



SOUTH NATION
CONSERVATION
DE LA NATION SUD

The North Castor River Subwatershed Plan

By the:

South Nation Conservation

In cooperation with the:

Township of Osgoode
City of Gloucester

Regional Municipality of Ottawa Carleton

Ontario Ministry of Natural Resources

Ontario Ministry of Agriculture & Food & Rural Affairs

January 1996



Acknowledgements

The development of the North Castor River Subwatershed Plan was the result of a collaborative effort by the South Nation River Conservation Authority (SNRCA) and its municipal partners to determine ways to improve the natural environment of the Subwatershed. The SNRCA would like to thank its municipal partners - the Township of Osgoode, the City of Gloucester and the Regional Municipality of Ottawa-Carleton (RMOC) - for their cooperation and support in the completion of the Plan.

In addition, the SNRCA would like to extend special thanks to the following individuals for their contribution to the Subwatershed Plan: David Miller with the Planning Department of the RMOC; Gordon Pratt, Kevin Grace, Karyn Ostafichuk and Cheryl McWilliams of the Township of Osgoode; Roger Shorey of the Planning Advisory Committee, Township of Osgoode; Joanne Nesbitt and Phil Huntley with the Development Department of the City of Gloucester; Fel Petti, Catherine Curry Jefferson and Erik Apedaile with the Environmental Services Department of the RMOC; Anda Rungis of the Ontario Ministry of Natural Resources; Gary McTavish of the Ontario Ministry of Agriculture, Food and Rural Affairs; and Albert McKeown, Dennis O'Grady and Martin Czariski of the South Nation River Conservation Authority.

CONTENTS

ACKNOWLEDGEMENTS

SUBWATERSHED PLAN HIGHLIGHTS

1.0 THE NORTH CASTOR RIVER SUBWATERSHED PLAN	
1.1 Subwatershed Plan Background	1-1
1.2 Subwatershed Plan Purpose	1-2
1.3 Subwatershed Plan Topics, Goals and Objectives	1-3
1.4 Subwatershed Plan Organization, Approach, Methodology and Implementation	1-6
2.0 THE NORTH CASTOR RIVER SUBWATERSHED TODAY	
2.1 Communities	2-1
Land-Use and Development Activity	2-1
Agriculture	2-2
Aggregates and Geology	2-2
Recreation and Open Space	2-2
Soils	2-3
Municipal Planning	2-3
2.2 Water	2-8
Surfacewater	2-8
Groundwater	2-10
2.3 Nature	2-10
Fish and Fish Habitat	2-10
Wildlife and Wildlife Habitat	2-13
3.0 THE FUTURE OF THE NORTH CASTOR RIVER SUBWATERSHED	
3.1 Land-Use Planning and Development Activity	3-1
Regional Municipality of Ottawa-Carleton Official Plan	3-1
Township of Osgoode Official Plan	3-2
City of Gloucester Official Plan	3-3
3.2 Limitations on Land Development	3-4
Past Limitations on Development	3-4
Present Limitations on Development	3-4
Options for Future Development	3-5
4.0 SUBWATERSHED PLAN RECOMMENDATIONS	
4.1 Communities	4-1
Planning and Development	4-1
4.2 Water	4-3
Surfacewater	4-3
Groundwater	4-4

4.3 Nature	4-5
Fish and Fish Habitat	4-5
Wildlife and Wildlife Habitat	4-6
4.4 Implementing the Subwatershed Plan Recommendations	4-8
North Castor River Subwatershed Implementation Timetable	4-10

5.0 REFERENCES	5-1
----------------	-----

APPENDICES

• Water Quality Analysis of the Castor River, 1994	A-1
• Official Plan Amendment No. 16 to the Official Plan of the City of Waterloo	B-1
• City of Vaughan Official Plan Amendment 400	C-1
• Excerpts from the Draft Official Plan of the Township of Kingston	D-1
• Land-Use Policies for Resource Lands in the Maitland Valley Watershed	E-1
• Legislation and Policies Applicable to Subwatershed Planning	F-1
• Summary of the Comprehensive Set of Policy Statements	G-1
• Summary of Technical Studies to Protect the Subwatershed Environment	H-1
• Aquatic Habitat Survey Report for Shields and Findlay Creeks	I-1
• Resource Management Targets for the Hanlon and Credit Watersheds	J-1

TABLES

2.1 Legislation/Procedures to be Considered Prior to Development	2-4
2.2 Sub/Watershed Planning in the Municipal Planning Process	2-5
3.1 Subwatershed Plan Development Options	3-9
4.1 Means to Implement Water Strategies to Sustain the Fish Population	4-12
4.2 Means to Implement Nature Strategies to Sustain the Fish Population	4-13

MAPS

• North Castor Watershed Aggregates	2-2/2-3
• North Castor Watershed Surficial Geology	2-2/2-3
• North Castor Watershed Agricultural Capability	2-4/2-5
• North Castor Watershed Bedrock Aquifers	2-10/2-11
• North Castor Watershed Overburden Aquifers	2-10/2-11
• North Castor Watershed Wetlands	2-14/2-15
• North Castor Watershed Vegetative Cover	2-14/2-15
• North Castor Watershed Rural Settlement	3-2/3-3

FIGURES

4.1 Targeting the North Castor River Fish Population to Implement the Plan	4-9
4.2 Areas Requiring Attention to Sustain the North Castor River Fish Population	4-9

Highlights of the North Castor River Subwatershed Plan

The intent of the North Castor River Subwatershed Plan is "to enhance the quality of life for the residents of the North Castor River Subwatershed, by maintaining and improving the health of their communities through the conservation, restoration and enhancement of the living and non-living environment, while planning and managing for future economic growth." The following recommendations, drawn from the Plan, are intended to address this purpose for the benefit of all residents living and working in the Subwatershed.

Communities

Action 1 Incorporate the Subwatershed Plan goals, objectives and recommendations, when and where deemed appropriate, into the Official Plan documents of the City of Gloucester and the Township of Osgoode as planning policy to guide land-use and development activity.

Action 2 Use the Subwatershed Plan as a resource document to develop descriptions of Development Limitation Areas (DLA's) to be identified in the Official Plans of the City of Gloucester and the Township of Osgoode to guide future planning and development activity.

Action 3 Implement the Subwatershed Plan recommendations and report on their achievement by continuing the work of the watershed partnership, established between the South Nation River Conservation Authority (SNRCA), the City of Gloucester, the Township of Osgoode, the Regional Municipality of Ottawa-Carleton (RMOC) and provincial ministries.

Water

Action 4 Continue monitoring the water quality of the North Castor River to determine its health and identify areas where remedial work should be carried out.

Action 5 Use the recommendations from the Storm Servicing Study for Proposed Development in the Village of Greely as the basis for implementing measures to protect the water quality of Shields Creek during and after the development of vacant lands adjoining the Creek in Greely.

Action 6 Make efforts to improve existing stormwater management in the Village of Greely to better the water quality of Shields Creek. Elsewhere in the Subwatershed, exercise less invasive municipal drainage practices and ensure that stormwater or other sources of water contamination be safely discharged to minimize their impact on the water quality of the North Castor River.

Action 7 Jointly develop and adopt, between the SNRCA, RMOC, Ontario Ministry of Natural Resources (OMNR), City of Gloucester and the Township of Osgoode, pre and post development sediment and erosion control guidelines for the Subwatershed.

Action 8 Undertake a groundwater survey of private wells to locate existing and potential water quality problems and identify local and regional aquifer recharge and discharge zones requiring protection.

Action 9 Establish the criteria and policy required to protect regionally important aquifer recharge zones located in the Subwatershed from contamination and include these provisions in the RMOC's, the City of Gloucester's and the Township of Osgoode's Official Plan.

Nature

Action 10 Establish a sustainable fish (trout) population along Shields Creek in Greely through partnership between the Township of Osgoode, the OMNR, the SNRCA, voluntary organizations, local anglers and residents.

Action 11 Establish a sustainable fish (trout) population along Findlay Creek in Leitrim through partnership between the City of Gloucester, the OMNR, the SNRCA, local anglers, voluntary organizations and residents.

Action 12 Inventory and where necessary conduct additional field work to determine the extent and significance of the Subwatershed's natural attributes (woodlands, wetlands, etc.) in the City of Gloucester and the Township of Osgoode in cooperation with the OMNR, the SNRCA, the RMOC, field clubs and local landowners.

Action 13 Improve green space linkages/corridors along and between the woodlands, wetlands, streams and rivers of the Subwatershed.

Action 14 Strengthen the protection of locally valued natural features in the Official Plans of the City of Gloucester and the Township of Osgoode.

Action 15 Improve the natural habitat of the Subwatershed by actively involving the community at large in environmental projects determined to be beneficial to the local environment.

Action 16 Identify those wetlands considered not to be provincially significant and evaluate them according to their local importance. Identify locally important wetlands in the Official Plans of the City of Gloucester and the Township of Osgoode and encourage residents to participate in their management and protection.

1.0 THE NORTH CASTOR RIVER SUBWATERSHED PLAN

1.1 Subwatershed Plan Background

The North Castor River Subwatershed Plan (NCRSWP) was initiated in the Autumn of 1993 by the South Nation River Conservation Authority (SNRCA) and other interested parties, at the request of the Township of Osgoode. Before further development could proceed in the Village of Greely, the Township felt that specific environmental concerns needed to be addressed. These concerns included water quality and quantity management related to stormwater runoff and drainage, and the maintenance of a cold water trout fishery for recreational purposes along the North Castor River.

At that time, the Province of Ontario had just released three documents espousing a *watershed approach* to municipal land-use planning and development. Other literature, including the Crombie Commission Report (1990) entitled Watershed advocate the integration of environmental considerations with land-use planning:

"Traditionally, human activities have been managed on a piecemeal basis, treating the economy separately from social issues or the environment. But the ecosystem concept holds that these are inter-related, that decisions made in one area affect all the others. To deal effectively with the environmental problems in any ecosystem requires a holistic or ecosystem approach to managing human activities".

The SNRCA and the Township of Osgoode felt the time was right to apply this new *watershed approach* to the North Castor River (NCR) Subwatershed not only to deal with these specific issues, but to also look at the downstream consequences of future development on the NCR. A *watershed approach* would help broaden the scope of the Township's land-use planning horizon to include environmental factors on a watershed basis generally not considered in planning and developing activities; in particular, linking water quality/quantity and fish/wildlife habitat needs with physical land-use planning to guide where future development should be directed in order to maintain a high quality of life for residents.

A committee, constituting representatives from the municipalities of Gloucester, Osgoode, the Regional Municipality of Ottawa-Carleton (RMOC), the Ontario Ministries of Natural Resources (OMNR), Municipal Affairs and Agriculture, Food and Rural Affairs (OMAFRA) and the South Nation River Conservation Authority was established to ensure representation from those organizations and individuals with a direct interest in the outcome of the Plan. It was charged with the responsibility to guide, advise and provide information to the Plan and to ensure its completion. Due to the untested nature of the *watershed approach* to

planning and development in Ontario, the committee from the start of the Study was uncertain about the results of the NCRSWP, when this new approach was applied to the North Castor River Subwatershed. Although this uncertainty was cause for concern, it did allow many different options to be considered regarding the content and layout of the Plan document.

The North Castor River Subwatershed contains a variety of land-use activities and environmental conditions (please refer to the North Castor Watershed series of maps presented in Chapter 2.). The landscape is predominated by a mixture of agricultural activities and previously cleared lands that are reverting back to woodland. Other lands include wetlands, woodlands, aggregate lands and urban, commercial, and industrial lands. Two areas of extensive future development activity in the Subwatershed, the Leitrim Development Area (LDA) and the Greely Development Area (GDA) have been studied and numerous reports prepared to further the proposed development (please see Chapters 2 and 3 for further discussion about these documents.) Further study is anticipated for the GDA prior to development taking place.

As such, the North Castor River Subwatershed Plan is intended to provide a broad environmental overview of the Subwatershed. It is intended to be of use to the public, private developers, municipal politicians and staff, and public agencies in determining the most appropriate places for future development. To this end, the Plan suggests a method (in Chapter 3) to determine which lands may or may not be developed across the Subwatershed. It also outlines how many of the Plan's recommendations are to be implemented via statutory and non-statutory means including municipal land-use planning policies/regulations, resource management programs/projects and community involvement, to help ensure the well-being of the Subwatershed environment.

1.2 Subwatershed Plan Purpose

The Purpose of the Subwatershed Plan is to:

- ◆ Address concerns related to proposed residential and commercial development in the vicinity of the Village of Greely that will impact on the waters of the North Castor River.
- ◆ Create a Subwatershed Plan that addresses these concerns and improves local decision-making about the type, magnitude and pace of development to be pursued while recognizing other local environmental considerations.
- ◆ Test the subwatershed planning concept in the South Nation River Watershed. This pilot project will enable the SNRCA to evaluate the Study approach being used and its merit for possible future application to other subwatersheds within its jurisdiction.

The Subwatershed Plan will:

- ◆ Broadly characterise the physical and natural features of the Subwatershed;
- ◆ Recognize the potential impacts of land-use changes;
- ◆ Produce recommendations to guide future planning and development of the Subwatershed; and
- ◆ Suggest ways to implement the recommendations of the Subwatershed Plan.

1.3 Subwatershed Plan Topics, Goals and Objectives

Subwatershed Topics

Environmental concerns and issues were identified for the Subwatershed and used to help determine the following topics and goals and objectives for the Subwatershed Plan:

- | | | |
|---------------------------------|-----------------------------|-------------------|
| ● wetlands | ● drainage | ● aggregates |
| ● fish habitat | ● agriculture land-use | ● development |
| ● buffer strips | ● water quality/quantity | ● floodplains |
| ● agricultural code of practice | ● regional official plans | ● beavers |
| ● ecological inventories | ● rural servicing | ● slope stability |
| ● erosion | ● groundwater | ● forests |
| ● wildlife habitat | ● natural ecosystems health | |

Goals and Objectives

The goals and objectives listed below span the long and short term planning horizon. They are intended to directly address the natural environment, that along with political, social, physical and economic considerations, are essential in maintaining healthy communities and a high quality of living for residents of the Subwatershed. Some of these goals and objectives have been met during the course of this Study. Many of them can only be realized after the completion of this study. The goals and objectives of the Subwatershed Plan are as follows:

1) Goal For Planning

- Improving the planning process for community development by:

Objectives

- Bringing together the major stakeholders in the Subwatershed (municipalities, agencies, politicians and the public) to form a committee that will be responsible for the subwatershed plan undertaking;
- Having the NCRSWP committee arrive at a consensus about the Study's findings and recommendations that satisfy the jurisdictional and political responsibility of each stakeholder;
- Streamlining the land-use planning and development approval process;
- Incorporating the Plan's recommendations, when and where feasible, into municipal planning documents as official plan policies, guidelines and regulations;
- Collecting and mapping information about the North Castor River Subwatershed by utilizing the RMOC's Geographic Information System (GIS) technology to produce maps of the Subwatershed's environmental attributes;
- Having the Subwatershed Plan provide information for use in a master drainage study in the Greely area.

2) Goal for Water

- Protecting, restoring, and enhancing water quality and quantity and associated aquatic resources by:

Objectives

- Minimizing erosion and preventing the sedimentation of waterways and the accelerated enrichment of streams and contamination of waterways from runoff;
- Ensuring that runoff from developing and urbanizing areas is controlled to ensure that it does not unnecessarily increase the risk of flooding;
- Adopting land-use controls and performance standards for controlling/prohibiting development of flood plains;
- Promoting the use of Best Management Practices in urban and rural areas;
- Determining effective ways to improve drainage in the Subwatershed; especially development lands west of the Old Prescott Road in Greely, in the vicinity of the Leitrim (Wetland) Development Area and in the area designated for industrial development south of Greely;
- Evaluating existing water quality and related stress on the Subwatershed ecosystem;
- Having the Subwatershed Plan Study form a strong basis of information for use in a master drainage study in the Greely area.

3) Goal for Nature

- Conserving, restoring and enhancing the natural resources of the Subwatershed (wetlands, woodlands and wildlife) by:

Objectives

- Determining the environmental areas (e.g. woodlands, stream corridors) to be given priority for protection, restoration and enhancement;
- Conserving and restoring, where possible, links between green areas and open spaces to establish a greenway corridor along the North Castor River and its tributaries;
- Maintaining, enhancing and designing channels that are sympathetic to the river ecosystem;
- Maintaining, restoring and enhancing a natural vegetative canopy along streams to ensure that stream temperatures do not exceed the tolerance limits of aquatic organisms;
- Maintaining and enhancing fish habitat along Shields Creek (North Castor River) in Greely and Findlay Creek in Leitrim.

4) Goal for Communities

- Restoring, protecting, developing, and enhancing the historic, cultural, recreational, and visual amenities of rural and urban areas within the Subwatershed, particularly along stream corridors by:

Objectives

- Balancing the preservation of natural systems with the needs and aspirations of the Subwatershed's residents;
- Ensuring that environmental resource concerns are fully considered and protected in establishing land-use patterns along stream corridors and adjacent to areas of ecological significance;
- Retaining and preserving open space and visual amenities in urban and rural areas by establishing and maintaining greenbelts along stream corridors and providing open space linkages to the existing municipal open space system;
- Educating the public about the North Castor River environment and recognizing the concerns and needs of the agricultural community by soliciting their public help in implementing the study's project-oriented recommendations;
- Making Andy Shields Park a recreational feature which will promote the public's awareness and enjoyment of the North Castor River;

- Ensuring that the recreational fisheries potential along Shields Creek in Greely and Findlay Creek in Leitrim is realised.

1.4 Subwatershed Plan Organization, Approach, Methodology and Implementation

Organization

The Study is a cooperative effort involving the South Nation River Conservation Authority, the Township of Osgoode, the City of Gloucester, the Public, the Regional Municipality of Ottawa-Carleton (RMOC) and the Ontario Ministries of Natural Resources (OMNR), Agriculture, Food and Rural Affairs (OMAFRA), and Municipal Affairs (OMMA). A committee made up of representatives from the above was formed to oversee the Study's implementation and completion. This committee, known as the North Castor River RoundTable, met on a number of occasions over the duration of the Study.

Ways and means to carry out the Plan were considered by the RoundTable at its inception. Due to the limited financial resources available for the Plan undertaking, it was decided to use existing information extensively and draw upon the in-house expertise available to the RoundTable members. Only when the RoundTable was unable to provide necessary information and resources was a professional consultant hired to do a separate storm servicing study.

Approach

The Subwatershed Plan espouses a *watershed approach* to planning and development, which embraces the ecosystem concept as its guiding principle. The watershed ecosystem encompasses the living creatures of the watershed: humans, plants and animals and the other characteristics and functions that control its environment. The Plan recognizes the need to adopt this way of thinking in future planning and development activities in the North Castor River Subwatershed.

Methodology

The NCRSWP methodology draws heavily from the Ontario Ministry of Environment and Energy's (OMOEE) set of watershed planning documents (June 1993) entitled: 1) Watershed Management on a Watershed Basis, Implementing an Ecosystem Approach; 2) Subwatershed Planning; and 3) Integrating Water Management Objectives into Municipal Planning Documents. In addition to the OMOEE's documents, the following watershed plans were

used to develop the Plan: The Laurel Creek Study of the Grand River Conservation Authority; The Collins Creek Study of the Cataraqui River Conservation Authority; The Credit River Conservation Authority Water Management Strategy; and the City of Vaughan Subwatershed Study.

Implementation

For this document to be a success, it must be able to bring about a general improvement in the overall health of the North Castor River ecosystem. The steps and measures outlined in the recommendations chapter of this Plan are intended to give municipal leaders, staff and the public suggestions as to how to accomplish this overall purpose. Specifically, two approaches are suggested to achieve this purpose: 1) adopt statutory type recommendations into official plan documents as planning policies and guidelines; and 2) implement non-statutory type recommendations through specific projects and day-to-day management practices and field projects.

2.0 THE NORTH CASTOR RIVER SUBWATERSHED TODAY

The North Castor River (NCR) drains into the Castor River at Russell, which drains into the South Nation River at Casselman. The North Castor River Subwatershed is illustrated on the series of maps entitled "North Castor Watershed" presented further on in this Chapter. It is one of the many subwatersheds forming the larger South Nation River Watershed. The Subwatershed boundary outlines the area of land that drains into the North Castor River and its tributaries including Findlay Creek, Shields Creek and Black Creek. The majority of the Subwatershed is located within the Township of Osgoode and the City of Gloucester, with very small portions located in Cumberland and Russell Townships.

2.1 Communities

Land-Use and Development Activity

The North Castor River Subwatershed contains a variety of land-use activities, land cover and environmental conditions. The landscape is predominated by a mixture of agricultural activities and previously cleared lands that are reverting back to woodland. Other land includes wetlands, woodlands, aggregate lands and urban/commercial/industrial lands. Agriculture is the main land cover, followed by wooded and open/green space, towns and villages, industrial/commercial space and aggregate areas for the lands in question.

The main channel of the North Castor River has remained relatively untouched, upstream from the point at which Findlay Creek enters the main channel of the NCR, to the place downstream where it converges with the Castor River. However, many of the NCR's tributaries including its headwater recharge/discharge areas have been straightened, channelized and low lying areas drained for agriculture purposes.

The Township of Osgoode is one of the fastest growing municipalities in the South Nation River Watershed. This is in part due to residents of urban Ottawa-Carleton seeking a more attractive lifestyle associated with rural RMOC and the availability of more affordable housing outside the urban RMOC core. The City of Gloucester continues to experience significant growth in the east, around Orleans and is planning for extensive residential and commercial growth in the Leitrim and River Ridge Development Areas.

In the RMOC, residential growth has been concentrated in areas east and west of the present urban core in Ottawa. This is changing rapidly as evidenced by the expansion of the Barrhaven area in Nepean and the development of numerous subdivisions in Osgoode and Rideau Townships. The development planned for the NCR Subwatershed in the Village of

Greely and the Hamlet of Leitrim will definitely affect the health of the North Castor River. The challenge is to ensure that mitigative measures are put in place to minimize the effects of development on the Subwatershed.

Agriculture

Agricultural remains a major land-use and farming activity remains strong in the Subwatershed, especially downstream of Greely towards Russell, along the North Castor River valley. A combination of dairy and beef farming, cash cropping and market gardening account for most of the farming activity. Most farmers appear to farm full-time, although this is changing to include more part-time farmers who supplement their incomes with off the farm employment.

Aggregates and Geology

The Subwatershed contains some of the most valuable and extensive mineral resource areas in the RMOC (please refer to the map entitled "North Castor Watershed Aggregates," found between pages 2-2 and 2-3). Most of them are concentrated in and around South Gloucester and Greely. These mineral resource areas are of special concern because they are located over a regionally important groundwater recharge aquifer (Chin et. al., 1980). Management guidelines should be established for these mineral resource areas to ensure that the groundwater resources of the Subwatershed are not contaminated (Geo-Analysis, May 1992).

The geology of the area is varied as shown in the map entitled "North Castor Watershed Surficial Geology," found between pages 2-2 and 2-3. The headwaters of Shields and Findlay Creeks stand out very clearly as organic deposits, both in Leitrim and Greely.

Recreation and Open Space

One of the reasons for the Subwatershed undertaking was to consider ways to enhance the North Castor River, especially the section flowing through Andy Shields Park in Greely, to make it a more attractive and environmentally healthy recreational feature for use by the community.

As it stands, Andy Shields Park is the only formal recreational area in the Subwatershed along the NCR. Fishing, birdwatching and walking are examples of recreational activities that can be enjoyed along the NCR and its tributaries.

NORTH CASTOR WATERS AGGREGATES

BEDROCK

- MARSH
- DIPFORD

SAND & GRAVEL

- CLASS 1
- CLASS 2
- CLASS 3
- CLASS 4



NORTH CASTOR WATERS
SURFICIAL GEOLOGY

-
- Till
 - Ice-contact stratified
 - Offshore marine deposits
 - Deltaic and estuarine
 - Nearshore sediments
 - Alluvial deposits
 - Organic deposits
 - Rock
 - Unclassified/Water

Soils

The soils of the Subwatershed are diverse and are associated with a number of land units or landscape types (see OMNR 1976 for further reference). Soil textures vary considerably from organic to loam, fine sandy loam, sandy loam and silt loam in Osgoode Township; from organic to loam, sandy loam and coarse sandy loam in Gloucester South.

The topography of the Subwatershed varies marginally. Most land is level with rolling slopes typically below 2 percent. The notable exception to this is the rise of land located north of South Gloucester in the vicinity of the old beach area of the ancient Champlain Sea (Schut and Wilson, 1987).

