



NATURAL HERITAGE REPORT

Campbellford/Seymour/Percy/Hastings

Quinte West ♦ Belleville

A Project of the
Bay of Quinte
Remedial Action Plan

Funding contributions from:

Great Lakes 2000 Cleanup Fund
Municipality of Campbellford/Seymour/Percy/Hastings
City of Quinte West
City of Belleville

In-kind contributions from:

Lower Trent Conservation
Quinte Conservation
Ministry of Natural Resources

Prepared by
Lower Trent Conservation
May, 2001



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- Ontario Ministry of Natural Resources

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Limitations of Mapping

The mapping in this report is based on the best information available during the study period. Discrepancies should be reviewed and corrected as more detailed information becomes available.

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" *The land ethic simply enlarges the boundaries of the community to include soils, water, plants and animals, or collectively: the LAND. In short, a land ethic changes the role of (humans) from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow members and also respect for the community as such.*"

Aldo Leopold (1949)

1. INTRODUCTION

The purpose of this Natural Heritage Report is to define the natural heritage system for the study area and suggest ways the municipality, in consultation and partnership with the community, might develop a natural heritage strategy to protect and enhance the habitats and biological diversity of that system and its ecological health.

In 1999, a number of partners under the umbrella of the Bay of Quinte Remedial Action Plan (RAP), including federal and provincial agencies, conservation authorities and local municipalities, began the process of mapping and describing the remaining natural heritage system (habitats and landscapes) close to the Bay of Quinte and up the Trent River.

The good news for local municipalities, generally, is that the Bay of Quinte watershed still retains large sections of landscape with high natural values.

1.1 BACKGROUND

In 1985 the Bay of Quinte was listed by the International Joint Commission as a Great Lakes *Area of Concern* due to severe water pollution problems. These problems, called Impaired Beneficial Uses, included the "degradation of fish and wildlife populations" and the "loss of fish and wildlife habitats". To restore impaired uses a strategy was created.

This strategy, known as the *Remedial Action Plan* (1990 and 1993), outlined a number of recommendations that both directly and indirectly might reverse the downward trends (collapse) in terms of natural habitats and wildlife numbers. For example, RAP advocates an ecosystem approach be taken in all future land use and economic planning processes in the Bay of Quinte watershed. Natural heritage strategies provide just such an ecosystem perspective. A natural heritage strategy encompasses an integrated landscape approach to identification, protection and rehabilitation of natural areas in a planning region.

In 1996, Ontario gave additional credibility to this broader approach in a new Provincial Policy Statement (PPS) issued under Section three of the Planning Act using, as it did, the phrase "ecosystem and watershed related issues". Section 2.3.1 and 2.3.2 of the PPS (Province of Ontario, 1996 and 1997) both refer to the need to demonstrate no negative impacts of development on the "ecological functions" of an area. The PPS (Section 2.3.3) continues with what amounts to a goal statement for a natural heritage strategy: "The diversity of natural features in an area and the natural connections between them should be maintained and improved where possible."

1.2 THE NATURAL HERITAGE CONCEPT

"Natural heritage is a concept that expresses collective and individual roles and responsibilities in relationship to biodiversity. As such, it recognizes the role of humans as the critical agents of change who, at the same time, are the stewards responsible for their natural inheritance and legacy (Riley and Mohr, 1994)."

The overall philosophy of a natural heritage approach is described by Riley and Mohr (1994):

Natural heritage systems are identified as a method for defining integrated networks of conservation lands and waters linked by natural and restored corridors. They are a practical technique to define conservation and protection objectives in land-use, watershed and resource planning. They can also define baseline or benchmark landscape systems against which to monitor cumulative effects and assess acceptable levels of landscape change.

In the settled and fragmented landscape of Quinte (as with most of southern Ontario) natural heritage systems, and the associated strategy designed for their protection and restoration, can accomplish the following:

- represent remaining types of ecosystems and processes,
- maintain, even enhance, populations of native species,
- conserve rare plant communities (eg. alvars, prairies),
- help protect water resources
- establish priorities for restoration, stewardship, purchase and protection,
- create a shared vision of place in the natural world, and
- assist municipal councils with establishing direction on how and where development can occur without compromising natural systems.

1.3 ELEMENTS OF A NATURAL HERITAGE SYSTEM

A natural heritage system can be identified at the regional, municipal or watershed scale and include core conservation lands and waters joined by natural corridors and restored linkages. It is a connected, diverse natural landscape. The "system" is comprised of existing natural heritage features and linkages, along with potential corridors and habitat rehabilitation areas that, if restored, would help to enhance the existing system.

The key components (core areas) of the natural heritage system include:

- Woodlands
- Wetlands
- Areas of Natural and Scientific Interest (ANSIs)
- Watercourses and valleylands
- Specialized communities

These core areas provide wildlife habitat for a full range of animals and plants. However, isolated patches of wildlife habitat are not enough to allow for sustainable, healthy populations. While some species range over agricultural lands, others require natural linkages and corridors between the core areas. These are essential to allow for migration of wildlife, to provide escape routes and to foster biodiversity of natural communities and genetic pools. A connected and

diverse natural system provides a scenic landscape with opportunities for passive recreational and traditional resource-based economic activities.

1.4 THE STUDY AREA

This Natural Heritage Report was completed for the newly formed Municipality of Campbellford/Seymour/Percy/Hastings, City of Quinte West, and City of Belleville (all located within the Counties of Northumberland and Hastings.) The City of Quinte West is comprised of the former City of Trenton, Township of Murray, Township of Sidney and Village of Frankford. The City of Belleville includes the former City and the Township of Thurlow. All of the municipalities involved in the study are currently preparing a new Official Plan.

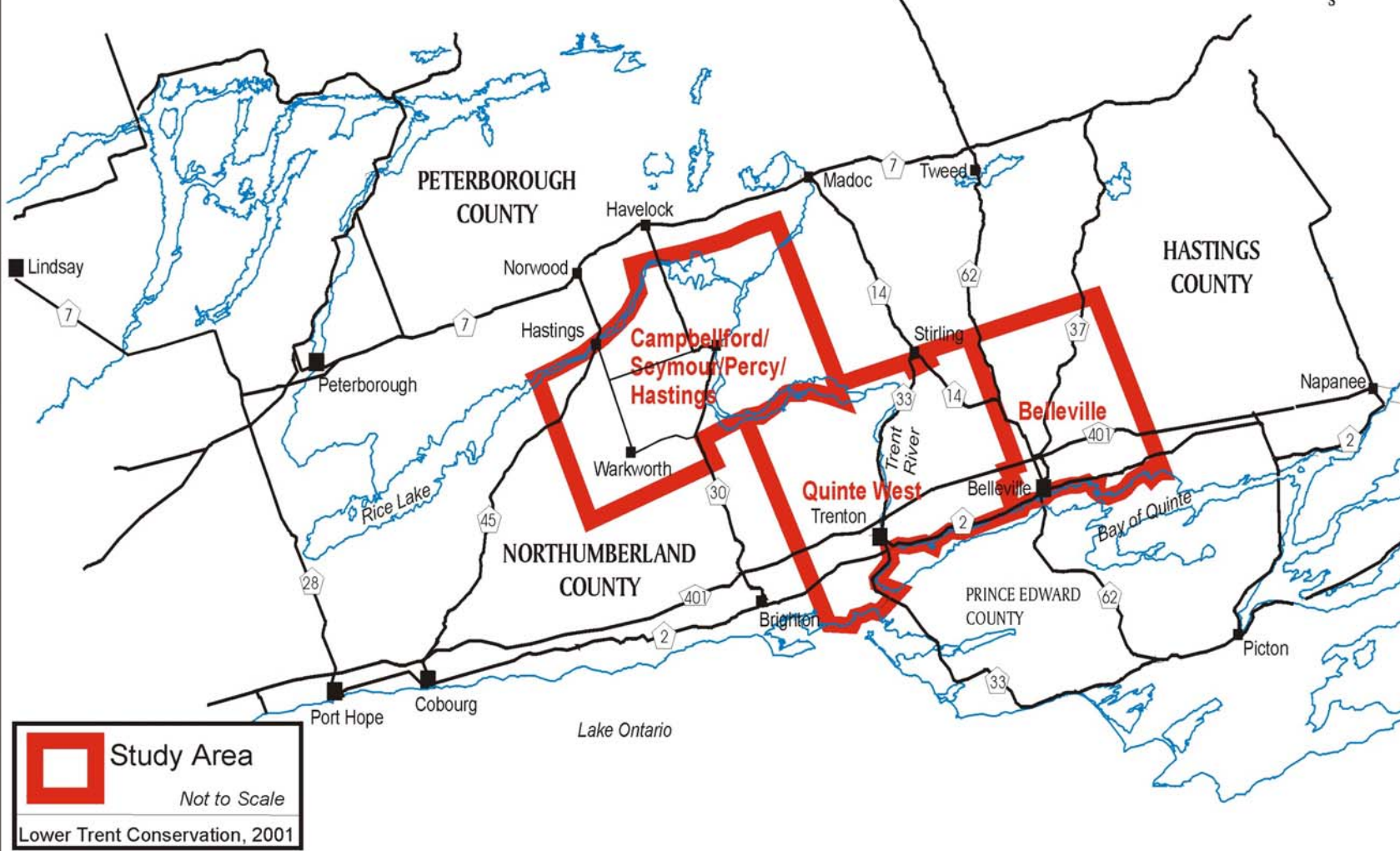
The study area is within the watershed of the Bay of Quinte. The tributary watersheds drain into the Trent River and Moira River or directly into the Bay of Quinte (with the exception of a small corner of Quinte West which drains directly into Lake Ontario). Figure 1 shows the location of the study area.

This area is comprised of an extremely diverse landscape. Glaciation sculpted the landscape leaving drumlins, kame deposits, and remnant shorelines. The wide range of physical features provides variety and enriches the rural character of the landscape. Natural stream corridors and hedgerows link the larger landscape features—wetlands, ravines, forests, and grasslands—to form a connected web of landforms and habitats. Water is abundant—cold and warm water streams, feed into the Trent and Moira, which in turn flow into the Bay providing a wide variety of fish habitat. Oak Lake, formed during the last ice age, is a unique landform in this area. Wildlife is abundant in the study area, with wild turkeys in the hardwood forests, herons and bitterns in the marshes, and concentrations of songbirds and butterflies along the bayshore.

Many Quinte landowners are excellent stewards of the land and portions of the study area remain relatively healthy. Nevertheless, urban and rural development, agriculture, and forestry have led to fragmentation of the landscape. As development continues to occur, the biological diversity and integrity of natural ecosystems will be threatened. The natural heritage system will become more fragmented, dividing the remaining natural areas into isolated pieces. Self-contained, remnant natural areas are not sufficient to support diverse communities of plants and animals. In addition to wildlife habitat, the role of a healthy natural heritage system in protecting water resources should not be overlooked. It is important to act now to protect not only the existing significant natural areas and linkages between them, but also to identify and promote establishment/enhancement of new linkages to ensure a healthy natural heritage system.

Much information about individual natural areas has previously been collected for the study area and is on file with various agencies. The challenge of this project is to bring the existing inventories together and use other information sources to map out a natural heritage system, identify significant areas, and most importantly, to identify the means by which to protect and enhance the identified system and the natural biodiversity that it supports.

Figure 1
Location of Study Area



1.5 BAY OF QUINTE REMEDIAL ACTION PLAN PROJECT PARTNERS

This Natural Heritage initiative is a project of the Bay of Quinte Remedial Action Plan. Project partners are listed below.

Great Lakes 2000 Cleanup Fund

- ~contributed \$30,000 to the project
- ~the Bay of Quinte Remedial Action Plan Habitat Project Coordinator, with funding through the Great Lakes 2000 Cleanup Funds, worked as a member of the technical team providing biological expertise including development of significance criteria, gathering information, and contributing to preparation of the report.

City of Belleville, City of Quinte West, Municipality of Campbellford/Seymour/Percy/Hastings

- ~contributed \$24,000 to the project
- ~participated at project team meetings
- ~provided information, mapping, aerial photographs

Lower Trent Conservation

- ~provided in-kind support including project administration, use of aerial photographs, mapping, office space, computers, supplies, travel, and participation of staff in meetings.
- ~Lower Trent Conservation was also responsible for overall preparation of the strategy including preparing the mapping and report

Quinte Conservation

- ~provided in-kind support including project administration, use of aerial photographs, mapping, participation of staff in meetings.

Ontario Ministry of Natural Resources (OMNR)

- ~the District Ecologist assisted with the project by participating in team meetings, providing information, and assisting with development of significance criteria
- ~various staff provided input to development of significance criteria and mapping techniques
- ~the Natural Heritage Information Centre (NHIC) provided digital information
- ~Ontario Base Maps and other information (eg. wetland, ANSI mapping) were used to prepare the digital mapping through agreement with OMNR
- ~OMNR's satellite imagery was used as a base for identifying and correcting wetland, woodland and significant valleyland features

Quinte Watershed Cleanup

- ~a committee representative participated in the project team meetings and reviewed reports

1.6 OBJECTIVES AND ANTICIPATED BENEFITS

Objectives

The intent of this project is to map out the natural heritage system for the study area and, in consultation with stakeholders, develop a strategy to protect it. This report represents phase 1 of the project: identification of the natural heritage system and development of a potential strategy to protect it. The proposed strategy includes a set of recommendations (for consideration by the municipality and community) aimed at ecosystem protection and enhancement through:

1. Municipal Planning (*protection of core areas--upland habitats, wetlands and riparian lands*);

2. Stewardship (*guidelines to help focus and encourage private landowner stewardship activities*);
3. Restoration (*guidelines to help identify potential restoration sites throughout the range of habitats present*).

The Report represents only the first phase of the project. The second phase will require public involvement: the agricultural community, developers, environmental groups, tourism and economic development interests, and other area interest groups and residents. Based on input and discussion with the community, the approach to natural heritage protection will be determined. The revised report will form the Natural Heritage Strategy.

The final, and most critical, phase is implementation. This will be an ongoing endeavour, and will require commitment from the municipalities, community, conservation authorities and other groups and agencies.

Anticipated Benefits

The ultimate goal of completing and implementing a natural heritage strategy is a healthy, functioning, diverse ecosystem. Protection of the natural systems, such as forests, wetlands, and riparian areas, is also the key to the protection of our valuable water resources.

Other benefits of completing a natural heritage strategy include:

- **Protection of Water Resources**

The protection of wetlands, woodlands and riparian lands helps protect water quality, sensitive recharge and discharge areas, and helps prevent flooding.

- **Social and Economic Benefits of a Healthy Environment**

Having a healthy natural environment is a boost to the local economy and brings social benefits to the community. Tourism dollars are brought to the area for recreational activities associated with a healthy environment—fishing, boating, wildlife watching, hiking, etc. Timber harvesting, commercial fishing and other resource based businesses are only sustainable in areas where sound water and land use management practices are implemented. Implementation of the Natural Heritage Strategy will help to protect and enhance the natural assets of the area. A healthy ecosystem also means a healthy place to live. This can be an asset for businesses and families considering moving to the area.

- **The Natural Heritage System is Complimentary to the Agricultural Sector**

Protecting natural areas from development results in less scattered rural development and ultimately helps to maintain the viability of the agricultural lands.

- **Long-term Protection of the Environment and Implementation of BQRAP Objectives and Recommendations**

Implementation of natural heritage strategies around the Bay will help to sustain habitat gains achieved through implementation of the RAP and will ensure that a mechanism is in place to

continue to promote protection and enhancement of the watershed ecosystem once the Bay of Quinte Remedial Action Plan is fully implemented.

- **Development of a methodology to apply to other areas within the Bay of Quinte watershed**

The methodology developed for this natural heritage strategy can be applied to other areas within the Bay of Quinte watershed and potentially to other Great Lakes Areas of Concern.

- **Ongoing database development and monitoring through GIS (Geographic Information Systems) Technology**

GIS technology is used to organize, map and analyse data. The mapping provides a base for future monitoring, and can easily be updated. As more detailed mapping, based on field surveys, becomes available, it can be incorporated into the system. The database associated with the mapping can also be routinely updated as new information is collected.

- **Implementation of Provincial Policy Statement**

Identification of significant woodlands, significant valleylands, significant wildlife habitat and a natural heritage system provides municipalities with a base of information to use to implement the natural heritage policies of the Provincial Policy Statement issued under the Planning Act.

- **Help address Cross-Boundary Natural Heritage Issues**

Because this project involves three municipalities and gives consideration to natural areas that extend beyond the study area boundaries, the information in the report will help the municipalities address, in a comprehensive manner, the protection of natural features that extend into neighbouring municipalities.

- **Responding to Climate Change**

It is anticipated that climate change will affect the natural heritage system. Fragile natural communities may easily be impacted by the fluctuating weather patterns that are expected to occur. Maintaining woodland coverage and robust natural communities will help to combat adverse effects.

The following is a list of expected benefits of the final strategy to the project partners and the community:

Municipalities

- the Natural Heritage Strategy will provide information and guidance to help implement the natural heritage policies of the Provincial Policy Statement
- spin-off social and economic benefits of a healthy environment

Lower Trent Conservation/Quinte Conservation

- implementation of the Natural Heritage Strategy will contribute towards achieving Conservation Authority goals of protecting and enhancing local watershed ecosystems
- the Strategy will provide information to assist with decision making in the plan input and review programs
- it will help focus stewardship programs and volunteer efforts

Ontario Ministry of Natural Resources

- the Natural Heritage Strategy will include recommendations aimed at implementation

of the natural heritage policies of the Provincial Policy Statement

Waterfront Regeneration Trust (WRT)

–implementation of the Strategy will help achieve the WRT's goals of protecting significant natural areas on the waterfront, including a target of no net loss of forest cover within rural landscapes

Stewardship Councils

–the Strategy will provide information to help focus future education and stewardship projects

Community environmental groups

–opportunities to participate in environmental enhancement projects (at the implementation stage) will be identified through implementation of the Strategy

Landowners

–the natural value of their property is described
–the Natural Heritage Strategy will provide direction/advice on land stewardship
–incentive programs may be available for restoration projects in core areas

Development community

–areas of environmental significance will clearly be identified on the Natural Heritage Strategy mapping, which will assist with upfront development design

All...

–a healthy environment in which to live

2. METHODS

This project is being completed in three phases:

This Natural Heritage Report is the first phase and includes:

- Development and description of Recommended Significance Criteria based on literature research
- Development and description of methods used for mapping out the natural heritage features and natural heritage system
- A recommended approach for consultation and implementation

Developing consensus on the Natural Heritage Strategy comprises the second phase and includes:

- Public Consultation
- Preparation of Natural Heritage Strategy (revisions to Natural Heritage Report)

The final phase, Implementation, is ongoing and includes:

- Adoption of Official Plan policies to implement the recommendations
- Inclusion of clauses in zoning by-laws to implement the Official Plan policies
- Development of stewardship programs
- Public education
- Restoration projects

One of the purposes of the project was to develop a protocol for developing a natural heritage strategy which could be applied to other planning areas/watersheds within the Bay of Quinte

watershed. While this first Natural Heritage Strategy for the area is being developed as a three phase project, the natural heritage strategies that follow should be able to benefit from this project and complete development of the significance criteria, mapping, public consultation and development of the strategy as one phase. The final step, implementation, will require an on-going commitment.

The following is a brief summary of the methodology—a more detailed account is provided in Appendix A.

The mapping and strategy were developed by Conservation Authority staff in consultation with the project partners. A project team was formed with representatives from the participating municipalities, conservation authorities, Ontario Ministry of Natural Resources and Quinte Watershed Cleanup. This group met periodically throughout the study to discuss and review progress, methods and recommendations. The project partners recognize that the community will have valuable input which will help with finalizing the strategy and ensuring that it can be successfully implemented.

The method used to develop this Natural Heritage Report relies heavily on Geographical Information Systems (GIS) mapping and the use of existing data, rather than extensive field surveys. Due to funding and time constraints, field inventories were not possible. It is hoped that as more detailed information becomes available, it can be incorporated into the mapping, and that, over time, a more detailed database on the natural heritage system will be developed and maintained.

Instrumental to completing the mapping for the strategy is a computer with Geographical Information System capabilities in ArcView, a plotter, satellite imagery and air photo coverage. Appendix A provides a description of the hardware and software requirements.

The first step in developing the strategy was to develop a digital map of the study area using digital Ontario Base Maps, obtained by agreement from the Ontario Ministry of Natural Resources.

The next step was to acquire natural heritage information. Digital and hard copy data is housed at a number of different offices. Information was collected from the following agencies and groups for this project to help identify the natural heritage system.

- Ontario Ministry of Natural Resources (Peterborough District)
- Ontario Ministry of Natural Resources (Natural Heritage Information Centre)
- Lower Trent Conservation
- Quinte Conservation
- Bird Studies Canada
- Canadian Wildlife Service

With this information, digital layers of existing natural heritage information were then created in the Geographic Information System:

- Provincially Significant Wetlands (area information--polygons)
- Areas of Natural and Scientific Interest (area information--polygons)

- Environmentally Sensitive Areas (area information--polygons)
- Evaluated Wetlands (not provincially significant) (area information--polygons)
- Wildlife habitat information (point data)
- Species of concern data (point data)

Information on woodlands was not available. Therefore, a digital layer had to be created by editing the vegetation layer on the digital Ontario Base Maps, using air photos and digital satellite imagery provided by the Ontario Ministry of Natural Resources. The method used for editing the woodlands was developed by OMNR (Scherzer, 2000). The results of this exercise was a digital layer, showing all woodlands over 1 ha.

With the exception of provincially significant wetlands and a few evaluated wetlands that were determined to be not provincially significant, there was not a lot of information on other wetlands. Air photo interpretation was therefore used to identify all wetlands and valleylands within the study area. A digital layer of wetlands and valleylands was then created using onscreen digitizing, with the satellite imagery and Ontario Base Maps as a base.

