatively small but highly significant area, could trigger a series of direct, indirect and cumulative impacts on a much wider portion of the unit.

General management guidelines as to the most appropriate means of maintaining the critical elements of Simcoe County's natural heritage system are briefly discussed in the following sections, grouped according to headwaters, middle/lower reaches, wetlands, valleylands, major lakes, and large forested areas:

### 4.2.1 Headwaters

Although these guidelines apply to all Terrain Units (since each contains headwater areas), they are particularly relevant to the Oak Ridges Moraine (ORM), Borden Sand Plain (BSP), NE (Niagara Escarpment), TTP (Tiny-Tay Peninsula) and OM (Oro Moraine) because of the important recharge/discharge functions these areas perform:

- a) maintain vegetative cover on slopes to prevent erosion and to control contaminant/nutrient loading;
- b) maintain ground water infiltration (recharge) and discharge relationships;
- c) maintain well vegetated riparian zones to regulate (cool) instream water temperatures, control erosion and capture contaminant/ nutrient laden runoff;
- d) maintain baseflow in streams; and
- e) maintain stream morphology (i.e., do not relocate, channelize or pipe headwater tributaries).

#### **4.1.2 Middle/Lower Reaches**

The following are appropriate management guidelines for the middle and lower reaches of all Terrain Units, but especially in the ITP (Innisfil Till Plain), ECP (Elmvale Clay Plain), WL (Wasaga Lowlands), TTP and CP (Carden Plain):

- a) maintain well vegetated riparian zones throughout entire reach of stream;
- b) where valleys exist, establish setbacks from top-of-bank to limit encroachment;
- c) remove physical barriers to fish movement; and
- d) treat or promote infiltration of storm water prior to it entering streams (tighter soils in valleys may limit ability to infiltrate).

#### **4.1.3 Wetlands**

Provincially or locally significant wetlands occur in all 10 Terrain Units except the Niagara Escarpment, and therefore the following guidelines apply throughout Simcoe:

- a) maintain surface and ground water connections (e.g., inflows and outflows).
- b) maintain adjacent upland habitat to complement wetland habitat; and
- c) maintain existing areal extent of wetlands

#### **4.1.4 Valleylands**

Well-defined valleylands are most predominant in the following Terrain Units: ITP, BSP, NE, TTP, and WL. Appropriate management objectives should be to:

- a) maintain valley landform;
- b) maintain forest cover on valley walls and in floodplain/bottomlands;
- c) maintain well vegetated riparian zones adjacent to watercourses;
- d) maintain an appropriate amount of upland habitat adjacent to the valley to complement wetland/ riparian habitat;
- e) maintain valleys as open corridors (e.g., remove physical barriers such as dams that act as obstructions to the movement of fish and wildlife, unless the purpose of the barrier is to maintain separation between incompatible species) that serve as vital linkages between upstream and downstream reaches.

#### **4.1.5 Major Lakes**

These include both inland lakes and the larger bodies of water (e.g., Lake Simcoe, Lake Couchiching and Georgian Bay) found in Simcoe County. Lakes are a particularly important element of the natural environment in the following Terrain Units: ITP, ECP, WL, TTP, OM, Rocklands (R), and CP, where management objectives should be to :

- a) maintain naturally vegetated shorelines and natural structure;
- b) maintain existing substrates in shallow nearshore areas;
- c) maintain water levels within a naturally fluctuating regime;
- d) maintain adequate terrestrial habitat adjacent to major waterbodies;
- e) require that shoreline management plans and settlement capability studies be undertaken for large inland lakes (e.g., Bass Lake, Orr Lake, and Farlain Lake) subject to development pressure to determine the appropriate amount, type and location for development; and
- f) encourage the rehabilitation/naturalization of already developed shorelines.

#### **4.1.6 Large Forested Areas**

Woodlands are also critical elements associated with each of the 10 Terrain Units. Although the larger contiguous blocks of forest are generally associated with NE, OM, TTP, R and CP, the guidelines provided below apply throughout the County and are of greatest concern in those areas where forest cover is patchy and has been strongly influenced by man's activities. These are to:

- a) maintain species composition and structural diversity;
- b) maintain old growth stands;
- c) discourage fragmentation of large contiguous forest blocks;
- d) maintain important forest interior habitat;
- e) maintain linkage between upland areas and valleylands/wetlands; and
- f) maintain linkage with other large forest blocks.