Drainage is varied. Along the North Castor River, it is imperfect to very poor in Greely and varies from poor to good toward the mouth of the River outside the village of Russell. Along Findlay Creek, it is imperfect to good south of Leitrim and poor where it enters into the North Castor River in Osgoode Township (Schut and Wilson, 1987).

By combining slope and soil surface texture information, the soil capability for agricultural purposes can be identified for the Subwatershed. As with the soil types, the soil capability varies throughout the area. Approximately 50% of the Subwatershed contains Class 1 to 3 lands; the other 50% is Class 4 to 7 with organic lands predominant (please refer to the map entitled "North Castor Watershed Agricultural Capability," found between pages 2-4 and 2-5). As expected, most of the remaining viable farming activity in the Subwatershed coincides with areas of higher agricultural soil capability, east of Greely along the North Castor River.

Municipal Planning

Land-use planning policy incorporating important environmental features can play a major role in minimizing land-use and development impacts on the Subwatershed. It is increasingly recognized that sub/watershed planning should be carried out early on in the land-use planning process to ensure that sub/watershed policies are incorporated into official plans (O.P.'s), before development activity proceeds.

The land-use planning process allows for the designation of land-uses that are compatible with environmental features and which will minimize environmental impacts brought about by development. A wide range of federal and provincial legislation and policies provide a framework for implementing local policies for sub/watershed resource protection (please refer to Table 2.1).

It is important to be aware that legislation and policies pertaining to the natural environment

of the NCR Subwatershed are constantly changing. The Planning Act (1983) and Municipal Act (1980) were recently amended as part of Ontario Government Bill 163 (Legislative Assembly of Ontario, 1994). The new Planning and Municipal Acts (1995) that came into effect on March 28, 1995 are significantly affecting planning and development practice in Ontario. The new Planning Act (1995) requires municipalities to be consistent with a set of comprehensive provincial policy statements (OMMA 1994) while planning for and appraising development in their communities. A summary of these comprehensive planning policy statements is available in Appendix G.

Once again, additional changes to the Planning Act (1995) are being proposed, in addition to those mentioned above. If anything is to be learnt from all of this legislative upheaval, it is that the Township of Osgoode and the City of Gloucester must determine with the help of their residents, what are the locally valued environmental features to be protected by planning policy and other mechanisms for future generations.

Table 2.1. Legislation/Procedures to be Considered Prior to Development in the Subwatershed

Legislation	Organization	Jurisdiction/Responsibility
Municipal/Regional Act Planning Act Drainage Act	Municipality	* construction and operation of drainage and stormwater works
Conservation Authorities Act Fill & Construction Regulations	Conservation Authority	* flood control, water management, conservation * approval of construction activities within the flood plain
Planning Act	Ministry of Municipal Affairs	* allows Ministries/Agencies to comment on large developments and subdivision proposals
Lakes/Rivers Improvement Act Beds of Navigable Waters Act Fisheries Act (Canada) Conservation Authorities Act Planning Act	Ministry of Natural Resources	* approval of works in lakes and water courses (alterations and diversions) * crown ownership of beds of navigable waters * fisheries, fish habitat * administration: technical and financial assistance to CA's
Ontario Water Resources Act Environmental Protection Act Environmental Assessment Act (proposed Municipal Class EA)	Ministry of the Environment & Energy	* approval of sewage works: public hearings may be called * water quality, water taking permits * activities which might injure the environment * municipal Class EA covers municipal sewage and water works * proposed Class EA for Conservation Authority projects will replace current exemption
Public Transportation and Highway Act	Ministry of Transportation & Communications	* subsidies for drainage works for urban roads and streets, including combined sewer separation
Drainage Act	Ministry of Agriculture, Food & Rural Affairs	* subsidies for work on drains to serve agricultural drainage requirements; applicable occasionally in urban setting

(After Triton et. al. May 1992)

Subwatershed planning can provide direction and guidance regarding future land-use

planning policies and decisions at the local level, irregardless of what the province is or is not proposing now or in the future. As such, the Subwatershed Plan is meant to influence future land-use planning and development that may impact on the natural environment. It is anticipated that recommendations forthcoming from this document will be reflected in policy documents such as the RMOC's Regional Official Plan and the Municipal Official Plans of Gloucester, Osgoode, Cumberland and Russell. Ultimately, the Subwatershed Plan is meant to support and enhance Regional and Municipal Official Plans, permitting general land-use decisions to be better integrated with the ecological makeup of the Subwatershed.

Ideally, the Subwatershed plan should be consulted as a first step in the preparation or amendment of Regional and Municipal Official Plans. Subsequent details are provided for in the preparation of master drainage plans, stormwater management plans and stormwater design plans. The sequence to be followed in the preparation of these documents in the planning process is illustrated in Table 2.2.

Table 2.2. Sub/Watershed Planning in the Municipal Planning Process

SUB/WATERSHED PLANNING	MUNICIPAL JURISDICTION	MUNICIPAL PLANNING
Watershed Plan: - Policy direction for full watershed. Provides direction and management practices for ecosystem. Establishes goals and objectives for watershed.	RMOC, Osgoode Gloucester, Cumberland Russell	Official Plan: - Policy direction for municipality or part of municipality. Deals with broad strategy for land-use change taking into account economic, physical, social and natural environment.
Subwatershed Plan: - Focuses on drainage area within watershed. - Provides details for implementing watershed policies	RMOC, Osgoode, Gloucester Cumberland, Russell	Secondary or Community Plan: - Develops objectives and policies based on achieving the environmental objectives set out the Watershed Plan.
Master Drainage Plan and Stormwater Management Plan: - Design incorporating best management practices; drainage plans; rehabilitation plans	RMOC, Osgoode, Gloucester Cumberland, Russell	Subdivision Plan and A Development Proposal: - Detailed lot plan or building development proposal.

(After Triton et. al. May 1992)

Sub/watershed planning has no statutory/legal basis in Ontario. The Planning Act (1980) provides the statutory authority required by local municipalities to plan and manage land-use and development activity. Gloucester, Osgoode, Cumberland and Russell Townships have all adopted official plans for their own jurisdictions. Each municipality with an official plan is responsible for implementing its own planning policies. Gloucester's, Osgoode's and Cumberland's official planning policies must conform to upper tier (RMOC) planning policies.

The Official Plan, when approved under the Planning Act, provides guidance to a municipal

council when it considers proposals for land-use and development change. Major development applications are usually dealt with through the following planning mechanisms:

- ◆ zoning by-laws which permit certain land-uses on properties subject to specific regulatory measures;
- ◆ subdivision plans which create new lots and blocks usually on vacant lands or in areas which are planned for change;

In addition to powers granted under the Planning Act, other existing legislation and guidelines (please see Table 2.1 and Appendix F) provide the necessary framework for sub/watershed planning to occur, including the protection of public safety and environmental features and the means for implementing sub/watershed environmental protection and management measures.

This legislation is administered by a number of federal/provincial agencies. This requires a great deal of co-ordination and co-operation amongst all those with an interest in environmental protection and management that is not always possible. Sub/watershed planning provides the means to realize effective and efficient co-ordination and co-operation amongst municipalities, federal and provincial agencies and members of the public. This is in addition to its ability to provide environmental information and recommendations for use in devising municipal planning policies.

All municipalities in the NCR Subwatershed have official plans in place. It is anticipated that recommendations forthcoming from the Subwatershed Plan will be adopted into local official plans as they are amended. The status of each Official Plan for the municipalities located in the Subwatershed is briefly discussed below.

Regional Municipality of Ottawa-Carleton Official Plan

The RMOC Plan was approved by the Minister of Municipal Affairs in September 1989. Subsequently, the RMOC has been carrying out a number of planning related initiatives including: an environmental review of the Official Plan by means of a Natural Environment Systems Strategy (NESS) and a transportation study; a discussion paper about a Socio-Cultural Approach to Planning and a Rural Servicing Strategy for the RMOC. All of this activity and the introduction of Draft Official Plan Amendment 45 for Provincially Significant Wetlands has resulted in the decision to review the RMOC Official Plan of 1989 and to respond to the many changes occurring in the Region.

The majority of the NCR Subwatershed is within the RMOC boundary. A small portion of

the Subwatershed lies outside the RMOC in Russell Township. The portion of the City of Gloucester within the study area is designated mainly as General Rural Area, Agricultural Resource Area, Mineral Resource Area and Urban Area in the RMOC O.P.. The portion of the Townships of Osgoode and Cumberland within the study area is designated mainly as General Rural Area and Agricultural Resource Area, with some Mineral Resource Area.

Township of Osgoode Official Plan

Osgoode's Official Plan was adopted by the Township Council in 1991. The headwaters of the North Castor River are located in the vicinity of the Village of Greely. It is the main urban area in the Osgoode Township portion of the Subwatershed.

The portion of the study area to the West of Highway 31 in Greely contains a range of land-use designations including Residential, Marginal Resource, Industrial and Open Space. Land-use designations downstream of Greely and East of Highway 31 are predominantly Agricultural Resource and Marginal Resource with some Residential land-use. Policies exist in the Official Plan to govern land-use within each of these designations:

The RMOC deferred approving an Official Plan land-use redesignation for the undeveloped parcel of land between Greely and Greely West until environmental and servicing concerns about the area could be alleviated. This was one of the main reasons for doing the Subwatershed Plan. Also, it was felt that the subwatershed planning process could provide a linkage between environmental protection and development related growth, crucial to providing needed services to residents of the Township. Official Plan policy would eventually be amended to incorporate recommendations of the Subwatershed to guide future land-use and development activity. This would not only satisfy the RMOC's concerns, but also help the Township prepare for the implementation of provisions contained in future amendments to the Planning Act (1995).

City of Gloucester Official Plan

The City of Gloucester Official Plan was approved by the RMOC in 1992. Leitrim and South Gloucester are the two existing villages/hamlets in the Gloucester portion of the Subwatershed. The other dominant land-uses include a number of aggregate operations and a large heavy industrial park around South Gloucester, two moderately sized light industrial parks located west of Leitrim, many low lying areas containing wetlands and forests and extensive areas of agricultural land, most of which has become idle.

Around Leitrim, lands are designated residential, industrial and institutional in the Gloucester

Official Plan. South of Leitrim towards South Gloucester, limited development (because of mineral resources and unstable lands) and industrial land-use designations are predominant. Around South Gloucester, the same designations apply with the addition of some residential land-use. From Baseline Road east towards Edwards, the main land-use designations are agricultural and limited development.

The development plans for the Leitrim expansion have been completed, with detailed site specific studies having been undertaken between 1989 and 1994. Adverse impacts of the proposed development have been minimized through the concept plan design and the stormwater management system developed for the site.

Township of Cumberland Official Plan

In the Township of Cumberland Official Plan, the portion of the Township that is within the study area is designated Rural Land-use Category. The primary land-use consideration within this designation is the protection, preservation and encouragement of the use of lands for food production. The majority of lands in this portion of the Township are classified by the Official Plan as "Lands which are Not Prime Agriculture Soils". Therefore, in addition to food production, certain use including public or quasi-public, recreation, commercial and industrial oriented to agriculture, and limited residential uses may be permitted.

Township of Russell Official Plan

In the Township of Russell Official Plan, the portion of the Township within the Subwatershed area is designated Agricultural and General Rural. The primary land-use consideration for the Agriculture category is to accommodate a significant agricultural environment on lands having a high agricultural capability. The General Rural designation promotes the maintenance of the rural character of the Township by limiting the spread of urbanization and the amount of non-resource based development.

2.2 Water

Surfacewater

One of the main reasons for the Subwatershed Plan undertaking was to evaluate existing water quality along the North Castor River and establish water quality baseline data for use in determining the effects of future development on the watercourse, in the vicinity of the Greely and Leitrim Development Areas. These two developments are proposed for the

headwaters of the NCR along Shields (North Castor River) and Findlay Creeks.

In 1994, the SNRCA and the RMOC established the "Castor River Water Quality Monitoring Program" to evaluate, characterize and monitor water quality trends in the Castor River Watershed. A report has been written about the findings of this work, entitled Water Quality Analysis of the Castor River, 1994, which was prepared to specifically address water quality along the North Castor River portion of the Castor River Watershed. The report is presented in Appendix A.

The North Castor River water quality sampling analysis intentionally focused on the aquatic ecosystem (i.e. coldwater fishery potential) and recreational uses along Shields Creek because of concerns about the long-term effects of increasing human activity on it. Such changes, especially rapid ones, can have detrimental or disastrous effects. Adverse effects caused by human activity, such as increased inorganic and organic effluent materials discharged into rivers and streams, may affect many of the ecosystem biota components, the magnitude of which depends on both biotic and abiotic site-specific characteristics. For many of the nutrient parameters tested there is no Ontario Water Quality Objective stated, nonetheless, excessive amounts of these substances can have detrimental effects on aquatic biota (SNRCA, January 1995).

Findings from the Castor River Water Quality Analysis Report (SNRCA, January 1995) are important because they help us to better understand the relative health of the North Castor River in relation to the Ontario Water Quality Objectives (OWQO) for the protection of freshwater fisheries.

The data indicates the water quality of the North Castor River to be impacted by excessive concentrations of total phosphorous and bacteria in the form of fecal coliform, meaning that the River is polluted. In addition, suspended sediment concentrations were found to increase with down river flow and exceeded acceptable OWQO levels downstream of Greely at the Quail Drain and where Findlay Creek meets the North Castor River. However, the water quality of the North Castor River did meet the objectives for the protection of freshwater aquatic habitat for pH and un-ionized ammonia at the time of sampling (SNRCA, January 1995).

If care is not taken in future land-use planning and development, water quality deterioration will be unavoidable and the ecosystem biota components of the North Castor River could suffer severe degradation. Since the North Castor River is small, any inputs from development and other land-uses may have a dramatic impact on water quality conditions (SNRCA, January 1995).

Groundwater

The relationship between groundwater and surfacewater is very complex. Our understanding of its significance to the well-being of our wetlands, rivers and streams is changing constantly. Consequently, there is a need to continue improving our knowledge of groundwater resources given the fact that approximately 18% of the population of the RMOC (1988 figures) or 127,000 people outside of the urban core, rely heavily on groundwater for their domestic water supply. This fact comes from the study entitled Private Individual Services in the Rural Area (Geo-Analysis, May 1992).

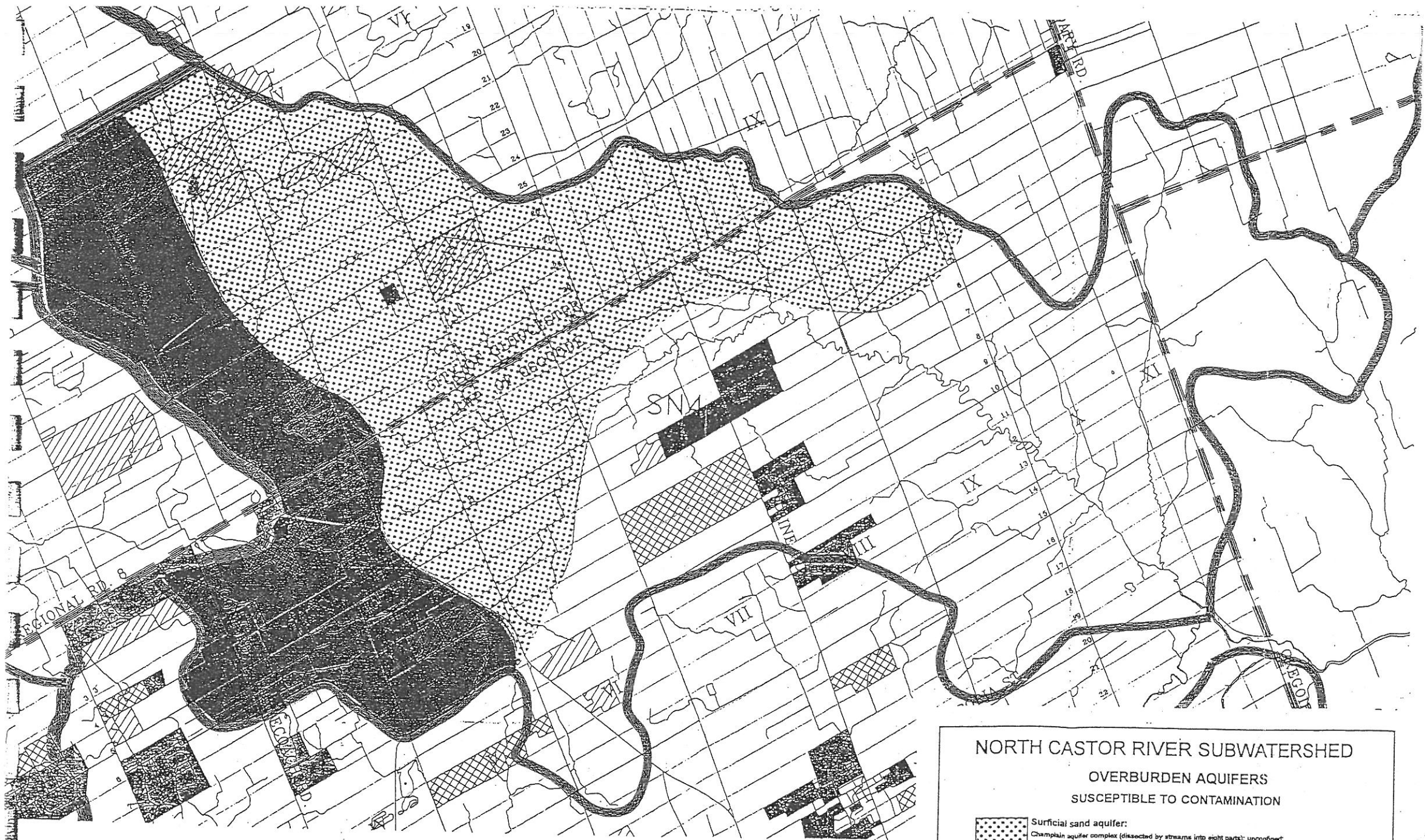
Providing a safe, secure and sustainable supply of drinkable water to the rural areas of the RMOC will be a challenge and will undoubtedly have implications for future planning and development activity in the rural areas of the RMOC, particularly within the NCR Subwatershed. This is because most of the future proposed development in Greely, Leitrim and South Gloucester will depend on groundwater to provide potable water for domestic use. This development is to take place over the aquifers supplying the groundwater necessary to these future communities.

The map entitled "North Castor River Subwatershed Bedrock Aquifers" (displayed between pages 2-10 and 2-11) shows the extent of the bedrock aquifers in the Subwatershed. The map entitled "North Castor River Subwatershed Overburden Aquifers" (presented between pages 2-10 and 2-11) (after Chin et. al., 1980) shows the overburden aquifers located in the Subwatershed and identifies them as being susceptible to contamination. The South Nation River Basin Water Management Study (SNRCA, February 1983) identifies the Rideau front and Champlain aquifers as significant recharge areas, both of which are exposed at the surface and thus susceptible to contamination. It recommends that they be protected to ensure that they continue to be sustainable sources of good, fresh groundwater for human consumption. The Geo-Analysis Study (May, 1992) which was prepared to help in the development of the RMOC's "*Rural Servicing Strategy*" also states that groundwater resource protection is still in its infancy in the RMOC area, and to a lesser extent in the remainder of the Province. Because of this, a better understanding of groundwater in the rural areas of Ottawa-Carleton is needed to ensure a sustainable supply of drinking water.



2.3 Nature

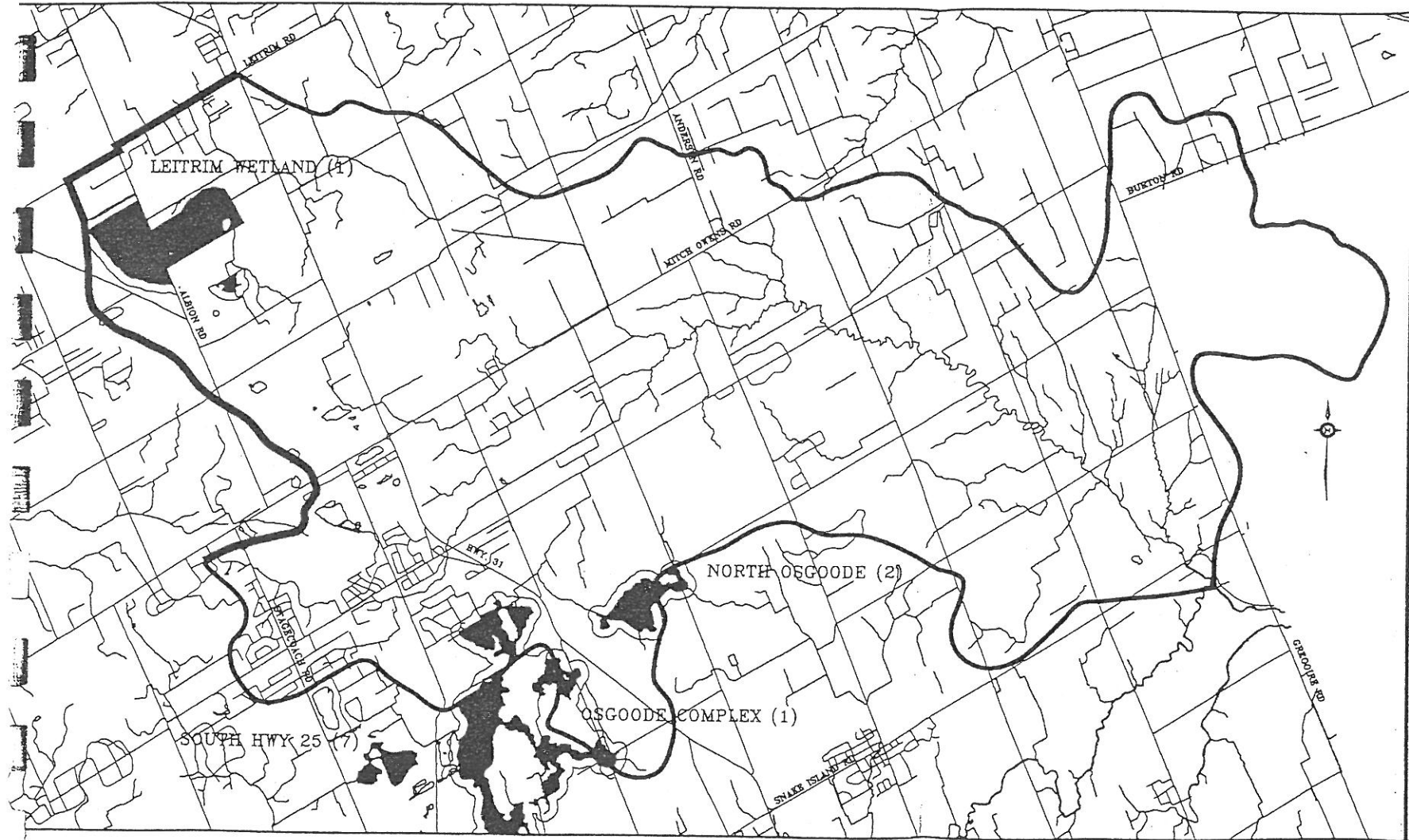
Fish and Fish Habitat

The North Castor River Subwatershed contains two regionally important trout fisheries, one along Findlay Creek south of Leitrim and another along Shields Creek in Greely. These Creeks have been degraded somewhat by various land-use activities over the years.