Provincially Significant Wetlands, from OMNR's Natural Resources Values Information System (NRVIS) database, were provided in digital form. Since portions of the digital mapping were inaccurate, the wetlands had to be positionally corrected using satellite imagery and the methods developed by OMNR.

Once the natural heritage digital layers were compiled, maps of the natural heritage system and its features were prepared and significance criteria applied. Since planning for natural heritage protection is best done at the watershed or broad landscape scale, the methodology for mapping, recommended significance criteria and the recommended approach to implementation are consistent across the study area.

3. SIGNIFICANCE CRITERIA

Assigning significance to natural areas was based on a review of the literature and in consultation with the project team members. The significance criteria outlined below has been used to map out the natural heritage system in this report and is recommended for defining significant areas for other Bay of Quinte natural heritage strategies. A brief description of the natural features identified is provided in Appendix B.

3.1 SIGNIFICANT WOODLANDS

Five criteria were used to identify significant woodlands. These consisted of size, presence of interior habitat, proximity to other significant natural features, hydrologic values, and age. The evaluation of significance was based on a minimum standards method, in which a woodland is considered significant if it meets one or more of the criteria (summarized in Table 1). An explanation of each significance criteria is provided below.

TABLE 1 SIGNIFICANT WOODLAND CRITERIA	
Criteria	Description
size	> 40 ha
interior/edge habitat	–based on habitat 100 metres from edge –has to be at least 300 metres wide (100 metres inside)
hydrological values	–any woodland > 1 ha that is adjacent to a stream is significant (this includes headwater woodlands)
habitat diversity	–forest patches located adjacent to or overlapping with other significant features, including Provincially Significant Wetlands, ANSI's, Environmentally Significant Areas
age	–woodland patches with old growth forest defined as communities of trees 100 years or older

3.1.1 Size

Woodlands 40 ha or greater in area

Larger woodlands are generally considered more valuable than smaller woodlands. Large woodlands can support a wider diversity of species and are less sensitive to disturbance (Riley and Mohr 1994, Larson et. al. 1999, OMNR 2000, Bowles 1999). Species are also less susceptible to local extirpations (disappearance) in large woodlands than small fragments (Larson et. al. 1999).

Forest cover in the study area is 30.6%. OMNR guidelines suggest that woodlands greater than 40 ha should be considered for significance in areas where forest cover is between 15% to 30% (OMNR 2000). Since forest cover was only slightly above this range, 40 ha was selected as the threshold patch area for woodlands significance. Additional considerations for setting this criteria included the high fragmentation of habitats and the potential for development pressures.

This threshold should also apply to other Quinte municipalities that occur south of the Canadian Shield. The area of forest cover is expected to be similar in these planning areas, and will probably not be less than 15%. In the event that forest cover is less than 15% in other municipalities, then the size threshold for this significance criteria should be lower. Consistent with OMNR guidelines (OMNR 2000), a threshold of 4 ha and 2 ha is recommended for areas with 5% to 15%, and less than 5% forest cover, respectively.

3.1.2 Interior/Edge Habitat

Presence of forest habitat 100 metres or greater from a forest edge with a minimum width of 300 metres.

Woodland edges represent a transition between habitat types where conditions are very different from the forest interior. Woodland edges are susceptible to many disturbances, such as noise or pollution, invasion by non-native species, extremes of temperature and humidity, and

increased parasitism and predation (Riley and Mohr 1994, Larson et. al. 1999). These factors result in differences in vegetation, insect densities and animal communities between the forest edge and interior (Larson et. al. 1999, Burke 1999).

While many native species use and benefit from forest edge, the fragmentation of woodlands in southern Ontario has resulted in a dramatic reduction of forest interior and consequently a decline in species that require these habitats. Many birds that breed in forests require large habitat areas and tend to nest 100 metres or greater from the edge of a woodland (Environment Canada et. al. 1998, Francis and Austen 1999). The abundance of some forest interior birds is estimated to have declined by as much as 90% in Ontario since European settlement (Cadman 1999). It has also been demonstrated that fewer species of forest interior birds are present in regions with low forest cover and little interior habitat (Riley and Mohr 1994, Villard 1999, Larson et. al. 1999).

Forest dependent nesting birds can be divided into 2 groups with respect to their requirements for forest interior habitat. Forest interior/edge species tend to nest 100 metres or farther from the forest edge. True forest interior birds will usually only nest 200 metres or more from the edge (Environment Canada et. al. 1998). These forests could be expected to support the full range of forest nesting birds, including the more sensitive species.

Woodlands in the study area with any interior forest habitat were considered significant. The presence of interior forest habitat was based on some forest being present at least 100 metres from the edge and a minimum patch width of 300 metres.

3.1.3 Hydrological Values

Woodlands, greater than 1 ha, adjacent to any watercourse or waterbody

Woodlands located near waterbodies, watercourses and headwaters provide important hydrological functions. Forested riparian and headwater areas help to control erosion, sedimentation and nutrient inputs, moderate stream temperature, and influence stream flows. Removal of riparian and headwater woodlands can result in degraded water quality, increased flood peaks, as well as reduced groundwater infiltration and baseflows (OMNR, 1988).

Besides their hydrological values, woodlands located near water are also critical for many species of fish and wildlife. Trees contribute debris to streams—debris is an important component in nutrient cycling, insect production and habitat structure. Many mammals, birds, reptiles and amphibians depend on riparian corridors for moving between habitats, or as nesting and hunting areas (Riley and Mohr 1994).

For these reasons, riparian and headwater woodlands were identified as significant.

3.1.4 Habitat Diversity

Forest patches overlapping or abutting with other significant features.

Natural areas that provide more than one type of habitat will usually support more species of plants and animals than a single habitat type (OMNR 2000). Often, habitats are linked not only spatially, but functionally as well. Groundwater feeding a wetland, for example, may be sourced in an adjacent forest. Most wildlife also require a complex of habitats to satisfy all their life history requirements. Although leopard frogs breed in the spring in wetland ponds, they will move to upland meadows in the summer to forage for insects.

Woodlands that were adjacent to, or overlapped with, other significant features were considered significant. Other significant features include areas that have been identified for their provincial or regional ecological significance through past studies, reports and planning documents. These consisted of Provincially Significant Wetlands, ANSI's, and documented Environmentally Significant Areas.

3.1.5 Age

Woodland patches with old growth forest defined as communities of trees 100 years or older.

Old growth forest is extremely rare in southern Ontario, accounting for less than one tenth of one percent of land cover. Prior to European settlement, old growth forest would have dominated the landscape (Riley 1999). Old growth forests are relatively undisturbed relicts of the original forest condition. They offer opportunities for studying and understanding forest ecosystems that are unavailable in younger woodlands. They also contribute to the biodiversity of our landscapes and provide specialized habitats for many wildlife. In addition, they have a spiritual and cultural value as places of silence and solitude.

Forest patches containing old growth woodland were considered significant. (Trees 100 years of age and older were considered to be old growth.) Potential old growth forests were identified from Forest Resource Inventory maps (and entered in the table for each woodland polygon). However, confirmation that these features persist will require field investigation. Old growth forests have not been identified on the maps at present, but as such information becomes available, any woodland patches having communities of trees 100 years or older should be considered as significant woodlands.

Figures 2 and 3 (in the back of this report) show the significant woodlands identified for the study area.

3.2 SIGNIFICANT WILDLIFE HABITATS

Identification of significant wildlife habitats was based on existing information collected from a variety of organizations, agencies and reports. Figure 4 (in the back of this report) shows the significant wildlife habitat identified. Although some of the wildlife habitats that have been listed below as significant are not present in the study area, they may occur in other municipalities fronting the Bay of Quinte. They have been included here since one of the objectives of this study is to develop significance criteria that will be applicable to other Quinte planning areas. In addition, new information may reveal new or previously unknown occurrences of these habitats that can subsequently be added to the natural heritage system.

Much of our information on the natural heritage system relates to wetlands and aquatic habitats.

Upland areas are often under-represented in protected areas, therefore more effort needs to be put into identifying this type of habitat. Through identification of significant wildlife habitat, some upland habitats are identified as Environmentally Sensitive Areas, rare vegetation communities, and habitats of species of concern.

Significant wildlife habitat includes:

- Seasonal Concentrations of Animals:
 - Colonial bird nesting sites
 - Waterbird migratory stopover areas
 - Landbird migratory stopover areas
 - Bat hibernacula
- Raptor nesting habitat
- Environmentally Sensitive Areas
- Rare vegetation communities
- Habitat of species of conservation concern

3.2.1 Seasonal Concentrations of Animals

Many species of animals collect in numbers during certain times of the year in response to seasonal constraints or life history requirements. These habitats are critical for the persistence of these species. Animals are often most susceptible to disturbance during these times.

For this study, only documented areas of seasonal concentrations were identified as significant. They included colonial bird nesting sites, waterbird and landbird migratory stopover areas, and bat hibernacula.

Other potential seasonal concentration areas, such as raptor winter feeding and roosting areas, waterfowl breeding areas, wild turkey winter range and deer yards, were not included. This was either due to a lack of available information on known sites and their relative importance, or because other features identified in the natural heritage system are expected to fulfill these species requirements.

The following describes seasonal concentration areas that were assessed and the sources of information used:

Colonial Bird Nesting Sites

Birds that breed in colonies are known as colonial nesting birds (OMNR 2000). They include herons, terns, cormorants and gulls. Although other birds also breed colonially, such as swallows, they were not assessed. Several studies by the Canadian Wildlife Service and Bird Studies Canada were reviewed for information on locations of colonial bird nesting sites in the Quinte region. Reports referenced included Austen and Cadman (1991), Austen et. al. (1996), Blokpoel and Tessier (1996), Collier et. al. 1992, Richardson (1994 and 1996), and Teeuw (1995).

A total of seven heronries were identified. No other colonial bird nesting sites were recorded for the study area, however, they did occur in other areas of the Quinte region. These reports should be referenced for natural heritage strategies for other Quinte municipalities proximal to the Bay of Quinte and Lake Ontario.

Waterbird Migratory Stopover Areas

Waterbirds includes all birds that breed or feed in association with water (Austen et. al. 1996). Waterfowl, shorebirds, gulls, terns and other species depend on areas with abundant food and undisturbed shorelines for feeding and resting during the summer and migration (OMNR 2000).

Summer and fall surveys on the Bay of Quinte completed by the Canadian Wildlife Service in 1994 and 1995 identified several concentration areas for waterbirds in the Bay of Quinte (Patrikeev et. al. 1997). Shorelines with the highest mean number of birds/kilometre (>5 birds/km in summer or 10 birds/km in fall), and/or that corresponded with areas recommended for protection, were identified as significant.

Several sites were within the study area, including:

- Meyers Point to the Trenton Sewage Treatment Plant
- The Dundas Street Bridge in Trenton to the Carrying Place Marsh south of the Murray Canal
- The Sidney Water Treatment Plant to Makatewis Island
- The Bakelite Thermosets property to Meyers Pier in Belleville

Other sites identified by this study will be relevant in identifying significant waterbird migratory and stopover areas for natural heritage strategies for other Quinte municipalities. Review of additional studies, such as Ross (1989), will be required for municipalities with Lake Ontario shoreline.

Landbird Migratory Stopover Areas

Migrating landbirds tend to cross large waterbodies at their narrowest point. Landbird migratory stopover areas on the Great Lakes are often associated with points of land that extend into the water and funnel species onto mainland resting and feeding grounds (OMNR 2000).

Identification of landbird migratory stopover areas was based on sites with documented recognition of their importance and use by staging landbirds. No sites were identified in the study area, however, some areas are present in other Quinte municipalities.

Bat Hibernacula (Caves)

Several species of Ontario bats, such as the Little Brown Bat, Big Brown Bat and Small-footed Bat, congregate in large numbers in caves to overwinter. Bat caves provide the specific conditions of temperature and humidity that hibernating bats require to survive the winter. Bats are extremely sensitive to disturbance during hibernation, since any changes in light, temperature, humidity or sound, will stimulate arousal and cause loss of vital energy reserves. Bat caves are also very rare in Ontario (Fenton, 1999; OMNR 2000).

Location of known bat caves were identified based on personal communication with experts and/or supporting documentation. One confirmed bat cave was present in the study area. This location is not shown specifically on the map because of the sensitivity of the site, but is part of a larger mapped natural area.

3.2.2 Raptor Nesting Habitat

Many raptors have specific nesting requirements for successful reproduction. Often, large trees to support weighty stick nests are needed, along with habitat characteristics such as proximity to water (eg. Osprey), or extensive forest cover (eg. Red-Shouldered Hawk). Disruption or disturbance of these habitats can make them unsuitable or impact breeding outcomes.

Few regional surveys of raptor nesting activity have been completed. Specific raptor nesting habitat has not been identified within the study area, but for the most part, raptor nesting sites will be protected through protection of other habitats such as woodlands, wetlands and riparian lands. Identification of specific trees/nesting platforms is beyond the scope of this study. For future studies, OMNR reports should be consulted for site specific information.

3.2.3 Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are areas that have been inventoried and evaluated based on a natural areas study. An environmentally sensitive area incorporates the full range of natural heritage features present and provides wildlife habitat. Evaluations of natural areas should be based on a list of criteria that will determine their significance. A study was completed for the lower Trent region by Brownell and Blaney (1995, 1996); the areas inventoried which were determined to be significant have been included in the natural heritage system. In order to be classified as significant, two of the following ten criteria had to be met in the Lower Trent study:

- A. Landform Representation, Rarity and Diversity
- B. Hydrological Function
- C. Vegetation Community Representation and Diversity
- D. Vegetation Community Rarity
- E. Condition/Quality of Habitats and Communities
- F. Species Diversity
- G. Species of Concern
- H. Habitat for Seasonal Concentrations of Wildlife
- I. Area Size, Shape and Buffering Capability
- J. Linkage and Clustering

Effort should be directed to completing Environmentally Sensitive Areas studies for other parts of the study area. ESAs often include several natural features and vegetation communities and are good for protecting habitats of a wide range of species.

3.2.4 Rare Vegetation Communities

Rare vegetation communities are those that are uncommon regionally, provincially, nationally or globally. They may be rare because they were never widespread, such as alvars, and/or because their distribution has been greatly reduced (eg. tallgrass prairie). Protection of rare vegetation communities is essential to maintain biodiversity and the species of plants and animals that are associated with these habitats.

Vegetation communities ranked as extremely rare, very rare or rare (S1, S2 or S3) by the Natural Heritage Information Centre (NHIC) were considered rare for this study. These rankings correspond to the distribution and number of occurrences of vegetation communities. Rare communities are those that have a restricted distribution or occur at few sites in the province.

Locations of rare communities was based on NHIC records.

3.2.5 Habitat of Species of Conservation Concern

For the purposes of this study, Species of Conservation Concern includes species ranked as extremely rare, very rare or rare (S1, S2 or S3) by the NHIC. Locations of rare species were derived from the NHIC database of element occurrences.

3.3 PROVINCIALY SIGNIFICANT WETLANDS

Wetlands can be comprised of different kinds of ecosystems such as marshes, swamps, bogs and fens. They have a very important function within the natural heritage system.

Ecological functions of wetlands (OMNR 1992) include:

- controlling and storing of surface water and the recharge and discharge of groundwater;
- maintaining and improving water quality, aiding in flood control, and protecting shorelines from erosion;
- trapping sediments which would otherwise fill watercourses;
- supporting and initiating complex food chains which are ultimately essential to a broad spectrum of living organisms, including humans;
- providing important habitat for a wide variety of plant and animal species such as breeding, spawning, migrating, etc.
- immobilizing some contaminants and nutrients;
- reducing some contaminants to less damaging compounds;
- assisting in maintaining water quality in adjacent lakes and streams that support fish populations;
- providing corridors for wildlife movement.

Benefits of wetlands to humans (OMNR 1992) include:

- harvest of valuable resource products such as timber, fish, fur, waterfowl and wild rice on a sustainable basis, which contributes substantial economic and social benefits to the Province;
- active and passive recreation;
- aesthetic appreciation;
- protection of cultural values;
- outdoor education;
- water supply.

Over three-quarters of the original wetlands in southern Ontario, below the Canadian Shield, have been lost to agriculture and urban development since European settlement (OMNR 1992). Recognition of the importance of wetlands, combined with a concern for wetland loss, has led the Province to develop policies to protect them.

Wetlands that have been identified as significant using the evaluation system set out by the Ontario Ministry of Natural Resources are considered to be provincially significant and are a core component of any natural heritage system (see Figure 4).

3.4 LOWLANDS

Lowlands include wetlands that have been evaluated (but are not provincially significant) and wetlands and valleylands identified through aerial photograph interpretation (see Figure 4). Both wetlands and valleylands are not suitable for development without draining and/or filling, and often are subject to flooding or poor drainage. They also have other functions within the natural heritage system (eg. wildlife habitat, linkages, hydrological function, fish habitat).

Wetlands are defined as “lands that are seasonally or permanently covered by shallow water, as well as lands where the water table is close to or at the surface. In either case, the presence of abundant water has caused the formation of hydric soils (soils in which there is an abundance of moisture) and has favoured the dominance of hydrophytic or water tolerant plants”(OMNR 1992).

Because of the concerns with wetland loss and recognizing their importance in ecosystem function, all wetlands should be protected. Wetlands that have been evaluated, but were determined to be not provincially significant have been included in the natural heritage system. Unevaluated wetlands (which includes wet forests) were identified through aerial photograph interpretation and mapped as part of the natural heritage system.

Valleylands are the flood plain lands adjacent to a watercourse, or in the case of a well defined valley, the lands between the top of slope on either side of a watercourse. Valleylands were identified for this project through aerial photograph interpretation.

3.5 AREAS OF NATURAL AND SCIENTIFIC INTEREST (ANSIs)

ANSIs have been mapped by the Ontario Ministry of Natural Resources (see Figure 4). ANSIs are special areas within the natural heritage system that should be preserved for either biological reasons (life science ANSIs) or because of the physical landform itself (earth science ANSIs). The areas identified for protection are selected to represent the wide range of earth and life science features in an area. Most of the mapped ANSIs are provincially significant, but in some cases this has not yet been confirmed. OMNR should be contacted to confirm significance when there is uncertainty.

3.6 RIPARIAN LANDS

The riparian lands are identified as a 30 metre protected area along both sides of all watercourses (see Figure 4). This riparian zone, sometimes referred to as the “ribbon of life”, is critical habitat for many terrestrial and aquatic species.

While fish habitat has not been specifically identified in this report, all fish habitat requires protection and is subject to the federal Fisheries Act (Department of Fisheries and Oceans, 1985). Protecting a 30 metre buffer along all watercourses will help protect fish habitat.

3.7 HABITAT OF ENDANGERED AND THREATENED SPECIES

The Natural Heritage Information Centre (NHIC) has provided information on endangered and threatened species. Since this information is very sensitive, no detailed information is provided in this report. Large blocks (1 square km) are shown on the maps, placed randomly over the

sites, to serve as a flag that the matter needs to be further investigated if development or site alteration is proposed.

3.8 LINKAGES AND CORRIDORS

Linkages and corridors are critical components of a natural heritage system. Natural connections between core natural areas allow for movement/migration of wildlife, and genetic and community diversity. Riparian corridors along the bayshore are important, but efforts should also be put into maintaining and forging corridors in a north-south direction to link the bay with upland areas.

With the exception of riparian lands along streams, corridors have not specifically been mapped out for this natural heritage system. A glance at the mapping indicates that the core areas overlap, creating linkages which undoubtedly function as wildlife corridors. Woodlands, wetlands, ANSIs, wildlife habitat, lowlands and riparian lands all have the potential to function as wildlife corridors; this should be taken into consideration when land use changes are being assessed in the municipal planning process.

As wildlife corridors are identified, through natural area studies or restoration efforts, they should be added to the mapping as “corridors.”

4. RECOMMENDED STRATEGY

Outlined in this section of the report, is the recommended strategy for protecting and enhancing the natural heritage system. The approaches identified will need to be presented to the public for consideration and input to ensure that they are appropriate for the local community. The final strategy will need to balance the needs and concerns of agricultural and other rural landowners, developers, environmental groups, and other interest groups with the necessity of a healthy environment for today and for future generations.

4.1 GUIDING PRINCIPLES

The following guiding principles should be taken into consideration for any plans to protect and enhance the natural heritage system:

- Protect the best
- Bigger is better
- Reconfigure/diversify
- Eliminate disturbance

Taking these guiding principles into account, the recommended strategy includes measures for protecting and enhancing the natural heritage system in the following three areas:

- Municipal and Resource Planning
- Stewardship
- Restoration

4.2 AN APPROACH TO IMPLEMENTATION THROUGH MUNICIPAL AND RESOURCE PLANNING

Official Plans have a major role in implementing a natural heritage strategy, identifying a full range of environmentally significant features, functions and linkages on the landscape. The health and diversity of the plants, animals and habitats of the remaining natural landscape can be maintained through the establishment, protection and enhancement of a natural heritage system of significant features and connecting corridors. It is the municipality's responsibility to ensure that sensitive features and their functions are not adversely affected by municipal and resource planning decisions.

4.2.1 Municipal Land Use Planning

Municipalities are encouraged to develop policies and schedules within their Official Plans and Zoning By-Laws to protect the natural heritage system of the region. The Province provides clear direction to this effect, in the Provincial Policy Statement issued under the Planning Act (see Table 2). The Natural Heritage Strategy will provide the Municipalities with the information they need to implement the natural heritage policies.