### **4.3 BOUNDARY ISSUES**

The recommended Natural Heritage System boundaries depicted in Figure 3 are intended as a planning level guide to assist with the formulation of land use designations and planning strategies. The precise delineation of greenspace boundaries will need to be undertaken in the field at a much more site-specific level as part of the Environmental Impact Statement (EIS) process described in Section 5.4.3. At this more detailed level of study, situations may arise where boundaries are amended or significant areas are added or deleted on the basis of new and more detailed information. In addition, buffers and setback requirements appropriate for preserving the integrity of ecological functions in response to intended land use changes will be determined as part of the EIS process.

#### 4.4 CONNECTING LINKS

Connecting links are the corridors of habitat which lie between the core greenland units. These provide opportunities for wildlife movement and enhance the long-term ecological viability of a region. The connecting links can also act as routes for recreational trail systems. The most obvious natural corridors follow river and stream valleys, since flood risks, water flow, and steep slopes on valley walls have long acted as constraints to development and other human activities. Historically, shorelines of Lake Simcoe and Georgian Bay would have been important corridors but intense cottage and other forms of recreational development along much of the coastline of these waterbodies have broken the continuity of these corridors and severely limit their effectiveness. Linkages and core areas are frequently traversed by roads, utility corridors and other man-made structures. As a rule, smaller and less heavily travelled concession roads do not seriously compromise the ecological viability of corridors and core areas but major, multi-lane highways with nearly continuous traffic (such as Highways 11 and 400) form major barriers to animal movement.

In Simcoe County, the 53 individual units that make up the proposed Natural Heritage System, as proposed in Figure 3, are well linked across the width and breadth of the study area. In the southern and westernmost areas, existing links are few and narrow but those that remain are of critical importance in maintaining the units. The Nottawasaga River valley functions as the primary north-south corridor through the County, extending from the Oak Ridges Moraine to Georgian Bay. Innisfil Creek and Lover's Creek provide a narrow corridor between the upper Nottawasaga River and Kempenfelt Bay. Together, Minesing Swamp and Camp Borden acts as a core area and hub, with connecting links radiating out in several directions. Mad River and Pine River valleys connect from there to the Niagara Escarpment.

To the northeast of Minesing Swamp, the amount of forest cover increases dramatically, creating several major corridors and many connecting points. The uplands of the Oro Moraine act as another hub and core area, lying between corridors that reach to Lake Simcoe, Severn Sound and Nottawasaga Bay via the Nottawasaga River. The northernmost portions of Simcoe County between Severn Sound, and Lake Dalrymple, consist of a vast area of mostly forested core habitat. This area can function as a giant east-west corridor.

Good linkage also exists beyond the boundaries of Simcoe County. The Oak Ridges Moraine and the Niagara Escarpment, two linear physiographic features characterized by rugged terrain and high topographic relief, form the most important links between Simcoe County and Peel and York Regions to the south and Dufferin and Grey Counties to the west. Linkage to the north and northeast is well developed on both the Precambrian Shield, where the Severn River forms a natural boundary between Simcoe and Muskoka District, and on the Carden Plain, where a series of extensive swamps extend eastward into Victoria County.

Restoration or enhancement of natural corridors can improve the function and quality of Natural Heritage units which are isolated or poorly connected to other units. Several potential linkage areas are identified on Figure 3 that, if restored would enhance the overall system. In most cases, these

rehabilitation opportunity areas presently consist of sparsely or discontinuously vegetated creek valleys or a loose string of small disjunct woodlands that extend across agricultural areas between two units. These corridors can be easily restored by allowing succession to occur naturally with some supplementary planting of appropriate native trees and shrubs. If these links can be re-established, their width will be limited by surrounding land uses, ownership patterns and the degree to which landowners are willing to accommodate and/or actively manage them. Ideally, these new corridors should be at least 200 m wide (i.e., 100 m on either side of a creek) in order to facilitate the safe movement of most wildlife species. A total of 19 potential linkage areas that should be given high priority for future restoration efforts are shown on the proposed Natural Heritage System map (Figure 3) and each is briefly described below:

**Area L1:** Located at the south end of the county on the Oak Ridges Moraine, this proposed link is short (less than 1 km) and crosses rolling upland habitat. It would form a physical connection between two major watersheds: the Humber River and the Nottawasaga River and would also establish an important link to greenland areas situated south of Simcoe County in Peel Region.