NORTH CASTOR RIVER SUBWATERSHED
 OVERBURDEN AQUIFERS
 SUSCEPTIBLE TO CONTAMINATION

- 
Surficial sand aquifer:
 Champlain aquifer complex (dissected by streams into eight parts); unconfined;
 individual wells have little potential to yield adequate supplies other than for domestic uses
- 
Surficial sand and gravel aquifer:
 Rideau Front aquifer, mostly unconfined;
 individual wells have the potential to yield adequate supplies for domestic and, in places, large municipal uses

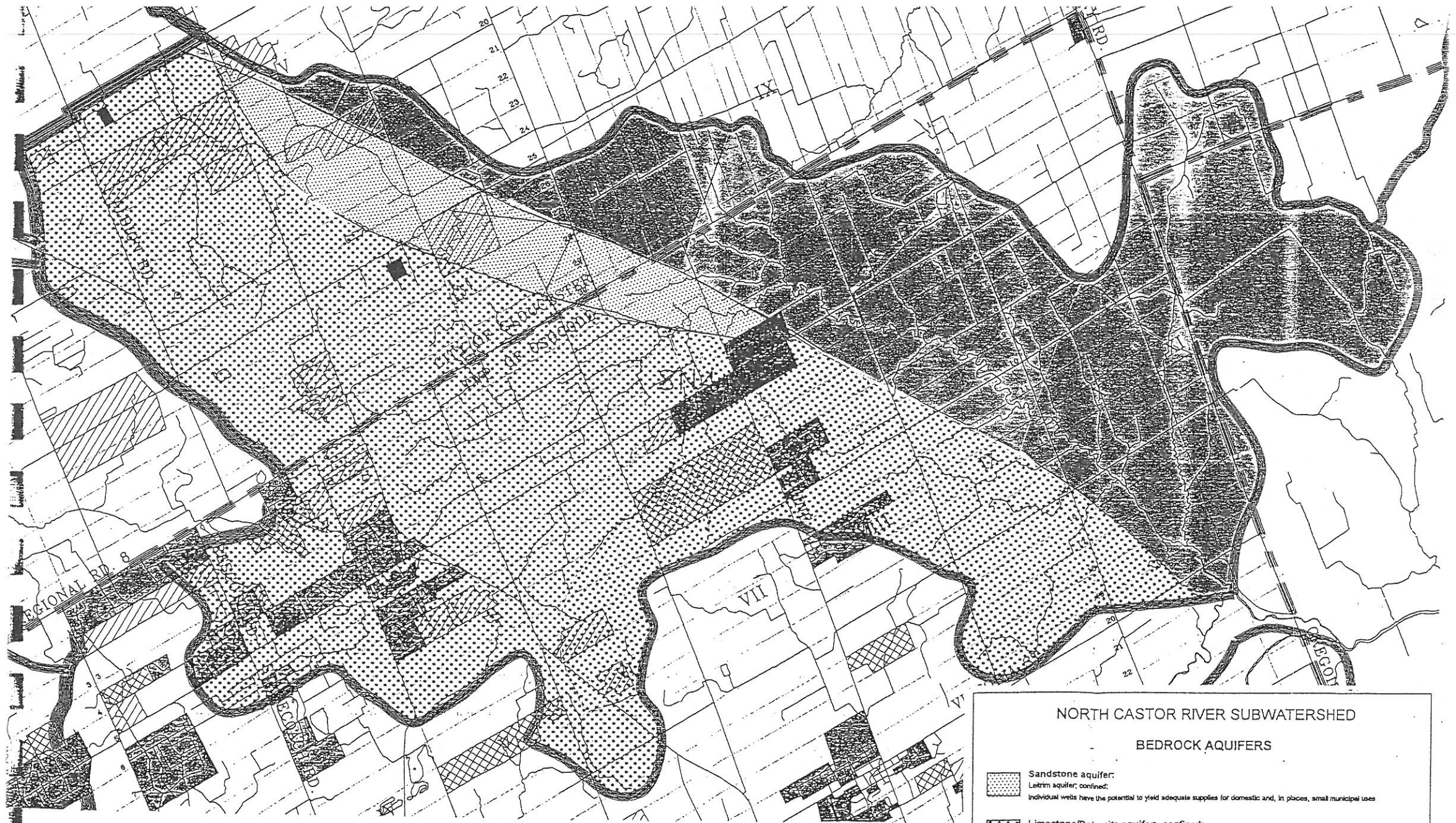


NORTH CASTOR WATERSHED WETLANDS

CLASSIFIED WETLANDS / TERRES HUMIDES CLASSIFIÉES


<p>Previously Significant Wetlands - Class 1-3</p> <p>Other Wetlands - Class 4 and greater</p> <p>Adjacent Land Boundary (LEB M)</p> <p>Wetland Mean (Class)</p>	<p>Terres humides d'importance prioritaire</p> <p>Autres terres humides - catégorie 4</p> <p>Limite de la terre adjacente (LEB M)</p> <p>Moyen de la terre humide (moyenne)</p>
--	---







NORTH CASTOR RIVER SUBWATERSHED

BEDROCK AQUIFERS

- 
Sandstone aquifer;
 Letrim aquifer, confined;
 Individual wells have the potential to yield adequate supplies for domestic and, in places, small municipal uses

- 
Limestone/Dolomite aquifer; confined;
 Individual wells have the potential to yield adequate supplies for domestic and, in places, small municipal uses

- 
Shale aquifer;
 Carlsbad Springs aquifer, mostly confined;
 Individual wells have little potential to yield adequate supplies other than for domestic uses

Nonetheless, they do have the potential to provide excellent opportunity for recreational sport fishing and amenity.

In 1994, OMNR conducted field surveys to provide information to the NCR Subwatershed Plan. A fish habitat survey was carried out along Shields Creeks. A similar survey was not carried out along Findlay Creek because of pending alterations stemming from the Leitrim Development. In addition, fish community sampling was undertaken in each watercourse. The purpose of the assessment was to determine the extent of the fishery and the suitability of these two watercourses to support aquatic life.

Staff at the OMNR Carleton Place Office devoted considerable time to carrying out the walking macro-habitat survey of Shields Creek and corresponding habitat mapping. An overview document was also prepared, conveying the general impressions of the field crew about the watercourse and fish species present in both Creeks. This document is presented in Appendix I.

Shields Creek (North Castor River)

According to the overview document (OMNR, January 1995), Shields Creek shows signs of significant human alterations over a long period of time. Some sections of it remain in a naturalized condition, while other reaches have been repeatedly ditched, resulting in considerable loss of aquatic habitat diversity. The upper reaches of the Creek in Greely have been subjected to very large sediment events, probably originating from ditches and storm sewers servicing the community. Erosion is common along the Creek channel, especially in Greely, with runoff from adjoining fields identified as a major contribution to this condition. Also, extensive green algae accumulations were reported along the Creek, which is indicative of high nutrient loading.

Although the upper reaches of Shields Creek appear to be in a poor state, the overview document states that the water temperature (baseflow conditions) at Highway 31 on August 17, 1994 was 19.1 C, indicating a potential cold/cool water source. Also, thirteen fish species were identified. The overview document provides encouragement for the maintenance of a trout fishery by citing that:

"twelve species is indicative of good diversity for a small creek system. Noteworthy is the absence of any Brook Trout, which have been repeatedly stocked in Shields Creek in recent years. However, the presence of the sculpin fish species within the community is indicative of cool water of good quality. The high number of fish forage species present and the absence of a true top piscivore in the community, holds some promise for the possible development

of a Brown Trout population within the Creek (similar to Poole Creek in Goulbourn Township)(OMNR, January 1995)."

Shields Creek, which runs through the Village of Greely, has been stocked with Brook Trout in recent years by the Ontario Ministry of Natural Resources in Carleton Place. According to the OMNR, it is not a self sustaining fishery (January 1995). Consequently, the effect of proposed development in Greely on the health of the stream has raised concerns about its long-term viability as a fishery.

Findlay Creek (North Castor River)

Findlay Creek is identified as one of the last remaining streams able to support a trout fishery in the RMOC area. It is fed from waters flowing from the Leitrim Wetland.

The overview document for Findlay Creek (OMNR, January 1995) notes that considerable background studies and data have been compiled in connection with the Leitrim Development Area. The details and extent of alterations to the Creek are to be worked out in a formal Fisheries Act agreement between the proponent, OMNR and the Federal Department of Fisheries. The alterations will enhance drainage from the Area while "at the same time improving the morphology, flow regime and overall aquatic habitat of the "coldwater" portion of Findlay Creek (OMNR, January 1995)."

The fish community sampling carried out in 1993 and 1994 confirmed that 12 fish species and no Brook Trout were to be found along Findlay Creek. The overview document further cites that:

"the 1994 results seem to confirm 1993 suspicions that the survival of stocked Brook Trout yearlings in Findlay creek is minimal and a continuation of rehabilitation efforts using this salmonoid species is not warranted. The Creek does, however, still display a "cold" overall thermal regime (August mid-day water temperatures at Blais Road were 16 C in 1993 and 17 C in 1994), but with significant fluctuations to temperatures above 22 C after storm events. Similar to Poole Creek in Goulbourn Township, Findlay Creek may have the temperatures to sustain a marginal Brook Trout population, but the forage characteristics in the system may no longer be suited to this species, especially juveniles. Accordingly, OMNR is now considering the use of Brown Trout, a more temperature tolerant coldwater species suited to a fish-forage base, as a future top predator in Findlay Creek (OMNR, January 1995)."

As mentioned above, Findlay Creek is about to be significantly altered due to pending development activity in the Leitrim Development Area. Details of this development can be found in a number of reports including Planning for Leitrim: An Integrated Approach: Vol. 1 & 2 (Cumming Cockburn, March 1991); Leitrim Development Area: Stormwater Management and Environmental Study Report and Pre-Design: Vol. 1 (Cumming Cockburn, May 1995) and The Design of Stormwater Management Works: Leitrim Development Area (Golder, August 1994). It is proposed that the impacts of this development on Findlay Creek be kept to a minimum and mitigative measures undertaken to improve the stream's aquatic habitat characteristics in order to sustain a trout fishery. No further stocking of the Creek is to proceed until the Storm Drainage work associated with the Leitrim Development Area is completed.

Wildlife and Wildlife Habitat

Wetlands

Two wetlands exist in the Subwatershed. The Leitrim Wetland situated at the headwaters of Findlay Creek has been identified as a Provincially Significant Class One Wetland. The North Osgoode Wetland located northwest of the village of Metcalfe is a Provincially Significant Class Two Wetland. The location of these wetlands is shown on the map entitled "North Castor Watershed Wetlands" (presented between pages 2-14 and 2-15).

Other wetlands do exist in the area. OMNR is attempting to establish their significance on an ongoing basis. Most recently, the Findlay Creek Wetland was evaluated by the OMNR Carleton Place Office. According to the Wetland Evaluation, Data and Scoring Record (March 1993), the Findlay Creek Wetland is not provincially significant.

Over the last 100 years, parts of the Leitrim Wetland have been converted to agricultural, industrial and infrastructure development, with further parts of it slated for residential development in the near future. Many studies have been undertaken to plan for this development. They are listed in the References of this document.

The integrity and viability of the North Osgoode Wetland is also questionable given its close proximity to an aggregate operation and due to drainage alterations carried out within it. These two wetlands and the other non significant wetlands located in the Subwatershed are extremely important environmental features. They are vital in maintaining the health of the Subwatershed ecosystem. This is because they act like large sponges that filter and release water slowly to Findlay Creek, Shields Creek and the North Castor River. They also provide habitat for wildlife and many distinctive types of vegetation and provide a critical link between land and water systems.

Woodlands

A variety of woodland types exist in the Subwatershed. The majority of the wooded areas are a mixture of second and third growth softwood and hardwood forest types at various stages of succession.

Woodlands have been classified using a scheme developed for the RMOC's NESS project. The location of these woodlands is shown on the map entitled "North Castor Watershed Vegetative Cover" (displayed between pages 2-14 and 2-15). The map shows the wooded areas of the Subwatershed using this scheme. It should be noted that only those woodlands greater than 2 hectares have been mapped. This means that the woodland coverage in the Subwatershed is actually more extensive than shown.

Woodlands perform many important ecological functions. As with wetlands, woodlands are also an ecological bridge between land and water systems, especially in groundwater aquifer recharge and discharge areas. Woodlands provide shading along watercourses where they lower water temperatures and increase its dissolved oxygen content. They mitigate the effects of water-borne soil erosion by reducing overland water flow and removing soil sediments potentially harmful to aquatic life. In addition, the aesthetic, shading, cooling and air quality improvement benefits of woodlands are becoming increasingly important to human communities as we learn more about our contribution to our well-being.

Wildlife

A complete inventory of the wildlife species found in the Subwatershed and their habitat is unavailable. Nonetheless, according to studies undertaken as part of other projects, many species of wildlife have been reported to make their home in the Subwatershed. Significant bird species to be found in the area include the Northern Harrier, Northern Goshawk, Cooper's/Red-shouldered Hawk, Screech/Barred/Long-eared/Northern Saw-whet Owl, Willow Flycatcher, Sedge Wren, Eastern Bluebird and Clay-coloured Sparrow (Cumming Cockburn Ltd., March 1991).

Other species living in the Subwatershed include those which occupy: 1) marshes - Snapping Turtle, Green /Leopard Frog, Beaver, Muskrat, Great Blue/Green Heron, Northern Harrier, Swamp Sparrow, Yellowthroat, Red-Wing Blackbird and the Mallard; 2) upland grasslands - Song Sparrow, , Bobolink and the Northern Harrier; 3) wet grasslands - Sedge Wren, Northern Harrier, Swamp Sparrow and the Yellowthroat; 4) successional uplands - Chestnut-Sided/Nashville Warbler, Least Flycatcher, Song Sparrow, Eastern Meadowlark, Flicker, Robin, Scarlet Tanager, Eastern Phoebe and White-tailed Deer; 5) shrub-dominated

NORTH CASTOR WATERSHED VEGETATIVE COVER

- DECIDUOUS FORESTS
 - Early successional deciduous forest
 - Late successional deciduous forest
 - Successional stage/species unknown
- CONIFEROUS FORESTS
 - Early successional coniferous forest
 - Late successional coniferous forest
 - Successional stage/species unknown
- MIXED FORESTS
 - Early successional mixed forest
 - Late successional mixed forest
 - Mixed-successional stage unknown
- PLANTATIONS
 - Deciduous (planted)
 - Mixed (planted)
 - Coniferous (planted)
- SWAMP FORESTS
 - Thicket swamp
 - Deciduous swamp forest
 - Mixed swamp forest
 - Coniferous swamp forest
 - Treed bog
- OPEN WETLANDS AND WATER
 - Marsh
 - Wetland (non-typed)
 - Open water
 - Bog
 - Fen
- SCRUB MEADOW/HEDGEROW
 - Scrub/thicket
 - Meadow (old field)
 - Rock/sand barren (outcrop)
 - Hedgerow



3.0 THE FUTURE OF THE NORTH CASTOR RIVER SUBWATERSHED

The North Castor River Subwatershed has remained a relatively undeveloped area, aside from some modest development in Greely, South Gloucester and Leitrim over the last 30 years. Most changes to the landscape, which are evident today, were brought about by the early settlers to the area, who cleared large parcels of land in the late 1800's to farm.

Today, many of these previously cleared lands are sitting idle and in some instances, reverting back to a natural state. However, ongoing expansion of the urban core of the Ottawa-Carleton Region to areas south of the National Capital Commission Greenbelt zone at Leitrim, is once again changing the landscape of the NCR Subwatershed. Significant residential, industrial and commercial development is planned for the Subwatershed over the next 20 years, in the City of Gloucester and the Township of Osgoode.

The challenge before the Township of Osgoode and the City of Gloucester is to manage this growth to maintain the rural character and natural amenity of the Subwatershed for both the existing and future residents of the area.

3.1 Land-Use Planning and Development Activity

Regional Municipality of Ottawa-Carleton Official Plan

The land-use schedule of the RMOC Official Plan (consolidated, September 1994) shows the land-use category designations for planning purposes in the Subwatershed.

Although much of the Subwatershed is designated to remain Agricultural Resource Area, there are nonetheless, extensive parts of the Subwatershed designated as General Rural Area and Mineral Resource Area. In addition, the Leitrim area has been designated as an Urban Area.

The General Rural Area designation permits country lot development and allows industrial and commercial uses related to local resources to be practiced. It is the responsibility of the local municipality to identify those General Rural Area lands suitable or unsuitable for development. Developing all suitable General Rural Area lands could significantly affect the health of the NCR Subwatershed. This is because the headwaters of the North Castor River above Shields Creek are in a designated General Rural Area, and above Findlay Creek in a designated Urban Area. The effects of this development, downstream along the North Castor River towards Russell could be significant, especially with regard to water quality and quantity.

The Mineral Resource Area classification allows pits and quarrying, farming and forestry activities, but no residential activity. Pits and quarrying activities have the potential to affect the water resources of the Subwatershed. This is because aggregate operations in and around South City of Gloucester occur over a significant groundwater aquifer recharge zone (please refer to the map entitled "North Castor River Subwatershed Overburden Aquifers Susceptible to Contamination," found between pages 2-10 and 2-11).

A number of large and small developments have either been approved or are being considered for approval as shown in the map entitled "North Castor Watershed Rural Settlement," (found between pages 3-2 and 3-3). Residential development activity will be concentrated in Leitrim, Greely and South Gloucester. Commercial development associated with this residential development will be located mainly in Leitrim and Greely. Industrial development will be concentrated in Leitrim, South Gloucester and Greely. A summary of the technical studies that could be required prior to development, in order to protect the Subwatershed environment, is presented in Appendix H for reference by the City of Gloucester and the Township of Osgoode.

Township of Osgoode Official Plan

The Township of Osgoode Official Plan outlines present and future planned land-uses in the Township. Most of the development in Osgoode's portion of the Subwatershed will be in the form of low density country lot subdivision development, concentrated around the Village of Greely.

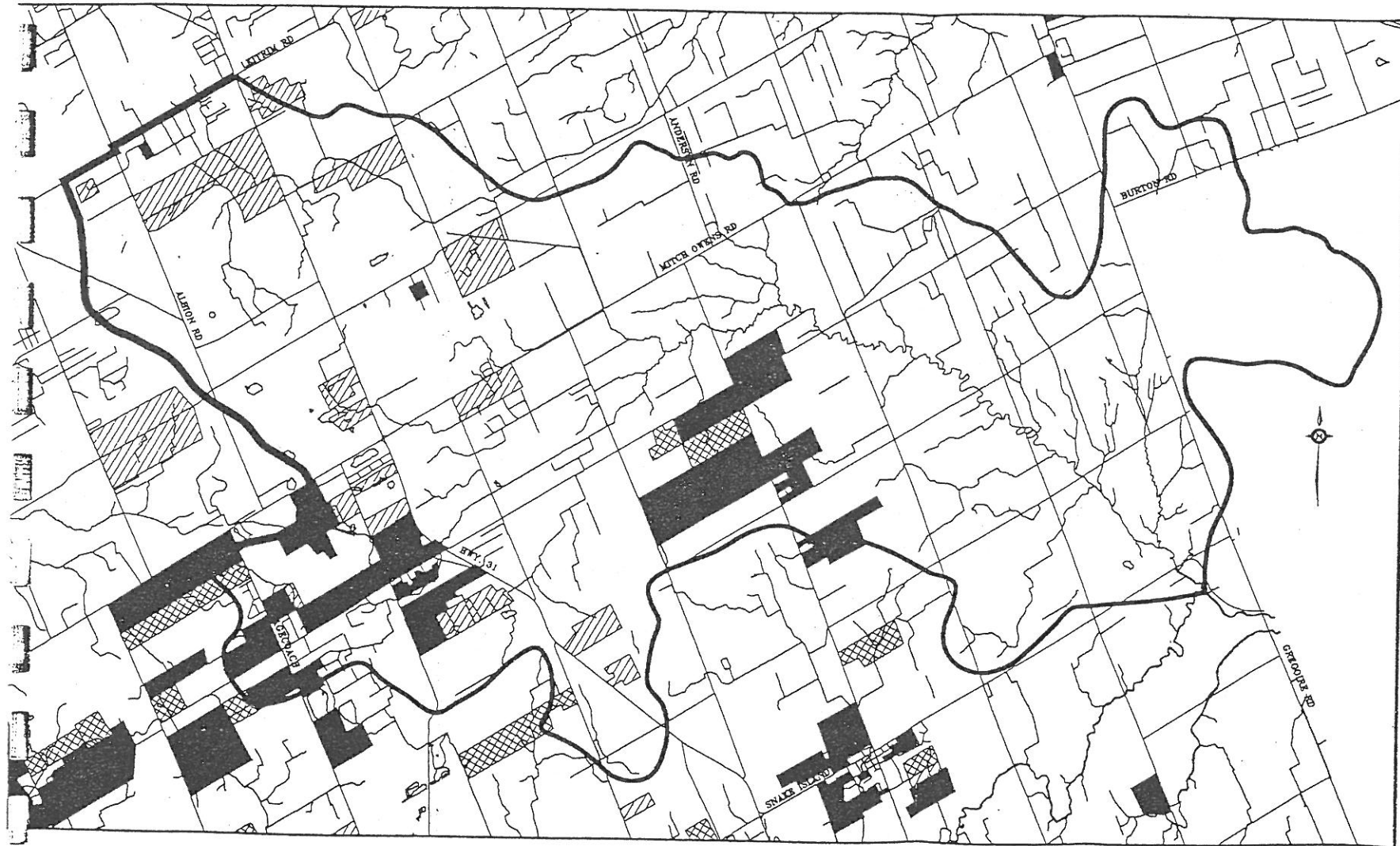
One of the purposes of the Subwatershed Plan undertaking was to address specific concerns related to this proposed residential development in Greely. To fulfil this aim, a separate Storm Servicing Study (McNeely Engineering, May 1995) was conducted to determine how proposed development in the Village of Greely could be serviced for stormwater purposes, while minimizing and mitigating the impacts of this proposed development on the North Castor River (Shields Creek). It is available separately from the SNRCA or the Township of Osgoode.

The Study addresses impacts of the proposed development on the North Castor River in the following areas: 1) stormwater peak flows, 2) water quality, and 3) aquatic habitat. It provides solutions to minimize the effects of development through the following means: 4) best management practices, 5) stormwater management ponds, and 6) a storm drainage plan. The Study also provides information needed to develop a detailed stormwater management plan, which is required before development can proceed.

Approval has also been given to consolidate and expand existing industrial activity along

areas - Green Heron, Leopard Frog, Cedar Waxwing, Phoebe, Willow/Alder Flycatcher, Yellow Warbler, Yellowthroat, Swamp Sparrow and the Red-Winged Blackbird; and 6) wooded areas - Brown Creeper, Nashville/Black-and-White Warbler, Northern Waterthrush, Great Horned Owl, Winter Wren, Great Crested Flycatcher, Rosebreasted Grosbeak, Sharp-shinned Hawk, Black-Capped Chickadee, Hermit/Wood Thrush, Blue Jay, Common Crow, Veery, Ovenbird, Goshawk, Broad-winged Hawk and the White-Tailed Deer (Cumming Cockburn Ltd., March 1991).

In conclusion, the natural environment of the North Castor River Subwatershed appears to be relatively healthy. However, a number of areas of concern have been identified and should be given further attention by the Township of Osgoode and the City of Gloucester in order to maintain the environmental health of the Subwatershed and quality of life for residents.



NORTH CASTOR WATERSHED
RURAL SETTLEMENT

SUBDIVISIONS

CONDOMINIUMS



PENDING



DRAFT APPROVED



REGISTERED



Highway 31 south of Greely, to be known as the Greely South Industrial Park. In addition, aggregate operations in the vicinity of the Industrial Park are to be expanded. This activity may pose a threat to the adjoining and provincially North Osgoode Wetland which drains to the Quail Drain and the North Castor River.

City of Gloucester Official Plan

The City of Gloucester Official Plan outlines present and future planned land-uses. In Leitrim, most of the proposed development is to be located south of Leitrim between Highway 31 and Albion Road in the vicinity of the Leitrim Wetland, along Findlay Creek. The area is designated as an Urban Area that is to incorporate a mix of housing types and opportunities for employment. It is the largest project slated for the Subwatershed in the foreseeable future. The concept plan for the Leitrim Development Area (LDA) has been approved and is to be phased in over a number of years. Subdivision applications are now being received for the LDA.

Environmental impacts of the LDA and mitigation plans have been addressed in a number of studies completed prior to the approval of the new Leitrim community, including the following: Planning for Leitrim; An Integrated Approach: Vol. 1 & 2 (Cumming Cockburn, March 1991); Leitrim Development Area; Stormwater Management and Environmental Study Report and Pre-Design: Vol. 1 (Cumming Cockburn, May 1995) and The Design of Stormwater Management Works: Leitrim Development Area (Golder, August 1994).

These documents represent a comprehensive analysis of the impacts of the proposed development, not only on the Leitrim Wetland, but also on the receiving watercourse, Findlay Creek. It is fair to say that this development is going to have a profound effect on the Leitrim Wetland, which is one of the major natural features of the NCR Subwatershed. Having said this, it is also important to recognize that a substantial effort was made to minimize the impacts of the development on the Leitrim Wetland, on Findlay Creek and its aquatic habitat/cold water fishery. If the North Castor River is to remain healthy downstream of Leitrim in the future, it is imperative that the Leitrim Conceptual Plan and its recommendations be followed during and after construction, with follow-up monitoring a regular procedure.

Subdivision development is also being proposed in the area on a much smaller scale than the LDA. The "North Castor Watershed Rural Settlement" map (presented between pages 3-2 and 3-3) shows where they are proposed to be located. A number of subdivision applications have been received for the City of Gloucester portion of the Subwatershed.

Further industrial expansion to the existing South Gloucester Industrial Park has also been

approved. In addition, aggregate operations adjoining the Industrial Park are to be expanded. These land-uses occur over the regionally important groundwater recharge aquifer referred to above.