Table 2 Section 2.3 of the PPS -- The Natural Heritage Policies	
2.3.1	<p><i>Natural heritage features and areas</i> will be protected from incompatible development.</p> <p>a) <i>Development and site alteration</i> will not be permitted in:</p> <ul style="list-style-type: none"> • <i>significant wetlands</i> south and east of the Canadian Shield; and • <i>significant portions of the habitat of endangered and threatened species.</i> <p>b) <i>Development and site alteration</i> may be permitted in:</p> <ul style="list-style-type: none"> • <i>fish habitat;</i> • <i>significant wetlands</i> in the Canadian Shield; • <i>significant woodlands</i> south and east of the Canadian Shield; • <i>significant valleylands</i> south and east of the Canadian Shield; • <i>significant wildlife habitat;</i> and • <i>significant areas of natural and scientific interest</i> <p>if it has been demonstrated that there will be no <i>negative impacts</i> on the natural features or the <i>ecological functions</i> for which the area is identified.</p>
2.3.2	<p><i>Development and site alteration</i> may be permitted on <i>adjacent lands</i> to a) and b) if it has been demonstrated that there will be no <i>negative impacts</i> on the natural features or on the <i>ecological functions</i> for which the area is identified.</p>
2.3.3	<p>The diversity of natural features in an area, and the natural connections between them should be maintained, and improved where possible.</p>
2.3.4	<p>Nothing in policy 2.3 is intended to limit the ability of <i>agricultural uses</i> to continue.</p>

The following Official Plan policies and the attached mapping (Figure 5 in the back of this report) are one approach that the area municipalities might consider in order to implement the natural heritage policies. It is recognized that modifications in terminology and format will be required to fit with each Official Plan. As new zoning by-laws are developed for the municipalities, they should include provisions to implement the natural heritage policies of the

Official Plan. Prior to any policies being adopted, public consultation will be required. It is important that local residents have a chance to review the mapping and any proposed policies as they will have valuable input that will assist with drafting the final strategy.

Environmental Protection-Wetland Designation

All Provincially Significant Wetlands should be placed in an *Environmental Protection-Wetland* designation.

- No development or site alteration is permitted within provincially significant wetlands.
- An Environmental Impact Assessment will be prepared by the developer to the satisfaction of the Municipality and the Conservation Authority for any development or site alteration proposed within 120 metres of a provincially significant wetland.

This policy will implement section 2.3.1a of the Provincial Policy Statement (PPS) relating to Provincially Significant Wetlands.

Environmental Protection Designation

All wetlands/valleylands identified on the mapping and all lands within 30 metres of a watercourse/waterbody should be placed in an *Environmental Protection* designation.

- No development is permitted within any wetland/valleyland identified on the schedule.
- No development or site alteration is permitted within 30 metres of a watercourse or waterbody.

The 30 metre setback should be measured from the top of the stream bank. This should be specified in the Official Plan/Zoning By-law.

This policy will:

- help address potential negative impacts on fish habitat and valleylands—section 2.3.1b of the PPS
- help to protect corridors and linkages—section 2.3.2 of the PPS, and
- assist with implementation of the natural hazard policies relating to flood plain protection—section 3.1.1b of the PPS

Land use proposals within an *Environmental Protection* designation would require an Amendment to the Official Plan. An application to amend the plan must be accompanied by an Environmental Impact Assessment.

Environmentally Sensitive Designation

All significant woodlands, ANSIs, wildlife habitat (ESAs, etc), and wildlife corridors¹ identified on the mapping should be designated *Environmentally Sensitive*.

¹ Wildlife corridors have not been identified at present. As these are identified, they should be included in the Official Plan through amendments.

- An Environmental Impact Assessment will be prepared by the developer to the satisfaction of the Municipality and the Conservation Authority for any development and site alteration proposed within:
 - Significant Woodlands
 - Areas of Natural and Scientific Interest
 - Significant Wildlife Habitat (Environmentally Sensitive Area)
 - Wildlife Corridors
 or within 50 metres of these features.

Some of the wildlife habitat data is point data only. This should be included in the Environmental Sensitive Designation as a “flag” that there may be sensitive habitat. When development is proposed within 50 metres of the area identified, an Environmental Impact Assessment should be completed to determine if there will be any negative impacts.

These policies will help to implement the Provincial Policy Statement: section 2.3.1 b relating to significant woodlands, wildlife habitat and ANSIs, and section 2.3.3 relating to the diversity of natural features and the connections between them.

Endangered and Threatened Species

Policies should be included in the “Environment” section of the Official Plan that states:

- No development or site alteration is permitted within significant portions of the habitat of endangered or threatened species.
- An Environmental Impact Assessment will be prepared by the developer to the satisfaction of the Municipality and the Ontario Ministry of Natural Resources for any development or site alteration proposed within 50 metres of significant portions of the habitat of endangered or threatened species.

Because this information is sensitive, exact locations have not been shown on the Natural Heritage Report mapping. Instead, a flagging system has been applied (using large squares placed randomly over the sensitive sites). A similar flagging approach could be used in the Official Plan, or the plan could reference screening maps supplied by the Ontario Ministry of Natural Resources. If a proposal is found to be located in or adjacent to an area of concern, the application should be circulated to the Ontario Ministry of Natural Resources for review.

Agricultural Uses

The Official Plan should clearly state that, as set out in section 2.3.4 of the Provincial Policy Statement, the recommended policies for the Environmental Protection - Wetland, Environmental Protection, and Environmentally Sensitive designations are not intended to limit the ability of agricultural uses to continue.

Definitions

The following definitions should be included in the Official Plan:

Site Alteration: means activities, such as fill, grading and excavation, that would change the landform and natural vegetative characteristics of a site.

Development: means the creation of a new lot, a change in land use, or the construction of buildings and structures requiring approval under the Planning Act.

Agricultural uses: means the growing of crops, including nursery and horticultural crops; raising of livestock and other animals for food or fur, including poultry and fish; aquaculture; agroforestry; maple syrup production; and associated on-farm buildings and structures.

Planning Applications

The natural heritage policies of the Official Plan should apply to:

- Plans of Subdivision and Condominium
- Amendments to the zoning by-law
- Site Plans
- Land Severances

Minor Variances will generally be permitted without completion of an Environmental Impact Assessment. The Municipality, however, may want to keep the option open of requiring Environmental Impact Assessments for minor variances (eg. where the proposal has the potential to negatively impact a special feature such as a Provincially Significant Wetland or the habitat of endangered/threatened species).

Vacant Lots of Record

For vacant lots of record, a building permit for residential purposes may be issued within an Environmental Protection designation, Environmentally Sensitive designation or on adjacent lands, provided that the site is developed in a manner which maintains the ecological integrity of the landscape. The landowner should be required to complete a development plan, outlining from an ecological viewpoint, the preferred site, design, and any construction details.

Permitted Uses

Not all activities are restricted in lands designated as Environmental Protection and Environmentally Sensitive. A list of permitted uses should be developed in consultation with the community and resource agencies. Permitted uses might include:

- agricultural uses
- tree cutting for landowner's own use, using best management practices
- docks (permits may be required under other legislation)
- conservation/passive recreational uses
- erosion/flooding control structures

4.2.2 Other Resource Use Recommendations

Environmental Impact Studies for Resource Use and Infrastructure Projects

Land or resource use proposals within the Environmental Protection designation, Environmentally Sensitive designation, or on adjacent lands that require:

- Full or Class Environmental Assessments under the Environmental Assessment Act,
- Applications for new or expanded aggregate licenses under the Aggregate Resources

Act, or

- Wayside permits issued under the Aggregate Resources Act, should be accompanied by an Environmental Impact Assessment.

Woodland Conservation By-law

A municipality with a population over 10,000 has authority, under the revised Municipal Act (1990), to:

- Pass a tree protection by-law "prohibiting or regulating the injuring or destruction of trees or any class of trees specified in the by-law in any defined area or on any class of land." (Province of Ontario, 1993)

Such a by-law typically require a person or company to get a permit to cut trees, with exceptions such as personal use and safety concerns.

The municipalities within the study area are encouraged to adopt a "Woodlands Conservation By-Law" to control the indiscriminate cutting or destruction (highgrading) of trees within existing woodlots. This should be done in conjunction with designating woodlands as significant to discourage woodland destruction by speculative developers/landowners.

The Woodlands Conservation By-Law would provide for the conservation and preservation of trees, and restrict, regulate and prohibit the destruction of trees by cutting, burning or other means. The objective of the By-law might be:

To protect the natural heritage system of the municipality, while respecting the rights of landowners, and allowing for tree cutting under specified circumstances.

It would not be the objective of the By-law to prohibit all cutting, but rather to encourage good forestry practices. This would ensure that trees are properly maintained and, when cut, harvested in a sustainable manner that benefits and minimizes damage to woodlots.

Some municipalities have passed by-laws which apply to woodlands over a certain size (eg. 2 ha or 20 ha), others have passed by-laws that restrict tree removal based on species or diameters; others have restrictions on tree removal based on woodlands density. It is up to the Municipality to determine to what areas or trees the By-Law would apply. In order to protect the natural heritage system identified in this report, it is recommended that the by-law apply to all natural heritage lands identified on the mapping and that a map of the system be attached as a schedule to the by-law. This would include significant woodlands, provincially significant wetlands, lowlands (valleylands and wetlands), ANSIs, ESAs, and riparian lands.

The By-law would not prohibit all cutting in such areas. Exempted activities (where no permit is required) could include:

- tree-harvesting for a landowners own use (this does not include any sale, exchange or other disposition of the trees that are cut);
- tree cutting on lands covered by a Woodlot Management Plan approved by a forestry consultant, provided that such work is completed in accordance with good forestry practices and the Woodlot Management Plan
- trees planted for the production of Christmas trees;
- trees planted for the purpose of commercial fruit production;

- tree removal for safety concerns;
- trees growing upon any roadway or opened road allowance.

If a By-law were in place, tree cutting would not be restricted anywhere in the Municipality that is not within the defined area on the schedule (the natural heritage system) and limited tree removal would be allowed within the natural heritage system, without a permit, if it were an exempted activity.

Other tree-cutting activity within the scheduled area would require a permit from the municipality, and would need to be done in accordance with good forestry practices. The municipality may charge a fee for such permits.

For tree cutting or removal within a scheduled area, the landowner would be required to complete an application form and submit it to the municipality. The municipality may require that the application be prepared by a professional forester and include detailed information on the woodland to be harvested (tree species, age, size and density) as well as the best management practices that will be used. Prior to harvesting, the trees to be removed would need to be marked.

A member of the municipal staff could be responsible for the administration of the by-law and delegated the authority to receive applications and fees, issue permits and to attach conditions. Before making a decision to issue a permit, municipal staff should ensure that all the required information is provided. The Municipality may wish to circulate the application to a Conservation Authority or consultant for review prior to making a decision. All permits issued to remove trees should be in accordance with good forestry practices.

The Municipality would also appoint an officer to enforce the provisions of the by-law. The by-law enforcement officer would be able to enter upon private land to inspect the site and enforce the provisions of the by-law.

There are many examples of by-laws to restrict tree cutting in southern Ontario that can provide a template for a “Woodlands Conservation By-Law” for this area. When the municipalities decide to proceed with such an initiative, consultation with the local community will be key to shaping a by-law that will be workable for the Quinte area. This by-law will need to be flexible and should recognize the rights and stewardship ethics of local landowners. Local municipalities may wish to extend the by-law to apply to individual trees along streetscapes. This again would need to be decided by the community.

4.2.3 Environmental Impact Assessment

The purpose of an Environmental Impact Assessment (EIA) is to assess the potential impacts of development and site alteration on natural heritage features and their ecological functions.

An assessment of impacts requires sufficient information on a proposed development to demonstrate *“that there will be no negative impacts on the natural features or the ecological functions for which the area is identified.”* (PPS, 1997)

Negative impact means:

- i in regard to fish habitat, the harmful alteration, disruption or destruction of fish habitat, except where it has been authorized under the Fisheries Act, using the guiding principle of no net loss of productive capacity.
- ii in regard to other natural heritage features and areas, the loss of the natural features or ecological functions for which the area is identified.

Scope of the Environmental Impact Assessment

It is critical that, for all EIAs, the following four questions are satisfactorily answered.

1. What type and size of development is proposed?
2. What are the key features and functions that may be affected by the development? (A map is required showing the proposed development and the natural heritage features/functions.)
3. What are the potential negative impacts?
4. Are there mitigative measures that can be taken to avoid or reduce negative impacts?

The level of detail needed to complete a review of development impacts will vary depending on the characteristics of the site and the proposed development. In some situations, a very detailed assessment may be necessary, while in others, a more limited assessment will suffice.

All impact assessments, regardless of the level of detail, should be based on a clear understanding of the undertaking and the environment, the potential impacts on key features and functions, and possible mitigation measures.

Less detailed assessments of development impacts are required where:

- proposed developments are expected to result in minimal impacts on natural heritage resources; and/or
- the expected impacts can be readily mitigated

A sample checklist for these assessments is included in Appendix C. In some cases, these can be completed by the landowner/applicant.

A more detailed assessment is required where:

- the potential impacts of an undertaking are unknown;
- impacts on natural heritage resources are likely; and/or
- appropriate impact mitigation techniques may not be apparent.

Detailed assessments should be completed by a qualified professional, acceptable to the Municipality and the proponent. The proponent is responsible for the cost of the assessment. It should be recognized that, generally, there will be negative impacts on natural features or

functions, otherwise an assessment would not have been required. The EIA should focus on describing the natural features and functions (conducting a field inventory where required), quantifying the potential negative impacts, and recommending mitigative measures to minimize the loss. The Environmental Impact Assessment must be done to the satisfaction of the municipality, in consultation with the Conservation Authority. Before initiating an EIA, the proponent should recognize that, in some cases, the potential negative impacts will not be acceptable.

Potential Impacts

Development activities that have the potential to impact the natural heritage system include: vegetation removal, grading, aggregate extraction, installation of services and utilities, building construction, water crossings, paving, groundwater taking, use of septic systems, human occupation, and recreation (walking, swimming, boating, fishing, hunting, and use of all terrain vehicles).

Vegetation removal/site grading can:

- cause loss of linkages and corridors for animal movement which results in isolation of species and loss of genetic diversity and biodiversity
- reduce wildlife habitat which fragments natural areas and reduces habitat to below critical levels
- result in loss of rare plant species and communities which affects biodiversity
- fragment natural areas which affects the presence of forest interior species, increased predation and introduction of non-native species
- reduce stability or cause physical alterations to sensitive landforms (earth science features)
- change the soil moisture regime and vegetation communities
- affect groundwater recharge
- disturb sensitive wildlife species

Vegetation removal and site grading in riparian areas can also:

- increase runoff and water temperature, which in turn affects aquatic habitats
- increase inputs of nutrients and contaminants to waterbodies which can affect aquatic plant growth and have lethal effects on aquatic life
- reduce amounts of leaves, twigs and insects to waterbodies (reduced food supply for aquatic life)
- reduce bank stability, and increase erosion and sedimentation with resultant impacts on aquatic habitat
- disrupt riparian corridors
- disturb sensitive wildlife species

Construction of buildings and roads and installation of services can:

- increase water contamination by oils, gasoline, grease and other materials from parking lots, driveways, and roads which affects aquatic life
- increase imperviousness which affects groundwater recharge, surface runoff and aquatic communities
- result in direct loss of wildlife from collisions with buildings

- attract nesting turtles and other wildlife to roadsides and roads which increases roadkills
- increase nutrient inputs from septic systems which affects aquatic habitat
- result in increased use of pesticides and fertilizers on lawns which affects aquatic life
- increase predation of wildlife species by pets and invasion of non-native species
- increase lighting and noise which may affect sensitive wildlife species
- attract nuisance species which impacts community diversity
- result in loss of linkages

Interference with waterways (realignment, stream crossings) can:

- affect fish movement
- affect water temperature and aquatic habitat
- affect channel geomorphology, wetland communities and fish habitat

Recreational activities and seasonal development can:

- increase harvest of fish and reduce populations
- improve access to sensitive sites which can result in vandalism and loss of ecosystem integrity
- increase shoreline alteration which affects fish habitat
- cause trampling of vegetation and soil compaction which affects vegetation communities and increases runoff to watercourses (impacting aquatic life)
- result in removal of vegetation causing loss of wildlife habitat and reduced biodiversity
- disturb sensitive wildlife species

Table 3 lists some of the potential impacts of development on specific natural features. It is meant to provide an overview but is not considered to be a complete list.

Table 3 Potential Impacts of Development on Natural Heritage Features			
Woodlands	Wetlands	Wildlife Habitat	ANSIs
–reduction in forest interior habitat due to loss of forest edge –loss of woodland area –loss/reduction in width of wooded linkages/corridors –removal of trees or placement of fill in hydrologically sensitive areas –loss of old growth trees –loss of rare woodland communities	–impact of stormwater runoff to wetland (pesticides, fertilizer, hydrocarbons, sedimentation) –impact on fish habitat –loss of wetland area –impacts on water temperature –loss of vegetated buffers –loss of linkages with upland areas –changes to the hydrological regime	–invasion of non-native species –loss of rare species –disturbance of sensitive wildlife –loss of habitat –changes to the hydrological regime	–physical impacts on significant landforms –vegetation destruction –changes to the water regime and resultant impacts

Appendix C of OMNR's Natural Heritage Reference Manual (OMNR 1999) provides a comprehensive list of potential physical impacts and potential impacts on features and functions. It also provides guidance for addressing impacts of development on natural heritage features. It is recommended that Municipalities use this document as a guide for completion of EIAs. Some key sections of this document have been included in Appendix C of this report for easy reference.

4.2.4 Compensation

Some woodlands have been deemed significant based on woodland coverage alone. These woodlands may not contain old growth species or rare habitats, and may not have an important hydrological function. An Environmental Impact Assessment may determine that loss of portions of these woodlands will not negatively impact the woodland's function. However, incremental loss of small pieces of woodlands will result in a cumulative loss and woodland coverage of the study area will be reduced.

Compensation would be required to address incremental loss if, through an EIA, it has been determined that development may be permitted within a significant woodland. The owner would be required to contribute financially to a "woodlands improvement fund" managed by the Municipality. The amount of compensation would be determined, as part of the Environmental Impact Assessment, based on area of woodland coverage lost, and/or the number and size of trees removed. A compensation fee schedule should be developed by the Conservation Authority and Municipality. The fund would be used to finance woodland enhancement projects in targeted areas.

4.2.5 Limitations of Mapping

It is important to recognize that the mapping in this report is, for the most part, based on interpretation of aerial photographs and satellite imagery, with some field checks and ground truthing.

Where there is a dispute over the limit of a natural area, the boundaries should be determined and confirmed in consultation with the Conservation Authority and/or Ontario Ministry of Natural Resources. It is important to recognize that site-specific studies will be helpful in mapping out more precise boundaries.

For planning purposes, a site inspection is recommended for any areas where there is uncertainty. As the municipalities prepare the schedules for their Official Plans, public review may result in the need to alter some boundaries. This can be done in the planning schedules, and changed in the Natural Heritage Strategy through regular monitoring and database updates.

It also should be recognized that there are areas where development has been proposed, draft approved, or final approved but development has not yet occurred. The maps in this Natural Heritage Report represent the natural heritage system, as it exists in the year 2000. It is beyond the scope, or intent, of this project to map out approved development areas. This can be done as Official Plan and Zoning By-law Schedules are prepared.

4.3 Stewardship Recommendations

In addition to protecting natural heritage features from non-compatible development, public ownership of sensitive lands is the ideal method of protection. However, recognizing that the majority of lands identified in the natural heritage system will remain in private ownership, long-term protection and management of these lands and features will remain the responsibility of the landowner. Public awareness of the value of the natural heritage system must be heightened and programs developed to energize the community and encourage them to take action. With limited funds and time, restoration activities should be focussed on priority areas where the ecological benefits will be the greatest.

Public Ownership

Where possible, core significant lands should be placed in public ownership where they can be preserved in a natural state. The transfer of ecologically significant lands to a land trust, conservation authority, municipality, or other public organization is encouraged through:

- transfer of lands arising out of land dedications as part of the land use planning process,
- bequests from private landowners,
- additions or consolidations to existing public holdings,
- strategic securement of ecologically sensitive lands otherwise approved for development.

Land Trusts, and other public bodies, should be provided information on key significant areas so they can focus land acquisition/conveyance efforts to significant areas.

Management Plans should be prepared for all public lands, which contain natural heritage features, that include measures for protecting and enhancing the natural heritage features.

Private Land Stewardship

The majority of lands identified in the natural heritage system will remain in private ownership and long-term protection and management of these lands and features will remain the responsibility of the landowner. The following recommendations are geared at heightening the conservation ethic of the community and encouraging stewardship.

- Develop a Stewardship Program to focus efforts on protecting and enhancing the natural heritage system. The program should include landowner contact as well as a grant incentive program to encourage “best management practices” in significant areas.
- Develop a stewardship strategy to identify and target priority features/habitats.
- Provide information to stewardship program coordinators and encourage them to focus activities on protecting and enhancing the natural heritage system.
- Encourage preparation of forest management plans for significant woodlands.
- Promote stewardship of the natural heritage system through education and awareness activities, including displays, web sites, publications, etc.

- Encourage participation in tax rebate programs such as Managed Forest Tax Incentive Program, Conservation Land Tax Incentive Program, and the Ontario Environmental Farm Plan Incentive Program. These programs promote the environmental stewardship of private forests and conservation land.
- Encourage landowners to donate/convey ecologically sensitive lands to land trusts or other public bodies. The Ecological Gifts Program (Environment Canada) provides significant tax advantages for conveying properties into public trust.

4.4 RESTORATION RECOMMENDATIONS

The following is a list of recommendations that should be considered for restoration projects. A site restoration and management plan should be developed prior to undertaking these projects. It should be recognized that, in some instances, the “do nothing” approach is the most appropriate means of restoration for some areas.