**Area L2:** This link follows Bailey Creek and would join the headwaters on the kame moraine with the bottomlands of Bailey Creek Swamp. It is about 3 km long and contains some isolated woodlots along the valley.

**Area L3:** The Nottawasaga River valley forms the most important north-south corridor through the county, yet forest cover is discontinuous along this 2 km stretch. Along this stretch the river leaves the broad Hockley Valley and crosses level tableland. Restoring vegetation within this corridor would also provide an important erosion control function.

**Area L4:** This is a very narrow link of about 300 m where a road and adjacent farmland create a break in the fairly continuous but narrow belt of woodland along Innisfil Creek. There are a few other short gaps along this creek which could also benefit from restoration.

**Area L5:** Scanlon Creek flows through a shallow, partially wooded valley between Cookstown Hollows and Scanlon Creek Conservation Area. This would provide a reasonable link between the large Holland Marsh and Innisfil Creek Natural Heritage units. Few other opportunities exist to provide a connection between the southwest shore of Lake Simcoe and interior greenlands.

**Area L6:** This restoration area would provide an effective link between the narrow unit associated with the Boyne River to the more extensive forested area along the Pine River. Several small isolated woodlots lie along this upland alignment and these could be easily connected.



- Area L7:*** A small unnamed tributary of the Nottawasaga River provides a narrow link between the swamp forests south of Camp Borden and the main branch of the Nottawasaga. This tributary is confined to a fairly distinct wooded valley but is crossed by several paved two-lane roads.
- Area L8:*** This is an upland link through Canadian Forces Base (CFB) Borden which is recommended because it is situated at a point where the Pine and Mad Rivers are fairly close together. Presently, this area consists of upland conifer plantations which already functions as a corridor for some wildlife. However, if these conifers were to be opened up, allowing a mix of deciduous species to establish themselves, the corridor would function more effectively and attract a wider range of species.
- Area L9:*** Establishing this link would connect the core area of Bear Creek and Allandale Bluffs with Lover's Creek. In a broader context, it would complete a large circular linked system that also includes Innisfil Creek and the Nottawasaga River. The link follows a major tributary creek of Bear Creek, passing mostly through a partially forested but fairly well defined valley.
- Area L10:*** This linkage between BSP5 and ECP1 already exists in the form of Coates Creek. However, the stretch of creek between the New Lowell Conservation Area and Minesing Swamp crosses open agricultural land and lacks riparian cover.
- Area L11:*** This link would form a connection between two distinct areas of WL2. At present Stayner Swamp is not linked to any adjacent areas and is somewhat fragmented. The south portion of Stayner Swamp consists of several disjunct wetland units. These could be joined across an upland area to the Coates Creek tributary, which in turn would form a connecting link with the core area of the Mad River (BSP5).
- Area L12:*** The provincially significant Stayner Swamp wetland outflows through Warrington Creek into McIntyre Creek. McIntyre Creek is accompanied by a belt of continuous riparian woodland but the lower stretch (about 2.5 km) of Warrington Creek crosses open country with virtually no natural vegetation along it. Natural vegetation should be restored here to re-establish a terrestrial corridor.
- Area L13:*** This proposed link would provide a riparian corridor between the provincially significant wetland and Willow Creek above Little Lake. The wetland is an important source of baseflow to Willow Creek. The lower section of about 1.5 km crosses open agricultural land with virtually no cover.
- Area L14:** This proposed link would connect the wetlands along the northeast side of Lake Simcoe and the extensive core natural areas surrounding Dalrymple Lake and extending northward. Presently, the Lagoon City wetland and nearby Lake Simcoe wetlands are effectively isolated from other areas. The proposed corridor follows a small creek which passes through about 2.5 km of open farmland.