In addition to the land-uses listed above, it is also very likely that other pits and quarries will be opening in the Subwatershed in the future, given the fact that much of Ottawa-Carleton's future aggregate supply is located in the Subwatershed. Further additional residential activity is also possible in South Gloucester, Greely and in the Leitrim area, once the planned Leitrim Development Area is built.

3.2 Limitations on Land Development

Past Limitations on Development

Based on the provisions of the 1983 Planning Act and its corresponding policy statements and regulations, certain lands in the Subwatershed cannot be developed. These lands generally constitute provincially significant class 1, 2 and 3 wetlands; floodplains/hazard lands; Class 1, 2, 3, and 4 agricultural lands; and mineral resource/aggregate areas. These "constraint lands" (excluding floodplains/hazard lands) are shown in the map series of the "North Castor Watershed" presented in Chapter 2.

Present Limitations on Development

On March 28, 1995 the revised Planning Act stipulating new provincial policies and regulations for land-use planning and development came into effect. It is redefining what areas within the Subwatershed can and cannot be developed. An abridged version of the "Comprehensive Set of Policy Statements" is presented in Appendix G. It is intended to guide those individuals and organizations with an interest in planning and development activity. Further clarification about the implications of these new policies should be taken up with planning staff in the Township of Township of Osgoode, City of City of Gloucester and RMOC, and with staff at the SNRCA, OMNR, OMOEE, OMMA and OMAFRA who have responsibility for land-use planning and development matters.

It is beyond the scope of, and resources available to the Subwatershed Plan to determine what lands can or cannot be developed as a result of provisions contained in the new Planning Act (1995) and subsequent revisions to it. Many details have yet to be worked out prior to it being fully implemented at the municipal/community level. This will take a number of years to accomplish successfully. Nonetheless, the Subwatershed Plan can play an important role in highlighting the existing natural features of the Subwatershed which the

new Planning Act (1995) Policies and Guidelines have identified as environmental features to be protected and enhanced in the provincial interest.

The approximate location of these natural features is shown in the map series entitled "North Castor Watershed" presented in Chapter 2 and are often referred to as "constraint lands" to development. In the NCR Subwatershed Plan, "constraint lands" will be referred to as "development limitation areas (DLA's)." How these DLA's are to be defined and addressed in local official plans will be up to the public, professional planners, elected representatives of the City of Gloucester, Township of Osgoode and RMOC, and provincial agencies and the SNRCA to decide.

Options for Future Development

Two major initiatives are underway that will dramatically affect how the Subwatershed will look in the future. The first initiative, as discussed above, is the implementation of the new provisions contained in the revised Planning Act (1995) and subsequent revisions to it that will redefine what areas of the City of Gloucester and Township of Osgoode can and cannot be developed in the future. The second initiative is the RMOC's Official Plan Review. A number of projects are taking place to support the Review, including the Natural Environment Systems Strategy, the Mineral Resource Study, the Rural Settlement Strategy, the Water and Wastewater Master Plan, the Transportation Master Plan, the Economic Profile Study and Retail Study (RMOC, January 1995). All of these studies, in conjunction with the RMOC's O.P. Review and changes to the Planning Act will help to lay the foundation for future planning and development in the two municipalities.

The Township of Osgoode and City of Gloucester need to be able to determine how their respective communities are to grow and be managed in a sustainable fashion. The environment is one component of the sustainability equation. It is increasingly recognized as the critical part of the equation. The Township of Osgoode and the City of Gloucester should decide how best to plan and manage future land-use and development activities in their portion of the Subwatershed by defining planning options available to them, before development begins.

To help each municipality decide how best to achieve this, example Subwatershed planning options are presented to assist them in developing their own specific planning options. Defining the criteria to be used to develop these options should be jointly pursued between the Township of Osgoode, City of Gloucester, RMOC, SNRCA, OMNR, OMAFRA, OMEE, OMMA and the public. These options are meant to provide decision-makers in the Township of Osgoode and the City of Gloucester with alternatives to planning and managing land-use and development within their respective area of the NCR Subwatershed. The options should

be based on the premise that the Subwatershed has a natural carrying capacity that should not be exceeded. This threshold is defined as:

"the number of people and types and locations of land-use activities which the Subwatershed will support without degrading the current ecological processes and system health indicators, such as water quality, aesthetics, plant and animal populations and general quality of life (Triton et. al., May 1992)."

Four examples of planning options that might be tailored for use in the management of the North Castor River Subwatershed are presented below. Each of these options utilizes a combination of the three Development Limitation Area descriptions described below to achieve different future environmental conditions in the Subwatershed. Eventually, when time and resources permit, the Township of Osgoode and the City of Gloucester would benefit from incorporating descriptions of these DLA's into their respective Official Plan documents. Explicit descriptions of the areas to be developed and not developed would provide tremendous guidance not only to the City of Gloucester and Township of Osgoode but also to those individuals who may have development interests in the Subwatershed. The DLA's should be periodically reviewed to ensure that municipal official plan policies are kept current.

Examples of possible options for the future development of the NCR Subwatershed are as follows:

- Option 1:** *Business as Usual.* Planning and development will continue as usual under the current planning policies and regulations. Current conventional urban and rural (agricultural/ forestry) management practices are maintained.
- Option 2:** *Protect all Development Limitation Area (constraint level) 1 lands only.* Development Limitation Area (constraint level) 2 and 3 lands would be allowed to revert to urban land-use. Innovative and environmentally responsible management of agricultural and wooded lands would be encouraged.
- Option 3:** *Protect all Development Limitation Area (constraint level) 1 lands and provide some development limitations (constraints) for land-use in Area 2 lands.* Encourage and provide assistance for the innovative and environmentally responsible management of agricultural/wood lands. Develop and enforce environmental management requirements for new development. Promote the retrofitting of existing septic systems and improve the environmental control policies for existing developed areas.

Option 4: *Limit Urbanization to Development Limitation Area (constraint level) 3 lands only.* Develop and enforce strict environmental management and enforcement guidelines for existing land-uses and future development. This would include retrofitting existing septic systems and rehabilitating streams, creeks and rivers in the Subwatershed.

Each of these planning options, adapted from the Laurel Creek Watershed Study (Triton et al., May 1992) is displayed in Table 3.1 (please see pages 3-9 to 3-12). These tables outline the degree to which each option might meet general Subwatershed Plan goals and objectives and is not intended to represent existing conditions in the Subwatershed. It should be noted that Option 2 advocates protection to many of the environmental features suggested to be protected under the new Planning Act (1995).

The criteria used to determine Development Limitation Areas are described below. Development Limitation Areas (constraint areas) identify the sensitive features/areas of the Subwatershed to be given protection. These protected areas are extremely important in maintaining and enhancing essential ecological processes and Subwatershed characteristics such as groundwater infiltration, water quality/quantity, woodlands and sensitive natural areas.

The DLA's presented are meant to serve as examples to help the City of Gloucester and the Township of Osgoode develop their own classification system.

- **Development Limitation Area (constraint level) 1** lands are areas where development will not be permitted in order to protect significant environmental features. These lands are vital to the sustenance of the Subwatershed's ecological functioning and for the provision of human/non-human life-support systems.

Constraint level 1 areas are identified as lands which perform one of two vital functions: first, riparian buffers which protect water quality and streambank stability and contribute to the maintenance of a healthy aquatic ecosystem; and second, lands which form an integral part of a linked system of natural spaces with high quality vegetation and a diversity of plant and wildlife habitat. Constraint level 1 areas include lands which are currently performing a valuable function which would be lost or degraded if the lands were disturbed in any way.

Development Limitation Area 1 lands could include ESPA's and Proposed ESPA's, Green Space Core Areas, High Priority Linkage/Support Areas and a 30 metre Riparian Buffer.

- **Development Limitation Area (constraint level) 2** lands are areas where

development is permitted subject to conditions. These areas serve to prevent environmental damage from occurring to environmental features which provide special benefits to the Subwatershed. Special benefits include the protection and enhancement of groundwater quantity and quality, and the ecological, historic, cultural, recreational and visual amenities of the Subwatershed.

Due to their location in the Subwatershed, these lands could provide a valuable ecological function by linking natural spaces or by buffering intermittent streams, but which are currently in a degraded state and would require management and rehabilitation to improve their functioning; and secondly, lands which serve an important ecosystem function that could be maintained, and perhaps even enhanced during the development process.

Area 2 lands could include Groundwater Recharge or Potential Recharge Areas, Lower Priority Linkages and Support Areas, Rehabilitation Areas, Urban Green Areas and Conservation Areas.

- **Development Limitation Area (constraint level) 3 lands** are areas where development is permitted and are characterized by their lower environmental sensitivity. They represent the remainder of the lands in the Subwatershed that do not serve one of the specialized functions of Development Limitation Area (constraint level) 1 and 2 lands.

It should be noted that although these areas are of lower environmental sensitivity, nonetheless, Development Limitation Area 3 lands are important to the overall health of the Subwatershed. Any land-use and development activity taking place on these lands will affect the natural ecosystem of the area. Thus any changes must be made within established guidelines using Best Management Practices (BMPs) to prevent adverse off-site impacts. In addition, Development Limitation Area (constraint level) 3 lands are subject (where applicable) to all the recommendations outlined in this Subwatershed Plan.

The planning options presented above should be adapted to the North Castor River Subwatershed to help local decision-making about the future of the area and the planning and management measures required to meet the preferred option. The new Planning Act (1995) Policies and information contained in this Plan could be used by the City of Gloucester and the Township of Osgoode to undertake a similar exercise to determine the best development option for the residents of each municipality. With the new Planning Act (1995) in place and the review of the RMOC Official Plan underway, the challenge is to determine which option is potentially the best for the City of Gloucester and the Township of Osgoode.

Table 3.1. Subwatershed Plan Development Options (After Triton et al., May 1992)

Option	Description	Goals					General Costs and Benefits
		Flooding/Erosion	Aquatic Features	Natural Features	Amenities	Groundwater	
1. Business as usual	<ul style="list-style-type: none"> ■ Continue development in the same manner as in the past ■ Will lead to substantial urban development in the Subwatershed ■ Some terrestrial features will be protected through current planning documents (e.g. wetlands) ■ Stormwater management will follow current policies of control of peak flow to predevelopment levels on a site by site basis ■ Some water quality control (sediment control) will be provided through OMNR, OMEE, SNRCA requirements ■ Stream and wetlands will be provided a buffer under current requirements (e.g. 120 metres for wetlands) 	<ul style="list-style-type: none"> ■ May provide local protection in controlling peak flows and erosion ■ Does not address cumulative impact of land use ■ Does not address impact of flow volume and duration changes on erosion 	<ul style="list-style-type: none"> ■ Some protection will be provided through buffers and water quality (sediment control) ■ Does not take management of a Subwatershed as an ecosystem into account ■ Does not provide linkages necessary or ensure that supporting terrestrial features are protected ■ Does not protect base flow needed for aquatic features ■ Continued degradation of aquatic habitat and loss of resiliency 	<ul style="list-style-type: none"> ■ Protection provided for some major terrestrial resource features (i.e. wetlands) ■ Does not protect supporting terrestrial features or linkages ■ Gradual deterioration in the isolated and heavily visited natural spaces 	<ul style="list-style-type: none"> ■ Provides for the protection of some major features (i.e. fisheries) ■ Does not provide for the protection of supporting areas or linkages ■ Loss of "character" for the Subwatershed, resulting in continued homogenization of the landscape 	<ul style="list-style-type: none"> ■ Protection of overall groundwater resource as a supply is not provided by master planning approach ■ Mitigation of impacts on groundwater with land use changes is not provided for ■ Protection of base flow to streams is not provided for 	<ul style="list-style-type: none"> ■ No additional cost to implement ■ Benefits of simple and familiar approach ■ Unacceptable environmental costs which will eventually lead to high dollar costs when environmental damage must be repaired ■ Flood damages may increase ■ Does not meet Subwatershed goals

Table 3.1. Subwatershed Plan Development Options (After Triton et al., May 1992)

Option	Description	Goals					General Costs and Benefits
		Flooding/Erosion	Aquatic Features	Natural Features	Amenities	Groundwater	
<p>2. Protect all constraint level 1 areas.</p> <ul style="list-style-type: none"> ■ Permit urban land use in constraint level 2 and 3 areas with controls through land use planning and Stormwater management practices 	<ul style="list-style-type: none"> ■ All highest quality terrestrial resource features would be preserved and buffers provided for protection ■ Buffers would be created along the creek/river systems to improve environmental protection of aquatic systems ■ Policies would be developed for quantity and quality control to protect the stream system ■ The approach for groundwater recharge areas (i.e. constraint level 2) would be the same as constraint level 3 ■ Provide rehabilitation works within stream system to improve stream quality and habitat ■ Provide stormwater controls in existing agricultural and urban areas to mitigate impacts 	<ul style="list-style-type: none"> ■ May provide protection to prevent an increase in flood or erosion potential in the Subwatershed ■ Would provide for development of remedial flood and erosion control measures for existing problem areas 	<ul style="list-style-type: none"> ■ Protection would be provided to aquatic features through buffers and specific water quality control measures ■ Protection would be limited by difficulties in providing adequate protection to groundwater features and corresponding base flow levels ■ Slower deterioration of habitat but no enhancement 	<ul style="list-style-type: none"> ■ Protection provided for highest quality terrestrial resource features ■ Does not provide for the protection of supporting areas or linkages ■ Slower deterioration of species richness and diversity but unlikely to be a self sustaining system 	<ul style="list-style-type: none"> ■ Provides for the protection of major natural features ■ Does not provide for the protection of existing areas or linkages ■ Loss of character ■ Homogenized landscape 	<ul style="list-style-type: none"> ■ Protection of overall groundwater resource as a supply is provided with master planning approach ■ Mitigation of impacts on groundwater and base flow with land use changes would be limited by difficulties in developing effective infiltration works 	<ul style="list-style-type: none"> ■ Low additional costs to implement use existing staff and policies ■ Increase in cost of development and housing lots ■ Meets some Subwatershed goals

Table 3.1. Subwatershed Plan Development Options (After Triton et al., May 1992)

Option	Description	Goals					General Costs and Benefits
		Flooding/Erosion	Aquatic Features	Natural Features	Amenities	Groundwater	
<p>3. Protect all constraint level 1 areas</p> <ul style="list-style-type: none"> ■ Provide for limited land use changes in constraint level 2 areas ■ Provide protective buffers and provide land use and stormwater management control measures to mitigate impacts with any land use changes ■ Rehabilitate existing degraded areas 	<ul style="list-style-type: none"> ■ All highest quality terrestrial resource features would be preserved and buffers provided for protection ■ Buffers would be developed along the creek/river systems ■ Selected lower quality linkage areas (i.e. constraint level 2) would be accommodated in future land-use plans to provide linkages between higher quality terrestrial features ■ Land-use policies would be developed (i.e. low density housing, open space) for recharge areas on constraint level 2 lands, to fulfill needed recharge capabilities ■ Policies would be developed for stormwater management quantity and quality control to protect watercourses ■ Provide stream and stormwater controls in existing agricultural and urban areas to mitigate impacts 	<ul style="list-style-type: none"> ■ Will provide protection to prevent any increase in flood or erosion potential throughout the Subwatershed ■ Would provide for the development of remedial flood and erosion control measures for existing problem areas 	<ul style="list-style-type: none"> ■ Protection would be provided to aquatic features through rehabilitation projects ■ A higher level of protection would be provided to maintain base flows, through land use controls in groundwater recharge areas ■ Would restore some ecosystem resiliency 	<ul style="list-style-type: none"> ■ Protection provided for high level terrestrial features ■ Protection and enhancement would be provided for some lower level terrestrial features ■ Linkage would be provided ■ Protects natural processes of species migration and genetic mixing ■ Self sustaining natural system possible 	<ul style="list-style-type: none"> ■ Provides for the protection of major natural features ■ Provides for the development of linkages ■ Preserves and restores landscape character ■ Will make the Subwatershed a more unique area representative of natural and cultural history 	<ul style="list-style-type: none"> ■ Protection of overall groundwater resource as a supply is provided with master planning approach ■ Provides for the implementation of effective controls to maintain recharge to groundwater aquifer systems 	<ul style="list-style-type: none"> ■ Some new staff and policies required ■ New review and enforcement procedures required ■ Increased costs to rehabilitate existing degraded areas ■ Increased costs for industrial land and housing lots ■ Will meet Subwatershed goals and make industry and housing more attractive to prospective buyers/clients

Table 3.1. Subwatershed Plan Development Options (After Triton et al., May 1992)

Option	Description	Goals					General Costs and Benefits
		Flooding/Erosion	Aquatic Features	Natural Features	Amenities	Groundwater	
<p>4. Prevent land use changes on all constraint level 1 and 2 areas</p> <ul style="list-style-type: none"> ■ Land use changes permitted on constraint level 3 lands only ■ Provide protection for stream systems with buffers ■ Provide land use and stormwater management control ■ measures to mitigate impact associated with development 	<ul style="list-style-type: none"> ■ All highest quality terrestrial features and recharge areas would be protected and buffers provided ■ Buffers would be developed along the creek/river system ■ Policies for land-use changes would be developed for stormwater management quantity and quality control, to protect the creek/river system ■ Require retrofit of existing residential, commercial and industrial development; e.g. improve existing drainage channels and ditches with Best Management Practices to mitigate erosion and nutrient runoff 	<ul style="list-style-type: none"> ■ Will provide protection to prevent any increase in flood or erosion potential throughout the Subwatershed 	<ul style="list-style-type: none"> ■ Protection would be provided to aquatic features through controls and rehabilitation works ■ Protection of base flows would be provided through remedial flood, recharge area and stormwater controls ■ Would restore some ecosystem resiliency and increase habitat quality and quantity 	<ul style="list-style-type: none"> ■ Protection for high and low level terrestrial features provided ■ Enhancement of linkages can be developed to improve habitat and protection of natural processes ■ Increased likelihood of stable ecosystem 	<ul style="list-style-type: none"> ■ Provides for the protection of natural features and the development natural cores, corridors and linkages 	<ul style="list-style-type: none"> ■ Provides for the maintenance of groundwater features including recharge areas ■ Does not resolve existing groundwater contamination 	<ul style="list-style-type: none"> ■ Very high implementation costs for new staff and enforcement ■ High capital costs to retrofit existing stormwater/septic systems ■ Restricted industrial and residential land with greatly increased costs ■ Loss of flexibility in locating new development ■ The environmental benefits over option 3 are outweighed by social and economic costs

4.0 SUBWATERSHED PLAN RECOMMENDATIONS

The recommendations presented in this section are intended to focus attention on a number of key areas for action over the short to long-term to ensure the future good health of the North Castor River Subwatershed. Achieving the goals and objectives outlined in this document will require cooperation and partnership amongst the many stakeholders with an interest in the stewardship of the natural environment and maintenance of the high quality of life that is enjoyed by residents of the Subwatershed.

A two-step approach is suggested to maintain and improve the health of the North Castor River Subwatershed, as part of a larger effort to sustain the existing lifestyle associated with a good standard of life. The first step is to ensure that environmental safeguards and provisions are contained as policy in the Official Plans of the City of Gloucester and the Township of Osgoode. The second step is to utilize other non-statutory means, like community groups and water quality improvement programs to ensure a healthy environment for residents and future generations living and working in the Subwatershed. Implementation of these recommendations is outlined in this Chapter.

4.1. Communities

Planning and Development

Action 1 The City of Gloucester and the Township of Osgoode should incorporate Subwatershed Plan goals, objectives and recommendations, when and where deemed appropriate, into their respective Official Plans as planning policy to guide land-use and development activity.

Three examples of how to accomplish this task through the official planning process are presented in the Technical Appendices for consideration by the City of Gloucester and the Township of Osgoode. Appendix C demonstrates how the City of Vaughan incorporated the findings of their Subwatershed Study into their Official Plan through an amendment. Appendix B shows how the City of Waterloo amended their Official Plan to include appropriate recommendations from the Laurel Creek Watershed Study. Appendix D shows how the Township of Kingston incorporated recommendations from the Collins Creek Watershed Study into their Official Plan draft. A fourth example of land-use policies developed by the Maitland Valley Conservation Authority for resource lands in their Watershed is presented in Appendix E. Many of these land-use policies recommendations have been adopted in the official plans of municipalities residing in the Maitland Valley Watershed.

Many of the clauses contained in these four examples could be employed in the Official Plans of the City of Gloucester and the Township of Osgoode, bearing in mind that the planning and development circumstance is different in each municipality. The City of Gloucester and the Township of Osgoode are strongly encouraged to determine which of the Subwatershed recommendations and corresponding planning policy are relevant in their jurisdiction and of use to each of them in planning for the future prosperity of their residents.

Action 2 The City of Gloucester and the Township of Osgoode should use the Subwatershed Plan as a resource document to help in the identification and description of Development Limitation Areas (DLA's) for inclusion in their respective Official Plans to help guide future planning and development activity.

The Subwatershed Plan is intended to provide environmental baseline information for use by the City of Gloucester and the Township of Osgoode in the development of their DLA criteria. These DLA descriptions should be incorporated into each municipality's official plan and used to update the City of Gloucester's Development Resource Policies and the Township of Osgoode's Environmental Protection Policies. Examples of what these DLA's are and how they might be used is described in Chapter 3.

The Planning Act allows the City of Gloucester and the Township of Osgoode to incorporate DLA descriptions into official plan documents. Each municipality should seek the assistance from the RMOC, the SNRCA, provincial agencies and residents in developing criteria for their DLA's.

In Chapter 3, land-use components/activities have been mapped that should be considered as criteria to be used in developing DLA's. DLA's based on the new policy provisions contained in the Planning Act (1995) and any ensuing revisions should be identified and reflect the most up-to-date environmental information available for the Subwatershed.

Action 3 The SNRCA, the City of Gloucester, the Township of Osgoode and the RMOC should work together to implement the Subwatershed Plan recommendations and monitor, review and report on the achievement of the Plan's goals, objectives and recommendations.

The details of the monitoring, reviewing and reporting procedure will have to be worked out between the City of Gloucester, the Township of Osgoode, the SNRCA, Provincial Agencies and interested members of the public. Subdivision development is an example of but one opportunity to monitor environmental impacts associated with development (e.g. sediment loadings on water quality for aquatic purposes) through the planning process.

Other examples showing how to achieve this specific recommendation are available from other watersheds in Ontario. Both the Sawmill Creek (Gore and Storrie, June 1994) and Collins Creek (Dillon, January 1994) Watershed Plans describe how to carry out monitoring, reviewing and reporting on achievements of the Subwatershed Plan.

The "Watershed Planner" tabloid, jointly published by the Ontario East Conservation Authorities (South Nation River, Mississippi and Rideau Valley, Raisin and Cataraqui Region Conservation Authorities) is available to all residents of the area and could serve to report on the accomplishments of the Subwatershed Plan. Also, the "State of the Nation" tabloid published by the SNRCA could convey the achievements of the Subwatershed Plan.

4.2. Water

Surfacewater

Action 4 Continue monitoring the water quality of the North Castor River to determine its relative health and identify areas where remedial work should be carried out.

According to a recent report (SNRCA, January 1995), the water quality of the North Castor River seems to be generally good. However, it has exhibited water quality parameters in amounts dangerous to human use of the riverine environment for drinking, fishing and swimming purposes. Another SNRCA study (September 1995) identifies the North Castor River Subwatershed as requiring further efforts to reduce erosion and phosphorous. Ongoing monitoring of water quality is important in establishing where environmental mitigation efforts are to be concentrated in the future.

Action 5 Use the recommendations from the Storm Servicing Study, Proposed Development in the Village of Greely as the basis for implementing measures to protect the water quality of Shields Creek during and after the development of vacant lands adjoining the Creek in Greely.

The location of the proposed stormwater drainage outlet along Shields Creek, in addition to specific best management practices to enhance the fishery along the Creek are outlined in the McNeely Engineering Storm Servicing Study Final Report (May 1995).

Action 6 **Make efforts to improve stormwater management in the Village of Greely to better the water quality of Shields Creek. Elsewhere in the Subwatershed, exercise less invasive municipal drainage practices and ensure that stormwater or other sources of water contamination be safely discharged to minimize the impact on the water quality of the North Castor River.**

Master Drainage & Stormwater Management Plans are studies that can be carried out to reduce the impact of existing or proposed development on a receiving watercourse and its water quality. Also, the SNRCA has a Stormwater Management Policy (1993) that can help a municipality protect the water quality of its streams and rivers.

In addition, altering drain management practices, as the Township of Osgoode is doing, can lessen the impact of drain maintenance on water quality, while ensuring that they remain open for the passage of water. Undoubtedly, these practises and others could be adapted for use on private lands and especially on agricultural lands where drain maintenance is an ongoing concern

Action 7 **The SNRCA, RMOC, OMNR, City of Gloucester and the Township of Osgoode jointly develop and adopt pre and post development sediment and erosion control guidelines for the Subwatershed.**

Sediment entering aquatic systems is known to be deleterious to the health of aquatic life and their habitat (SNRCA, January 1995). Measures must be taken to keep sediment suspended sediment levels within the OWQO's, if the health of the North Castor River is to be maintained and improved.