Woodlands

- Maximize size of woodlands (focus on larger woodlands)
- Diversify species
- Modify the shape for compaction to reduce amount of forest edge and increase amount of interior habitat
- Recombine separate woodland patches where there is potential to create woodlands greater than or equal to 40 ha
- Plant native species
- Ensure that sensitive non-forested habitats (prairies, alvars and savannahs) are identified and excluded from woodland restoration projects

Significant Wildlife Habitat

- Apply management techniques appropriate to the type of habitat. Site inspections and detailed management plans are required to ensure that sensitive natural communities and species are not negatively impacted by inappropriate restoration activities.
- Install nesting platforms, boxes, etc.
- Eliminate disturbance (eg. through fencing of cattle)

Valleylands and Stream Corridors

- Plant native trees and shrubs to increase/enhance vegetation cover within valleylands
- Focus planting programs to ensure that woody vegetation extends to a minimum of 10 metres beyond the top of valley slope. Where there is no defined valley, the vegetation should extend a minimum of 30 metres from the water’s edge
- Focus efforts on first and second order watercourses (especially cold water streams).
- Eliminate disturbance (eg. through fencing of cattle, retiring cropland adjacent to watercourses)

Wetlands

- Establish vegetative buffers along wetlands (minimum of 30 metres in width)
- Eliminate disturbance (eg. through fencing of cattle)

Corridors

- Along the Bay of Quinte, enhance and widen shoreline corridors with grasses and/or woody species to a minimum width of 30 metres
- Along watercourses, enhance and widen riparian vegetation (grasses/woody species) to a minimum of 30 metres, with priorities being placed on first order and second order cold water streams
- In upland areas, widen corridors to a minimum width of 100 metres. Projects that link upland habitats with aquatic habitats should be given higher priority than projects that link upland habitats with other upland habitats

Environment Canada, the Ontario Ministry of Natural Resources, and the Ontario Ministry of Environment have developed a series of habitat guidelines for wetland, riparian and woodland restoration. These are summarized in Tables 4, 5, and 6 and should be used to guide restoration activities.

Table 4 Summary of Wetland Habitat Restoration Guidelines	
Parameter	Guideline
Percent Wetlands in Watershed and Subwatersheds	Greater than 10% of each major watershed in wetland habitat; greater than 6% of each subwatershed in wetland habitat; or restore to original percentage of wetlands in the watershed.
Amount of Natural Vegetation Adjacent to the Wetland	Greater than 240 metres width of adjacent habitat that may be herbaceous or woody vegetation.
Wetland Type	The only two wetland types suitable for widespread rehabilitation are marshes and swamps.
Wetland Location	Swamps should be as large as possible to maximize interior forest habitat. Marshes of various sizes attract different species and a range of sizes is beneficial across a landscape.
Wetland Size	Headwater areas for groundwater recharge, floodplains for flood attenuation, and coastal wetlands for fish production.
Wetland Shape	Swamps should be regularly shaped with minimum edge and maximum interior habitat. Marshes thrive on interspersed, a term describing the irregular shape of functional marsh habitats.
Source: Environment Canada, OMNR, OMOE. <i>Framework for Guiding Habitat Rehabilitation in Great Lakes AOCs</i> , 1998.	

Table 5 Summary of Riparian Habitat Restoration Guidelines	
Parameter	Guideline
Percent of Stream Naturally Vegetated	75% of stream length should be naturally vegetated.
Amount of Natural Vegetation Adjacent to Streams	Streams should have a 30 metre wide naturally vegetated buffer on both sides.
Total Suspended Sediments	Suspended Sediment concentrations should remain below 25 mg/l for the majority of the year.
Percent of an Urbanized Watershed that is Impervious	Less than 15% imperviousness in an urbanized watershed should maintain stream water quality and quantity, and leave biodiversity relatively unimpaired.
Fish Communities	Targets are set based on knowledge of underlying characteristics of watershed (drainage area, surficial geology, flow regime), historically and currently occurring fish communities, and factors presently impacting the system and their relative magnitudes.
Source: Environment Canada, OMNR, OMOE. <i>Framework for Guiding Habitat Rehabilitation in Great Lakes AOCs</i> , 1998.	

Table 6 Summary of Forest Habitat Restoration Guidelines	
Parameter	Guideline
Percent Forest Cover	30% of watershed should be in forest cover.
Size of Largest Forest Patch	At least one 200 ha forest patch which is a minimum 500 metres wide.
Percent of Watershed that is Forest Cover 100 metres and 200 metres from Forest Edge	Greater than 10% forest cover 100 metres from edge; greater than 5% forest cover 200 metres from edge.
Forest Shape and Proximity to other Forested Patches	Forest patches should be circular or square in shape and in close proximity (i.e. 2 km) to adjacent patches.
Fragmented Landscapes and the Role of Corridors	Corridors designed to facilitate species movement should be a minimum of 100 metres wide and corridors designed for specialist species should be a minimum of 500 metres wide.
Forest Quality - Species Composition and Age Structure	Watershed forest cover should be representative of the full diversity of species composition and age structure found in that ecoregion.
Source: Environment Canada, OMNR, OMOE. <i>Framework for Guiding Habitat Rehabilitation in Great Lakes AOCs</i> , 1998.	

5. STRATEGY DEVELOPMENT

This report has been developed for three adjacent municipalities within the Bay of Quinte watershed. A consistent approach has been used across the study area to map the natural heritage features and for development of significance criteria. Likewise, a consistent approach is recommended for development of the strategy. Natural features and watersheds transcend municipal boundaries; resource management efforts are, therefore, more effective if carried out on a watershed basis or a broad landscape scale.

5.1 PUBLIC CONSULTATION

This report represents only the first phase of the Natural Heritage project. Upon completion of the report, it is important that the municipalities proceed with public consultation and preparation of the Natural Heritage Strategy. While a consistent approach across the study area is ideal, it is not critical that all three municipalities follow the same approach. For example, Campbellford/Seymour/Percy/Hastings is further along with preparation of their official plan and has already had a fair degree of public consultation. If the municipality is ready to proceed with implementation, it is encouraged to do so. Further public consultation for Campbellford/Seymour/Percy/Hastings may be able to be done in conjunction with public meetings for their new Zoning By-law.

The following is an approach which the other two municipalities, or all three, might consider. This process could be carried with joint meetings to cover more than one municipality but, if preferred, a public process for individual municipalities could be carried out. This would, however, be more costly and the benefit of having broader interests represented at the meetings would be lost.

Public Meeting (#1) (Information Session)

Hold an information session to inform the community of the work that has been completed to date.

Notice of Meeting:

- Advertise in local newspaper
- News release to local newspaper and radio stations
- Direct mail to area interest groups (eg. Federation of Agriculture, Environmental groups, Tourism groups, Economic Development groups, etc.)

Format:

- Open House (0.5 to 1 hour for meeting attendees to view mapping and displays)
- Brief presentations from Municipal, Conservation Authority and OMNR staff
- Question Period
- Form Working Group

Key Messages:

- The Natural Heritage Report is a good news story. Unlike many areas of southern Ontario, there are relatively healthy natural communities still intact in the Quinte Area.

This is a boon for the local community as it not only provides a healthy environment in which to live and helps protect precious water resources, but also is an attraction for tourism and economic development.

- Natural heritage is important to local lifestyles and the quality of life. An array of natural heritage features allows for passive recreational activities such as hiking and walking. This type of activity is growing in popularity in the Quinte area.
- Significance criteria was developed based upon a review of the literature and follows guidelines set out in the reference manual for the Provincial Policy Statement.
- The mapping in the Natural Heritage Report is based on the best information available. As more detailed mapping becomes available it can be incorporated into the report.
- Not all of the proposed land use restrictions are new. Many areas identified in the natural heritage system (provincially significant wetlands, lowlands, riparian lands) are already protected in municipal official plans and zoning by-laws.
- Completion of this project is a requirement for the Municipality. Without a natural heritage strategy, the Municipality cannot make informed decisions on the natural heritage components of the Provincial Policy Statement.
- The mapping and report deals with natural heritage issues only. Natural hazard areas such as flood plains, erosion prone areas, and dynamic beaches also require protection. Sensitive groundwater resources are other areas that need to be identified and protected. It is quite likely that many of these areas have already been covered off in the natural heritage system.
- The project is not just about municipal planning. Stewardship, education and restoration of impaired habitats are also important components.

Working Group Meeting (#1)

A working group, composed of representatives from a wide range of interests, meets to draft recommendations for the strategy.

Public Meeting (#2)

Hold a second information session to present findings of the working group.

Notice of Meeting:

- Advertise in local newspaper
- News release to local newspaper and radio stations
- Direct mail to attendees of first information session and area interest groups (eg. Federation of Agriculture, Environmental groups, Tourism groups, Economic Development groups, etc.)

Format:

- Brief presentations from the Working Group on recommendations
- Question Period

Working Group Meeting (#2)

Hold a final working group meeting to discuss input from public session and make necessary revisions to recommendations.

Prepare Natural Heritage Strategy

Update and revise the Natural Heritage Report and mapping based on public consultation to create the Natural Heritage Strategy.

5.2 IMPLEMENTATION

Once the community and municipalities have agreed upon what the Natural Heritage Strategy should look like, the final phase of the project begins. Implementation will require the on-going commitment of many partners—municipalities, conservation authorities, provincial ministries, interest groups, and landowners.

An important step will be implementation through the planning process. Municipalities will need to draft policies for their Official Plans (followed by Zoning By-Laws) to implement the Natural Heritage Strategy. Public consultation will again be required at the plan development stage.

Resource managers will also need to work on developing programs for stewardship and education and on focussing restoration efforts in key areas.

Key to the implementation of the natural heritage strategy is the development of an understanding within the community of how protection of the natural heritage system is linked with the community's vision of "a great place to live." Scenic vistas, clear water, abundant forests and wetlands are all part of the natural landscape and are vital to the area's diverse tourism opportunities. These natural amenities also provide for a high quality lifestyle. There is a direct link between protecting the region's green infrastructure and water resources with development and economic growth in the Quinte area. This link needs to be recognized and promoted.

5.2.1 ON-GOING DATA COLLECTION

The Natural Heritage Strategy should be seen as an evolving process. Ongoing adjustments to the natural heritage system/strategy will be required in order to incorporate new information and data, to reflect increased understanding of ecological processes, and to integrate improved planning and resource management models.

The municipalities should be encouraged to undertake field studies using the Ecological Land Classification System developed by the Ontario Ministry of Natural Resources and up-to-date mapping technology such as the Global Positioning System. This type of project would determine more accurately the boundaries of natural heritage areas and the significant features within them. The inventories could be done through a contract with the local Conservation

Authority. It is important to note that any such project will require an extensive landowner contact program to obtain permission for entry and surveys on private lands. This can be a time consuming and costly component of the project.

It should also be recognized that natural features and the natural heritage system are not static features, but that their areal extent varies over time based on weather patterns, natural processes and human impacts. For example, beaver dams cause fluctuations to wetland boundaries and woodlands tend to expand outward through natural regeneration. Adjacent land policies and setbacks give some degree of protection to fluctuating natural area boundaries, but the mapping needs to be updated regularly to reflect the changing natural heritage system.

5.2.2 DATA MANAGEMENT

A database should be attached to the digital mapping that is designed to record new information collected through site inventories and environmental impact assessments. It is critical that this database is maintained and enhanced. New information/data should be shared between the implementation partners as it becomes available.

Sources of input data might include:

- Environmental Impact Statements
- Environmental Assessments or Class EAs
- Resource and biological inventories
- Subwatershed Plans
- Assessment records and development proposals
- Contributions from area naturalists

Maintenance of the database and mapping should be the fiscal responsibility of the Municipality. The local Conservation Authority may have the mapping and environmental expertise required to revise the maps and database and could be contracted by the municipalities to undertake regular updates.

It is recommended that Natural Heritage System mapping be updated at least every five years and the database annually.

5.2.3 MONITORING FOR SUCCESS

Keeping the maps current will allow for monitoring of changes to the natural heritage system. Restoration projects can be tracked and new mapping of natural areas can be entered into the map layers. Ongoing monitoring of the impacts of development on the natural heritage system can be undertaken by conservation authority and municipal staff through tracking of planning application decisions.

Implementation of the Natural Heritage Strategy should be seen as an evolving process – monitoring of the progress followed by adaptations to the recommendations to ensure that the natural heritage system is being protected.

An Implementation Committee is required to ensure implementation of the strategy. Representatives from the conservation authorities, municipalities, and stewardship agencies and

groups should form the implementation committee. This committee should meet annually to review and assess progress made in implementing the Natural Heritage Strategy. Based upon the assessment, the committee may wish to take additional actions to achieve the intent of the Natural Heritage Strategy.

As new information becomes available, the municipalities are encouraged to incorporate it into their Official Plans, through amendments to the schedules and/or policies. For example, based on the results of Environmental Impact Assessments or other inventories, specific woodlands may be identified as highly significant. Rather than leaving these in the “Environmentally Sensitive” designation (which may permit development), it would be more appropriate to move them to the “Environmental Protection” designation, and zone them accordingly.

The municipality is encouraged to form an Environmental Advisory Committee to assist in the monitoring of the Natural Heritage Strategy.

6. CONCLUSION

The quality of our lives is dependent on the quality of our environment. With human domination of the biosphere, our species has the ability to seriously alter and negatively impact the natural landscape. When making land use decisions, whether through municipal planning or private land management, consideration must be given to the broader perspective of ensuring long-term ecological health.

Development and implementation of a natural heritage strategy can help to protect the remaining richness and diversity of habitats and landscapes – the ecological integrity of the region. It can heighten civic environmentalism, create a shared vision, and encourage the community to take collaborative action to guard and restore the natural integrity of the landscape.

The municipalities and the community are encouraged to take this report and embrace the intent of the recommendations within, and to work together to create a natural heritage strategy which will protect our natural inheritance for future generations.

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APPENDIX A DETAILED METHODOLOGY

NATURAL HERITAGE REPORT Campbellford/Seymour/Percy/Hastings Quinte West ♦ Belleville

A Project of the
Bay of Quinte
Remedial Action Plan



Prepared by
Lower Trent Conservation
May, 2001

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This document outlines the methods used to prepare the mapping for the Natural Heritage Report for the Municipality of Campbellford/Seymour/Percy/Hastings, City of Quinte West, and City of Belleville. Since it is also intended as a guide for other resource managers who are developing natural heritage strategies, potential improvements or changes are also provided for future consideration. Most of the details provided below relate to procedures for digital mapping, but guidance is also provided for information gathering and aerial photograph interpretation.

1. THE TOOLS

- Computer–Pentium III (minimum), 450 Mhz, 2-4 GB hard drive (free space), 128 mb RAM, modem
- Plotter–E-type, colour
- Digitizing tablet
- Geographic Information System software–ArcView (3.1 minimum) and ARC/INFO (PC ARC/INFO minimum)
- ArcPress (an Extension for ArcView) is recommended for plotting
- Boundary Reconciliation Tool (developed by Ministry of Natural Resources)
- Microsoft Excel
- Stereoscope

2. BASIC INFORMATION

- Satellite Imagery
 - IRS Panachromatic (5m resolution) fused with Multi-Spectral Image (20 - 25m resolution)
- Recent aerial photograph coverage–stereoscopic pairs
 - Colour
 - Large scale, 1:10,000 preferable
- Digital Ontario Base Maps (OBMs)
 - ARC/INFO format (e00)
 - Scale 1:10,000
- Forest Resource Information (FRI) Maps
 - hard copies are acceptable, but digital copies are preferable

3. PREPARATION OF THE DIGITAL BASE MAP

The base map is prepared in ArcView using digital 1:10,000 OBM layers. The maps are downloaded from the Ontario Ministry of Natural Resources (OMNR) web site, under licence with the Ministry of Natural Resources, in ARC/INFO exchange format. Individual map sheets are merged, layer by layer, to form the base. The base map (for the current study area) is referenced to the UTM coordinate system (Zone 18, NAD 27) . The map sheets for the portions

of the study area that are in zone 17 are projected into zone 18. Zone 18 is also appropriate for other municipalities bordering the Bay of Quinte.

The following digital OBM themes are required:

- transport
- townlines
- building
- cultpoints
- drainlines
- drainage (polygons)
- vegetation
- contour

The Digital Topographic Database Overview prepared by OMNR (1994) is critical to identify required digital layers. It outlines background information about the OBMs and includes a list of feature codes (fcodes) which are needed for this project.

4. INFORMATION GATHERING

Digital and hard copy data is housed at a number of different offices. Key sources of information are:

- Ontario Ministry of Natural Resources (District office)
- Ontario Ministry of Natural Resources (Natural Heritage Information Centre)
- Conservation Authorities

Other agencies and organizations may be able to provide information. These include:

- Bird Studies Canada
- Canadian Wildlife Service

5. DIGITAL MAPPING OF NATURAL FEATURES

In order to create the natural features maps, digital data must be acquired or produced for the following components of the natural heritage system.

- Provincially Significant Wetlands (PSW)
- Significant Woodlands
- Areas of Natural or Scientific Interest (ANSIs)
- Significant Wildlife Habitat
- Lowlands (wetlands and valleylands)
- Riparian Lands

These natural features are composed of one or more digital themes (or layers). Satellite imagery is used to correct/update some of this information. Additional information is added to the natural features polygons as attributes.

5.1 Provincially Significant Wetlands

The first step in creating a Provincially Significant Wetland layer is to obtain digital inventoried wetlands from OMNR's Natural Resources Values and Information System (NRVIS). Ensure that the wetland layer is complete and includes all open water marsh polygons. This may be provided separately.

The NRVIS wetland layer should be reviewed to ensure that it is reasonably accurate. Some errors may have occurred when the wetland was originally digitized for input into NRVIS. For example, polygons may be missing from the wetland or the table, which indicates significance, may be incorrect. The data needs to be carefully checked for missing wetlands and inaccuracies.

For the purpose of a broad scale natural heritage strategy, the external wetland boundary is the major consideration. Major changes should not be made to the mapping (ie. the digital wetland should resemble the wetland on the hard copy mapping).

OMNR has developed a methodology for correcting digital wetlands in ArcView. The methodology is summarized below, but the details are outlined in the OMNR document United Counties of Leeds & Grenville Pilot Woodland/Wetland/Urban Polygon Mapping Project: Protocol for making changes to NRVIS Wetland Polygons. This manual should be consulted and adhered to. Prior to initiating editing of wetlands, OMNR should be contacted to discuss any new developments in this technique.

OMNR is in the process of reviewing and correcting the digital wetland mapping. If OMNR has completed this task for the study area, the wetlands can be used as is.

The following is a summary of the methodology:

1. Have the following themes displayed on screen:
 - hydrology from OBMs
 - OMNR Wetlands from NRVIS
 - 20 - 25m multispectral image fused to 5m resolution Indian Satellite imagery fused to DEM (digital elevation model)
 - other OBM layers may be helpful including vegetation, contours, transport, townlines, buildings and cultpoints

Also have available actual paper/mylar copies of the wetland mapping and air photos for the area.

2. Review each wetland looking for the following indicators which may suggest that a correction is required:
 - the wetland polygon is not closed
 - road crossings in the wrong location
 - wetland polygon has similar shape to OBM hydrology but is shifted
 - river is not centred within riverine wetland (river crosses wetland boundary)

- NRVIS wetland community doesn't align with edge of lake
 - NRVIS wetland polygon doesn't coincide with a "block" of uniform colour on remote sensed image
3. Undertake changes as required using vertex edits and/or the boundary reconciliation tool in ArcView.
 4. Document and review, for approval, all changes made to wetland boundaries with district staff from the Ministry of Natural Resources.

Once the editing is complete, the provincially significant wetlands need to be separated from the other evaluated wetlands. The “provincially significant wetlands” will form one layer. The other wetlands will be placed in another layer (not provincially significant) and used for mapping “Lowlands”.

5.2 Woodlands

The initial woodlands layer is comprised of the vegetation layer from the Ontario Base Maps. The vegetation layer needs to be edited to exclude vegetation communities that are not woodlands (eg. old fields/shrub thickets) and to account for changes to the woodlands since the OBM vegetation layer was created. A methodology for creating a woodland layer, using satellite imagery to correct the vegetation layer, was developed by OMNR: [Steps and Procedures for Editing an OBM Vegetation Layer to Produce a Woodlands Layer Using Satellite Imagery \(Pilot Project for the United Counties of Leeds & Grenville County\)](#) (Scherzer, 2000). This methodology is summarized below, with some changes which are needed for the Natural Heritage project. The details are outlined in the protocol developed by OMNR. Before starting the work, OMNR should be consulted to see if any changes have been made to the methodology.

1. Have the following themes showing on computer screen (where available):
 - A copy of the OBM vegetation, to be edited
 - OBM hydrology
 - OBM transport
 - 20 -25m multispectral image fused to 5m resolution Indian Satellite imagery fused to DEM
 - NRVIS PSWs and ANSIs
 - Significant Natural Areas
 - Other OBM layers may be helpful including, townlines, buildings and cultpoints

If available, the following themes would also be helpful:

 - Air photo plot centres
 - OMNR G&Y & ELC plot centres
 - NRVIS Woodlot Improvement Areas
 - NRVIS Provincial Parks

- NRVIS Conservation Areas

Hard copy Forest Resources Inventory (FRI) maps and the most recent aerial photographs should be readily available for consultation for areas difficult to interpret.