- Area L15:** The headwater tributaries of Hogg Creek (TTP3) could be connected to Orr Lake (TTP1 ) in two separate locations by creating short habitat linkages along slopes and ridges.
- Area L16:** The Wye River flows through a fairly large area, but it possesses minimal forest cover along its upper and middle reaches. The section containing the proposed linkage area is partially forested and would contribute to a east-west corridor through the Penetang Peninsula. A sizeable block of forest cover (ECP3) remains near the eastern side of Nottawasaga Bay but it is not well linked and likely will become increasingly fragmented by future shoreline development. The proposed link would establish a corridor and improve forest cover in the lower part of the Wye River.
- Area L17:** This link would strengthen a second connection between the forested area on the east side of Nottawasaga Bay and the Penetang Peninsula. It follows a small west-flowing stream which is partially forested but crosses through open land for a distance of about 1 km within which restoration of vegetation would be desirable.
- Area L18:** Hogg Creek and the Sturgeon River are separated by a fairly high plateau. There is an opportunity to connect these adjacent watersheds near their mouths by establishing trees along a section of the west-facing slope of the Hogg Creek valley.
- Area L19:** An unforested gap less than 1 km wide exists between Units R2 and OM6. Establishing this connection would link two tributaries of the North River (Bear Creek and Purbrook Creek), as well as create an unbroken corridor of woodland across the contact zone between the bedrock granite of the Precambrian Shield and the till plain immediately to the south.

## 5.0 IMPLEMENTING THE NATURAL HERITAGE SYSTEM

### 5.1 PLANNING CONTEXT

The movement to integrate the principles of sustainable development into the municipal planning process is continually growing in Ontario and there is currently a strong recognition of the importance of preserving key elements of the natural environment for future generations. Once lost, natural heritage features and functions are difficult, if not impossible, to restore or recreate. To ensure their continued presence, it is absolutely imperative that the necessary decisions and actions be implemented at the very outset of the planning process.

In May of 1996, the provincial government released a Provincial Policy Statement (OMMAH 1996), a document that amended sections of the *Planning Act*, R.S.O. 1990. This document replaces the Comprehensive Set of Policy Statements issued in 1994 and the accompanying set of Implementation Guidelines that provided policy direction to municipalities with respect to their expanding role in the identification and protection of significant natural heritage resources.

At the time that the Simcoe County Natural Environment Study was initiated, it had been our intention to follow the planning principles espoused by Bill 163, since the County of Simcoe's new Official Plan would have to demonstrate conformity with the provincial policy statements that were in place at the time of its inception. With the recent change in government at the provincial level, however, Bill 163 has been superseded by Bill 20, referred to as the *Land Use Planning and Protection Act* (November 1995). Bill 20 has many of the same objectives as did its predecessor, namely: to streamline the planning process, to empower municipalities to accept greater control over planning matters, and to protect the environment while at the same time promoting economic growth and development.

The new Provincial Policy Statement (1996) arising from this Bill 20 came into effect on May 22, 1996. Although the policy statements dealing with natural heritage features and areas are not as detailed as those contained in the CSPS, the basic intent of both documents is still quite consistent. Under the PPS (1996), a fundamental objective of municipal planning will be to ensure that significant natural heritage resources are "protected from incompatible development". As was the case under Bill 163, development will not be permitted in "*significant portions of the habitat of endangered and threatened species, and in significant wetlands south and east of the Canadian Shield*", which includes all but the extreme northeast corner of Simcoe County. While development may be permitted in or adjacent to other natural heritage features such as fish and wildlife habitat, ANSIs, significant woodlands and significant valleylands, such development may only occur "if it has been demonstrated that it will not *negatively impact* the natural features or the *ecological functions* for which the area is identified".

Whereas the CSPS contained very specific directives in defining significant elements of the natural environment, the PPS is less prescriptive in this regard. With the exception of provincially significant wetlands and the habitat of endangered and threatened species, which are matters of provincial interest, it is now the responsibility of a municipality to determine what constitutes "significant" natural heritage areas within a more local or regional context. The proponent of any change in land use that could potentially have an adverse effect on the features and functions of a significant natural area will be required to demonstrate, to the satisfaction of the municipality or the provincial government, as well as other pertinent review agencies (e.g., conservation authorities), that "*development and site alteration*" will result in "*no negative impacts*" before approval is granted. As was the case with approvals under the CSPS, it is expected that an Environmental Impact Statement (EIS) will be the mechanism for demonstrating "no negative impacts". Further discussion as to the particular study requirements of an appropriate EIS within the context of Simcoe County's Natural Heritage System is provided in Section 5.4.4.