Groundwater

Action 8 **The City of Gloucester and the Township of Osgoode in conjunction with the RMOC, MOEE, the Regional Health Unit and the SNRCA undertake a groundwater survey of private wells to identify existing/potential problems and to identify local and regional aquifer recharge and discharge areas requiring protection.**

The Ontario Water Resources Act allows for the general protection of aquifers. The North Castor River Subwatershed contains two regionally important recharge aquifers, which are crucial in providing both public and private water supplies. Contamination of groundwater primarily comes from industrial development, aggregate extraction, landfills, agricultural sources of pesticides and nitrates, and from rural estate development (Beak et. al. June 1992).

Much development has already occurred on top of these aquifers. More development activity is planned over these aquifers in the future, including the expansion of aggregate operations and industrial activities. The bulk of this development is dependent on water drawn from these aquifers.

Currently, no program exists to monitor and protect aquifers at any level of government. The abovementioned organizations should jointly develop and establish a groundwater/aquifer protection, monitoring and management program for the Subwatershed. The established Water Quality Committee of the RMOC could oversee this work.

Action 9 Establish the criteria and policy required to protect regionally important aquifer recharge zones located in the Subwatershed from contamination and include these provisions in the RMOC's/City of Gloucester's/Township of Osgoode's Official Plans.

The upper portion of the North Castor River Subwatershed lies on top of a regionally significant recharge aquifer. It should be protected against future contamination, as it provides drinking water to the residents of the area. A map identifying the recharge area should be included in the Regional Official Plan. Policy assistance should be made available to City of Gloucester and Township of Osgoode to help them in identifying acceptable land uses on or near this recharge area.

4.3. Nature

Fish and Fish Habitat

Action 10 The Township of Osgoode, the OMNR, the SNRCA, voluntary organizations and residents work together to establish a sustainable trout fishery along Shields Creek in Greely.

OMNR (January 1995) reports that "the presence of Sculpin within the (fish) community is indicative of cool water of good quality. The high number of forage species present and the absence of a true top piscivore in the community holds some promise for the possible development of a Brown Trout population within the Creek (similar to Poole Creek in Goulbourn Township)." The trout fishery should be established as part of a larger plan to improve the water quality of the North Castor River and the recreational amenity of Andy Shields Park, as outlined in a Recreation Concept Plan (Corush et. al., November 1987) developed for the Park.

Action 11 The City of Gloucester, OMNR, SNRCA, local anglers, voluntary organizations and residents work together to establish a sustainable trout fishery along Findlay Creek in Leitrim.

According to OMNR (January 1995), the "Ministry is now considering the use of Brown Trout, a more temperature-tolerant coldwater species suited to a fish-forage base, as a future top predator in Findlay Creek." No further stocking of fish is recommended until the stormwater management work associated with the Leitrim Development is completed.

The studies prepared for this development in Leitrim (Cumming Cockburn Ltd., 1991/1994) outline the measures to be taken needed to protect the significant environmental features of Findlay Creek and the Leitrim Wetland. Implementation of these measures will require that everyone with an interest in achieving a healthy aquatic environment along Findlay Creek work together to make the fisheries agreement work. In addition, establishment of a trout fishery should be linked to efforts to improve the water quality and ecological integrity of the Creek. Transferring ownership of the Leitrim Wetland to the SNRCA will also enhance efforts to achieve a healthy and viable riverine corridor.

Wildlife and Wildlife Habitat

Action 12 The City of Gloucester and the Township of Osgoode in cooperation with the OMNR, the SNRCA, the RMOC and local landowners inventory and where necessary, conduct additional field work to determine the extent and significance of the Subwatershed's natural attributes (woodlands, wetlands, etc.).

After being identified, the location of these natural features should be displayed in the official plans of both municipalities to expedite future development and efforts to protect, restore and enhance locally valued natural features.

Action 13 Improve green space linkages/corridors between the woodlands, wetlands and stream and rivers of the Subwatershed.

Linkages between land and water ecosystems are crucial to the well-being of wildlife. The woodlands, wetlands and watercourses of the Subwatershed provide most of the wildlife/aquatic habitat coverage in the area. The most effective way to ensure the sustenance of wildlife is to protect those components of the ecosystem that they rely upon for their survival.

The Township of Osgoode and City of Gloucester should consider designating protection to

locally important woodland, wetland, stream and river linkages/corridors. The RMOC (through its NESS project), OMNR and SNRCA should assist each municipality in the task of identifying where these linkages/corridors exist and where they might best be established. Typically, a 15 metre buffer strip on either side of intermittent streams and 30 metres on either side of perennial streams is recommended to protect riparian/aquatic habitat (Triton et.al., May 1992). A 100 metre wide woodland corridor should be considered to protect nesting habitat of some bird species (Dillon, January 1994).

Action 14 Strengthen the protection of locally valued natural features in the Official Plans of the City of Gloucester and the Township of Osgoode.

A locally valued natural feature like a woodland provides habitat for wildlife, helps to cleanse our water and air, offers us access to many recreational opportunities and provides us with many products for our use including maple syrup, firewood and lumber. The City of Gloucester and the Township of Osgoode could take advantage of existing legislation (Planning Act/Trees Act) to provide additional protection to the woodlands of the Subwatershed through planning policy and the adoption of tree cutting by-laws.

Action 15 The City of Gloucester and the Township of Osgoode should use the Subwatershed Plan to seek community help in efforts to improve the natural habitat of the Subwatershed, by actively involving them in environmental projects considered to be beneficial to the local environment.

Fewer financial resources are available to municipalities today to improve the local environment. Nonetheless, the need still remains to tackle environmental issues across the Subwatershed. Communities will increasingly be called upon to take care of themselves. The public (landowners, schoolchildren, community groups, voluntary organizations, etc.) represents the last significant untapped resource available to both municipalities to do more with less. Seeking the public's help in implementing the recommendations of this Plan is an excellent opportunity for each municipality to get the public involved in "taking charge and care" of their own affairs.

Organizations like the Eastern Ontario Model Forest, local chapters of the Ontario Woodlot and Sawmill Operators Association, the Ontario Soil and Crop Improvement Association and field naturalist clubs, as well as service organisations, schools and individuals can provide local expertise and assistance with natural resource planning, management and project implementation. Assistance is also available from organisations like the SNRCA, the OMNR and the National Community Tree Foundation to provide funding assistance revegetate streams, rivers, old fields and communities.

Action 16 Identify those wetlands considered not to be provincially significant and evaluate them according to their local importance. Incorporate locally important wetlands into official plans and encourage residents to participate in their protection and management.

The location of the North Osgoode and Leitrim Wetlands should be clearly shown in local official plans. Every effort should be made to protect these two wetlands and the other wetlands of the Subwatershed, because they provide innumerable benefits such as reducing water runoff and erosion, filtering and cleansing water and providing food and shelter to wildlife. Wetlands should be thought of as community assets, with management strategies/agreements for each Wetland drawn-up and agreed to by all concerned parties.

4.4. Implementing the Subwatershed Plan Recommendations

The recommendations listed above are intended to protect, restore and enhance the environment of the North Castor River Subwatershed and the quality of life enjoyed by residents of the area. These recommendations are to be implemented by programs and projects of federal, provincial and local agencies in cooperation with local non-governmental organizations and landowners and through federal and provincial legislation in the normal day-to-day operations of municipalities and provincial/federal agencies. In addition, it is anticipated that many of these recommendations can only be implemented over the medium to long-term (e.g. mapping of DLA's in Gloucester and Osgoode), while other recommendations can be implemented over the short to medium-term (e.g. streambank planting in Greely).

The success of the Subwatershed Plan will ultimately depend on implementing as many of the abovementioned recommendations as possible. It is essential to involve community volunteers, non-governmental organisations (NGO's) and public agencies in site specific projects over the short to medium-term to build interest in the Subwatershed Plan and its overall purpose to improve the environmental quality of the Township of Osgoode and the City of Gloucester.

As illustrated in Figure 4-1, two methods are suggested to implement the recommendations set out in this document: 1) by statutory means using federal/provincial legislation and those powers delegated to municipalities through the Municipal Act and the Planning Act; and 2) by using the programs, projects, management guidelines/practices and the significant resources available from community groups, service clubs and residents of the area.

The fish (trout) population of the North Castor River is intended to be the catalyst for implementing the Subwatershed recommendations and to achieve the abovementioned

purpose. The fish (trout) population has been chosen because it is a symbolic locally valued, environmental feature that has regional recreational significance. It also has the potential to create social, economic and environmental benefits to both municipalities if fully realised. The fish (trout) population is a natural focal point from which to concentrate efforts to launch regeneration projects throughout the Subwatershed.

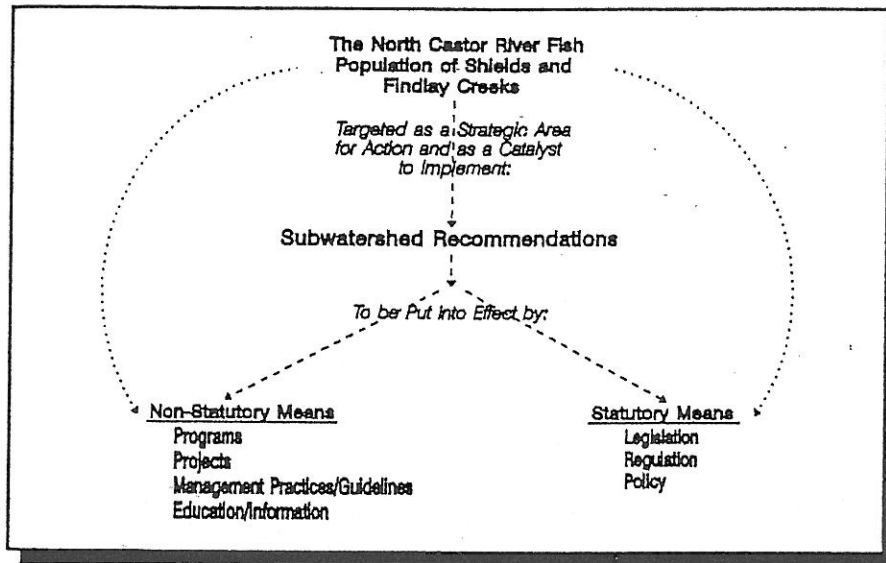


Figure 4.1. Targeting the North Castor River Fish Population to Implement the Subwatershed Plan

Figure 4.2 shows the main areas to be dealt with in order to improve the fish and wildlife habitat and water quality/quantity of the North Castor River to sustain the fish (trout) population.

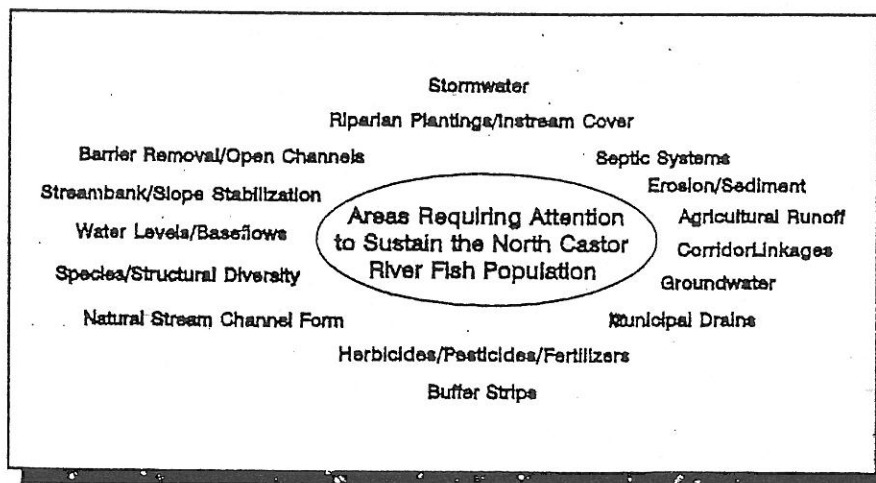


Figure 4.2. Areas Requiring Attention to Sustain the North Castor River Fish Population

The following steps are suggested to implement the Plan's recommendations. The North

Castor River fish (trout) population is proposed as the catalyst to achieve most of these recommendations and address the areas identified in Figure 4.2. The timetable presented below lists the steps necessary to implement these recommendations. Achieving the points listed in the timetable depends on local circumstances, priorities and available resources.

North Castor River Subwatershed Implementation Timetable

- 1) Using *Statutory Means* (to implement recommended Actions 1, 2, 3, 14 and 16).

Steps for 1996

- Seek official recognition of the Subwatershed Plan
- Begin developing criteria for the Development Limitation Areas (DLA's)(discussed in Chapter 3) in conjunction with the planning & development staff of the City of Gloucester, the Township of Osgoode, the RMOC, the SNRCA, the OMNR and other provincial agencies. Carry out additional fieldwork to supplement information made available through the RMOC's Natural Environment Systems Strategy and this Plan.

Steps for 1997 and Beyond

- Incorporate descriptions of DLA's into the official plans of the City of Gloucester and the Township of Osgoode as planning policy. Display DLA's in the official plan schedules of each municipality to identify where future development may or may not be located.

- 2) Using *Non-Statutory Means* (to implement recommended Actions 3, 4, 5, 6, 7, 10, 11, 12, 13 and 15).

Steps for 1996

- Publicize the major recommendations of the Plan, especially the intent to rehabilitate the North Castor River fish (trout) population, beginning with Shields Creek through Greely.
- Form a Subwatershed group to spearhead efforts to implement the Plan's recommendations. Seek representation from citizens and officials with an interest in helping with the rehabilitation the North Castor River and its fish (trout) population.
- Develop a fisheries strategy with OMNR's assistance for Shields and Findlay Creeks

(listing short to long-term actions/targets to be met).

Some of the measures suggested as projects to be carried out as part of a fish (trout) implementation strategy include: 1) maintaining or enhancing existing water baseflows; 2) rehabilitating or where possible enhancing existing natural creek channels; 3) constructing or replacing creek channels in the most environmentally responsible manner possible; 4) restoring or enhancing streamside vegetative cover to reduce water temperatures and water erosion; and 5) monitoring the results of these measures (OMNR, March 1994).

- Do the field work necessary to complete the fisheries strategy.
- Seek community help in implementing the fisheries strategy beginning in 1997 (some preliminary work may be able to be started in 1996). Focus efforts on doing environmental projects (such as streambank tree planting; cleaning-up streams; removing instream barriers to fish movement; and monitoring water quality, etc.) with the help of local citizens and voluntary groups.

Steps for 1997 and Beyond

- Implement the fisheries strategy.

Tables 4.1 and 4.2 below list the many statutory and non-statutory means available to sustain the fish (trout) population of the North Castor River and its tributaries. It is important to note that the issues/areas identified for further action to improve water quality/quantity and fish and wildlife habitat in the Subwatershed are critical components that must be properly planned and managed for, if a sustainable fish population along the North Castor River in Findlay and Shields Creeks is to be a reality for future generations living and working in the Township of Osgoode and the City of Gloucester.

Table 4.1. Statutory & Non-Statutory Means Available to Implement Water Strategies to Sustain the Fish Population of the North Castor River Subwatershed.

Water Resource Management Issues/Area Requiring Action	Non-Statutory Means	Statutory Means
<p>1) Water Quality & Quantity:</p> <ul style="list-style-type: none"> ■ Septic systems ■ Agricultural runoff ■ Stormwater ■ Municipal drains ■ Herbicides/pesticides/fertilizers ■ Erosion/sediment ■ Groundwater ■ Water levels/baseflows 	<p><u>Programs</u></p> <ul style="list-style-type: none"> ■ Ontario Environmental Farm Plan Incentive Program ■ SNRCA Conservation Awareness, Water Quality Improvement/Monitoring, Erosion/Flood Control & River Corridor Management Programs <p><u>Projects</u></p> <ul style="list-style-type: none"> ■ SNRCA tree planting, bioengineering, water quality monitoring & improvement (e.g. livestock fencing, manure storage, etc.) ■ Municipal stormwater management & grading/drainage projects ■ Ontario Soil & Crop Improvement Association soil & water improvement projects ■ Community led (by schools, service clubs, local groups) water quality & quantity improvement projects <p><u>Management Practices/Guidelines</u></p> <ul style="list-style-type: none"> ■ Best Management Practices for agriculture (conservation tillage, buffer strips, etc.) ■ Ontario Water Quality Objectives (management criteria for quality and quantity of surface/groundwater) ■ Stormwater Management Practices Planning and Design Manual ■ A Summary of Policies and Guidelines for the Protection of Aquatic Habitat in Ontario ■ Agricultural Code of Practice ■ SNRCA Stormwater Management Policies <p><u>Education/Information</u></p> <ul style="list-style-type: none"> ■ OMAFRA & OMNR extension notes/facisheets ■ Agriculture Canada Best Management Practices booklets 	<p><u>Legislation/Regulation</u></p> <ul style="list-style-type: none"> ■ Environmental Protection Act - Part III, Ontario Reg. No.358 ■ Drainage Act (enables municipalities to manage drains) ■ Fisheries Act ■ Conservation Authorities Act - FC & AW Reg's. ** ■ Lakes & Rivers Improvement Act ■ Development Charges Act ■ Ontario Water Resources Act - MISA Reg's. * ■ Planning Act - O.P. zoning bylaws, subdivision & site plans ■ Municipal Act - bylaws <p><u>Policies</u></p> <ul style="list-style-type: none"> ■ O.P. policies (wetlands, floodplains, ground/surface water, etc.)

* MISA Reg's. - Municipal Industrial Strategy for Abatement, ** FC & AW Reg's. - Fill, Construction & Alteration to Waterways.

Table 4.2. Statutory & Non-Statutory Means Available to Implement Nature Strategies to Sustain the Fish Population of the North Castor River Subwatershed.

Land Use Management Issues/Areas Requiring Action	Non-Statutory Means	Statutory Means
<p>2) Fish & Wildlife Habitat:</p> <ul style="list-style-type: none"> ■ Buffer strips ■ Corridor linkages ■ Streambank/slope stabilization ■ Riparian plantings/instream cover ■ Species/structural diversity ■ Natural stream channel form ■ Barrier removal/open channels 	<p><u>Programs</u></p> <ul style="list-style-type: none"> ■ Wildlife Habitat Canada ■ OMNR Community Wildlife & Fisheries Improvement Program ■ Environment Canada Action 21 Community Funding Program ■ SNRCA Forestry, Erosion Control & River Corridor Management Programs ■ Agriculture Canada Wetlands, Woodlands, Wildlife Program ■ Ontario Forestry Association Project Tree Cover ■ Private Forests Sustainability Funding Program ■ National Community Tree Foundation Funding Program ■ Eastern Ontario Model Forest Program ■ Ontario Environmental Farm Plan Incentive Program <p><u>Projects</u></p> <ul style="list-style-type: none"> ■ SNRCA tree planting, bioengineering & artificial wetland construction ■ OMNR tree planting, fish & wildlife rehabilitation ■ Field Naturalists wildlife habitat protection & restoration ■ Ducks Unlimited waterfowl habitat protection & restoration ■ Ontario Federation of Anglers & Hunters fish & wildlife protection & restoration ■ Ontario Soil & Crop Improvement Association soil & water improvement projects ■ Community led (by schools, service clubs, local groups) fish & wildlife habitat improvement projects <p><u>Management Practices/Guidelines</u></p> <ul style="list-style-type: none"> ■ Best Management Practices for agriculture (conservation tillage, buffer strips, etc.) ■ Fish Habitat Protection Guidelines for Developing Areas ■ A Summary of Policies and Guidelines for the Protection of Aquatic Habitat in Ontario ■ Natural Channel Systems: An Approach to Management & Design <p><u>Education/Information</u></p> <ul style="list-style-type: none"> ■ OMAFRA & OMNR extension notes/factsheets ■ Agriculture Canada Best Management Practices booklets 	<p><u>Legislation/Regulation</u></p> <ul style="list-style-type: none"> ■ Drainage Act (enables municipalities to manage drains) ■ Fisheries Act ■ Conservation Authorities Act - FC & AW Reg's. ** ■ Development Charges Act ■ Ontario Water Resources Act ■ Lakes & Rivers Improvement Act ■ Planning Act - O.P. zoning bylaws's, subdivision & site plans ■ Municipal Act - bylaws's ■ Trees Act - bylaws's <p><u>Policies</u></p> <ul style="list-style-type: none"> ■ O.P. policies (wetlands, stream/river corridors, woodlands, etc.)

** FC & AW Reg's. - Fill, Construction & Alteration to Waterways.

5.0 REFERENCES

- Beak Consultants Limited et. al. June 1992. Credit River Water Management Strategy - Phase 1 and Phase 2. Credit River Conservation Authority, Mississauga, Ontario.
- Chin, V.I., K.T. Wang and D.J. Vallery. 1980. Water Resources of the South Nation River Basin - Summary. Water Resources Report 13 of the Water Resources Branch, Ministry of the Environment, Toronto, Ontario.
- City of Waterloo. September 1993. Official Plan Amendment No.16 to the Official Plan of the City of Waterloo Planning Area. Planning Group, Waterloo, Ontario.
- Corush et. al. November 1987. Andy Shields Family Park: Master Development Plan. The Corporation of the Township of Osgoode, Metcalfe, Ontario.
- Crombie, J. et. al. 1990. Watershed. Royal Commission on the Future of the Toronto Waterfront, Toronto, Ontario.
- Cumming Cockburn Ltd. March 1991. Planning for Leitrim: An Integrated Approach: Vol. 1 - Environmental Analysis. City of Gloucester, Gloucester, Ontario.
- Cumming Cockburn Ltd. August 1991. Planning for Leitrim: An Integrated Approach: Vol. 2 - Master Drainage Plan. City of Gloucester, Gloucester, Ontario.
- Cumming Cockburn Ltd. October 1994. Leitrim Development Area: Stormwater Management and Environmental Study Report and Pre-Design: Vol. 2.
- Cumming Cockburn Ltd. May 1995. Leitrim Development Area: Stormwater Management and Environmental Study Report and Pre-Design: Vol. 1 - Main Report. City of Gloucester, Gloucester, Ontario.
- Dillon Consultants Limited. July 1993. Collins Watershed Phase 1: Final Report. Cataraqui Conservation Authority, Glenburnie, Ontario.
- Dillon, M.M. Consultants Limited. January 1994. Collins Watershed Phase 2: Implementation Report. Cataraqui Conservation Authority, Glenburnie, Ontario.
- Gartner Lee Limited. December 1993. The City of Vaughan Subwatershed Study -Background Report on Existing Environmental Conditions and Functional Assessment: Final Report. City of Vaughan, Vaughan, Ontario.

- Gartner Lee Limited. May 1994. City of Vaughan Official Plan Amendment 400, Environmental Management Plan: Draft. City of Vaughan, Vaughan, Ontario.
- Geo-Analysis and J.L. Richards & Associates Ltd. May 1992. Private Individual Services in the Rural Area. Regional Municipality of Ottawa-Carleton and the Ontario Ministry of Municipal Affairs, Ottawa, Ontario.
- Golder Associates Ltd. August 1994. Hydrogeological and Geotechnical Considerations: The Design of Stormwater Management Works for the Leitrim Development Area. Cumming Cockburn Ltd., Ottawa, Ontario and the City of Gloucester, Gloucester, Ontario.
- Gore and Storrie Limited. June 1994. The Sawmill Creek Watershed Study: Study Report. Rideau Valley Conservation Authority, Manotick, Ontario.
- Maitland Valley Conservation Authority. 1992. General Land-Use Policies for Resource Lands in the Maitland Valley Watershed. Wroxeter, Ontario.
- Marshall, Macklin, Monaghan and LGL Limited. October 1993. Hanlon Creek Watershed Plan: Summary Report. Thornhill, Ontario.
- McNeely Engineering Consultants Ltd. May 1995. Storm Servicing Study for Proposed Development in the Village of Greely Located at the Southwest Corner of Old Prescott and Parkway Roads, Township of Osgoode: Final Report. Orleans, Ontario.
- Ontario Ministry of Environment and Energy. June 1993. Watershed Management on a Watershed Basis: Implementing an Ecosystem Approach. Water Resources Branch, Toronto, Ontario.
- Ontario Ministry of Environment and Energy. June 1993. Subwatershed Planning. Water Resources Branch, Toronto, Ontario.
- Ontario Ministry of Environment and Energy. June 1993. Integrating Water Management Objectives into Municipal Planning Documents. Water Resources Branch, Toronto, Ontario.
- Ontario Ministry of Environment and Energy. June 1994. Stormwater Management Practices Planning and Design Manual. Queen's Printers for Ontario, Toronto, Ontario.
- Ontario Ministry of Municipal Affairs. 1994. Comprehensive Set of Policy Statements. Queen's Printers for Ontario, Toronto, Ontario.
- Ontario Ministry of Natural Resources. 1976. Ontario Land Inventory. Land Inventory Unit, Richmond Hill, Ontario.
- Ontario Ministry of Natural Resources. March 1993. Wetland Data and Scoring Record: Findlay Creek Wetland. Carleton Place, Ontario.