2. Systematically scan the satellite image, looking at each OBM vegetation polygon, and edit using the ArcVIEW Boundary Reconciliation tool.
 - a. Woodland vs Old Field Shrub Thicket
Make sure it is woodland as opposed to old field shrub thicket by uniformity of texture and colour.
 - Expand/contract size of vegetation polygon to reflect only woodland.
 - b. Change of land use
OBM vegetation polygon delineates an area on the image that is uniformly pink (agricultural field) or blue (indicating development eg. subdivision)
 - Contract size of vegetation polygon to reflect only woodland
 - c. Road crosses OBM vegetation polygon
 - If road is wider than 21 metres, split polygon using outer road boundaries.*
 - d. Vegetation polygons on both sides of narrow road crossing (<21m wide)
 - Join the polygons to make one contiguous woodland polygon if road is less than 21 m wide.*

**Note: Based on the Natural Heritage Strategy work done to date, it is recommended that rather than trying to measure the width of the road, polygons should be split for County Roads and Highways, but not split for Township roads. The exception to this would be where the clearing for a Township road is obviously more than 21 metres in width or a major road seems very narrow because of overhanging woodland coverage on both sides.*
 - e. Potential forest cover on satellite imagery which is not in OBM vegetation layer
The image shows uniform reddish-green colouring (indicating forest) in the area between 2 or more vegetation polygons.
 - Confirm that the reddish green reflectance is woodlands as opposed to old field shrub thicket. If yes, create new vegetation boundary and join to existing polygons if required.
 - f. Two or more OBM vegetation polygons are bisected by an OBM river arc
 - Join polygons to make a contiguous polygon.
 - g. Wetland boundary or OBM hydrology boundary overlaps with OBM vegetation boundary.**
 - Snap OBM vegetation boundary to wetland boundary.

***For the Natural Heritage Strategy work, wooded areas inside the drainage polygon and wetland also need to be edited and maintained. These can be kept as a separate theme and added to the woodland theme using the “union” option in the geoprocessing extension.*

- h. NRVIS woodland boundary is adjacent to a lake boundary
 - Snap OBM vegetation boundary to drainage layer.
- i. OBM vegetation polygon overlaps with Conservation Area, Provincial Park, ANSI or Significant Natural Area
 - Correct woodland boundary if better data is available for these areas.

Prior to proceeding with analysis, the woodlands inside the drainage/wetland layer need to be unioned with woodlands outside the drainage area.

Once the editing of the woodland layer is complete, create a field for area in the tables and calculate the area in hectares. This is for use in future analysis.

The next step is to eliminate any woodlands less than 1 ha in size through a simple query. The resulting woodland layer is the one that should be used for analysis. (Note: if woodlands extend beyond the municipal boundaries, they should still be included in this layer.)

The next step is to apply the significance criteria. The following steps should be taken:

5.2.1 Size

Woodlands are considered significant if they are greater than 40 ha in size (the size may vary for different planning areas). To identify these, conduct a query in ArcView to find all woodlands > 40 ha and create a new layer.

5.2.2 Interior Habitat

Woodlands with interior habitat include woodlands that have 100 metres of edge habitat and still have at least 100 metres of woodland within the buffer. This means that a woodland has to be at least 300 metres wide.

In ArcView, create a 150 metre internal buffer as a shape file using ArcView’s buffer operation (under *Theme–Create Buffer*). Use the sample script “*Explode*” to create a buffer file comprised of separate shapes. *Union* the buffer file with the original woodland file. Do a query to select the records that have no buffer distance. Create a new layer that contains only these records. Then use *select by theme* to identify all woodlands from the original layer that overlap with the records that have no buffer distance. The selected woodlands have interior habitat. Make these into a new layer (shape file).

5.2.3 Diversity

Woodlands are identified as diverse if they overlap with a provincially significant wetland, ANSI or ESA. This is done by overlaying the woodlands with the Provincially Significant Wetlands to identify all woodlands polygons that overlap. Use *select by theme* to accomplish this. Repeat this for ANSIs and ESAs separately, adding each selection to the first set. Once completed, *convert to shape file*. The woodlands in this file are identified as “diverse.”

5.2.4 Hydrological Significance

Woodlands that are within 10 metres of a watercourse or waterbody or overlap a watercourse or waterbody are identified as hydrologically significant. To identify these, create a 10 m buffer along both sides of the drainlines and the outside of the drainage (polygons). Overlay the original woodlands with the buffer and *select by theme* all woodlands that intersect the buffered watercourses and waterbodies. *Convert to shape file*. This layer is the hydrologically significant woodlands.

5.2.5 Age

The Forest Resource Inventory Mapping (completed by the Ontario Ministry of Natural Resources, 1980) is used to help identify significant woodlands. It is only available in hard copy format for the Quinte area. Since the mapping is 20 years old, the information has to be verified by air photo interpretation and/or site inspections. The mapping is most useful in identifying more mature woodlands. If the dominant species is greater than 80 years old, at the time of mapping, it would now be over 100 years old and considered as old growth. Between 40 and 80 years old would now be 60 - 100 years old now and considered as mid - late successional. Old growth and mid - late successional woodlands should be highlighted separately on the paper maps. This information can then be attributed to the woodlands polygons (added to the tables). Any polygon that has old growth or mid - late successional woodlands somewhere within its boundaries are given the attribute.

The attributed information is only to be used as a flagging device, that indicates that there is the potential for old growth or mid - late successional forest to be present. If development is proposed in an area, field checks are required to verify that these woodlots are still in existence and that the more mature species have not been removed via harvesting or high-grading.

5.3 Areas of Natural and Scientific Interest (ANSIs)

Digital mapping of ANSIs can be obtained from OMNR (from NRVIS). The NRVIS ANSI layer includes polygons for the ANSIs and small circles or “point-like” data (polygons) that represent Sites of Biological Significance. The Sites of Biological Significance need to be queried out and used in the Significant Wildlife category. In order to find the point data, do a query based on size (eg . area < 1 ha). The “point-like” polygons will be obvious once the area field in the table is examined.

The ANSI layer includes both provincially significant ANSIs and sites where the significance has yet to be confirmed. They were not separated for the original Natural Heritage project.

The ANSI shape files are used as is, with no corrections made to them.

5.4 Wildlife Habitat

Wildlife Habitat is comprised of a number of themes including some polygons, point, and line data.

5.4.1 Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are mapped as polygons. Most ESAs are included in the NRVIS data. Any other known ESAs within the study area should be digitized and included in this digital layer. ESA's include wetlands, woodlands and a variety of other natural communities including alvars, sand barrens, savannahs, prairies, and rock barrens. For some areas, more information on ESAs will be available (eg. for the lower Trent region, a series of natural areas reports were completed, which means that there is more detailed information available for this area than some of the neighbouring areas).

5.4.2 Rare Habitats and Habitat for Rare and Vulnerable Species

Point data includes digital information on rare habitats and the habitat for rare and vulnerable species. This information is available through an agreement with the Natural Heritage Information Centre. The information is provided in Microsoft Excel format and must be queried to remove all species/habitats that are ranked as endangered or threatened. This data should be put in a separate table for more restricted use.

The database needs to be made into a theme using *Add Event Theme* (under *View*). Since the database provided by NHIC is in decimal degree coordinates, it needs to be projected into UTM coordinates. The "*Projection*" option under *View-Properties* can be used to accomplish this. Save the results in a new projected theme (shape file).

5.4.3 Sites of Biological Significance

Additional point data is added from the NRVIS ANSI layer discussed above. This "point data" represents Sites of Biological Significance (based on a query of the ANSI layer). Some of the point data is located within mapped ANSIs. This needs to be queried and deleted. The remaining "point-like" data needs to be saved in a new shape file (polygons). A new shape file (points) needs to be created based on the "point-like" selection (Sites of Biological Significance). The Sites of Biological Significance point data is then used in the Wildlife Habitat category.

5.4.4 Heronries

Information on heronries can be obtained from the Ontario Heronry Inventory (1990-1991) (Collier, 1992). A theme (point data) called "heronries" is created by entering the UTM coordinates. Use *add event theme* to create this layer.

5.4.5 Concentration Areas for Waterbirds

Another theme, Concentration Areas for Waterbirds, is created based on information obtained from the Canadian Wildlife Service (Patrikeev, 1997). The study (1994 and 1995) identifies several concentration areas for waterbirds along the Bay of Quinte. A digital shape file (lines) is created from this information.

5.4.6 Additional Habitat Information

All additional habitat information obtained for significant wildlife habitat should be put into digital

themes (polygons, points or lines). These might include: deer yards, wild turkey wintering range, raptor nesting sites, bat hibernacula, waterfowl/shorebird staging areas, etc.

5.5 Lowlands (wetlands, valleylands, flood plains, wet forests)

Many wetlands have not yet been inventoried or mapped. Therefore, air photo interpretation using a stereoscope is done to identify unevaluated wetlands, smaller wetlands and other low-lying wet areas. Through air photograph interpretation, stream valleys and flood plains are also identified. These areas are not separated but are identified as one layer of information entitled “Lowlands”.

Overlay acetate on each photograph. The wetlands, valleylands and flood plains must be drawn with grease pencils onto the acetate. The acetates need to be carefully labelled for future reference.

A digital layer of the “Lowlands” is created using heads up digitizing. The satellite imagery, and the vegetation, contours, road network, buildings, and drainage layers from the Ontario Base Maps (OBM) are used as a back drop to digitize the information drawn out on the acetates. A new theme needs to be created (as a polygon layer) entitled “Lowlands”. Some corrections may need to be made based on the satellite imagery and OBM information, as it is digitized.

Wetlands that have been evaluated but determined to be not provincially significant are included in the NRVIS wetland layer. These wetlands are corrected using the methodology (outlined above) for provincially significant wetlands. They need to be queried out of the provincially significant wetland theme and are an additional theme that is shown in the “Lowlands” category.

For future consideration:

- It may be desirable to separate the flood plain and valleylands from the wetlands during the air photo interpretation stage and to digitize to separate layers. This may be helpful if the Municipality chooses to apply different policies to wetlands and to valleylands/flood plains.
- The identified Lowland Areas, when overlain with the Woodland Layer, may be useful in mapping out upland versus lowland forests.
- Another option is to transfer the information from air photos to Ontario Base Maps or Forest Resource Information (FRI) maps and digitize from these maps.
- Site inspections would be useful for questionable areas.

5.6 Riparian Lands

Riparian lands are a 30 metre buffer along each side of a watercourse or along the shore of a waterbody. This is created in ArcView by creating a buffer under two OBM themes: drainlines and drainage. The first step is to create two new layers: a new drainline layer that has the feature codes (fcodes) FD32825011, GA24850000, and GA24850150 and a drainage layer that has the fcodes GA24850102, GB15300102, and GB24300102. Make sure that the map units and distance

units are both set to metres (in *View - Properties*) before starting this operation. For the drainlines, create a 30 metre buffer as a shape file under *Theme–Create Buffer*. For the drainage, start by creating a 30 metre buffer under *Theme–Create Buffer*. Choose the “only outside polygon” option. Dissolving the barriers between buffers for presentation purposes is an option, but this step is not necessary and requires considerable computer resources.

The results of this exercise will be two themes: a drainline buffer and a drainage buffer. Both of these are used to define the Riparian Lands.

5.7 Habitat of Endangered and Threatened Species

In the element occurrences database, provided by the Natural Heritage Information Centre, there is information on the Habitat of Endangered and Threatened species. This information is very sensitive and should not be shown specifically on the maps. The data for endangered and threatened species should be queried from the database and put in a new table. A shape file needs to be made from the new table. The next step is to make a new shape file (polygons) (1 km square) to place randomly over the location of each endangered or threatened species site. No information is provided in the table. The original shape file (with the table containing specific information) is then deleted.

6. OTHER CONSIDERATIONS

6.1 Study Area Limits

Since natural areas do not follow municipal boundaries, the natural heritage system boundary is expected to be somewhat irregular. For example, the total size of a natural area that extends outside the municipal boundary is mapped. It is important to take natural features that extend beyond municipal boundaries into consideration when doing analyses such as woodland size and interior habitat.

6.2 Area Calculations

It may be necessary to clip the natural heritage features (eg. woodlands, wetlands, etc.) at the municipal boundaries in order to calculate areas or percentages of the municipality that are forested, have wetlands, or are covered with natural heritage features. These files should only be used for this purpose. For any analysis to determine significance, the natural heritage features should extend beyond the municipal boundary.

REFERENCES

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- Scherzer, Randy. May 30, 2000. *Steps and Procedures for Editing an OBM Vegetation Layer to Produce a Woodlands Layer Using Satellite Imagery* (Pilot Project for the United Counties of Leeds & Grenville County). Ontario Ministry of Natural Resources.
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APPENDIX B

DESCRIPTION OF NATURAL AREAS

NATURAL HERITAGE REPORT

Campbellford/Seymour/Percy/Hastings

Quinte West ♦ Belleville

A Project of the
Bay of Quinte
Remedial Action Plan



Prepared by
Lower Trent Conservation
May, 2001

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The following is a description of the natural areas identified in the natural heritage system.

A) WETLANDS

Descriptions of the following wetlands are based on wetland evaluations, unless otherwise noted. References to the significance of species is based on information provided in the evaluations. Please note that significance levels may have changed since the evaluations.

A) Provincially Significant Wetlands

Barry Lake Wetland Complex (*provincially significant*)

101.4 ha

Lots 14 - 19, Conc. 11 & 12, Campbellford/Seymour/Percy/Hastings (formerly Percy Township)

Barry Lake Wetland is comprised mostly of swamp, with about 17% of the area being marsh. Portions of the swamp form a boreal-like community dominated by cedar and balsam fir. A wide variety of boreal species such as goldthread, bunchberry, three-seeded sedge and twin flower have been observed. These species, combined with a dense mat of sphagnum moss species, showy lady's slipper, yellow lady's slipper and northern green bog orchids make this a unique habitat. The provincially significant red-shouldered hawk occurs in this wetland along with eight regionally significant species and four locally significant species.

The wetland provides a feeding area for osprey and nesting area for common loons. It also provides fish spawning/nursery habitat.

Hydrologically, Barry Lake Wetland serves as the headwater region for an unnamed creek which flows into the Trent River. Barry lake plays an important role in the hydrology of the surrounding area by acting as a water storage basin and recharge zone.

Bayside Wetland (*provincially significant*)

19 ha

Lots 11 - 15, Conc. B. F., Sidney Ward, City of Quinte West

Located near Bayside on the Bay of Quinte, this single contiguous wetland is mainly a lacustrine marshland (exposed to the bay), with some ash, willow, and maple swamp bordering the seasonal pond and two temporary creeks. The creeks drain the land surrounding the airport runway and the subdivision that is adjacent to the Bayside East Wetland Complex. This type of marsh has a high ranking for biological productivity due to the net primary biomass production of robust emergents in predominantly mineral versus organic soils.

Over forty percent of the area is characterized by submerged vegetation such as water milfoil and Canada waterweed, thus providing locally significant spawning and nursery habitat for the commercial fishery. This is a fairly rare type of marsh within the landscape and has ephemeral ponds which are microhabitats for unique benthic invertebrates. There is also suitable waterfowl breeding habitat with provincially significant caspian terns present as seasonal migrants.

Bell Creek Swamp Complex (*provincially significant*)

88ha

Lots 14 and 15, Conc. 1; Lots 11 – 16, Conc. 2, City of Belleville, formerly Township of Thurlow

Bell Creek Swamp Complex is located on the eastern edge of Belleville. The wetland is 58% swamp and 42% marsh. This wetland plays a role in flood attenuation, pollution uptake, groundwater discharge, and in providing habitat for a number of wetland species.

Belleville Marsh (*provincially significant*)

41.4 ha

South of Keegan Parkway, west of Herchimer Ave. to east of Haig Road, City of Belleville

Belleville Marsh is located along the Bay of Quinte shoreline at the east end of the former City boundaries. This provincially significant wetland offers a multitude of benefits for the local community and the Bay of Quinte ecosystem. It is one of the few remaining coastal wetlands in the Great Lakes. The wetland includes both marsh and swamp communities and supports habitat for a variety of plants and wildlife, some of which are rare in Ontario. Between 1993 and 1997, just over 100 species of birds and 13 species of amphibians and reptiles were recorded. The Belleville Marsh helps improve water quality in the Bay and offers educational and recreational opportunities in an urban centre. It is an important link with other significant habitats to the east, including Blessington Creek Marsh, Bell Creek Marsh and Point Anne Alvar. The City of Belleville owns approximately 16 ha of land within the wetland. A stormwater detention pond is proposed adjacent to the marsh and will provide some complementary aquatic and terrestrial habitat.

Blessington Creek Marsh (*provincially significant*)

75ha

Lots 14 – 20, Conc. B.F., City of Belleville, formerly Township of Thurlow

Blessington Creek Marsh is located approximately 1 km east of Belleville. The wetland consists primarily of marsh (87%) with only about 13% swamp. This wetland plays a role in helping to control erosion along the Bay of Quinte shoreline and in providing habitat for a number of wetland species, including the provincially significant least bittern and caspian tern. The marsh also provides locally significant fish habitat for spawning and rearing.

Burnley Creek Wetland (*provincially significant*)

132 ha

Lots 7 - 10, Conc. 3; Lots 3 - 9, Conc. 2, Campbellford/Seymour/Percy/Hastings (formerly Percy Township)

Burnley Creek Wetland is a wooded swampland along the mid-reaches of Burnley Creek. About 8% of the wetland is classified as marsh. The creek is a coldwater stream that provides fish habitat for brook and brown trout.

Coniferous trees and tall shrubs are the dominant types of vegetation in the swamp, with robust emergents, such as cattails, and floating pondweed occurring in the marsh. The provincially

significant red-shouldered hawk occurs in this wetland, along with three regionally significant species: swamp sparrow, giant St. John's-wort, and skunk cabbage.

Canal Wetland (*provincially significant*)

197.2 ha

Lot 7, Conc. 10; Lots 8 - 9, Conc. 11; Lots 10 - 11, Conc. 12, Asphodel Township

Lots 1 & 2, Conc. 13 & 14, Campbellford/Seymour/Percy/Hastings (formerly Seymour Township)

This large riverine wetland is situated along the north shore of the Trent River, two kilometres northeast of the former Village of Hastings downstream to Steam Mill Island. It is found within the physiographic region of the Peterborough Drumlin Field, and is hydrologically located in the Dunette Landing (Rice Lake) subwatershed of the Trent River. This wetland is predominantly open water and riverine marsh, with shrub and treed marsh further inshore. A wet deciduous swamp of red and silver maple, black ash, cedar, speckled alder and dogwood straddles the upper reaches of the feeder streams. The open water marsh is characterized by submergent vegetation such as coontail and milfoil. The riverine marsh has floating plants such as bullhead, white water lily and pondweed, with robust emergents like cattails and broad-leaved arrowhead merging with water willow and sweet gale in the shallows.

Although this moraine region is known for its highly calcareous till and consequently its recharge capabilities, this wetland has silt and organic soils and plays a minor hydrological role. Canal wetland is provincially significant due to the biological role it performs, notably in its biodiversity, productivity and size. It supports a commercial warm water fishery, regionally significant water hemlock, swamp birch, river nut sedge and osprey. Wild rice helps support a locally significant deer population and the area is used recreationally for duck hunting.

Carrying Place & Twelve O'Clock Point Marsh (*provincially significant*)

62 ha

Lots 12 - 13, Conc. SECP & Lots 104 -106. Conc. 1, Ameliasburgh Ward, Prince Edward County

Lots 10 - 13, Block C, Murray Ward, City of Quinte West

This wetland is a lacustrine marsh located along the Bay of Quinte. Over half of the area of the wetland is open water, with eel grass as the predominant submergent vegetation. The submergent vegetation provides cover for a locally significant warm water fish nursery. There is a patch of cattails at the shoreline, along with red maple, gray alder and poplar, that provide waterfowl breeding habitat. As a lacustrine marsh, it plays a negligible hydrological role in the watershed with regards to flood attenuation, nutrient trapping, or groundwater recharge, but is considered provincially significant due to the presence of colonial waterbirds such as caspian terns and black terns. This is also the location of a culturally significant historical portage dating back to before European settlement.

Cold Creek Wetland (*provincially significant*)

634 ha

Lots 13 - 17, Conc. 6.; Lots 11 - 14, Conc. 7, Cramahe Township

Lots 2 - 10, Conc. 7; Lots 23 - 36, Conc. 5, Municipality of Brighton

Lot 17, Conc. 3; Lots 15 - 17, Conc. 4; Lots 7, 8, 10 - 22, Conc. 5; Lots 3 - 10, Conc. 6

Murray Ward, City of Quinte West

The Cold Creek Wetland is a long linear wetland that stretches from Alnwick-Haldimand Township (southwest of Greenley's Corners) in the west to the east of Wooler in Quinte West. The wetland is associated with Cold Creek and is therefore riverine in nature. Via the creek, the wetland is hydrologically connected with other wetlands in the Cold Creek watershed.

Segments of the Cold Creek wetland has been evaluated separately at different times. Portions of the Cold Creek: Shiloh to Wooler evaluation and the Cold Creek Wooler evaluation are within the study area.

The Cold Creek wetland (Shiloh to Wooler and Wooler) is comprised of 68% marsh and 32% swamp. Both parts of the wetland within the study area score highest (over 200) in the special features component. Provincially significant animal species include northern harrier and blue spotted salamander; regionally significant species include green-backed heron, Blanding's turtle and map turtle. Great blue heron nest in the swamp, which is also of local significance for deer. The creek is noted for providing spawning and rearing habitat for muskellunge and brown and speckled trout.

Resource products with cash value present in the wetland include snapping turtles and bull frogs as well as furbearers such as muskrat, raccoon, beaver and mink. Wild rice and commercial fish (bait/coarse fish) are also present. Cold Creek is also popular for sport fishing.

Crowe River Wetland (*provincially significant*)

84 ha

Lot 26, Conc. 13, Campbellford/Seymour/Percy/Hastings (formerly Seymour Township)

The provincially significant Crowe River Wetland is located upstream from Allan Mills. A small portion of the wetland is in the former Municipality of Campbellford/Seymour, while the remainder is in the Township of Stirling-Rawdon.