## 5.2 THE ROLE OF SIMCOE COUNTY

As an upper-tier municipality, the County of Simcoe is given authority to prepare an Official Plan that not only establishes a framework for the long-term structure and pattern of future development for the County, but also prescribes land use designations and formulates policies which all local municipalities within Simcoe are expected to conform to in their Official Plans. If these natural heritage policies are persuasive and compelling, they can be an effective means for coordinating and implementing ecosystem planning over a wide area and thus can enable both upper- and lower-tier municipalities to achieve a common set of objectives in a consistent and equitable manner. Rather than merely "downloading" responsibility for environmental management onto the local municipality, it is expected that the County will assume a very proactive leadership role in this regard.

A considerable opportunity exists within the County of Simcoe Official Plan to achieve the objective of protecting and preserving ecologically important natural heritage areas that make a significant contribution to the regional ecosystem. The County Official Plan can also provide a framework within which its member municipalities are better able to identify additional areas and features for protection that are significant at a more local (i.e., township) level.

One of the most common shortcomings of County or Regional Official Plans is their failure to adopt consistent definitions of what is meant by natural heritage systems and why they are deserving of protection. Perhaps most importantly, they do not identify a clear mechanism for ensuring conformity between different levels of planning jurisdiction. One of the primary strengths of the CSPA was that, for the first time in the relatively short history of ecosystem planning in Ontario, it introduced a very specific set of criteria for determining significance that was to be applied consistently throughout southern Ontario. (However, it should also be noted that this aspect of the CSPA also came under considerable criticism for being overly prescriptive, cumbersome and too inflexible). By comparison, the PPS now gives far greater autonomy to a municipality when defining significance at a regional or local level. The functional assessment approach to natural heritage identification and protection espoused by this study will allow the County of Simcoe to determine significance within the context of its own unique ecosystem.

Once the Official Plan has been approved and adopted it is anticipated that the County of Simcoe will continue its leadership role and provide assistance and direction to local municipalities with respect to Natural Heritage protection. Through its LINC program, and in partnership with its member municipalities, the County has already developed state-of-the-art GIS and data management capabilities. Over time, and as additional data are made available, it is anticipated that the County will gradually expand its role as a central repository for written, digital and mapped information pertaining to the natural heritage resources of Simcoe. This information, in turn, would be made available to assist local municipal staff in matters dealing with land use and resource planning.

### 5.3 PROTECTING THE COUNTY'S NATURAL HERITAGE SYSTEM

The long-term protection and maintenance of the Natural Heritage System proposed in Figure 3 will be vital to ensure the continued health and integrity of Simcoe County's environmental resources. By applying strict land use controls within core areas of the recommended system and through careful planning in adjacent areas, there are many important environmental benefits that can be realized. These include the following:

- a) protection of areas of permeable soils promoting infiltration (i.e, ground water recharge);
- b) prevention of physical encroachment by development into sensitive natural areas;
- c) protection of major stream corridors to allow the passage of water and the movement of aquatic and terrestrial organisms;
- d) provision of flood control;
- e) protection against stream bank erosion and stream warming due to loss of vegetative cover;
- f) increase in the removal of water-borne pollutants;
- g) provision of food and habitat for wildlife;
- h) provision of physical linkages to other significant areas within and external to Simcoe County; and
- i) protection of lands that provide various social and economic benefits related to tourism, aesthetics and passive recreational activities.

As shown in Figure 3, an extensive amount of land within Simcoe County has been included within the proposed Natural Heritage System. These areas represent a combination of the following: 1) lands such as provincially significant wetlands and flood-prone hazard lands which are protected from incompatible development by Provincial policy; 2) lands that have been assigned some other significance status (e.g., locally significant wetlands, ESAs and ANSIs); and 3) lands that possess regional ecological significance or perform an important function (e.g., woodlands, valleylands, fish and wildlife habitat, ground water recharge/discharge areas, etc.).

Collectively, the 53 units that make up the Natural Heritage system (Figure 3) represent one-third (33.3%) of the total land mass of Simcoe County. This compares favourably with the work of Noss (1995), who suggests that in order to maintain the ecological integrity of a given region it is necessary to achieve protection for between 25 and 75% of the area. Although the proposed Natural Heritage system for Simcoe falls closer to the low end of this range, given the large size of Simcoe County, one-third of its landbase still translates into roughly 1,500 km<sup>2</sup> of greenlands.