- Ontario Ministry of Natural Resources. February 1994. Aquatic Habitat Mitigation and Compensation Reference Manual. Aquatic Ecosystems Branch, North York, Ontario.
- Ontario Ministry of Natural Resources. March 1994. Fish Habitat Protection Guidelines for Developing Areas. Aquatic Ecosystems Branch, North York, Ontario.
- Ontario Ministry of Natural Resources. June 1994. Aquatic Habitat Compliance Reference Manual. Aquatic Ecosystems Branch, North York, Ontario.
- Ontario Ministry of Natural Resources. October 1993. A Summary of Policies and Guidelines for the Protection of Aquatic Habitat in Ontario. Aquatic Ecosystems Branch, North York, Ontario.
- Ontario Ministry of Natural Resources. January 1995. Aquatic Habitat Survey and Fish Community Sampling: Overview Documents Prepared for Shield's and Findlay Creeks. Carleton Place, Ontario.
- Regional Municipality of Ottawa-Carleton. January 1995. Daily Planet: Your Guide to Regional Planning Initiatives. RMO Planning and Property Department, Ottawa, Ontario.
- Schut, L.W. and E.A. Wilson. 1987. The Soils of the Regional Municipality of Ottawa-Carleton: Volume 2 (excluding the Ottawa Urban Fringe). Report No. 58 of the Ontario Institute of Pedology. Ontario Ministry of Agriculture and Food and Agriculture Canada, Research Branch.
- South Nation River Conservation Authority. February 1983. South Nation River Basin Water Management Study: Main Report. Canada/Ontario Eastern Ontario Subsidiary Agreement with the SNRCA, Berwick, Ontario.
- South Nation River Conservation Authority. 1993. Stormwater Management Policy. Berwick, Ontario.
- South Nation River Conservation Authority. January 1995. Water Quality Analysis of the Castor River, 1994. Berwick, Ontario.
- South Nation River Conservation Authority. September 1995. Non-Point Source Pollution Study: Draft Report. Berwick, Ontario.
- Township of Kingston. September 1994. Draft Official Plan. Research and Planning Policy Department, Kingston, Ontario.
- Triton Engineering Services Limited et. al. May 1992. Laurel Creek Watershed Study: Draft. Grand River Conservation Authority, Cambridge, Ontario.

APPENDICES

- Water Quality Analysis of the Castor River, 1994 Appendix A
- Official Plan Amendment No. 16 of the City of Waterloo Appendix B
- City of Vaughan Official Plan Amendment 400 Appendix C
- Excerpts from the Draft Official Plan of the Township of Kingston Appendix D
- Land-Use Policies for Resource Lands in the Maitland Valley Watershed Appendix E
- Legislation and Policies Applicable to Subwatershed Planning Appendix F
- Summary of the Comprehensive Set of Policy Statements Appendix G
- Summary of Technical Studies to Protect the Subwatershed Environment Appendix H
- Aquatic Habitat Survey Report for Shields and Findlay Creeks Appendix I
- Resource Management Targets for the Hanlon and Credit Watersheds Appendix J

APPENDIX A

Water Quality Analysis of the Castor River, 1994

INTRODUCTION

Aquatic ecosystems are susceptible to changes caused by human activities. Such changes, especially rapid ones, can have detrimental or disastrous effects. Adverse effects caused by human activity, such as increased inorganic and organic effluent materials discharged into rivers and streams, may affect many of the ecosystem biota components. The magnitude of these effects depend on both biotic and abiotic site-specific characteristics. When developing a watershed or sub-watershed plan, the local water quality, resident biotic species, local water demands and other factors have to be considered.

The Castor River is sensitive to changes and at present there are some areas of particular concern. One of these areas is a 1 km section on the North Castor River between Greely and Sale Barn Road. Contingent on the results of a study conducted by the Ontario Ministry of Natural Resources, this river section may have the potential to be restored to a cold water fishery. In January, 1995 the Ministry of Natural Resources will be producing a report regarding the condition of this river section.

As well, Findlay Creek which drains the Leitrim Bog into the North Castor River, is classified as a cool water fishery. The sub-watershed plan will consider the present water quality in these and other sections of the River and how it may be affected by potential stormwater outlets, future land development and present land use management practices. The plan may also define water quality criteria for the River based on a number of considerations specific to the sub-watershed.

Concerned with potential future effects on the North Castor River biota caused by land development, the Township of Osgoode initiated the North Castor River Sub-watershed Study. In response to the North Castor River Sub-watershed Plan, the South Nation River Conservation Authority in partnership with the Regional Municipality of Ottawa-Carleton is conducting the Castor River Water Quality Monitoring Program. SNRCA and RMOC established three objectives for the Castor River Water Quality Monitoring Program. These objectives are: (1) to evaluate and characterize water quality in the Castor River within the RMOC geographical boundary; (2) to monitor long term water quality trends in the Castor River, pending funding and approvals, and; (3) to provide water quality information to be used for the development and evaluation of the North Castor River Sub-watershed Plan.

SAMPLING

Nine water sampling stations were established in the Castor River sub-watershed: two on the South Castor River; two on the Middle Castor River, and; five on the North Castor River and its tributaries. Figure 1 shows a map of all the sample stations. For this report only the data collected the North Castor River and its tributaries will be reviewed. Data for the Middle Castor River and the South Castor River will be presented in an addendum to this report. There was a station on the North Castor at Greely and one station on each of Findlay Creek and the Quail Drain. A fourth station was located 1 km down stream of the junctions of Findlay Creek and the Quail Drain and the North Castor River (Station 206). The fifth station (Station 202) was located 5 km down stream of station 206.

Water samples will be tested for three groups of parameters: bacteria indicators, nutrient/physical parameters and metals. To date, the bacteria indicator and nutrient/physical parameter data have been reported. Bacteria indicators include fecal coliform and *Escherichia coliform*. Nutrients include total and dissolved phosphorous and nitrogen compounds (total Kjeldhal nitrogen, ammonia, and nitrate+nitrite). Included in the physical parameters are suspended solids, sulphate, pH, alkalinity, chloride, and conductivity. Metals include chromium, copper, nickel, zinc, aluminum, cadmium, lead, cobalt, molybdenum, vanadium and iron. All the water chemistry analysis was completed by the Regional Municipality of Ottawa-Carleton laboratory.

Most bacteria, nutrient/physical and metal samples were taken using a dual sampling bucket from the centre of a bridge spanning the river. The effectiveness of this method is impaired when water depth is less than 60 cm. In areas where low flow did not allow this method to be used, an extension pole was used to collect samples from the river bank.

Precipitation data for Osgoode Township was obtained from the Ontario Ministry of Agriculture, Food and Rural Affairs. A wet event was characterized by a precipitation volume greater than 10 mm within a period of 24 hours before sampling. There was only one wet sample collected per station during the sample period. This wet sample was taken on June 28.

RESULTS

A summary of the North Castor River water quality data collected at the five North Castor stations is presented in Table 1 and the complete data set is presented in Appendix 1. Rainfall records for the months between June and September are included in Appendix 2.

Unless otherwise noted, all Ontario Water Quality Objectives (OWQO) that are referred to are for the protection of freshwater fisheries.

DISCUSSION

Excessive quantities of total phosphorous should be avoided, as it can cause prolific aquatic weed growth. Figure 2 shows the minimum, maximum and mean concentrations of total phosphorous at each of the stations. The mean concentrations of total phosphorous increased with down river flow. The guideline for total phosphorous is 0.03 mg/l. The mean total phosphorous concentration at the Greely station was 0.02 mg/l, with only one sample exceeding the total phosphorous guideline of 0.03 mg/l. At stations 206 and 202 the mean concentrations of total phosphorous were 0.04 and 0.05 mg/l, respectively. At all the stations, except the Greely station, a majority of the total phosphorous concentrations exceeded or equalled the guideline.

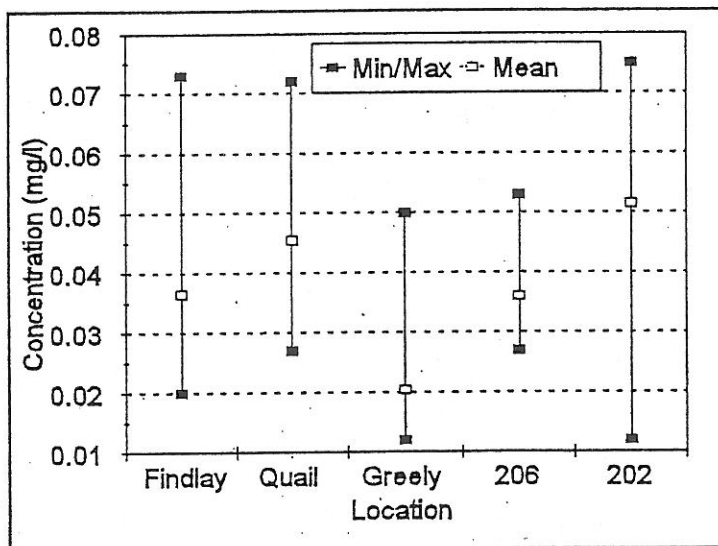


Figure 2. Total Phosphorous Concentrations.

The aquatic life OWQO for nitrite-nitrogen is 0.06 mg/l. However, due to aerobic conditions in aquatic ecosystems most, if not all, nitrite-nitrogen is quickly converted to nitrate-nitrogen, which has no freshwater aquatic life OWQO. As a result, the nitrite portion of nitrate+nitrite-nitrogen is very small. Not only does nitrate-nitrogen add to the available nutrients in aquatic ecosystems, rainbow trout eggs have shown a significant increase in mortality at exposures as low as 10 mg/l (Environment Canada, 1992). Figure 3 shows the minimum, maximum and mean concentrations of nitrate+nitrite-nitrogen for all the stations. In the North Castor River at Greely the mean concentration of nitrate+nitrite-nitrogen was 0.61 mg/l. The Quail Drain mean nitrate+nitrite concentration was 0.60 mg/l. The mean nitrate+nitrite concentration in Findlay Creek was 0.04. At station 206, the mean nitrate+nitrite concentration was 0.22 mg/l. Further down stream at station 202 the mean nitrate+nitrite concentration was 0.19 mg/l.

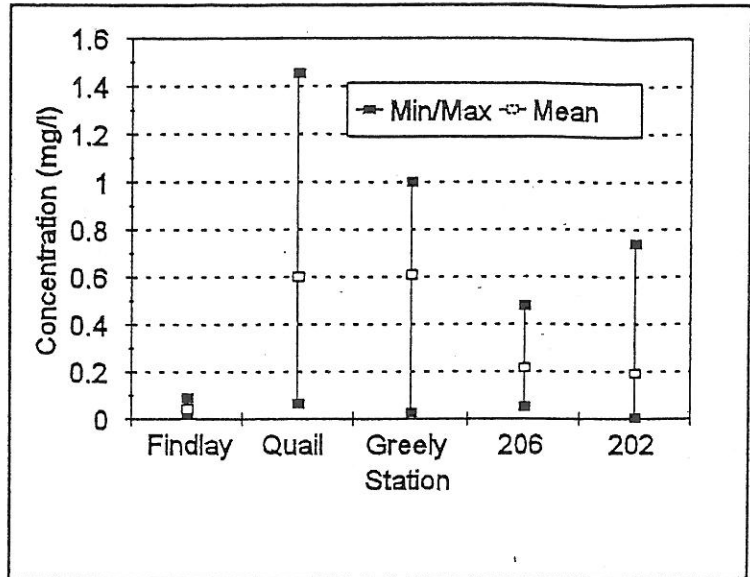


Figure 3.. Nitrate+Nitrite Concentrations.

At high concentrations, ammonia is a significant toxin to the aquatic biota. The toxicity of ammonia is due to un-ionized ammonia. Un-ionized ammonia concentrations are related to pH and temperature; as temperature and pH increase so do un-ionized ammonia concentrations. The aquatic life OWQO for un-ionized ammonia is 0.02 mg/l. When temperature and pH were accounted for, none of the un-ionized ammonia concentrations exceeded this objective. Figure 4 shows the minimum, maximum and mean un-ionized ammonia concentrations for all the stations. In general, the un-ionized ammonia concentrations increased with down river flow in the North Castor River. The mean un-ionized ammonia concentration at Greely was 0.0006 mg/l. Further down stream at stations 206 and 202, the means were 0.0007 and 0.0036 mg/l, respectively.

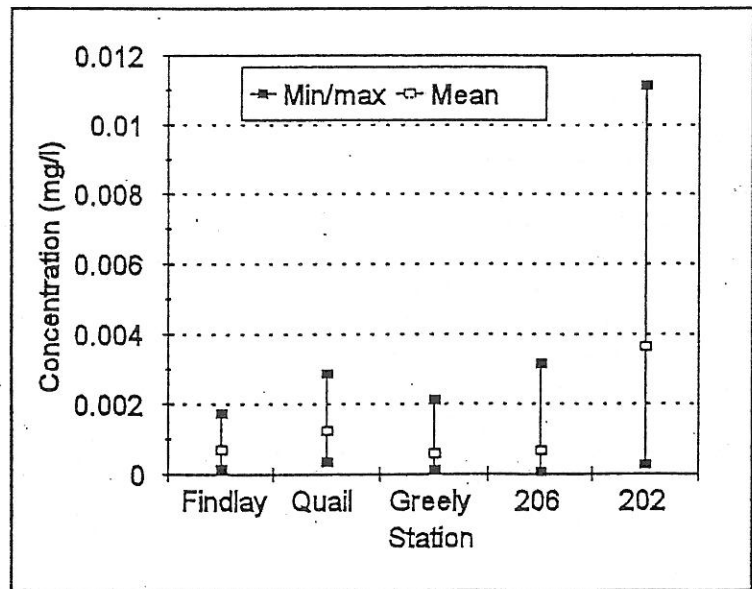


Figure 4. Un-ionized Ammonia Concentrations.

As alkalinity concentrations lower, the toxicity of several metals increases. The OWQO for the

protection of aquatic biota is that "alkalinity should not be decreased by more than 25% of the natural concentrations" (Ontario Ministry of the Environment, 1978). The mean alkalinity (CaCO₃) concentration in the North Castor River at Greely was 245.87 mg/l. The mean alkalinity concentrations in the Quail Drain and Findlay Creek were 227.52 mg/l and 225.32 mg/l, consecutively. At station 206 on the North Castor River the mean alkalinity concentration was 238.31 mg/l. At station 202, the mean alkalinity concentration was 230.94 mg/l.

OWQO for pH ranges between 6.5 - 8.5. However, at the extremities of this range, the toxicity of other parameters may be increased. All the pH values were within the objective range. The pH of the North Castor River at Greely ranged between 7.9 and 8.2. Findlay Creek draining the Leitrim Bog had the lowest pH values, ranging from 7.6 to 8.4. The Quail Drain had pH values ranging between 7.9 and 8.5. At both stations 206 and 202, the pH ranged between 8.0 and 8.4.

The guideline for the protection of freshwater aquatic life for suspended solids is that inputs of "suspended solids should not exceed 10 mg/l when background suspended solids concentrations are equal to or less than 100 mg/l" (Environment Canada, 1992). Thus, any effluent entering the North Castor River from a point source should not contain suspended sediment concentrations greater than 10 mg/l. The type of fisheries to be protected must be considered before a criteria specific to the North Castor River is established to protect the aquatic biota from increased suspended sediment concentrations. Increases in suspended sediment concentration of approximately 5-25 mg/l can reduce stream productivity by 3-13% (Environment Canada, 1992). At suspended sediment concentrations of 100 mg/l salmonoid growth is depressed and feeding responses are slower. Salmonoids will be displaced at concentrations greater than 300 mg/l (Environment Canada, 1992). Figure 5 shows the minimum, maximum and mean suspended sediment concentrations for all the stations. In general, suspended sediment concentrations increased with down river flow. At Greely the mean suspended sediment was 6.46 mg/l. Further down stream, at stations 206 and 202, mean suspended sediment concentrations were 18.16 and 21.11 mg/l. This increase in sediment load may, in part, be contributed to suspended sediment inputs from the Quail Drain and Findlay Creek. At all the stations, the highest recorded suspended sediment concentration occurred on June 28, the one sample date with wet event conditions.

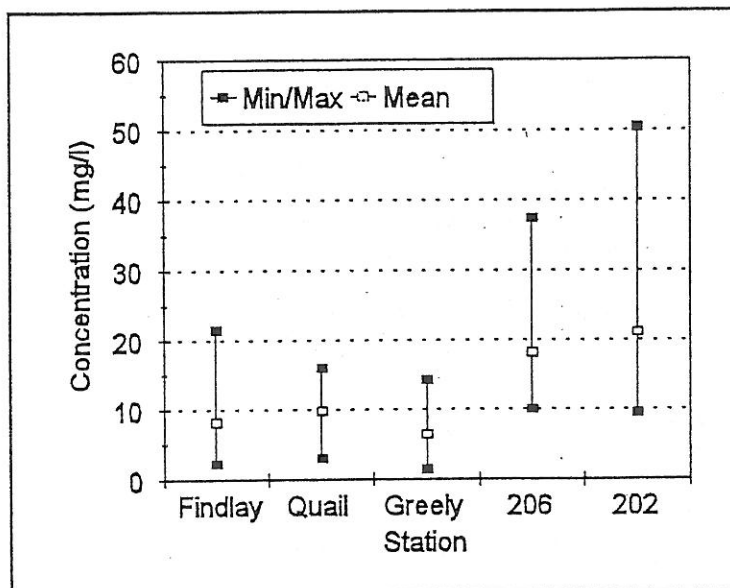


Figure 5. Suspended Sediment Concentrations.

There is no OWQO for the protection of freshwater aquatic habitat for fecal or *Escherichia* coliform.

For recreational uses, "A potential health hazard exists if the fecal coliform geometric mean density for a series of water samples exceeds 100 per 100 ml." (Ontario Ministry of the Environment, 1992). Although the North Castor River does not have a large recreational potential due to limited flows during June, July and August, at all water sampling stations the fecal coliform densities consistently exceeded the objective. Figure 6 shows the minimum, maximum and mean fecal coliform concentrations at all the stations. The fecal coliform concentrations at Greely ranged between 10 and 2500. In Findlay Creek the fecal coliform concentrations ranged between 10 and 2700. Fecal coliform concentrations ranged between 40 and 2500 in the Quail Drain. At station 206, the fecal coliform concentrations ranged between 240 and 2700. Further down stream at station 202, the fecal coliform concentrations ranged between 170 and 6400. High fecal coliform concentrations indicate that there is some form of fecal contamination.

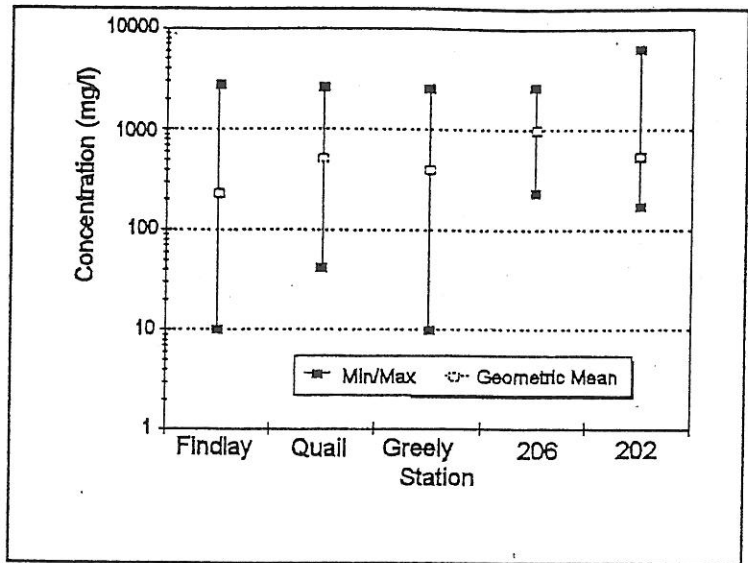


Figure 6. Fecal Coliform Concentrations.

Overall, of the three North Castor River stations, the Greely station had the lowest mean values for suspended sediment, total phosphorous, un-ionized ammonia and fecal coliform. The mean concentrations for these parameters increased with down stream flow, with station 202 having the highest mean values.

CONCLUSION

The data indicates the water quality of the North Castor River at the time of sampling met the objectives for the protection of freshwater aquatic habitat for pH and un-ionized ammonia. The River is impacted to some degree by pollution, as indicated by excessive concentrations of total phosphorous and fecal coliform. If care is not taken in future development and land use planning and management, further water quality deterioration will be unavoidable and the ecosystem biota components of the North Castor River could suffer severe degradation. Since the North Castor River is small, any inputs from development and other land uses may have a dramatic impact on water quality conditions.

RECOMMENDATIONS

To fulfil the objectives of the Castor River Water Quality Monitoring Program, water sampling should continue for at least two more years. Sampling should begin in April, when flow is at the maximum in the North Castor River and continue into November. Water sample should be taken bi-weekly. For a fuller representation of conditions, sampling should be conducted in both wet periods (within 24 hour of 10 mm of rain fall) and dry periods.

Before effluent from any stormwater or other source is discharged into the North Castor River system, a study of possible impacts on water quality should be conducted. Any discharge should

not raise parameter concentrations to levels that are considered to be harmful to the coldwater fishery biota nor above the freshwater aquatic life OWQO.

Any development should incorporate best management practices for land use and water management. If the North Castor River sub-watershed water quality deteriorates remedial actions should be taken.

If the section of the North Castor River between the Town of Greely and Sale Barn Road is deemed by the Ministry of Natural Resources to have the potential to be restored to a cold water fishery, stormwater and other outlets may have to be located down stream of this section.

REFERENCES

Environment Canada, Water Quality Branch. (1992) Canadian Water Quality Guideline.

Ontario Ministry of the Environment. (1978) Water Management - Goals, Policies, Objectives and Implementation Procedures of the Ministry of the Environment.

APPENDIX B

**Official Plan Amendment No. 16
to the Official Plan of the City of Waterloo Planning Area**

OFFICIAL PLAN AMENDMENT NO. 16 TO THE OFFICIAL PLAN OF THE
CITY OF WATERLOO PLANNING AREA

PART A - THE PREAMBLE

PURPOSE:

The purpose of this Amendment is to incorporate appropriate recommendations of the Laurel Creek Watershed Study into the Official Plan for Special Policy Areas 35 and 36.

LOCATION:

These lands being the subject matter of this Amendment, generally are located as shown on the Key Map and are designated as Special Policy Area 35 and Special Policy Area 36 as shown on the Key Map.

BASIS:

The overall purpose of the Laurel Creek Watershed Study was to develop a comprehensive environmental management plan to provide guidance to local and regional authorities in planning future land use development in the Watershed while at the same time protecting, enhancing, rehabilitating and managing the natural environment.

This Amendment recognizes the Laurel Creek Watershed Study and incorporates Watershed goals, objectives and policies to realize implementation of the Laurel Creek Watershed Study. It also recognizes that Watershed and Subwatershed planning are integral to the municipal planning process. This recognition shall pertain to all lands situated within Special Policy Areas 35 and 36.

The northwest corner of Special Policy Area 35 has been deemed by the Ontario Municipal Board to be an environmentally sensitive landscape that will require special environmental studies prior to the approval of a district plan for the area. This northwest corner is designated Special Policy Area 36 in the Official Plan.

PART B - THE AMENDMENT

All of this part of the document entitled PART B - THE AMENDMENT consisting of the following text, referred to as "Details of the Amendment" constitutes Amendment No. 16 to the Official Plan of the City of Waterloo Planning Area.

DETAILS OF THE AMENDMENT

ITEM 1: The City of Waterloo is hereby modified by adding the following Section 1.6.2.13 after Section 1.6.2.12 and said Section 1.6.2.13 is hereby approved:

1.6.2.13 The Plan recognizes the Laurel Creek Watershed Study and incorporates watershed goals, objectives and policies to guide future development and protect the environment. It is recognized that watershed and subwatershed planning are integral to the municipal planning process.