Within Campbellford/Seymour, the wetland is comprised mostly of marsh and open water, with some swamp.

Dartford Pond-O'Reilly Lake Wetland (*provincially significant*)

168.7 ha

Lots 4 - 5, Conc. 4; Lots 3 - 12, Conc. 5; Lots 9, 11, 12, 13, Conc. 6, Campbellford/Seymour/Percy/Hastings (formerly Percy Township)

The Dartford Pond-O'Reilly Lake Wetland is mainly a riverine wetland. The area is mostly treed swamp with some thicket swamp and marsh.

No endangered or threatened species have been identified. However, two provincially significant plant species have been noted in the wetland: panic grass and Walter's barnyard grass. Several regionally and locally significant plant species are also present. With regards to

animal species, the provincially significant Coopers hawk and American coot occur in this wetland. The double crested cormorant and common loon are also present. The wetland provides locally significant winter cover for wildlife, feeding area for osprey, habitat suitable for waterfowl breeding, and fish habitat.

The area is used moderately for hunting, fishing and nature enjoyment.

Dead Creek Marsh Wetland Complex (*provincially significant*)

359 ha

Lots 8 - 20, Conc. B; Lots 12 - 21, Conc. C; Lots 1 - 8, Block C, Murray Ward, City of Quinte West

The Dead Creek Marsh Complex is located in the southern part of Murray Ward (Quinte West). Comprised of 6 individual wetlands, it is approximately two-thirds swamp and one-third marsh. 80% of the wetland is palustrine (headwater area), 15% riverine and 5% lacustrine (associated with the Bay of Quinte).

The wetland is important from a hydrological perspective, providing an important flood attenuation and groundwater recharge function and playing a role in water quality protection.

Special features, which contribute to the significance of the wetland, include the presence of provincially significant animal species including least bittern, black tern, caspian tern, great blacked-backed gull and black crowned night heron. Habitat for colonial waterbirds and spawning and nursery fish habitat are also present.

Fur bearing mammals include beaver, muskrat, raccoon, red squirrel and red fox. Bull frogs and snapping turtle are found within the wetland.

Disturbances include the presence of purple loosestrife. The Murray Canal, which was constructed in the late 19th century, severs the wetland, cutting the headwater areas off from the riverine and lacustrine wetland.

Foxboro Swamp (*provincially significant*)

1260 ha

Lots 29 – 38, Conc. 6; Lots 29 – 38 Conc. 7, Sidney Ward, City of Quinte West
Lots 12 and 13, Conc. 5; Lots 1 – 26, Conc. 6; Lots 1 – 17, Conc. 7
City of Belleville, formerly Township of Thurlow

Foxboro Swamp is an extensive wetland located approximately 2 km north of Foxboro. This wetland is composed of 90% swamp and 10% marsh. It is important hydrologically as a groundwater recharge area and plays an important role in flood attenuation.

The Foxboro Swamp is connected to the Moira River along the south and to the forests of the Oak Hills to the west. It provides habitat for a number of significant species including northern harrier, black tern, osprey and otter. This wetland is also important as spawning and rearing areas for several fish species including pike, perch, muskellunge, bass and pickerel.

Hoards Creek Tributary Wetland (*provincially significant*)

152 ha

Lots 16 - 24, Conc. 7 & 8 , Campbellford/Seymour/Percy/Hastings (formerly Seymour Township)

This wetland is 68% swamp and 32% marsh.

It provides breeding/feeding habitat for provincially significant animal species: northern harrier and pectoral sandpiper.

Killoran Lake Wetland (*provincially significant*)

59 ha

Lots 12 - 14, Conc. 10, Campbellford/Seymour/Percy/Hastings (formerly Percy Township)

Killoran Lake Wetland is a headwater wetland surrounding a small lake. The wetland type is divided between swamp and marsh with about 10 ha of the wetland in open water.

The wetland supports a good diversity of marsh vegetation which in turn provides good habitat for waterfowl. The diverse habitats around the lake, including extensive forest cover, provide habitat for small mammals and upland birds.

The provincially significant black tern has been identified as a possible breeder in this wetland. The locally significant common loon was also found nesting on the site. The provincially significant sedge, *Carex annectans* (Bickn.), occurs in the wetland, along with 5 regionally significant plant species. Fish habitat is also present.

Lower Salmon River Wetland (*provincially significant*)

151ha

Lots 27 – 31, Conc. B.F., City of Belleville, formerly Township of Thurlow

Lots 1 – 5, Conc. 2; Lot 5, Conc. 3, Township of Tyendinaga

Lower Salmon River Wetland is located approximately 5 km east of Belleville. The wetland consists primarily of marsh (89%) with some swamp (11%). This wetland plays a role in helping to control erosion along the Bay of Quinte shoreline, in providing ground water discharge, and in providing habitat for a number of wetland species, including the provincially significant caspian tern. The marsh also provides regionally significant fish habitat for spawning and rearing. Two provincially rare species are found in the wetland: narrow-leaved water plantain (*Alisma gramineum*) and small beggarticks (*Bidens discoidea*).

Murray Marsh Wetland (*provincially significant*)

approx. 4,850 ha (including upland islands)

Lot 24 - 27, Conc. 6; Lots 23 - 31, Conc. 7; Lots 23 - 34, Conc. 8; Lots 23 - 33, Conc. 9; Lots 22 - 31, Conc. 10, Municipality of Brighton

Lot 22, Conc. 7; Lots 18 - 22, Conc. 8; Lots 13 - 22, Conc. 9; Lots 7 - 22, Conc. 10, Murray Ward, City of Quinte West

Lots 17 - 22, Conc. 1, formerly Seymour Township

Murray Marsh Wetland is one of the largest wetlands in southern Ontario. One of its unusual features is a series of “islands” which are actually drumlins, that rise out (to varying heights) of the otherwise flat plain which is mainly swamp and marsh. The drumlins and the upland adjacent to the wetland provide fairly abrupt edges to the wetland. The Trent River forms the northern boundary of the wetland. Four streams flow through the marsh, emptying into the Trent River: Marsh Creek, Salt Creek and two unnamed watercourses. In addition to marsh and swamp, a small area of fen occurs with numerous species typical of this type of wetland.

Murray Marsh Wetland scores over 200 points in each of the biological, social, and special features components of the wetland evaluation. Hydrological values, however, are fairly low for a riverine wetland of this size. This is due to the fact that major detention areas are also present upstream and downstream.

The wetland is of special significance because of the presence of the small white lady’s slipper, which is an endangered species in Ontario. The rare white fringed orchid is also reported to occur in the wetland. Several herpetiles also have been recorded.

The Ontario Ministry of Natural Resources (OMNR) and Lower Trent Conservation own large tracts of land within the Murray Marsh. Approximately 39% of the marsh is in public ownership.

Flooding and wet conditions make the marsh inaccessible for much of the year and generally unsuitable for agriculture and development. As a result, much of the marsh is in an undisturbed state, providing refuge for a variety of plant and wildlife communities.

Source: *Mosquin and Wilson, 1985.*

Nappan Island Complex (*provincially significant*)

496 ha

Lots 7 - 13, Conc. 12; Lots 6 - 14, Conc. 13; Lots 7 - 11, Conc. 14, Campbellford/Seymour/Percy/Hastings (formerly Seymour Township)

The Nappan Island Complex includes at least one significant vegetation community - a shrub-rich poor fen community that is considered rare in southern Ontario.

A number of birds nest in the wetland—the diversity of breeding birds is well above average for the region, including the provincially rare Cooper’s hawk. The bald eagle, an endangered species, has been reported to utilize this area for feeding during the breeding season.

The first record of northern shrew for the region also comes from Nappan Island.

This section of the Trent River is considered to be significant for fish spawning and rearing.

O’Melia-Lamey Lakes Wetland (*provincially significant*)

60.5 ha

Lots 11 - 12, Conc. 8; Lots 10 - 13, Conc. 9, Campbellford/Seymour/Percy/Hastings (formerly Percy Township)

The O'Melia-Lamey Lakes Wetland is located approximately 3.5 km south of Hastings. The wetland is predominantly marsh, with only 15% of the area defined as swamp. The wetland occurs on organic soils surrounding two small lakes. It is important hydrologically as a major recharge zone for Percy Creek and plays an important role in flood attenuation.

The wetland is a good example of a lake-side marsh. It supports good quality habitat including open water marsh, cattail marsh and yellow birch/black ash swamp. The O'Melia-Lamey wetland is one of an extensive group of natural areas located south of Hastings. These areas are important links for the free travel of animal populations from other natural areas to the south and west.

A provincially significant sedge, *Carex formosa*, occurs here, along with several regionally and locally significant plant species. The locally significant common loon and blue-gray gnatcatcher also occurs. Fish habitat is present in the wetland, which also serves as a feeding area for osprey.

Percy Creek Wetland (provincially significant)

205.5 ha

Lots 7 - 8, Conc. 8; Lots 4 - 8, Conc. 7; Lots 5 - 6, Conc. 6,
Campbellford/Seymour/Percy/Hastings (formerly Percy Township)

Percy Creek Wetland is a riverine wetland extending along the valley of Percy Creek. Approximately 86% of the wetland is swamp, while the remainder is marsh.

The provincially significant marsh wren and regionally significant swamp sparrow occur in the wetland. The provincially significant sedge, *Carex prasina*, is present along with four regionally significant plant species.

The wetland provides nesting habitat for great blue heron, and locally significant habitat for deer. It also serves as fish habitat--brook and brown trout occur in Percy Creek.

Presqu'île Bay Marsh (provincially significant)

970 ha

Lots 23 - 36, Conc. B & C, Municipality of Brighton & Murray Ward, City of Quinte West

This marsh is located along the north and west shores of Presqu'île Bay, just east of Brighton, and includes a significant portion of Presqu'île Provincial Park. It extends only marginally into the Natural Heritage Project study area.

The wetland is lacustrine. Most of the wetland is exposed to Presqu'île Bay and part of it is located at the mouths of several creeks including Smithfield Creek and Butler Creek. Much of the wetland is on silty soils; this in part has led to a high diversity of vegetation communities. Vegetation and open water are well interspersed; approximately half of the wetland is open water. Eighty percent of the wetland is marsh, 17% is swamp and 3% is fen.

The wetland is a very important stop-over for migrating passerines, shorebirds and waterfowl. A large variety of amphibians and reptiles are also found in the wetland and surrounding areas. At

least four species of salamanders, six toad and frog species, four turtle species and five snake species have been recorded.

The Presqu'île Bay Marsh is well known for its richness and diversity of plant and animal life. Provincially significant breeding species include pied-billed grebe, least bittern, ruddy duck, black-crowned night heron, northern harrier, black tern, caspian tern, marsh wren and sedge wren. Many other significant species are seen regularly during migration. At least five provincially rare wetland plants occur including grass-leaved water-plantain and Smith's club-rush. Several plant species usually associated with northern habitats are also found in the wetlands within the provincial park. The area surrounding the wetland provides good winter cover for ruffed grouse and gray partridge.

Because of its proximity to Lake Ontario, it has little value for detention of flood waters.

Disturbances to the wetland include urban development such as roads, buildings, a utility corridor, filling, channelization and water pollution.

Source: Ontario Ministry of Natural Resources, 1987

Thrasher's Corners Wetland (*provincially significant*)

176 ha

Lots 20 – 24, Conc. 6; Lots 18 – 23, Conc. 5, City of Belleville, formerly Township of Thurlow

Thrasher's Corners Wetland is located approximately 2 km south of Plainfield. The wetland consists primarily of deciduous swamp, with only about 9 % marsh. It is important hydrologically as a groundwater recharge area and plays an important role in flood attenuation.

This wetland, which is directly linked to the much larger Foxboro Swamp to the west, provides habitat for a number of provincially significant species including red-shouldered hawk, black tern and American coot. Regionally significant species occurring here include lesser scaup and ring-necked duck.

Trent River Final Bend Swamp (*provincially significant*)

163 ha

Lots 11-14, Conc 7; Lots 13 - 15, Conc 8, Sidney Ward, City of Quinte West

Trent River Final Bend Swamp is located along the Trent River, just to the southwest of Stirling. This riverine wetland is 55% swamp and 45% marsh. It is a diverse wetland, sporting a variety of vegetation communities. By way of the Trent River, it is hydrologically connected with other wetlands along the Trent River. The surrounding landscape is diverse including coniferous and deciduous forest, creeks, open river, hilly terrain, farmland, and some urban/cottage development.

The wetland has regional significance as a fish spawning and rearing area for muskellunge and sturgeon. It is also of regional significance as a waterfowl staging area and is an active feeding area for great blue heron. The wetland provides breeding/feeding habitat for the provincially significant river otter, pied-billed grebe, and marsh wren as well as the regionally significant

swamp sparrow. Because of these features, the wetland scores the maximum possible in the Special Features component of the evaluation.

Fur bearing mammals such as muskrat, raccoon, beaver and mink occur in the wetland, along with other resources such as snapping turtles and bull frogs. Commercial fish (bait fish and/or coarse fish) are harvested from the wetland.

Trout Creek Wetland (*provincially significant*)

120.8 ha

Lots 21 - 24, Conc. 7 & 8; Lots 23 - 24, Conc. 9, Campbellford/Seymour/Percy/Hastings (formerly Percy Township)

Lots 1 - 3, Conc. 6, Campbellford/Seymour/Percy/Hastings (formerly Seymour Township)

The Trout Creek Wetland is comprised of swamp and marsh. It has an important hydrological function for flood attenuation and water quality improvement.

The wetland provides habitat for least bittern and black tern (which are provincially significant animal species). Marsh violet and smooth white violet (regionally significant species) and Canada gooseberry, swamp red current, and Canada warbler (locally significant species) also occur. The wetland also provides nesting habitat for colonial waterbirds (ie. great blue heron).

Trout Creek Wetland also is important as it provides fish spawning and nursery habitat.

Weller's Bay Complex (*provincially significant*)

363 ha

Lot 109 - 115, Conc. 2; Lot 1, WSCP; Lots 1 - 2, ESCP; Ameliasburgh Ward, Prince Edward County

Lot 12 - 13 (Stinson Block), Hillier Ward, Prince Edward County

Lots 6 - 11, Conc. C; Gore A; Gore B; Lot 1, Block C; Murray Ward, City of Quinte West
Bald Head Island

The Weller's Bay Complex extends along the shoreline of Weller's Bay and includes the sand bar that separates the Bay from Lake Ontario. Most of the wetland is lacustrine (being along the shore of Weller's Bay), but a small portion that extends up Gardenville Creek is riverine. Because of its proximity to Lake Ontario, the wetland is of little hydrological value.

Most of the wetland is marsh, with some swamp. The marsh is dominated by water milfoil, coontail, muskgrass, cattails, grasses and pondweeds. The swamp is dominated by jewelweed, willows, alders, ferns, horsetails and sedges.

The wetland provides a feeding area for terns and gulls. It is provincially significant for waterfowl production and is important for migratory passerines. The wetland also provides spawning and rearing habitat for fish. Wild rice, bullfrogs, snapping turtles, muskrats and raccoons are valuable resources that are present in the wetland. In addition, commercial fish are abundant during at least part of the year.

The Weller's Bay Wetland provides habitat for the provincially significant least bittern, black tern, northern harrier and marsh wren.

There is a moderate level of fishing, hunting and boating activity in the area. Some disturbance is also caused by roads, railway tracks, channelization and adjacent cottages.

Source: Ontario Ministry of Natural Resources, 1987

Wilson Island East Wetland (*provincially significant*)

595.24 ha

Lots 24 - 26, Conc. 1, Campbellford/Seymour/Percy/Hastings (formerly Seymour Township)

This riverine wetland is comprised of 65% swamp and 35% marsh.

The wetland provides breeding/feeding habitat for provincially significant animal species including river otter, northern harrier, and marsh wren. The provincially significant plant species, small beggarticks, has also been found in the wetland. The wetland is of regional significance for fish spawning and rearing (for muskellunge). Some commercial fish harvesting and trapping has occurred.

Part of the wetland is publicly owned, being located in Keating-Hoards Natural Habitat Area (owned by Lower Trent Conservation).

1.2 Evaluated Wetlands – Not Provincially Significant

Aikens Road East Wetland Complex (*not provincially significant*)

18.8 ha

Lots 19 -22, Conc. 1; Lot 19, Conc. 2, Sidney Ward, City of Quinte West

This smaller sized wetland is located south of Highway 401, halfway between Trenton and Belleville, at the southeastern edge of the Lower Trent watershed. Despite its smaller size, it is an important undeveloped area having a new subdivision, aggregate quarry, golf course and extensive agriculture in the vicinity.

Mostly a swamp of sugar maple, white elm, black willow and red ash, there are two cattail marshes within this wetland complex comprising three individual wetlands. It is supplied and drained by an intermittent stream. The surrounding forested zone connects with adjacent wetlands and acts as a wildlife corridor. Within its borders, waterfowl such as herons and spotted sandpipers can be found, as well as marsh hawks, ovenbirds and great crested flycatcher. Beavers also occur.

Bayside East Wetland Complex (*not provincially significant*)

11 ha

Lots 15 - 20, Conc. 1, Sidney Ward, City of Quinte West

Bayside East Wetland Complex is a coastal wetland just east of C. F. B. Trenton, and is hydrologically connected to Montrose Wood Wetland Complex and Bayside Marsh. There are six separate wetlands of which four are small hardwood swamps, with two marshes connected by an intermittent stream. The surrounding habitat is fairly diverse. The wetland is in close proximity to other wetlands including Aikens Road East Wetland Complex and Trenton Airport

Approach Complex. The combination of all these wetland units serve to provide an important groundwater recharge zone and act as a buffer to increasing urbanization in the area.

Belleville Treatment Plant Wetland (*not provincially significant*)

2.5 ha

South of the CPR, east of Sidney Street, City of Belleville

The Belleville Treatment Plant Wetland is located along the Bay of Quinte in the City of Belleville. It borders a small cove on the northwest side of Zwick's Island. The wetland is dominated by a submergent marsh community composed of pondweed, milfoil, coontail, and water lilies. Bordering the marsh community is a small swamp area of black willow, grasses, and sedges. Purple loosestrife is also present. Wetland such as this one, that are located in an urban area, are valuable for providing a variety of habitat. The wetland is an active feeding area for Caspian tern. The submergent marsh community provides fish spawning and nursery habitat for smallmouth and largemouth bass. Bullfrogs, snapping turtles, raccoon and beaver, which traditionally have economic value, have been observed in the wetland.

The Belleville Treatment Plant Wetland has been severely altered over the years. Historically this wetland covered the entire area of Zwick's Island. Most of the wetland has been used as a landfill site and filled. What remains is rated as a Class 6 wetland.

Flying Club Road Wetland (*not provincially significant*)

44.2 ha

Lots 12 - 15, Conc. 3; Lot 14, Conc. 4, Sidney Ward, City of Quinte West

Several kilometres east of Batawa, this single contiguous wetland drains an area predominated by drumlins, via a permanent stream that empties into the Trent River just north of Trenton. Its primary significance is its hydrological function for flood attenuation, nutrient trapping and as a carbon sink. It also provides locally significant winter wildlife cover.

The northern section has hardwoods extending down from the forested drumlin, with tamaracks, willows and alders around the edges of the dogwood swamp. A hydro corridor bisects the wetland with a sugar maple stand and a cattail marsh in the southern section. The forested areas are substantial enough to provide habitat for ruffed grouse, flickers, woodpeckers, and woodcock. Bluebirds have been sighted here and the wetland is deemed to be suitable waterfowl breeding habitat. The presence of green herons, marsh wrens, sora rails, snapping turtles and otter indicates a healthy marsh.

Godolphin Esker Wetland Complex (*not provincially significant*)

79.4 ha

Lots 20 - 21, Conc. 10; Lots 20 - 21, Conc. 11; Lots 21 - 22, Conc. 12, Campbellford/Seymour/Percy/Hastings (formerly Percy Township)

This headwater wetland complex is composed of two treed swamps with trees and shrubs, such as white cedar, spruce, red ash, balsam fir, slender willow, and diverse herbal ground cover. The floor is thick with mosses and saturated with standing water.

An esker, a ridge of coarse sand and gravel deposited by a glacial stream, winds through the wetland. It is most notable for its groundwater recharge capabilities. With no appreciable inflows, this wetland plays an important role in flood attenuation, as well as nutrient trapping, and water quality improvement. There are four types of seasonally flooded areas (ephemeral, temporal, seasonal and semi-permanent) contributing to the local biodiversity. Regionally significant plant species here are small pondweed, cuckoo flower, marsh violet and locally significant swamp red currant.

Huntingwood Road Wetland (*not provincially significant*)

37.9ha

Lots 33, Conc. 3, Sidney Ward, City of Quinte West

Huntingwood Road Wetland is located approximately 2 km northwest of Belleville. The wetland is 56% marsh and 44% swamp. It provides habitat for a number of wetland species.

Mapleview Wetland (*not provincially significant*)

(152 ha)

Lots 7-11, Conc. 7; Lots 3-8 & 10-15, Conc. 8, Murray Ward, City of Quinte West

Mapleview Wetland is located to the northwest of Frankford. It is 74% swamp and 26% marsh. About two-thirds of the wetland is considered to be riverine, while the remainder is palustrine (a headwater area). The wetland is drained by two watercourses – one watercourse drains northwesterly into Murray Marsh Wetland (providing a hydrological connection with this larger wetland), while the other drains northeasterly (to a wetland along the south side of the Trent River). The wetland plays a hydrological role in flood attenuation. Emergents within the wetland provide some shoreline protection.

The regionally significant eastern newt occurs in the wetland, but there are no reports of other significant species. Local residents have noted that breeding pairs of waterfowl have been observed in the wetland. While there are many pools and good cover for waterfowl breeding (and wood duck boxes have been installed) recent damage to the wetland has reduced its attraction to breeding birds. However, important habitat for wild turkeys is present.