Simcoe County is of sufficient size and diversity to accommodate a significant amount of future growth and settlement, and at the same time achieve the desired level of environmental protection. It will be up to the County's Official Plan to determine where development will occur and in what form and also to decide which areas should remain undeveloped over the life of the plan.

Just as inclusion within the Natural Heritage System does not, in many instances, imply that development will automatically be prohibited from these areas, it is also recognized that exclusion from the system does not mean that such areas are prime candidates for future development. While development should be directed to occur in the "white areas" (i.e., outside the greenlands system), it is recognized that natural heritage is just one of many equally important considerations that will guide future development. Other Official Plan policies will address such things as the availability of municipal services (infrastructure), agricultural land conservation, resource management (forestry, aggregate extraction), population forecasts, and growth and settlement patterns. Infrastructure and growth and settlement are presently the subjects of other background reports being prepared in support of the County of Simcoe Official Plan.

Although designating certain lands as being ecologically important in an Official Plan is a vital first step in bringing about their protection from potentially incompatible land use activities, there are essentially two avenues available to the County of Simcoe that will achieve a greater degree of long-term protection. These are land stewardship and land acquisition.

### **5.3.1 Stewardship**

Stewardship involves the management or maintenance of land in such away that the significant features and functions of the area are preserved and in some cases enhanced. This can be carried out by private individuals or public agencies or both working in a partnership arrangement. Unlike acquisition, which typically has more force and authority because it involves outright ownership and thus a degree of control over the land, stewardship arrangements are often voluntary and rely principally on the "good will" of the participants. While most stewardship agreements involve non-legally binding (i.e., handshake) agreements, some are legally binding on either the owner or the property.

The primary advantage of handshake agreements is that they are relatively easy to implement and are acceptable because they do not place any undo onus on the landowner. Management agreements are those where the landowner grants permission to a public agency such as a conservation authority or the MNR to implement specific management practices (e.g., tree planting, stream rehabilitation, public trail access). A further incentive to the landowner is the possibility that they may be eligible to receive a property tax rebate on the significant portions of their lands.

A more expensive but considerably more effective stewardship option is the Conservation Easement. A conservation easement is a legal agreement attached to the title of the land that specifies permitted and/or prohibited uses. The easement may be held by an organization such as the Ontario Heritage Foundation, a conservation authority or a non-governmental organization (NGO). The Couchiching Conservancy is an example of an NGO that currently operates in Simcoe County which has as its mandate the protection and restoration of the special natural areas of the Couchiching-Severn region (Reid and Peterson 1994).

Although conservation easements are gaining more acceptance as a viable conservation option, there are still relatively few precedents in Ontario and those that do exist have not been in effect long enough to assess their success. Some landowners are reluctant to enter into such agreements because it effectively strips them of any control over future use of the land.

A key prerequisite associated with all forms of land stewardship is the need to educate landowners about the various advantages and commitments associated with each so that they can make well-informed decisions. Public awareness and appreciation of the ecological significance of one's land is often a major incentive to protect it.

### **5.3.2 Acquisition**

The primary advantage of acquisition over land stewardship is that ultimate land ownership rests with a public body (such as the County, the local municipality, a conservation authority or the MNR) with the mandate to ensure its long-term protection and management. However, inherent in this approach is the need to raise the often substantial funds necessary to purchase the land. This financial obligation, combined with issues of liability and ongoing management commitments are significant challenges. Given these considerations, therefore, acquisition should only be employed to secure those unprotected lands deemed to be of the highest priority within the County's Natural Heritage System.

Much of the land identified within the County's Natural Heritage System is located in rural areas and is privately owned. For those landowners with a desire to see their lands protected well into the future the Official Plan will provide them with a policy framework to encourage long-term maintenance and management of Simcoe's greenlands through the various stewardship mechanisms described above.

## **5.4 POLICY DIRECTIONS**

As discussed in Section 5.3, the formulation of effective policy is a critical step in the long-term protection of natural heritage areas, both at the county level as well as at the local municipal level. As the consideration of a Natural Heritage System moves forward, there are three main policy components to address. These are:

- a) Identification of natural heritage areas in planning documents;
- b) Protection of natural heritage areas through education; and
- c) Evaluation requirements to direct site-specific studies.