ITEM 2: The City of Waterloo Official Plan is hereby modified by renumbering existing Sections 1.7.2.3 through 1.7.2.7 to 1.7.2.5 through 1.7.2.9. The following Sections 1.7.2.3 and 1.7.2.4 are to be added after Section 1.7.2.2. Said Sections 1.7.2.3 and 1.7.2.4 are hereby approved:

1.7.2.3 To protect, conserve, manage and enhance natural resources including land, surface water and groundwater quantity and quality, forest and wildlife.

1.7.2.4 To minimize the threat to life and the destruction of property and natural resources from flooding and preserve or re-establish natural floodplain hydrologic functions.

ITEM 3: The City of Waterloo Official Plan is hereby modified by deleting existing Sections 1.7.3.6 and 1.7.3.7 and replacing with Sections 1.7.3.6 through 1.7.3.12 after existing Section 1.7.3.5. Existing Sections 1.7.3.8 through 1.7.3.36 are to be renumbered 1.7.3.13 through 1.7.3.41 Said Sections 1.7.3.6 through 1.7.3.12 are hereby approved:

1.7.3.6 To ensure that runoff is controlled such that it does not increase the frequency of occurrence of peak flows for all storm events, it reduces the intensity of flooding and does not increase the existing risk to life and property and to institute runoff control to prevent the accelerated enrichment of streams and contamination of waterways from runoff containing nutrients, pathogenic organisms, organic substances, heavy metals and toxic substances.

1.7.3.7 To minimize the disturbance of stream beds and prevent sheet and streambank erosion during development and post development periods and, where practical, to restore eroding streambanks to a natural or stable condition in order to prevent sedimentation of waterways.

- 1.7.3.8 To protect, restore, rehabilitate and enhance water quality and associated aquatic resources and water supplies.
- 1.7.3.9 To provide protection and enhancement of the fishery habitat through such means as maintaining the connective processes between groundwater and baseflow to streams.
- 1.7.3.10 To ensure that environmentally sensitive areas, significant wetlands and woodlots and other environmentally important resources are identified and protected from negative impacts of proposed development so as to maintain essential ecological processes and genetic diversity.
- 1.7.3.11 To rehabilitate and transform stream corridors into attractive community assets consistent with historical, recreational, visual or other cultural amenities located along stream corridors. Where appropriate, the natural vegetative canopy along streams should be maintained, restored and enhanced by maintaining the environmental continuity along stream corridors and providing open space linkages to the existing municipal open space system.
- 1.7.3.12 To undertake measures to protect, restore, and enhance the local surface discharge aquifer, and to protect the water supply aquifer system.
- ITEM 4:** The City of Waterloo Official Plan is hereby modified by adding the following Section 6.35 and is hereby approved:
- 6.35 In addition to other applicable policies presented in this Plan, the following policies shall apply to all lands identified as Special Policy Area 35:
- 6.35.1 **GENERAL**
- 6.35.1.1 The following Laurel Creek Watershed policies shall apply to all lands situated within Special Policy Area 35 as illustrated on Schedule "A" -Land Use Plan. These policies will be used in the creation of new district plans and other municipal plans and documents.
- 6.35.1.2 The Laurel Creek Watershed, Subwatershed and Constraint Level Area boundaries and ecological buffer widths are general in nature only and their actual determination will be achieved through Subwatershed studies and subsequently approved in corresponding new district plans.
- 6.35.1.3 These policies shall be implemented by Council in consultation with the Grand

River Conservation Authority, Regional Municipality of Waterloo and any other public agency having jurisdiction. Environmental policies shall be implemented through such mechanisms as:

- 6.35.1.3.1 Subdivision agreements;
 - 6.35.1.3.2 Site plan agreements;
 - 6.35.1.3.3 Conditions for municipal approval;
 - 6.35.1.3.4 Design and performance guidelines;
 - 6.35.1.3.5 Restrictive covenants;
 - 6.35.1.3.6 Public acquisition of rights to environmental constraint areas through purchase, easement and dedication; and
 - 6.35.1.3.7 Environmental warnings to landowners and occupants.
- 6.35.1.4 No proposed severance of land shall be permitted nor draft plan of subdivision shall be approved for urban development on any land within Special Policy Area 35 until such time as:
- 6.35.1.4.1 Regional capital servicing studies have defined the nature and feasibility of expanding Regional services to support urban development; and
- 6.35.1.5 No registration of plan of subdivision nor the issuance of a building permit for urban development purposes shall be permitted until satisfactory arrangements have been made to ensure the financing of Regional capital service improvements as identified in 6.35.1.4.1 above, in the manner warranted by development in the area.

6.35.2 **WATERSHED PLANNING**

- 6.35.2.1 It is recognized that watershed planning is integral to the municipal planning process. Watershed planning provides broad policy direction and management practices for the protection, enhancement and rehabilitation of the natural environment. The requirements to undertake watershed planning are recognized in this Plan in order to allow land use decisions to be placed into an overall ecological context.
- 6.35.2.2 Information Map 3 - Laurel Creek Watershed and Sub-Watershed Boundaries shows the extent of the Laurel Creek Watershed within the City of Waterloo and the area of the Watershed included in Special Policy Area 35. Information Map 3 also details the individual sub-watershed areas that comprise Special Policy Area 35.

6.35.3 SUB-WATERSHED PLANNING

6.35.3.1 It is recognized that sub-watershed planning is integral to the municipal planning process. Sub-watershed planning focuses on individual drainage area within a watershed and provides details for implementing these watershed policies. The requirement to undertake sub-watershed planning is recognized in this Plan and shall be implemented during the preparation of new district plans in order that development applications achieve the Watershed goals and objectives as set out in Section 1.7 of this Plan.

6.35.3.2 Sub-watershed studies shall be undertaken during the preparation of new district plans under the direction of the City of Waterloo in consultation with the Grand River Conservation Authority, Ministry of Natural Resources, the Regional Municipality of Waterloo, and any other public agency having jurisdiction, to demonstrate that the following objectives as set out in district plans shall be met:

6.35.3.2.1 Specified Watershed stormwater flow targets with respect to peak, volume and timing;

6.35.3.2.2 Stormwater runoff control and groundwater infiltration measures based on total annual volume;

6.35.3.2.3 Specified water quality and in-stream targets with respect to discharges of heated water, phosphorus, sediment, bacteria and oxygen demanding substances along with proposed procedures for monitoring these targets;

6.35.3.2.4 Through continuous hydrologic modelling, maintain baseflow and discharge to receiving streams, wetlands and drainage swales as close as possible to existing conditions, where soil and water table conditions are suitable;

6.35.3.2.5 Where hydrogeologic studies and continuous hydrologic modelling have indicated that an area of groundwater recharge is likely to contribute to the water supply aquifer system, the potential for water quality impacts will be minimized to the extent possible. Also, infiltration controls shall be required to maintain the infiltration rate as close as possible to existing conditions by minimizing loss of recharge to the system.

6.35.3.2.6 At-source stormwater management control measures, dependent upon the hydrogeologic setting;

- 6.35.3.2.7 Existing drainage systems including perennial and intermittent sections of streams and swales and their actual buffer widths have been identified, protected and enhanced.
- 6.35.3.2.8 Objectives and requirements for necessary ecological buffers as set out in Section 6.35.6 for Constraint Level One and Two Areas be established;
- 6.35.3.2.9 Determination of the actual boundaries of all Constraint Level Areas and required buffers widths;
- 6.35.3.2.10 An evaluation demonstrating that where development is proposed within a Constraint Level One Area for uses outlined in Sections 6.35.5.4 and 6.35.5.5 adjacent to Constraint Level One Area, the size and physical form and ecological functions will be protected and maintained;
- 6.35.3.2.11 An evaluation demonstrating that where development is proposed either adjacent to or within a Constraint Level Two Area, the ecological functions will be protected and maintained;
- 6.35.3.2.12 Identification and evaluation of terrestrial habitats within all affected Constraint Level Areas;
- 6.35.3.2.13 Propose procedures to periodically monitor environmental objectives and review performance criteria and performance measures;
- 6.35.3.2.14 Identify sub-categories of Constraint Level Areas along with their environmental protection and/or management requirements; and
- 6.35.3.2.15 Other studies and specifications as deemed appropriate.

6.35.4 Stormwater Management and Erosion/Sedimentation Management

6.35.4.1 It is recognized that stormwater management and erosion/sedimentation management is integral to the municipal planning process. These management requirements utilize best management practices to implement and enforce environmental measures and targets to be set out in district plans. The requirement to undertake stormwater management and erosion/sedimentation management is recognized in this Plan and shall be implemented at the draft plan of subdivision and other development application stages.

- 6.35.5 Environmental Constraint Areas
- 6.35.5.1 General
- 6.35.5.1.1. Environmental Constraint Area Policies shall apply to all lands identified as Special Policy Area 35 on Information Map 4 - Environmental Constraint Level Areas, as Constraint Level One Areas, Constraint Level Two Areas and Constraint Level Three Areas.
- 6.35.5.1.2 There shall be environmental sub-categories to define the types of environmental features that comprise Constraint Level One and Two Areas. These sub-categories shall be presented along with their corresponding implementation policies in new district plans.
- 6.35.5.2 Constraint Level One Areas perform important ecological processes and protect biological diversity and life-supporting systems that would be lost or degraded if such areas were permanently disturbed in any way. Constraint Level One Areas are "preservation areas" intended to preserve, enhance and protect important environmental features from land use impacts that would detrimentally alter their size and physical form, impair their ecological functions or degrade their quality.
- 6.35.5.3 Constraint Level One Areas shall be designated 'Open Space' on Schedule 'A' - Land Use Plan.
- 6.35.5.4 No development shall be permitted to establish within a Constraint Level One Area, not including floodplain areas, perennial streams and their minimum 30 meter vegetation buffer areas, or intermittent stream sections and their minimum 15 meter vegetation buffer areas as addressed in Section 6.35.5.5, with the exception of the following uses:
- 6.35.5.4.1 Underground public service crossing provided that it can be demonstrated to the satisfaction of the City of Waterloo in consultation with the Regional Municipality of Waterloo, the Grand River Conservation Authority and the Ministry of Natural Resources that impacts of such crossings on ecological functions and environmental quality will be minimized as much as possible through such measures as determining that no reasonable alternative routing is available, crossings will be properly installed using innovative materials and construction techniques, and that all impacted areas will be properly rehabilitated immediately following construction;

- 6.35.5.4.2 Maintenance and reconstruction of existing public roadways and minor widenings within existing rights of way;
- 6.35.5.4.3 Above ground public service crossings within existing road rights of way and existing public utility easements;
- 6.35.5.4.4 Community recreation trails provided that impacts on that ecological functions and environmental quality will be minimized as much as possible through such measures as the proposed routing is properly located, installed and managed;
- 6.35.5.4.5 Existing buildings developed in accordance with the Zoning By-law;
- 6.35.5.4.6 Development of an existing properly zoned lot of record on March 22, 1993;
- 6.35.5.4.7 A building or structure that is intended for flood or erosion control or is normally associated with the proper management of the natural environment as approved by the City of Waterloo, the Grand River Conservation Authority and the Ministry of Natural Resources; and
- 6.35.5.4.8 Lands having existing development approvals, specifically being registered plans, approved draft plans of subdivision and the zoning approvals related thereto. In these cases, Council may wish to consider exercising its powers specified in Section 2.3.6 to this Plan to acquire or protect as much as possible the Constraint Level One Area to be impacted by the proposed development.
- 6.35.5.5 No development shall be permitted to establish within Constraint Level One Area that is a floodplain area, perennial stream and its minimum 30 meter vegetation buffer, or intermittent stream section and its minimum 15 meter vegetation buffer with the exception of the following uses:
 - 6.35.5.5.2 Above ground and underground public service crossing including such things as utility corridors and public roads, subject to the conditions specified in Section 6.35.5.4.1; and
 - 6.35.5.5.2 Those uses specified in 6.35.5.4.2 through 6.35.5.4.8.
- 6.35.5.6 Notwithstanding Sections 6.35.5.4 and 6.35.5.5 no development shall be permitted to establish within a Provincially-Significant Wetland as defined in the Provincial Wetlands Policy Statement and identified by the Ministry of Natural Resources. These areas are designated 'Open Space' on Schedule 'A' -- Land Use Plan.

- 6.35.5.6.1 Where sub-watershed studies have identified additional lands as part of a Provincially-Significant Wetland Area, such lands will be protected from development at the district planning stage and will be incorporated by Amendment as 'Open Space' on Schedule 'A' - Land Use Plan.
- 6.35.5.7 Subdivision plans and other development applications including municipal trunk services proposed within 120 meters of a Provincially-Significant Wetland Area or within a Provincially-Significant Wetland Complex, as defined in the Provincial Wetlands Policy Statement and identified by the Ministry of Natural Resources, shall be required to submit an Environmental Impact Statement to the satisfaction of the City of Waterloo, the Ministry of Natural Resources and the Grand River Conservation Authority.
- 6.35.5.8 Where municipal trunk services are being proposed adjacent to or within a Constraint Level One woodlot or adjacent to a Provincially-Significant Wetland, a hydrogeologic analysis shall be required to demonstrate that services will be designed to ensure that the size and physical form and ecological functions of the Constraint Level One Area will not be negatively impacted upon through disruption of groundwater flows.
- 6.35.5.9 Constraint Level Two Areas provide important ecological functions to the Watershed and allow for the creation of new ecological features such as vegetative buffers, wetlands and linkages between vegetated areas and watercourses. Constraint Level Two Areas are "conservation areas" intended to allow a certain level of development to alter the size and physical form of an environmental feature provided that ecological functions including hydrologic and hydrogeological functions are protected and maintained.
- 6.35.5.10 Where a reclassification of a Constraint Level Two Area to another environmental constraint level is being proposed, such reclassification shall be more precisely defined through sub-watershed studies at the district planning stage. Where it can be demonstrated that a Constraint Level Two Area reclassification to a Constraint Level One Area is warranted, an Amendment on Schedule 'A' - Land Use Plan to change the land use designation of the Constraint Level Two Area to 'Open Space' shall be required.
- 6.35.5.11 Where development is being proposed within a Constraint Level One Area, enhancement to ecological functions shall be encouraged by Council.
- 6.35.5.12 Where development is proposed within a Constraint Level Two Area, Council may wish to consider exercising powers specified in Section 2.3.6 of this Plan

to acquire or protect as much as possible, the Constraint Level Two Area to be impacted by the proposed development.

- 6.35.5.13 Where municipal trunk services are being proposed adjacent to or within a Constraint Level Two woodlot or wetland Area, a hydrogeologic analysis shall be required to demonstrate that services will be designed to ensure that the ecological functions of the Constraint Level Two Area will not be negatively impacted upon through disruption of groundwater flows. Development impacts on the size and physical form of the Constraint Level Two Area shall be minimized as much as possible.
- 6.35.5.14 It shall be the policy of this Plan that to maintain water quality and quantity to the water supply aquifer system, any land use proposed on a Constraint Level Two which forms part of the Regional Groundwater Recharge Area shall be limited to forms of development where imperviousness is kept to a minimum, there is limited infiltration of stormwater and the risk of potential contamination to the water supply aquifer system is low.
- 6.35.5.15 Constraint Level Three Areas are defined as "management areas" which integrate land use development with the Watershed environment. Although Constraint Level Three Areas do not serve specialized ecological functions as exhibited in Constraint Level One Areas and Constraint Level Two Areas, they are subject to all the Watershed policies in this Plan using best management practices.
- 6.35.5.16 Where a reclassification of a Constraint Level Three Area to a Constraint Level Two Areas is being proposed, such reclassification shall be more precisely defined through sub-watershed studies at the district planning stage.
- 6.35.6 **Ecological Buffers**
- 6.35.6.1 It shall be the policy of this Plan that all Constraint Level One perennial streams shall be subject to a minimum 30 meter natural, vegetation buffer on each side of the watercourse measured from the top of the banks.
- 6.35.6.2 It shall be the policy of this Plan that all Constraint Level One intermittent stream sections and Constraint Level Two intermittent streams shall be subject to a minimum 15 meter natural vegetation buffer on each side of the defined drainage channel measured from the top of the banks.

- 6.35.6.3 Where a change in the legal use of land is being proposed adjacent to a Constraint Level One Area or Constraint Level Two wooded, wetland and watercourse Area, the applicant shall be required to submit as part of a draft plan of subdivision, or a severance application, an ecological buffers may vary in width and extent and shall be determined on a case by case, site specific basis.
- 6.35.6.4 Where an ecological buffer study is required as set out in 6.35.6.3 above, such study shall:
- 6.35.6.4.1 Be carried out by a qualified professional whose primary expertise is in environmental evaluation;
 - 6.35.6.4.2 Identify and comment upon the size and physical form and ecological functions of all Constraint Level One Areas and Constraint Level Two Areas to be buffered;
 - 6.35.6.4.3 Identify and comment upon all land uses proposed to be located adjacent to Constraint Level One and Constraint Level Two Areas and the development pressures likely to be exerted on those Areas;
 - 6.35.6.4.4 Identify and comment upon proposed actions to protect and maintain the size and physical form and ecological functions of all Constraint Level One Areas;
 - 6.35.6.4.5 Identify and comment upon proposed actions to protect and maintain the ecological functions of affected Constraint Level Two Areas as well as actions to minimize as much as possible the impacts of the size and physical form of affected Constraint Level Two Areas;
 - 6.35.6.4.6 Determine actual Buffer widths that would meet 6.35.6.4.4 and 6.35.6.4.5 above, and identify the methodology used to determine the actual buffer widths;
 - 6.35.6.4.7 Propose land ownership for all the buffer areas;
 - 6.35.6.4.8 Identify and comment on land uses that could exist within all the buffer areas without creating a negative impact on the ecological functions of the Environmental Constraint Areas to be buffered; and
 - 6.35.6.4.9 Propose procedures for monitoring the effectiveness of all buffer areas.

6.35.6.5 To ensure that environmental features are adequately protected from potential negative impacts of development, it shall be the policy of this Plan that:

6.35.6.5.1 All ecological buffers for Constraint Level One Areas and intermittent watercourses shall be included in the 'Open Space' designation on Schedule 'A' - Land Use Plan; and

6.35.6.5.2 Where more than one ecological buffer exists within any specific area, the buffer having the greatest width shall apply.

6.35.6.6 The City of Waterloo may evaluate ecological buffer studies utilizing its own resources or it may retain outside expertise for advice. The City may also from time to time request the assistance of the Regional Ecological and Environmental Advisory Committee on ecological buffer studies that pertain specifically to Environmentally Sensitive Policy Areas.

6.35.7 Watershed Performance Criteria and Measures

6.35.7.1 It shall be the policy of this Plan that to enable Environmental Constraint Areas to be preserved, conserved and/or managed in the process of land use change, Watershed Level Two and Constraint Level Three Areas in consultation with the Grand River Conservation Authority, the Regional Municipality of Waterloo, the Ministry of Natural Resources and any other public agency having jurisdiction. These Watershed performance criteria shall be determined in sub-watershed studies and incorporated during the preparation of new district plans. Performance criteria shall be defined under the following categories:

6.35.7.1.1 Floodplains and Watercourses

6.35.7.1.2 Erosion and Sedimentation

6.35.7.1.3 Stormwater Management

6.35.7.1.4 Recharge Areas and Groundwater Resources

6.35.7.1.5 Natural Areas

6.35.7.2 To implement the Watershed performance criteria, corresponding performance measures will be established in consultation with the Grand River Conservation Authority, the Regional Municipality of Waterloo, the Ministry of Natural Resources and any other public agency having jurisdiction, and shall be determined in sub-watershed studies and incorporated during the preparation of new district plans. The applicant shall be responsible for demonstrating to the satisfaction of the City of Waterloo, that the design and

construction solutions for the proposed development can reasonably meet the performance measures.

6.35.8 **Watershed Monitoring and Review**

6.35.8.1 Monitoring and assessment of performance criteria, measures and mitigation procedures will be established by the City of Waterloo in consultation with the Grand River Conservation Authority, the Regional Municipality of Waterloo, the Ministry of Natural Resources, and any other public agency having jurisdiction. Monitoring and assessment shall address such things as hydrology, water quality, habitat conditions and constraint level area conditions. These shall be established in sub-watershed studies and implemented through corresponding district plans and other applicable municipal documents.

ITEM 5: The City of Waterloo Official Plan is hereby modified by adding the following Section 6.36 and is hereby approved:

6.36 In addition to other applicable policies presented in this Plan, the following policies shall apply to all lands identified as Special Policy Area 36 (North-West Corner):

6.36.1 All policies pertaining to Special Policy Area 35 shall pertain to that portion of land within Special Policy Area 36 as illustrated on Schedule 'A' - Land Use Plan in addition to the following:

6.36.1.1 This area is recognized as an environmentally sensitive landscape where evaluation of cumulative ecological impacts of urban use on Environmentally Sensitive Policy Area 10, 17, 19 and 76 is required prior to the approval of a district plan for an urban purpose for any of the lands within Special Policy Area 36;

6.36.1.2 The evaluation of the environmentally sensitive landscape study, as set out in 6.36.1.1 above shall assess the wildlife habitats, ecological functions and inter-relationships within and among the Environmentally Sensitive Policy Areas, 10,17,19,76.

6.36.1.2.1 This study will determine environmental target or special restrictions on any urban use which are found to be necessary in order to sustain the environmental features and inter-relationships of Environmentally Sensitive Policy Area 10,17,19 and 76; and

6.36.1.2.2. The Regional Ecological and Environmental Advisory Committee in consultation with the City of Waterloo and other appropriate public agencies; will establish the terms of reference for this study and shall review it prior to final approval of such terms of reference by Regional Council.

APPENDIX C

**City of Vaughan Official Plan Amendment 400
Environmental Management Plan**

City of Vaughan
Official Plan Amendment 400
Environmental Management Plan

Ground Water Resources

GOALS AND OBJECTIVES

Goal:

- To maintain and enhance, the flow of ground water to streams and preserve the quality of ground water systems for future generations.

Objectives:

- To identify and protect hydrogeologically sensitive areas in planning for new development and redevelopment in order to:
 - i) maintain and enhance ground water recharge to protect streamflow and aquatic habitat;
 - ii) protect against ground water contamination resulting from private sewage disposal systems;
 - iii) protect against ground water contamination resulting from industrial, commercial and other land use activities.
- To identify potentially contaminated industrial and commercial sites both existing and those no longer in use, including illegal sites, in cooperation with the Ministry of the Environment and Energy.

POLICIES

The City recognizes the need to protect hydrogeologically sensitive areas in planning and designing for new development and redevelopment.

The City shall require:

- a) That ground water resources management be addressed in the Neighbourhood Planning process. That a ground water management resources plan establish Best Management Practices (BMPs) for the each Neighbourhood Plan in order to protect ground water resources and aquatic habitat, as described below in Section 1.4.1
- b) That ground water infiltration rates be maintained at the pre-development levels or enhanced where possible and desired.
- c) That ground water flow routes not be impaired.
- d) That no new development be located in a ground water discharge zone. These were generally defined in the Environmental Background Study as the valley corridors in Vaughan, however, other areas may be determined to be discharge zones following more site-specific study.
- e) That developments which require substantial below-ground excavation, i.e. excavation greater than 4 m in depth, not be located in areas where there is a high potential for ground water interference and dewatering, unless the City in consultation with the Ministry of the Environment and Energy approves a mitigation plan.
- f) That industrial or commercial developments be sited away from recharge areas because of their potential to use toxic chemicals. High recharge or infiltration areas are generally areas of granular soil, predominantly sands and gravels, which in areas of downward hydraulic gradients will have a relatively high potential for contaminant movement downward into the ground water system.
- g) That prior to the approval of any rezoning application for industrial/commercial uses, an on-site spills contaminant strategy shall be prepared for the subject property to the satisfaction of the City and the Ministry of the Environment and Energy.
- h) Potentially contaminated sites including industrial and commercial sites in disuse, and landfill sites which have been closed, shall be documented in the ground water resources management plan. This listing shall provide the basis for determining the need for future site analysis to determines the presence of a public health hazard and mitigation required for future use.

Surface Water Resources

GOALS AND OBJECTIVES

Goals:

- To maintain and restore the quality of surface water within the City of Vaughan.
- To preserve and protect the water quality and environmental functions of the headwater streams and watersheds which originate within the City of Vaughan and to ensure that no further degradation occurs prior to reaching downstream municipalities.

Objectives:

- To require the use of Best Management Practices (BMPs) in newly urbanizing areas to ensure that storm water is treated before being discharged to watercourses.
- To require stringent sediment and erosion controls be established around all construction sites to reduce the potential for sediment and erosion controls be established around all construction sites to reduce the potential for sediment and other contaminants to enter nearby streams.
- To require these same sediment and erosion controls be established prior to any road construction or alterations which may affect a watercourse.
- To consider opportunities to improve water quality in the rural and agricultural areas of the City through altering of land use practices.
- To support the Vision of the Don Watershed Task Force for improving water quality in the Don River.
- To require spill management design be incorporated in all industrial and commercial properties where toxic chemical may be used.