Raccoon, beaver, red fox, mink, skunk and coyote have all be observed in the marsh. Hunting occurred in the past, but the number of ducks visiting the wetland has declined in recent years (possibly due to eutrophication). Some turkey hunting takes place.

Meyers Creek Wetland Complex (*not provincially significant*)

55.1 ha

Lots 14 - 16, Conc. 2; Lots 13 - 18, Conc. 3, Sidney Ward, City of Quinte West

Meyers Creek is classified as a warm water stream which is locally significant as spawning habitat for northern pike and salmon from the Bay of Quinte. Located northeast of Trenton, the Meyers Creek Wetland Complex is intersected by Highway 401 and is almost completely swampland, dominated by large silver maple stands in the least flooded sections. A heron rookery is located in the dead hardwoods bordering a small marsh.

The wetland complex has a riverine zone (straddling Meyers Creek) but is primarily palustrine due to the physiographical nature of its location, which is both undulating terrain and flood plain. There are also two intermittent inflow streams and, because this is a complex of three wetlands, it is effective at flood attenuation and as a long term nutrient trap. These characteristics provide water quality improvement between contributing and receiving areas by maximizing the chemical interactions in the flowing water. This is important in reducing eutrophication downstream in a region of intensive agriculture. The wetland is also an important groundwater recharge zone.

Montrose Wood Wetland Complex (*not provincially significant*)

22.5 ha

Lots 24 - 26, Conc. 2, Sidney Ward, City of Quinte West

At the intersection of Montrose Road and the western end of Moira Street (west of Belleville) is a small wetland comprised of two units of forested swamp. The smaller black willow, red ash unit is now isolated from its former source due to the channelization and re-routing of four out of five of the intermittent inflows. Both wetlands are hydrologically connected by surface water to nearby wetlands, which is of maximum importance to wildlife migration. The larger swamp area receives water flowing out of the subdivision through straight cut ditches. It remains flooded only temporarily because upstream water detention is minimized by these alterations. In its centre there is a small marsh dominated by meadowsweet, as ground cover, surrounded by a stand of purple loosestrife.

Although there has been moderate disturbances on this privately owned wetland, it is valuable in short-term water quality improvement, filtering agricultural and suburban drainage, and recharging groundwater in the Bay of Quinte subwatershed between Meyers Creek and Potter Creek.

Potter Creek Tributary (*not provincially significant*)

3.9ha

Lot 33, Conc. 1, Sidney Ward, City of Quinte West

Potter Creek Tributary is at the southwestern edge of the City of Belleville. The wetland consists primarily of marsh (68%) with the remainder being swamp. This wetland plays a role in helping to control erosion along the shoreline and in providing habitat for a number of wetland species.

Stevenson Lake Wetland (*not provincially significant*)

71.79 ha

Lot 18, Conc. 8; Lots 17 - 18, Conc. 9, Campbellford/Seymour/Percy/Hastings (formerly Percy Township)

Stevenson Lake is the headwater for an intermittent unnamed tributary of Percy Creek. The lake has an important hydrological function, acting as a natural reservoir.

On the west side of the lake, the semi-submerged shoreline, dominated by cattail, alder and red-osier dogwood, merges with an open canopied lowland forest composed of trembling aspen and white birch. Red-osier dogwood and high bush cranberry are the most abundant shrubs.

Herb mat species include marsh marigold, purple avens and jewelweed. On the steeper sloped eastern shore, a closed canopied beech-sugar-maple-red oak forest occurs.

Stirling Wetland (*not provincially significant*)

approx 70 ha

Lot 21-22, Conc. 8; Lot 21 - 27, Conc. 9, Sidney Ward, City of Quinte West

Stirling Wetland is a small wetland, just to the south of Stirling, which drains via a small watercourse into Rawdon Creek. It is a palustrine wetland, comprised of marsh and swamp. The marsh includes typical species such as cattail, duckweed, sedges, burreed, joe-pye weed, horsetail, pondweed, and milfoil. Alder, willow, dogwood, black ash, trembling aspen, elm, red maple, ostrich fern and sensitive fern are among the species present in the swamp communities.

Purple loosestrife is present in both the marsh and swamp. Nearby human impacts include residential development in the village. As well, the sewage lagoon for the village is located within the wetland. Two major roads are located in the vicinity of the wetland--County Road 33 is located just to the west, and Highway 62 transects the eastern portion of the wetland.

Trenton Airport Approach Complex (*not provincially significant*)

16 ha

Lot 13 - 15, Conc. 1, Sidney Ward, City of Quinte West

The Trenton Airport Approach Complex is located just to the east of C.F.B. Trenton and White's Road (north of Old Hwy 2). It is comprised of two individual wetlands, one is 11.8 ha and the other is 4.2 ha. Approximately 60% of the wetland is considered palustrine (a headwater area) while the remainder is riverine and is associated with an unnamed watercourse that empties into the Bay of Quinte.

The wetland, which is about 57% swamp and 43% marsh, is home to furbearers such as beaver, muskrat and raccoon. Local residents report that they use the wetland for hunting, nature viewing, and fishing.

The wetland is hydrologically connected to nearby locally significant wetlands and the provincially significant Bayside Wetland to the south and plays a role in flood attenuation. Emergent vegetation within the wetland helps to control shoreline erosion along the watercourse.

From a biological view point, the wetland is not significant. Provincially or regionally significant species were not noted. It is worth noting that there is suitable habitat for waterfowl breeding, and osprey have been observed hunting in a nearby sewage lagoon (at Kenron Estates). As well, the wetland is considered as fish habitat.

2. AREAS OF NATURAL AND SCIENTIFIC INTEREST (ANSIS)

Brighton Provincial Wildlife Area Bluff ANSI

809 ha

Lots 21 - 22, Conc. 2 & 3, Murray Ward, City of Quinte West
Lots 23 - 32, Conc. 2; Lots 23 - 26, Conc. 3, Municipality of Brighton

The area surrounding the Brighton Provincial Wildlife Area is a provincially significant earth science ANSI. The boundaries of the ANSI (shown on the mapping) are larger than the boundaries of the original ANSI. This boundary change has yet to be confirmed.

The features and sediment arrangements within this site represent a good cross-section of the late glacial history of the area and a mature tunnel valley system. Points of particular interest are:

- the large gravel bedforms located in the southern portion of the site,
- the lee-side or obstacle deposits
- the fluvial erosion of drumlin margins
- furrowed till
- subaqueous fans
- the gorge cut into the upland
- the wave-altered south facing cliffs and the subaqueous fans which conform to their shape and the possible lagoon.

Portions of the ANSI are under public ownership.

Source: *Correll Resource Investigations, 1991*

Cramahe Hill Beaches ANSI

696 ha

Lots 20 - 22, Conc. 1, Campbellford/Seymour/Percy/Hastings (formerly Percy Township)
Lots 4 - 8, Conc. 8; Lots 4 -11, Conc. 9; Lots 7 - 10, Conc. 10, Cramahe Township

The Cramahe Hill provincially significant earth science ANSI represents a good cross-section of coastal development in glacial history of the area. Points of particular interest are: good undisturbed examples of spit development in high-water Lake Iroquois phase, fair examples of shoreface bars, and erosional notches in the drumlin which possibly were formed in the Frontenac level of Lake Iroquois.

Source: *Correll Resource Investigations, 1991*

Healey Falls ANSI

6 ha

Lot 16, Conc. 11, Campbellford/Seymour/Percy/Hastings (formerly Seymour Township)

In this provincially significant earth science ANSI, river erosion has cut down through Trenton limestones to expose the massive Leray beds of the upper Black River group.

Source: *Cuddy, 1977*

Moira Karst ANSI

191 ha

Lot 31, Conc. 8, City of Belleville, formerly Township of Thurlow
Lots 1 - 3, Conc. 7, Township of Tyendinaga

The Moira Karst ANSI is a provincially significant earth science site. It extends along the Moira River for about 4 km between Latta and Chisholm. Considered one of the outstanding examples of karst development in Ontario, the many features found here include a complex solution cave, sinkholes, collapsed caverns and underground channels, limestone islands and blind channels in the river's course, and clint and gryke patterns in limestone pavement.

The south part of the site, where many of the underground caverns and drainage channels cut into the limestone bedrock by river flow have collapsed, is known as the "Scuttleholes". Further north is the Moira Cave, which has developed at approximately the same level as the Moira River, on the inside of the meander. The cave floods each spring during runoff and carries water all year. Over 1000 m of passageway in the Moira Cave have been surveyed by the Toronto Caving Group making this the longest explorable cave in Ontario. There are many passageways and a number of entrances. Flowstones, stalactites, stalagmites and embedded fossils are present on the cave walls.

The cave is a major hibernation site for five of the eight species of bats found in southeastern Ontario. In fact, the largest hibernation population of little brown bats (*Myotis lucifugus*) known from caves in southern Ontario, uses this site.

A bottomland forest dominated by black maple-white elm-basswood-bur oak-hackberry supports several southern species such as bladdernut (*Staphlea trifolia*), moonseed (*Menispermum canadense*), hackberry (*Celtis occidentalis*), and black maple (*Acer nigrum*).

Source: Lindsay (1986)

Murray Marsh ANSI

3760 ha

Lot 24 - 27, Conc. 6; Lots 23 - 31, Conc. 7; Lots 23 - 34, Conc. 8; Lots 23 - 33, Conc. 9; Lots 22 - 31, Conc. 10, Municipality of Brighton

Lot 22, Conc. 7; Lots 18 - 22, Conc. 8; Lots 13 - 22, Conc. 9; Lots 7 - 22, Conc. 10, Murray Ward, City of Quinte West

Lots 17 - 22, Conc. 1, formerly Seymour Township

Murray Marsh has been designated a provincially significant life science ANSI. It is comprised of an extensive wetland area with a number of drumlin "islands," some of which have been cleared and are used for agriculture. There is considerable marshland and swamp forest, both of which have excellent wildlife populations. The area supports a large deer yard, a number of rare nesting birds, and a large population of muskrats. Some rare plant species have also been reported.

Source: Cuddy, 1977

For more information, refer to the description of the Murray Marsh Provincially Significant Wetland.

Oak Lake Island Beaches ANSI

89 ha (plus 226 ha for extension)

Lots 19 - 29, Conc. 8; Lots 28 - 29, Conc. 9, Sidney Ward, City of Quinte West

Oak Lake Island Beaches is a provincially significant earth science ANSI. The current ANSI is only 89 ha in size, but a 226 ha addition is proposed. This boundary change has yet to be confirmed. Oak Lake Island Beaches is a very good example of the way coastal processes affected existing landforms. The body of water which covered the area was high-level Lake Iroquois.

Points of interest include:

- large undisturbed areal extent of shoreface bars
- wave altered cliff
- fluted till and drumlins
- large glaciofluvial ridges

Source: *Gorrell Resource Investigations, 1991*

Petherick's Corner Esker ANSI

94 ha

Lot 22, Conc. 9; Lots 19 - 26, Conc. 8, Campbellford/Seymour/Percy/Hastings (formerly Seymour Township)

This provincially significant earth science ANSI is a well formed and relatively undisturbed portion of the Campbellford esker. A tributary joins the main esker just east of Petherwick Corners. Yellow and queen lady's slippers have been identified in the swamp lying along the south side of the esker.

Source: *Cuddy, 1977*

Petherick's Island Beaches ANSI

66 ha

Lots 20 - 22, Conc. 10, Campbellford/Seymour/Percy/Hastings (formerly Seymour Township)

Petherick's Island Beaches is an earth science site considered to be provincially significant. Several gravel bars lie on Trenton limestone. The lowest bar is at 646 feet above sea level; (the highest at 669 feet above sea level. The "island" was probably a shoal in Lake Iroquois which subsequently became an island in Lake Frontenac.

Source: *Cuddy, 1977*

Point Anne Alvar ANSI (unconfirmed)

280 ha

Lots 15 - 23, BFC, formerly Thurlow Township, City of Belleville

The Point Anne Alvar is being considered for designation as a provincially significant life science ANSI. This has yet to be confirmed. It is one of the few remaining moderate to high quality alvars in Ontario. Point Anne alvar contains several rare species such as Dwarf Hackberry and remnant prairie species. It is part of the Napanee Plain alvar region, which is considered one of the most threatened in Ontario.

Source: *Hartley et al, 1997*

Thomasburg Esker ANSI

114 ha

Lots 15 - 16, Conc. 1, Lots 16 - 17, Conc. 2; Lots 18 - 20, Conc. 3, Municipality of Centre Hastings

The Thomasburg Esker ANSI is a Late Wisconsinan glacial feature. The ANSI is composed of two segments of the esker, separated by an aggregate extraction site. This provincially significant earth science ANSI is located on the north boundary of Belleville and extends outside of the study area.

Trent River Final Bend Swamp ANSI

257 ha

Lots 10 - 14, Conc. 7; Lots 11 - 16, Conc. 8, Sidney Ward, City of Quinte West

This provincially significant life science ANSI is comprised of an alluvial plain overlying limestone and is located at a bend in the Trent River. The area has rich, moderately mature silver maple swamp forest and some dry mesic deciduous forest with southern floral elements.

Source: *Cuddy, 1977*

For more information refer to the description of the Trent River Final Bend Swamp Provincially Significant Wetland.

Weller's Bay ANSI

234 ha

Bald Head Beach and Island, Smoke's Point, Ameliasburgh Ward, Prince Edward County
Bald Head Beach, Murray Ward, City of Quinte West

Weller's Bay is a provincially significant life science ANSI. In a recent report, it is recommended that the designation be downgraded to regionally significant, but this has yet to be confirmed. The ANSI is comprised of a well developed bay mouth barrier spit on Lake Ontario. Sand dunes and wetlands occur on the ANSI and backshore vegetation communities include meadows, thickets, deciduous groves and marsh. Provincially and regionally significant flora occurs here. The sand spit is federally owned and is not subject to development pressure. It was formerly used for bombing practice during World War II and therefore public access restrictions are posted.

3. SIGNIFICANT WILDLIFE HABITAT

3.1 Environmentally Sensitive Areas

Barcovan Swamp

166 ha

Lots 12 - 23, Conc. C, Murray Ward, City of Quinte West/Municipality of Brighton
Topographic Map Reference: 1:50,000 - 31 C/4 UTM: 880785

Barcovan Swamp is located just northwest of Barcovan Beach, 0.8 km inland from Lake Ontario. It has extensive muck deposits over a limestone plain, a landform which is rare along the

Newcastle to Trenton Waterfront. As the source of Dead Creek, it has a regionally significant hydrological function. Three of its communities are rare along the Waterfront including white cedar-cottonwood swamp, mature red maple-hemlock forest on undulating terrain and Canada bluejoint-sedge marsh. It contains two plant species considered rare in the OMNR's Eastern Region and 5 plant species that are along Waterfront. Barcovan Swamp is an integral part of a 326 ha complex known as the Dead Creek Marsh, a provincially significant class 3 wetland. This natural area is recommended for Significant Natural Area designation.

Source: *Brownell, 1993*

Batawa

328.7 ha

Lots 1 - 4, Conc. 4; Lot 1, Conc. 5, Murray Ward, City of Quinte West

Lot A & 1, Conc. 3 - 5, Sidney Ward, City of Quinte West

Topographic Map Reference: 1:50,000 - 31 C/4 UTM: 919930

The Batawa study area (also known as Glen Miller-Batawa), is located about 3 km directly north of Trenton overlooking the Trent River. The area lies primarily on limestone plain with a few drumlins and fluvial deposits scattered over the plain. The site contains provincially rare vegetation communities including mixed oak alvar savanna, mixed oak woodland, and bur oak woodland. Most communities are in fair condition, with many areas recovering from heavy past grazing and cutting. Batawa contains 4 provincially rare plant species, 6 plant taxa that are rare in eastern Ontario, and 1 that is rare in the Lake Ontario Lowlands physiographic region. A provincially rare bird, the cerulean warbler, was noted as a possible breeder based on an observation by S. Blaney of a singing male in suitable habitat. A provincially rare butterfly, the olive hairstreak, occurs. Batawa should be considered a Significant Natural Area because it meets 5 of 10 natural areas selection criteria, identified in the Lower Trent Conservation Natural Areas Study.

Source: *Brownell and Blaney, 1996*

Carrying Place Woods

237.6 ha

Lots 1 - 9, Block C BFC; Lots 6 - 9, Conc. C, Murray Ward, City of Quinte West

Topographic Map Reference: 1:50,000 - 31 C/4 UTM: 910800

Carrying Place Woods is located 6.7 km southwest of Trenton, on the south side of the Murray Canal. There is good representation of marsh communities, mature deciduous swamp and some upland forest on sand plain. The diversity of vegetation community associations is relatively high. Its mature silver maple swamp, sedge marsh, open water wild rice marsh and mature red maple-red ash swamp are considered rare along the Newcastle to Trenton Waterfront. This site has the highest diversity of breeding birds of the 27 nature areas studied by Brownell in 1992. Carrying Place Woods is an integral part of a 326 ha complex known as the Dead Creek Marsh, a provincially significant class 3 wetland. This natural area is recommended for Significant Natural Area designation.

Source: *Brownell, 1993*

Cramahe Hill Complex

200.5 ha

Lots 4 - 7, Conc. 8 & 9; Lots 5 - 6, Conc. 10, Cramahe Township

Lots 20 - 22, Conc. 1, formerly Percy Township (Campbellford/Seymour/Percy/Hastings)

Topographic Map Reference: 1:50,000 - 31 C/4 UTM: 743950

The Cramahe Hill Complex (also known as Codrington Forest) is located approximately 14 km north of Brighton. Seven separate blocks of natural habitat make up this significant complex. The site includes part of the provincially significant Cramahe Hill earth science ANSI, which contains Lake Iroquois beach and shorecliff features. The original area (of the Codrington Forest) formed one large, contiguous area about 700 ha in size. The area defined as the Cramahe Hill Complex Natural Area is somewhat smaller. It has been reduced through exclusion of anthropogenic communities and communities badly degraded by long-term cattle grazing. The remaining blocks contain several areas of high quality, potential old growth forest and three ravine systems with a headwater area and seepage communities. In the southernmost block, two seepage areas occur where spicebush (*Lindera benzoin*) is common. Spicebush ravine is considered rare to uncommon in Ontario (S3 ranking). This Carolinian species reaches its northern limit in eastern Ontario at this and the Salt Creek sites. Cramahe Hill contains 2 plant species considered rare in Ontario, 3 plant species that are rare in eastern Ontario, and 1 plant species that is rare in the Lake Ontario Lowlands physiographic region. Six breeding bird species were present which are considered to be rare within the Lake Ontario Lowlands and one is rare within the lower Trent region. Cramahe Hill is considered a Significant Natural Area because it meets 8 of the 10 natural areas selection criteria identified in the Lower Trent Conservation Natural Areas Study.

Source: *Brownell and Blaney, 1996*

Dead Creek Escarpment Woods and Alvar

128.8 ha

Lots 10 - 14, Conc. B, Murray Ward, City of Quinte West

Topographic Map Reference: 1:50,000 - 31 C/4 UTM: 905820

Dead Creek Escarpment Woods and Alvar is located about 4.5 km southwest of Trenton, about 0.5 km inland from the Bay of Quinte. This is the only well vegetated example of sand plain in the Prince Edward Peninsula physiographic region along the Waterfront (Newcastle to Trenton). Two rare soil types have developed over the shallow sandy till over limestone bedrock. Sections where the bedrock is exposed on the south east side are referred to as alvar habitat. This is the only example of this habitat along the Newcastle to Trenton Waterfront, however it is currently being grazed. The natural area contains one provincially rare plant species, 4 plant species considered rare in the OMNR's Eastern Region and 14 taxa rare along the Waterfront. Dead Creek Escarpment Woods and Alvar is recommended for Significant Natural Area designation.

Source: *Brownell, 1993*

Dead Creek Marsh

83 ha

Lots 9 - 13, Conc. B, Murray Ward, City of Quinte West

Topographic Map Reference: 1:50,000 - 31 C/4 UTM: 912820

Dead Creek Marsh is located about 5.5 km southwest of Trenton, on the northeast side of the Murray Canal. There is good representation of marsh communities, mature deciduous swamp and some upland forest on sand plain. Its mature red ash - red maple swamp, open water wild rice marsh and mature black maple limestone talus slope are considered rare along the Newcastle to Trenton Waterfront. Dead Creek Marsh is an integral part of a 326 ha complex known as the Dead Creek Marsh Wetland Complex, which is provincially significant. The natural area is recommended for Significant Natural Area designation.

Source: *Brownell, 1993*

Johnstown Drumlins

162.0 ha

Lots 3 - 8, Conc. 3; Lots 4 - 8, Conc. 4, Sidney Ward, City of Quinte West

Topographic Map Reference: 1:50,000 - 31 C/4 UTM: 944938

The Johnstown Drumlins study area is located 4 km directly north of Trenton on the east side of the Trent River. The area offers good representation of forested, drumlinized clay plain. Most communities are in fair to good condition, with some forests recovering from selective cutting about 50 years ago. Five community types found here are considered rare or uncommon within the lower Trent region including mesic bitternut hickory forest, black maple forest and potential old growth sugar maple-beech, sugar maple-red oak, and sugar maple-mixed oak forests.

Johnstown Drumlins contains 6 plant taxa that are rare in eastern Ontario, and 1 that is rare in the Lake Ontario Lowlands physiographic region (status based on Cuddy, 1991 and this study). One breeding bird species present is considered rare in the Lake Ontario Lowlands physiographic region. Johnstown Drumlins is considered a Significant Natural Area because it meets 6 of the 10 natural selection criteria.