#### **5.4.1 Identification**

This report and associated mapping provides the technical rationale for establishing a natural heritage system. Successful implementation will depend on identifying the natural heritage areas not only in the Simcoe County Official Plan, but also in local municipal Official Plans.

This issue of "identification", while seemingly a simple administrative exercise, is a critical first step in the eventual implementation of the system. The County should endeavour to ensure that local municipalities understand and appreciate their role in the implementation process and encourage the inclusion of natural heritage policies in local Official Plans.

#### **5.4.2 Protection**

The financial realities of the 1990s inhibit public agencies from purchasing sensitive environmental areas. This had been the primary tool for protection during the 1960s, 1970s, and 1980s. However, public acquisition and management of sensitive lands is not always the best approach to dealing with these areas, especially in primarily rural locales.

In many cases, private land stewardship can provide more effective management of these areas. In many situations, the sensitive nature of these lands or their special "attributes" were one of the motivating reasons the landowner purchased in the first place. As mentioned, in Section 5.3 above, these landowners are often quite knowledgeable about the important aspects of their property, and have every intention of maintaining or enhancing (such as through replanting) these areas for the future. In other situations, landowner education may be beneficial in helping landowners better appreciate the importance of their lands, not only within their property boundaries, but also how these lands "fit" within the larger landscape fabric.

It is recognized that certain land uses, such as agriculture, are included within the proposed Natural Heritage system boundaries. It is not the intent of this process, however, to expect that such activities will simply cease. Rather, this report recommends that the County and local Official Plans indicate, through policy, the long-term desirability of including such lands in a Natural Heritage system and to promote their acquisition, protection and management.

#### **5.4.3 Evaluation**

Given the large land area within Simcoe County and the sources of the technical information used in the formulation of the natural heritage system, the accompanying mapping has been prepared at a scale of 1:125,000. As discussed in Section 4.3, this study recognizes that with the exception of Provincially Significant Wetlands, significant habitat for threatened and endangered species, and



hazard lands (floodplains), the natural heritage boundaries depicted on Figure 3 do not necessarily represent "no-touch lines". Ecosystem planning is not a static process and it must be recognized that as more detailed, site-specific information comes to light the precise boundaries of these areas may shift somewhat in either direction. These detailed studies will take place at the local municipal level through the completion of secondary plans or through draft plans of subdivision. Following is a brief discussion of the recommended studies required in support of development applications at the local level.

### Environmental Impact Studies

Development adjacent to the recommended Natural Heritage System may proceed as long as 1) it can be demonstrated that there will be no negative impacts on the natural heritage functions, attributes, or linkages for which they are recognized and that 2) the proposed development meets the objectives of other policies within the Official Plan. Public or private proponents seeking development opportunities within the Natural Heritage System or on land adjacent to its boundary will be required to determine in-field natural heritage system boundaries and appropriate setbacks through the preparation of an Environmental Impact Study (EIS). Under Bill 163, adjacent lands were established at varying distances, dependent on the specific feature identified (e.g., 120 m from Provincially Significant Wetlands). The new Provincial Policy Statements (OMMAH 1996) does not provide a precise definition of "adjacent lands" nor does it specify proximity distances which would trigger the need for an EIS. In this regard, the document instead makes reference to guidance from the Province or to "municipal approaches which achieve the same objectives" (p. 13). Until directed otherwise by Provincial Policy, the County's Official Plan should apply 120 m as a means of defining both "adjacent lands" and the distance within which an EIS is required, since there is strong scientific rationale for this number (OMMA 1995).

The objective of the site EIS will be to identify and assess the potential impacts of specific development proposals on local natural heritage system functions, attributes and linkages and to demonstrate compliance with other environmental objectives, such as maintaining or promoting infiltration in an area performing a significant recharge function. The most critical natural heritage functions have been described previously in Section 3.1 of this report.

Site EISs can take the form of full, or scoped studies. Area municipalities will assist proponents in identifying the key technical issues to be addressed and the appropriate level of effort required in preparation of a site EIS. The exact EIS requirements will vary depending on the specific development scenario being proposed, the significant ecological features and functions associated with that portion of the Natural Heritage unit, and the predicted impacts (direct, indirect and cumulative) of the development proposal on the unit. Where small developments (such as individual lot severances) barely encroach on adjacent lands, a scoped EIS would likely be the appropriate vehicle for addressing impacts. This usually involves a checklist approach. Larger, more complex proposals, such as plans of subdivisions, are more likely to require a full site EIS.

Components of the EIS will generally include:

- a) detailed study area description, including delineation of the natural heritage boundary;
- b) characterization of adjacent natural heritage functions as they exist;
- c) detailed description of the proposed development or activities;
- d) prediction of potential direct, indirect, and cumulative effects of development compared with overall environmental goals;
- e) identification and evaluation of options to avoid impacts;
- f) identification and evaluation of options for mitigation or rehabilitation, including setbacks;
- g) selection of the preferred mitigation/ rehabilitation strategy;
- h) summary of predicted net effects after mitigation/ rehabilitation compared with overall environmental targets; and
- i) evaluation of the need for a monitoring program.

## **6.0      RECOMMENDATIONS**

Recommendations arising from this study are provided below:

- a) It is recommended that the proposed Natural Heritage System depicted in Figure 3 be incorporated into the County of Simcoe's Official Plan as a separate schedule. This schedule is envisioned to be used as an overlay on the OP schedule that identifies land use designations. This Natural Heritage schedule would be used to assist County and local municipal planners/engineers in siting large-scale facilities such as sewer and water mains, County roads, and municipal sites, to determine whether land development proponents are required to conduct an EIS, and to determine future settlement areas.
- b) It is recommended that the County of Simcoe, through the policy context of the Official Plan, provide guidance to lower tier municipalities in the identification and protection of other natural heritage features, (e.g., smaller woodlots, local recharge/discharge areas and tributary creeks and streams which are not depicted on Figure 3), in their local Official Plans. This is in recognition of the fact that at a local level these areas make a contribution to the maintenance of a healthy ecosystem.
- c) It is recommended that the 19 linkage areas identified in Figure 3 be considered as high priority candidates for rehabilitation and enhancement of ecological functions, in order to strengthen physical connectivity among the various units of the system.

- d) It is recommended that any proposed "development" (as defined by the 1996 Provincial Policy Statement) encroaching directly on or within 120 m of an area identified as part of the County's Natural Heritage System be required to undertake an Environmental Impact Statement (EIS), prepared to the satisfaction of the County, local municipality, and/or conservation authority.
- e) It is recommended that development planning affecting Simcoe's significant natural heritage areas have regard to all relevant provincial policies, regulations and guidelines in effect at the time of application.
- f) It is recommended that the County of Simcoe, in partnership with the OMNR, the NVCA and its member municipalities, continue to maintain a data base of background information (published and unpublished) regarding the natural and physical resources of the County and that this information be made available to local municipal planning staff as required. This is best achieved through the County's LINC Geographic Information System.
- g) It is recommended that the status and boundaries of the units that currently make up the County's Natural Heritage System be subject to ongoing refinement as new or better information becomes available. Similar greenspace initiatives presently being carried out at a local municipal level (e.g., the Townships of Springwater, Tay and Oro-Medonte) will undoubtedly identify additional natural areas (beyond those depicted on Figure 3) that could be incorporated into the County plan in future. The Niagara Escarpment (NE) units, for example, may also require some revision once the OMNR's forthcoming report on the Niagara Escarpment is approved and released to the public. These amendments will assist in bringing upper and lower tier municipal Official Plans into conformity with each other. The County's LINC system is the obvious vehicle for updating the Natural Heritage System.
- h) It is recommended that the County encourage landowner stewardship of significant natural heritage areas on private properties, enter into conservation easements/management agreements or, where practical, acquire land outright. Stewardship and acquisition opportunities should be explored through partnership arrangements with government agencies and/or NGOs.
- i) It is recommended that the County of Simcoe assume a proactive role in cooperating with its member municipalities to achieve consistent mapping of significant natural areas and consistent use of terminology/definitions regarding greenland elements and environmental policies.

- j) It is recommended that the County of Simcoe Official Plan promote the philosophy of watershed and subwatershed planning, which integrates water resource management and land use planning, as a means to help maintain the significance of the natural heritage features within the County. Specifically, the importance of ground water and surface water interactions and its value in sustaining the Natural Heritage System should be noted.
  
- k) It is recommended that the County of Simcoe enter into partnership arrangements with lower tier municipalities, local conservation authorities, provincial ministries and non-governmental organizations to preserve, conserve, and enhance the Natural Heritage System.

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