Source: *Brownell and Blaney, 1996*

Lovett Swamp

110.6 ha

Lots 17 - 20, Conc. B, Murray Ward, City of Quinte West

Topographic Map Reference: 1:50,000 - 31 C/4 UTM: 877798

Lovett Swamp is located 6.5 km southeast of Brighton, on the north side of the Murray Canal. It is an area of complex surficial geology resulting in a high diversity of soil types, four of which are rare in Northumberland County and along the Newcastle to Trenton Waterfront. It supports mature silver maple swamp and sand barren communities which are considered rare along the waterfront. Four plant species considered as rare in the OMNR's Eastern Region and 14 plant species that are rare along the Waterfront are found here. Lovett Swamp is part of a 326 ha complex known as the Dead Creek Marsh wetland Complex, a provincially significant class 3 wetland. This natural area is recommended for Significant Natural Area designation.

Source: *Brownell, 1993*

Mayhew Creek Headwater

432.2 ha

Lots 15 - 28, Conc. 1; Lots 17 - 26, Conc. 2, Murray Ward, City of Quinte West

Topographic Map Reference: 1:50,000 - 31 C/4 UTM: 850858

Mayhew Creek Headwater study area is located approximately 3 km west of Trenton, just south of Highway 401. The shorecliff, boulder pavement and sand plain left by Lake Iroquois supports a high diversity of habitats and plant species, many of which are provincially and regionally rare. Two plant species found here, nut grass (*Cyperus schweinitzii*) and sedge (*Carex Laevivaginata*), have not been previously documented in eastern Ontario. Provincially rare communities include black oak woodland, black oak-white oak-white pine woodland, spicebush ravine and old growth hemlock ravine. The black oak and oak-pine woodland communities are some of the best known examples in eastern Ontario. The 10.7 ha hemlock forest is estimated to be about 120 - 150 years old with about 3% of the trees reaching about 250 years old. It may be one of the oldest, extensive examples of old growth forest in southern Ontario. Generally, the area supports relatively high quality upland forest and is highly representative of the Lake Iroquois sand plain landform. Mayhew Creek contains 3 plant species considered rare in Ontario, 11 plants that are rare in eastern Ontario, and 7 plants that are rare in the Lake Ontario Lowlands physiographic region. Red-shouldered hawk, a provincially significant bird species, was recorded as a possible breeder in 1995. The site is important hydrologically as a major recharge area and strong coldwater spring source for Mayhew Creek. It is adjacent to the Murray Hills Significant Natural Area, and Brighton Provincial Wildlife Area and earth science ANSI. Buffering capability is quite low due to its highly irregular shape and nearby housing development. Mayhew Creek Headwater is considered a Significant Natural Area because it meets 8 of 10 natural areas selection criteria. The site warrants consideration by the OMNR as a regionally significant life science ANSI or sections could possibly be incorporated with Murray Hills Significant Natural Area as a provincially significant life science ANSI.

Source: *Brownell and Blaney, 1996*

Murray Hills Headwater

383.5 ha

Lots 10 - 17, Conc. 2; Lots 12, 14 - 17, Conc. 3, Murray Ward, City of Quinte West

Topographic Map Reference: 1:50,000 - 31 C/4 UTM: 873883

Murray Hills Headwater study area is located approximately 3 km northwest of Trenton. This area is very obvious to anyone travelling along Highway 401 as a largely forested, long terraced slope. This shorecliff and lower sand plain left by Lake Iroquois support a high diversity of habitats and plant species, many of which are provincially and regionally rare. Four plants species found there have not been previously documented in eastern Ontario. Louisiana waterthrush, a provincially significant species, was recorded as a probable breeder in May 1995. Rare communities present include black oak savannah, white oak-red oak savannah, dry prairie, mature sugar maple - red oak - beech - white pine forest, and spicebush ravine. Generally, the area supports relatively high quality upland forest and is highly representative of the Lake Iroquois shorecliff landform. It is important hydrologically as a major recharge area and source for Mayhew Creek. Murray Hills is considered a Significant Nature Area because it meets 8 of 10 natural selection criteria.

Source: *Brownell and Blaney, 1995*

Oak Lake

274.2 ha

Lots 18 - 19, Conc. 7; Lots 19 - 29, Conc. 8; Lots 26 - 30, Conc. 9,

Sidney Ward, City of Quinte West

The Oak Lake study area is 274.2 ha in size and is located approximately 3 kilometres southwest of Stirling. The site consists of a complex of three natural areas separated by anthropogenic communities. The largest and westernmost of these is a northwest facing slope system on sand plain, sculpted by Lake Iroquois, which has been proposed as an addition to the Oak Lake Island Beaches provincially significant earth science ANSI. The other two are predominantly drumlinized till plain. Lake Iroquois beach features occur in all three sections. The majority of the site is upland, with dry mesic conditions prevailing. Provincially rare prairie-affiliated shrub thicket and black oak-white oak woodland communities are present, as are good examples of oak-white pine and oak-sugar maple communities. The site represents the easternmost known occurrences of prairie communities in Canada. At the base of the slope, seepy white cedar dominated swamps occur, acting as an important source area for a tributary of Rawdon Creek. Oak Lake contains 3 plant species that are provincially rare, 13 plant species that are rare in eastern Ontario and 8 plant species that are rare in the Lake Ontario Lowland physiographic region. The provincially significant Cooper's hawk was a probable breeder at this site. Oak Lake is considered a Significant Natural Area because it meets 8 of 10 natural selection criteria identified in the Lower Trent Conservation Natural Areas Study.

Source: *Brownell and Blaney, 1996*

Salt Creek Valley

607.2 ha

Lots 21 - 35, Conc. 9 ; Lots 25 - 35, Conc. 10, Cramahe Township

Lots 1 - 4, Conc. 7; Lots 1 -2, Conc. 8, formerly Haldimand Township (Alnwick/Haldimand)

Lots 6 - 10, Conc. 1, formerly Percy Township (Campbellford/Seymour/Percy/Hastings)

Topographic Map Reference: 1:50,000 - 31 C/4 UTM: 660926

Salt Creek valley is located approximately 15 km north of Colborne and 6 km southwest of Warkworth. The area is large (607.2 ha) and very diverse in terms of landforms and vegetation communities. Extensive shrub thicket and conifer and mixed forest swamps are associated with Salt Creek, which flows eastward through a deep valley. The steep valley slopes were modified by the wave action of Lake Iroquois, and support high quality forest of unusual composition. Provincially rare, dry mesic woodland and remnant tallgrass prairie communities are present on kame moraine and sand plain in the western and central portions of the area. The prairie remnants have been studied in detail by Dr. P. Catling and V. R. Brownell during their work on the Rice Lakes Plains. Other significant communities include the following: spicebush seepage slope; dry mesic black oak-white oak-red maple-white pine woodland and forest; intermediate-mature white cedar-hemlock swamp; white cedar-balsam fir-tamarack-white pine swamp; sugar maple-bitternut hickory-white ash seepage slope; red maple-white pine; hemlock-sugar maple; and white pine-white cedar forest. The area supports a relatively high proportion of high quality communities and is highly representative of the sand plain, kame moraine and drumlinized till moraine landform. Salt Creek Valley contains 8 provincially rare plant species, 19 considered rare in eastern Ontario, 5 in the former OMNR Central Region, and 7 rare in the Lake Ontario Lowlands physiographic region. Two bird species that are rare in the Lake Ontario Lowlands physiographic region were recorded as probable or confirmed breeders. The site is important hydrologically as a major recharge area and spring source for Salt Creek. Salt Creek Wetland scored 493 points in the wetland evaluation (completed by Sine and McIntyre in 1987), but the

score should be recalculated using data obtained in the Brownell and Blaney study. Salt Creek Valley is considered one of the best Significant Natural Areas in the lower Trent region because it meets 10 of the 10 natural areas selection criteria. It is also recommended for consideration by the OMNR as a provincially significant life science ANSI.

Source: *Brownell and Blaney, 1996*

Stirling Slope Complex

200.5 ha

Lots 7 - 14, Conc. 6; Lots 8 - 14, Conc. 7, Sidney Ward, City of Quinte West

Topographic Map Reference: 1:50,000 - 31 C/4 UTM: 947010

The Stirling Slope Complex is located approximately 9 km north of Trenton near Frankford. This area is very distinctive kame feature which slopes steeply westward to the Trent River. A shorecliff and beach left by glacial Lake Iroquois on the east side of the study area has been largely removed for sand and gravel. Generally, the area supports high quality upland forest and is highly representative of the kame and Lake Iroquois shorecliff landform. Provincially rare communities include black oak savannah, white oak-red oak savannah, dry prairie, and spicebush ravine. The site supports some of the rarest vegetation types in Ontario. It is the easternmost location in Canada for dry mesic prairie. Six small remnant prairies exist on the steep, west-facing slope and ridge tops. Prairie vegetation has been largely destroyed in Ontario, and elsewhere in North America, making these small relicts extremely important in terms of protection of representative examples of a major natural ecosystem, and maintenance of options for scientific research. Dry prairie, black oak-white pine savannah and oak-dwarf hackberry savannah are considered critically imperiled communities (S1R1 rank) in Ontario. The overall condition of the site is high. Stirling Slope Complex contains 5 plant species considered rare in Ontario and 18 plant that are rare in the Ontario Lowlands physiographic region. Four of the plant taxa were previously undocumented as occurring in eastern Ontario. Dwarf Hackberry is known from only 2 other sites in eastern Ontario (Point Anne and the Salmon River alvar) and 4 sites in southwestern Ontario and is considered imperiled in Ontario (S2 rank). Stirling Slope Complex is considered a Significant Natural Area because it meets 6 of 10 natural areas selection criteria. This site is recommended for consideration as a provincial life science ANSI. Contact with the nature Conservancy of Canada is strongly recommended with regards to the future protection of this area.

Source: *Brownell and Blaney, 1995*

Stockdale Drumlins

133.4 ha

Lots 2 - 5, Conc. 5 & 6, Murray Ward, City of Quinte West

Topographic Map Reference: 1:50,000 - 31 C/4 UTM: 900955

Stockdale Drumlins study area is located approximately 10 km northwest of Trenton, just west of Batawa. The site was initially identified in the late 1970's as being potentially significant, however detailed studies were never conducted. The area consists of two largely vegetated, parallel drumlins with a small intervening wetland area. This was the only example of upland forest on drumlinized clay plain studied in 1994. Most of the drumlinized clay plain within the lower Trent region has been cultivated or utilized for pasture. Stockdale Drumlins contains 7 plant species that are rare in eastern Ontario, 2 plant species that are rare in the Lake Ontario

Lowlands physiographic region, and two bird species that are rare in the lower Trent region. Rare communities include mature sugar maple-red oak-beech-white pine forest and spicebush ravine. It is important hydrologically as a recharge area and spring source for Cold Creek. Stockdale Drumlins is considered a Significant Natural Area because it meets 7 of 10 natural areas selection criteria.

Source: *Brownell and Blaney, 1995*

Swing Bridge Woods

50.4 ha

Lots 22 - 25, Conc. B & C, Murray Ward, City of Quinte West/Municipality of Brighton

Topographic Map Reference: 1:50,000 - 31 C/4 UTM: 865792

Swing Bridge Woods is located about 6 km southeast of Brighton at the northwest end of the Murray Canal. It contains the only known example of intermediate-mature black cherry forest along the Newcastle to Trenton Waterfront and two rare communities, northern wild rice marsh and mature sugar maple - white pine - white birch forest. All of its communities are of high quality. The natural area supports a provincially rare plant species previously undocumented for the region. There are 4 plant taxa that are rare along the Waterfront and 3 regionally rare species. Swing Bridge Woods is recommended for Significant Natural Area designation.

Source: *Brownell, 1993*

Trent River Marshland

231.7 ha

Refer to "Canal Wetland" in the wetlands section of this report for information on this Environmentally Sensitive Area.

Wooler Road Woods

39.1 ha

Lot 9 - 10, Conc. A & B, Murray Ward, City of Quinte West

Topographic Map Reference: 1:50,000 - 31 C/4 UTM: 913833

Wooler Road Woods is located 3 km southwest of Trenton, 0.7 km inland from the Bay of Quinte. It is the only example of forested clay plain in the Prince Edward Peninsula physiographic region along the Newcastle to Trenton Waterfront. Two rare soil types have developed over the shallow till over limestone bedrock. High quality, mature sugar maple-beech deciduous forest with unusual associates dominates and is rare along the Waterfront. The area contains one provincially rare plant species, one plant species considered rare in the OMNR Eastern Region, and 2 taxa rare along the Waterfront. Wooler Road Woods is recommended for Significant Natural Area designation.

Source: *Brownell, 1993*

3.2 Heronries

A total of seven heronries were identified within the study area. Confirmation that these heronries are still intact is needed (through site inspections) when planning decisions are to be made based on this information (see Table 1).

TABLE 1 HERONRIES							
Colony	BA-001	BA-002	BA-006	BA-007	BA-009	G-017	G-024
Top. Map	31 C/5	31 C/4	31 C/4	31 C/4	31 C/5	31 C/6	31 C/3
UTM	18 TE 827224	18 TD 770992	18 T TE 676015	18T TD 859931	18T TE 781130	18T UE 098052	18T UE 014 000
Twp	Seymour	Brighton	Percy	Murray	Seymour	Thurlow	Sidney
Nearest Waterbody	Crowe River	Salt Creek	Percy Creek	Cold Creek	Trent River	Chrysal Creek	Palisser Creek
Tree Status	dead deciduous	live & dead deciduous	dead deciduous	live deciduous			live & dead deciduous
Tree species	elm						
Habitat		swamp	beaver pond			flooded area	
Other Bird Species			Great Horned Owl				
Nest height (m)	8 - 11	11 - 14	13	12 - 15			15
Disturbance	logging, drainage	hunting, poaching	farming adjacent			fishermen	none
Source: Collier, Graham, Raglin, 1992							

3.3 Concentration Areas for Waterbirds

Waterbird Migratory Stopover Areas

Summer and fall surveys on the Bay of Quinte completed by the Canadian Wildlife Service in 1994 and 1995 identified several concentration areas for waterbirds on the Bay of Quinte (Patrikeev et. al. 1997). Shorelines with the highest mean number of birds/kilometre (>5 birds/km in summer or 10 birds/km in fall), and/or that corresponded with areas recommended for protection, were identified as significant.

Several sites were within the study area, including:

- Meyers Point to the Trenton Sewage Treatment Plant
- The Dundas Street Bridge in Trenton to the Carrying Place Marsh south of the Murray Canal
- The Sidney Water Treatment Plant to Makatewis Island
- The Bakelite Thermosets property to Meyers Pier in Belleville

3.4 Sites of Biological Significance

Sites of Biological Significance have been identified by the OMNR and are included in the mapping as point data. While many of the sites occur within Areas of Natural and Scientific Interest, these were not shown on the mapping. The sites outside of the ANSIs, which are included in the Natural Heritage System maps, are: Middle Chrysal Creek, Moira Conservation Area, Thrasher's Corners Swamp, Thurlow Township Swamp, Wilson Island, Wooler Lowlands, Glen Miller (Bleasdel) Boulder, Pancake Hill Slope Forest, and Potter Creek. The OMNR should be contacted for more information on these sites.

3.5 Natural Areas

The Natural Heritage Information Centre's (NHIC) Natural Areas database was used to identify natural areas. A point occurs on the map for each entry and a table is attached that includes location information, name of the natural area, size, and significance level. A description of each of the natural areas is provided in a separate Microsoft Excel table. The main types of natural areas listed in the database include Earth Science ANSIs, Life Science ANSIs, wetlands, Conservation Areas, Provincial Parks, Earth Science Sites, Life Science Sites, and International Biological Program sites. Many of these sites may be located within a mapped area. If a development or restoration project is located near any of these sites, the Conservation Authority or OMNR should be contacted for more information on sensitivity or potential impacts.

3.6 Rare Species (Element Occurrences)

Information on rare species was obtained from the Natural Heritage Information Centre (NHIC). The database contains records of "Element Occurrences." These are locations where an element either exists or has existed. The database attached to the mapping includes the name of the species, location, and its status in several rarity ranking systems. Records that include rare or endangered species have been removed from the database. Many of the element occurrences are within mapped natural areas such as wetlands, ANSIs and ESAs. If a development or restoration project is located near any of these element occurrences, the Conservation Authority or OMNR should be contacted for more information on sensitivity or potential impacts.

4. SIGNIFICANT WOODLANDS

A table has been created that attaches a record number to each woodland, indicating its size and which of the significance criteria it satisfies (size, interior habitat, diversity or hydrological significance). It also identifies whether or not the woodland polygon has the potential for old-growth or mid to late successional woodlands. In total, there are 1458 woodland polygons that are considered significant. Table 2 lists all polygons over 200 ha in size. The entire woodland table is available in digital format.

TABLE 2 SIGNIFICANT WOODLANDS – Records for all woodlands over 200 ha

RECORD #	AREA (HA)	SIZE (>40 ha)	INTERIOR HABITAT	DIVERSITY	HYDROLOGICALLY SIGNIFICANT	OLD GROWTH	MID-LATE SUCCESSIONAL	EASTING (UTM)	NORTHING (UTM)
1437	794.83	>40	present		yes		potentially	281840	4922027
255	528.78	>40	present	yes	yes	potentially	potentially	263420	4904607
1178	486.30	>40	present		yes	potentially	potentially	297663	4901288
899	419.22	>40	present	yes	yes	potentially	potentially	294480	4900601
1411	409.60	>40	present	yes	yes		potentially	286156	4904769
1175	399.37	>40	present		yes	potentially	potentially	300876	4906512
1449	368.55	>40	present	yes	yes	potentially	potentially	267573	4894922
1336	365.13	>40	present		yes	potentially	potentially	299412	4895579
1262	356.41	>40	present		yes	potentially	potentially	299691	4899987
1412	350.41	>40	present	yes	yes	potentially	potentially	263460	4899479
1374	347.59	>40	present	yes	yes	potentially	potentially	306495	4904738
1102	333.20	>40	present	yes	yes	potentially	potentially	309689	4903408
1419	329.12	>40	present	yes	yes	potentially	potentially	261759	4901771
1388	317.72	>40	present	yes	yes	potentially	potentially	309483	4904956
1387	314.07	>40	present		yes	potentially	potentially	291498	4902835
1409	311.91	>40	present	yes	yes	potentially	potentially	286582	4893318
1258	282.12	>40	present		yes		potentially	281608	4919043
1389	278.44	>40	present	yes	yes	potentially	potentially	313683	4906115
253	272.10	>40	present		yes		potentially	259647	4906572
1390	271.71	>40	present	yes	yes	potentially	potentially	312358	4904051
725	267.66	>40	present	yes	yes	potentially	potentially	287675	4888006
1136	239.30	>40	present	yes	yes	potentially	potentially	307431	4902182
1447	235.76	>40	present	yes	yes	potentially	potentially	262830	4895203
896	228.67	>40	present	yes	yes		potentially	296868	4903811
726	226.09	>40	present	yes	yes	potentially	potentially	291766	4893166
668	221.18	>40	present		yes	potentially	potentially	288353	4893166
1177	220.35	>40	present		yes	potentially	potentially	298444	4903322
1098	218.77	>40	present		yes		potentially	315221	4900743
1091	201.75	>40	present		yes	potentially	potentially	288750	4890520
257	201.56	>40	present	yes	yes	potentially	potentially	265009	4902199
910	200.90	>40	present		yes		potentially	294218	4897151

5. RIPARIAN LANDS

Riparian lands are 30 metre buffers along watercourses and waterbodies. Detailed site descriptions are not available for the riparian lands, although it is important to note that many of these overlap with other natural features such as woodlands, wetlands and lowlands. Approximately 10,878 ha or 8.4% of the study area is identified as riparian lands.

6. LOWLANDS

Lowlands consist of a range of conditions including wetlands, valleylands and wet forests. The lowlands represent 26,231 ha or x 20.3% of the study area, but they overlap with the identified wetlands, riparian lands and woodlands. Detailed descriptions are not available for the lowlands.

7. ENDANGERED AND THREATENED SPECIES

A few locations which are considered to be the habitat of endangered and threatened species have been noted within the study area. These are shown on the maps with large (1 km square) symbols, placed randomly over the location. If development or site alterations are proposed in the vicinity of the habitat of endangered and threatened species, the OMNR should be contacted for more details. It should be noted that there may be other areas that comprise the habitat of endangered or threatened species, that are not shown on the map. The NHIC web site and OMNR should be contacted for the most recent and detailed information.

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APPENDIX C

ENVIRONMENTAL IMPACT ASSESSMENTS

NATURAL HERITAGE REPORT

Campbellford/Seymour/Percy/Hastings
Quinte West ♦ Belleville

A Project of the
Bay of Quinte
Remedial Action Plan



Prepared by
Lower Trent Conservation
May, 2001

ENVIRONMENTAL IMPACT ASSESSMENTS

The purpose of an Environmental Impact Assessment (EIA) is to assess the potential impacts of development and site alteration on natural heritage features and their ecological functions.

An assessment of impacts requires sufficient information on a proposed development to demonstrate “that there will be no negative impacts on the natural features or the ecological functions for which the area is identified.” (PPS, 1997)

Appendix C of the Ontario Ministry of Natural Resources’ (OMNR) Natural Heritage Reference Manual (which is included in this Report for easy reference) provides a comprehensive list of potential physical impacts and potential impacts on features and functions. It also provides guidance for addressing impacts of development on natural heritage features. It is recommended that Municipalities use this document as a guide for completion of EIAs.

The sections of OMNR’s Natural Heritage Reference Manual included in this report are:

Ontario Ministry of Natural Resources. June, 1999. ***Natural Heritage Reference Manual***, pp. 45 - 53. For Policy 2.3 of the Provincial Policy Statement.

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NATURAL HERITAGE REPORT

Campbellford/Seymour/Percy/Hastings
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–4 maps are separate .jpg files