POLICIES

- a) Existing Land Uses
- i) The City recognizes its role in water quality improvement within the Greater Toronto Area and shall support watershed studies involving other municipalities

and government agencies. For subwatershed studies being conducted pursuant to applications for development in Vaughan, the City will undertake to consult with municipalities which may be impacted by such development, in keeping with the principles of ecosystem planning.

- ii) The City shall evaluate aspects of its operations and maintenance procedures, which may contribute to water quality impairment including grass-cutting, road maintenance, etc.
- iii) The City shall require the restoration and revegetation of areas bordering streams and watercourses for new development.
- iv) The City shall consider the use of salt alternatives in areas where surface water may be more sensitive such as the Oak Ridges Moraine in the northeastern portion of the municipality as well as other recharge areas identified in Figure 8 of the Environmental Background Study.

b) Storm Water Management

- i) The City shall require storm water quality and quantity control for all proposed developments in accordance with the MOEE/MNR Interim Storm water Quality Control Guidelines.
- ii) The City shall require a Storm water Quality and Quantity Control Plan to be an integral part of the Neighbourhood Secondary Planning process for Urban Villages 1 and 2 and the Woodbridge Expansion Area. With regard to surface water protection, a range of Best Management Practices shall be considered in a storm water plan.

Examples of the types of BMPs include the following:

- * wet ponds;
- * creation of storm water wetlands;
- * multiple pond systems;
- * infiltration trenches or basins;
- * grassed or vegetated swales;
- * filter strips; and
- * oil/grit separators.

- iii) The City shall require that storm water be treated as close to the storm as possible. Accordingly:

- * roof leaders shall not be directly connected to the storm sewer system except under special circumstances where BMPs may not be possible.
- iv) The selection of storm water management techniques will be governed by the type of fisheries resource present, the soil conditions and the local ground water conditions. Preliminary and Final design shall be to the satisfaction of the City, the MNR, and the MTRCA.
- * The proposed storm water quality and quantity management method will be developed prior to completion of the Neighbourhood Plan in order to permit proper assessment of development impacts upon environmental features.
 - * The City shall evaluate the use of source controls in parking lots and other large paved surfaces such as oil/grease separators where required.
 - * The City shall require the installation of source controls (such as oil/grease separators or other contingency measures) on all industrial sites which may have the potential of contributing contaminants to the sewer system or to a watercourse via overland flow. It shall be the responsibility of the owner to maintain such facilities in proper working order.

c) Construction Activities

- i) The City shall require that all proposed development lands have sediment control barriers in place to the satisfaction of the City and the MNR and MTRCA before topsoil removal and grading of the site begin. This policy may be implemented through a by-law pursuant to the Soil Preservation Act.
- ii) The City shall require that proponents design and undertake a monitoring program for construction sites to ensure the sediment control measures remain effective throughout the entire construction period and subsequent landscaping. This monitoring shall be conducted by a qualified professional capable of assessing water quality impacts and it shall be the responsibility of this person or firm to inform the City of problems and recommend remedial measures.

FISHERIES AND AQUATIC HABITAT RESOURCES

GOALS AND OBJECTIVES

Goals:

- To maintain high quality aquatic habitat, and to enhance or restore degraded aquatic habitat as opportunities provide.

Objectives:

- To minimize erosion and sedimentation of waterways.
- To prevent the accelerated enrichment of streams and contamination of waterways from runoff containing nutrients, pathogenic organisms, organic substances, and heavy metals and toxic substances.
- To maintain or restore a natural vegetative canopy along streams where opportunity exists to ensure that mid-summer stream temperatures do not exceed tolerance limits of desirable aquatic organisms.
- To maintain or enhance baseflow in streams.

POLICIES

- a) Any development or change in land use near or adjacent to an existing or potential fish habitat area shall be reviewed by the Ministry of Natural Resources and the City with respect to its potential impact. Any proposal will be subject to a evaluation to determine if it will result in a reduction of the environmental functions, attributes, or linkages of the stream which could impair aquatic health.
- b) Where is had been developed by the Ministry of Natural Resources and the City that any development or change in the legal use of land will affect the natural functions of any fish habitat, the proponent shall be required to follow the interim process for authorization of fish habitat alteration administered by the Ministry on behalf of the Federal Department of Fisheries and Oceans.
- c) The hierarchy of preferences used by the Ministry of natural Resources to achieve no net loss of fish habitat is:
 - i) maintain fish habitat without disruption of the natural productive capacity;
 - ii) mitigate to alleviate potential adverse impacts; and
 - iii) Compensation if habitat alterations cannot be avoided or mitigated, but only if alteration is approved by the Ministry.

- d) As part of the Environmental Impact Study (EIS) prepared prior to the Neighbourhood Plan the City may require that the proponent include the following with regard to fisheries and aquatic habitat.
- i) a description of the project;
 - ii) alternative ways of undertaking the project and the potential impacts associated with the various alternatives;
 - iii) proposed mitigation measures to alleviate potential negative impacts; and
 - iv) opportunities to compensate for loss of habitat if there will be a loss that cannot be avoided or mitigated.
- e) Where it is determined by the Ministry of Natural Resources that any development or change in the legal use of land will cause a harmful alteration or loss of habitat which is unavoidable and unmitigable and that compensation is not possible, the Ministry on behalf of the Federal Department of Fisheries and Oceans may prohibit the development or land use change.
- f) Where compensation is permitted for loss of habitat, the proponent shall be required to negotiate compensation conditions with the Ministry of Natural Resources and the Federal Department of Fisheries and Oceans. Compensation should reflect management interests of the MNR for the watershed in question.
- g) The City recognizes that water resources and water related features such as stream corridors, headwater areas, wetlands, ground water recharge and discharge areas and ground water aquifers, which are not specifically identified as fishery resource areas, are significant natural resources that provide a specific function in the provision and maintenance of healthy fish habitats, and should be protected from the impacts of development through the use of necessary mitigative techniques or prohibition of development.
- h) Baseflows shall be maintained in all streams which currently have year-round flow. The use of the term "maintained" shall mean that baseflows shall be within 15% of normal seasonal fluctuations; and
- i) Current baseflows should be determined by the Conservation Authority during summer periods.
 - j) Storm water treatment facilities shall not create elevated stream temperatures through discharge of treated water. This shall require that water quality ponds provide some ability to cool water prior to release into the stream.

WETLAND PROTECTION

GOALS AND OBJECTIVES

Goal:

- To ensure no loss of important wetland functions or wetlands within classified or unclassified wetlands within the City of Vaughan.

Objectives:

- To minimize disturbance to wetlands, preserving or enhancing the habitat they provide.
- To support the Province of Ontario's Wetlands Policy Statement and provincial initiatives regarding wetland management.
- To provide buffers to wetlands to maintain or enhance their functions.

POLICIES

1. For the classified wetlands identified in Schedule A, development applications adjacent to these areas must satisfy the Provincial Wetlands Policy Statement with respect to:
 - 1a) completion of an Environmental Impact Study (EIS) which must demonstrate that:
 - i) there will no loss of wetland functions;
 - ii) subsequent demand for development will not cause increased pressure on the resource in the future;
 - iii) there will be no affect on existing site-specific wetland management practices; and
 - iv) there will be no loss of contiguous wetland area.
2. For the unclassified wetlands, proponents will be required to consult with the MNR to determine whether a wetland evaluation is necessary.
 - 2a) if the unclassified wetland should be assessed as Class 1 through 3, then the requirement of an EIS as per policy 1 will apply.

- 2b) if the unclassified wetland is considered classed 4 through 7, then the proponent shall demonstrate that development will not impair important wetland functions (e.g., ground water recharge/discharge, habitat); and
 - 2c) if a wetland evaluation is not considered necessary by the MNR, the City still regards these as areas of local significance and will require the protection of important local functions.
- 3. Private landowners within Vaughan will be encouraged to protect unclassified wetlands not identified in Schedule A in order to ensure their continued environmental function.
 - 4. Landowners will be encouraged to create wetlands where appropriate, which will contribute to general ecological functions in the landscape.

TERRESTRIAL RESOURCES PROTECTION

GOALS AND OBJECTIVES

Goal:

- To protect, restore, and enhance the important terrestrial functions within the City of Vaughan.

Objectives:

- To maintain and enhance the terrestrial resources (functions, attributes, and linkages) present in the landscape.
- To maintain and enhance the biological diversity as it relates to indigenous flora and fauna.
- to ensure that the subsequent management of terrestrial resources perpetuates their health.

POLICIES

The policies have been organized under the following heading; Identification, Protection, Management and Rehabilitation.

a) Identification

- The City has completed a functional assessment of terrestrial resources (principally forests) within Urban Villages 1 and 2 and the Woodbridge Expansion Area. These areas are depicted as High, Moderate or Minor depending on the degree of environmental function being performed. These areas are depicted on Schedule 2A. Subsequent efforts should confirm these boundaries at a more site-specific level. In areas where these boundaries have not been identified, they should be determined using similar functional assessment methods.

b) Protection

- The City shall require protection of terrestrial areas of Moderate or High environmental function (as determined through the functional assessment described above). Protection addresses the maintenance of existing functions, attributes and linkages. This will mean the prohibition of development from within these predominantly woodlot areas. Potential effects on environmental functions within wooded areas will also require an understanding of relationships performed by adjacent naturally vegetated lands (i.e., the contribution of adjacent natural areas to the importance of a High or Moderate area). Similarly, the assessment will benefit from an understanding of how the specific natural area fits within a broader context (e.g. subwatershed).
- Potential effects on terrestrial resource functions may occur from a variety of impacts (e.g., construction activities, post-construction management activities). An assessment of effects must address both direct and cumulative effects. The cumulative effects assessment must address but not necessarily be limited to:
 - i) indirect effects;
 - ii) bio-magnification effects (e.g. contaminant concentration in organisms);
and
 - iii) threshold effects.

For development adjacent to areas of High or Moderate environmental function, a mitigation strategy report will be required. This is described further under the heading Study Requirements.

- For those terrestrial systems which have been designated as being of Minor environmental function, the City shall consider development suitability in or near these areas on a case-by-case basis. The appropriateness of development will be demonstrated by the completion and acceptance of an Environmental Impact Study (EIS), which is described further under the heading Study Requirements.

- The City shall also consider the potential of such areas in terms of the value to the community which their preservation may provide (e.g., aesthetic value, educational benefits).
- Within designated Woodland EPAs, the following uses may be permitted:
 - i) passive recreational use;
 - ii) appropriate timber management (i.e., determined in consultation with the OMNR); and/or
 - iii) educational activities.
- Where terrestrial resources remain in private ownership, the City will require some means of access to these areas for the purposes of verifying maintenance of environmental function.
- In all situations (High, Moderate, Minor environmental function), the need for buffers as a tool for resource protection should be assessed. The extent of the buffer shall be confirmed through site-specific investigation and discussions with appropriate agencies.
- While EISs are expected to focus on technical matters, the City should continue to consider the human values associated with terrestrial resources (e.g., both productive and passive).
- The City supports the Regional Municipality of York's Tree By-law and shall utilize its provisions to facilitate achievement of City's terrestrial resource policies.
- c) Management
 - All retained and protected terrestrial resources will be managed in a manner that will maintain or enhance existing functions, attributes and linkages.
 - Management will be undertaken as outlined in relevant sections subsequent "Study Requirements" discussions.
 - All environmental studies undertaken for an assessment of terrestrial resources should be managed and/or coordinated by the City.
 - The City will work with other agencies (i.e., OMNR and MTRCA) to increase awareness regarding the importance of terrestrial ecosystems to the environment. In this regard, the City will identify and prioritize educational opportunities within

both urban and rural situations. These opportunities in an urban context should be located within Greenway Corridors.

- The City shall in cooperation with other agencies, promote the importance of terrestrial resources to schools and community groups. Appropriate means (e.g., tree planting, preparation and distribution of information with municipal billings) should be identified and used where appropriate.

d) Rehabilitation

- The City encourages the rehabilitation of displaced or degraded terrestrial ecosystems. In this regard they will work with the OMNR in achieving their goals of restoring and replacing natural ecosystems.
- The City, as a condition of development approval, shall require the subject landowner to undertake the necessary measures to protect the environmental health and functions. The City may also require certain measures be undertaken to enhance environmental functions.
- The City will identify primary terrain and biological areas for rehabilitation. Terrain rehabilitation areas include valley wall slopes that are sensitive to erosion (i.e., non-vegetated). As well, areas identified as discharge zones (Schedule _____) will benefit from rehabilitation to optimize the quality of surface water provided.
- Primary biological rehabilitation areas are principally those valleylands where vegetation gaps limit the movement of wildlife through the system and where gaps negatively affect the aquatic resources present. A few primary tableland opportunities exist where successional fields can be rehabilitated or advanced to close the forest canopy between important, High and Moderately functioning areas. Similarly, coniferous plantations can be considered for rehabilitation to indigenous forest cover, where appropriate.
- Terrestrial resources within designated EPAs which have been damaged by nature or human activities shall receive high priority for rehabilitation.
- The City shall encourage proponents to plant native tree species in subdivisions. Further, the City shall encourage a diversity of tree species be planted such that no more than 20% of a subdivision be comprised of any one species. Similarly, the City shall implement native species requirements on City property. Wherever possible, those planting will be created as units of habitat rather than as scattered individual stems.

- The City encourages and supports the work of the Don Watershed Task Force in rehabilitating and regenerating the Don River.

ENVIRONMENTALLY SIGNIFICANT AREAS (ESAs) AND AREAS OF NATURAL AND SCIENTIFIC INTEREST (ANSIs)

GOALS AND OBJECTIVES

Goals:

- To provide for the protection and enhancement of Environmentally Significant Areas (ESAs) and Areas of Natural and Scientific Interest (ANSIs) which have been identified by the MTRCA and the MTR.

Objectives:

- To maintain and enhance the ecological functions of ESAs and ANSIs including:
 - ground water recharge; infiltration and discharge functions;
 - hydrological function;
 - biology diversity function; and
 - habitat function.
- To maintain or enhance the linkages between ESAs, and ANSIs and other natural areas including terrestrial features, wetlands and valley stream corridors.

POLICIES

- a) The City recognizes EPAs and ANSIs as an important part of the City's natural heritage system.
- b) The City requires that development applications in rural areas of Vaughan within or in close proximity to an ESA and ANSI shall be accompanied by an environmental impact study (EIS) of the impact the development will have or is expected to have on the environmental functions, or attributes of the ESA or ANSI and shall provide details of any mitigative measures that will ensure the ESA or ANSI will not be adversely impacted.

VALLEY AND STREAM CORRIDORS

GOALS AND OBJECTIVES

Goals:

- To maintain the ecological health and integrity of valley and stream corridors by identifying and conserving these areas from the headwater streams to the river's mouth.
- To provide for the integration of valley and stream corridor systems into the community public greenway system and provide for public access and recreational opportunity without impairing ecological function.

Objectives:

- To protect upstream and downstream public and private lands from direct and substantial flood damage.
- To reduce risks to the residents of Vaughan and downstream municipalities from threats to health and safety or from economic loss due to flooding.
- To preserve valley corridors and the streams contained within them in a natural state by maintaining, and where needed, enhance riparian cover for fish and wildlife habitat.
- To maintain or create greenway corridors along river and stream valleys.

POLICIES

- a) New urban development shall not be permitted within valley and stream corridors. Urban development includes: buildings, structures and associated private servicing such as at-grade parking facilities and septic systems.
- b) "Valleylands and Stream Corridors" shall be identified and designated to facilitate the achievement of the goals for valleylands. The Valleylands are shown on Map _ in Appendix A. Areas indicated as "Valleylands and Stream Corridors" may be modified in consultation with appropriate public agencies without amendment to this plan. Both major and minor valleys are recognized as significant to the health and diversity of the watershed system. Valleylands are defined to include all lands located in a valley, and shall generally extend a minimum of 10 m inland from the

crest of a stable valley wall. The associated 10 m buffer may be extended to include significant ecological areas. A stable valley wall is defined by the MTRCA as a 2H:1V stable slope line from the base of the valley wall slope trend intersection with the adjacent valley stream channel invert.

- c) Generally only those recreational activities which take place outdoors shall be deemed compatible with the natural character of the valleys. Those public works considered to be essential for location in the valleys are those associated with flood control, drainage and sewerage systems and those which because of their linear nature must traverse the valleys at some point. Note: where such structures are necessary, they must be properly sited and constructed with state-of-the-art erosion and sediment control measures to minimize environmental impacts.
- d) Uses such as golf courses, and activities requiring the use of motorized vehicles or equipment shall only be permitted in valleylands where it is demonstrated that such uses will not impair the environmental functions, attributes and linkages being performed by the valley and stream corridor: In general, the following issues must be considered in any golf course application:
- continued viability of woodlots
 - surface and ground water quality and quantity
 - existing watercourses and topography
 - fish and wildlife habitat
 - ESAs and ANSIs
 - wetlands
- e) The placement of structures on hazard lands (as defined by the MTRCA) is prohibited, and in considering development proposals for lands adjacent to the valley, regard must be had for the conservation of the natural environment. Any proposal affecting these lands is subject to the Fill and Construction Regulations of the MTRCA.
- f) Normally required minimum setbacks or such setbacks as are determined by detailed site study shall be measured from the crest of the valley slope as defined prior to development.
- g) The City shall not accept lands below the crest of the slope of the river valleys or the 10 m buffer areas adjacent to the top-of-bank for the purpose of satisfying parks dedication requirements imposed under the Planning Act. Valley and stream corridors and associated buffers shall not be included in the City's parkland

calculations unless such areas have been utilized for associated servicing infrastructure.

- h) Except where otherwise may be specified in the Official Plan, where any such lands have been designated as Open Space and form a portion of a property to which the density of development must be related, such as defined in the implementing zoning by-law shall be excluded from the land area for such density calculations. Where the 10 m buffer area adjacent to the top-of-bank is dedicated to the City, such area may be used in the calculation of density.
- i) The City, in consultation with the MTRCA, may impose setbacks for underground from stable or unstable valley slopes so as to maintain the stability of the valley slope and/or protect unstable slopes from slumping or erosion.
- j) The City shall support the ongoing efforts by the MTRCA (such as the Authority's Valley and Stream Corridor Management Plan) and the MNR, to protect valleyland areas, and shall work cooperatively with these agencies to successfully achieve the goals of this plan.
- k) The City shall prohibit direct storm sewer discharge into defined and illdefined valley systems within Vaughan.
- l) Minor Watercourses.

It is recognized that some modifications to minor watercourses may occur at the time of proposed development. Alterations to stream corridors and/or watercourses to accommodate new urban development shall not be permitted unless otherwise approved through completion of a Neighbourhood Plan as described elsewhere in this document. Where such alterations are proposed, they will be discussed in consultation with the Ministry of Natural Resources and the Metropolitan Toronto and Region Conservation Authority. As a general rule, a proposal for alteration must address the following:

- a) potential impacts associated with flooding and erosion;
- b) potential on-site impacts including those related to construction and longterm maintenance;
- c) use of techniques which will contribute to the rehabilitation of the watercourse, riparian vegetation, and other corridor areas;
- d) use of natural channel design which addresses the maintenance of channel length; the preservation of a stream corridor consistent with the size of the stream flowing through it and the natural meander belt; incorporation of a natural meander wave length; use of a range of particle sizes in the bed material; and establishment or the provision for the formation of pools and riffles at appropriate intervals; and

- e) an assessment of how the alteration may affect any fish or fish habitat on-site or downstream and the methods of compensation. The assessment shall include recommendations on how any impacts may be mitigated or compensated for.

FLOODING AND HYDROLOGY

GOALS AND OBJECTIVES

Goals:

- To minimize the threat to life and the destruction of property and natural resources from flooding, and to preserve natural floodplain hydrologic functions.
- To maintain or re-establish the natural hydrologic cycle of evaporation, transpiration, infiltration and runoff as a means to maintain the pre-development stream hydrograph and protect or enhance biological systems including aquatic habitat.

Objectives

- To ensure that runoff from developing and urbanizing areas is controlled such that it does not unnecessarily increase the frequency and intensity of flooding at the risk of threatening life and property.
- To adopt appropriate land use controls and performance standards for controlling development of flood plains.
- To ensure that best management practices serve to protect and enhance water quality, to moderate increases to stream temperature and provide low flow control to protect or enhance biological systems including aquatic habitat.

POLICIES

1. Master Environmental Servicing Plans which satisfy the requirements of the City and the Metropolitan Toronto and Region Conservation Authority and the Ministry of Natural Resources shall be submitted and approved prior to final approval of Neighbourhood Plans.

The Master Environmental Servicing Plan (MESP) shall be prepared on the basis of subcatchment areas to be determined by the City in consultation with the MTRCA. The detailed requirements of the MESP are provided below.

2. All Master Environmental Servicing Plans must assume post development storm water quantity control to pre-development levels for the 2 through 100 year storm events and storm events and storm water quality control in accordance with the current Ministry of Natural Resources/Ministry of the Environment and Energy Storm water Control Guidelines.

Should a subsequent MTRCA approved watershed hydrology study indicate that no alternative runoff control requirement is appropriate, alternative criteria may be established by the City and the MTRCA.

3. The Master Environmental Servicing Plan must:
 - a) show how the existing drainage patterns are being maintained;
 - b) utilize hydrogeologic and soils information to determine where and what type facilities would be most appropriate;
 - c) minimize the number of storm facilities;
 - d) show how the best management practices serve to protect and enhance where possible, aquatic habitat and address low flow management;
 - e) show how storm water facilities can be incorporated as an amenity enhancing the Neighbourhood Plan; and
 - f) show how storm water facilities can be incorporated into the Greenway System where appropriate.
4. The City shall not accept storm water management facilities as part of the parkland dedication under the Planning Act. At the discretion of the City, minor exceptions may be made should the storm water facility be designed and incorporated as a substantial addition to the park environment.

LANDFORM CONSERVATION

GOALS AND OBJECTIVES

Goal:

- To maintain the landscape character, vistas and panoramic views in providing for new development and redevelopment opportunity.

Objectives:

- To maintain continuous and distinctive landform features.
- To maintain significant scenic vistas and panoramic views for the community and the general public in development areas.
- To minimize topographic change.
- To minimize disturbance to steep slopes.
- To provide flexible standards for subdivisions and services to promote effective landscape preservation.

POLICIES

In areas of the Oak Ridges Moraine designated as having significant landform character:

- a) Landform conservation planning shall be undertaken to the satisfaction of the City and the Ministry of Natural Resources. Landform conservation planning shall demonstrate that the landform character of the site will be maintained or enhanced.
- b) Neighbourhood Plans must demonstrate approaches to land use planning, siting and design which will be compatible with existing landform character and the existing settlement landscape.

The specific planning, siting design, grading construction, restoration and construction practices that will be employed to ensure the protection or enhancement of the landform character of the site shall be provided to the satisfaction of the City and the Ministry of Natural Resources.

- c) Cluster development may be required to protect landform features and associated natural areas.
- d) Zoning by-laws will provide flexible design standards for subdivision design and building setback requirements in order to preserve landscape character.
- e) The City may provide bonusing incentives for innovative design which minimize visual impact and maintains on-site open space features. The ultimate use and ownership of the landform features and associated natural areas to be protected

shall be established to the satisfaction of the City in the development review process.

- f) Road design with orientation parallel to existing contours shall be encouraged. Road design standards may provide greater flexibility for alternative design.

APPENDIX D

Excerpts from the Draft Official Plan of the Township of Kingston, Ontario

EXCERPTS FROM THE DRAFT OFFICIAL PLAN OF THE TOWNSHIP OF KINGSTON, ONTARIO

3.1 Watershed Planning

It is an objective of this Plan to recognize and support the principles, aims and contributions of watershed planning and the need to integrate watershed and land use planning. The principles and aims of watershed planning include:

- the recognition of, preservation and enhancement of the natural environment to maintain ecological integrity;
- recognition of and commitment to the management and protection of the quality of surface and ground water and related resources;
- a commitment to integrated and co-ordinate resource management;
- the maintenance of natural watercourses in a naturally functioning state and as undisturbed as possible;
- the control of discharges to surface water and ground water;
- the enhancement of water conservation practices;
- the establishment and monitoring of water quality and quantity targets;
- the identification and protection of significant hydrogeological areas; and
- the restriction of incompatible land uses within environmentally significant and sensitive areas.

These principles have been followed in the preparation of this Plan and shall be given due consideration in the assessment of amendments to the Plan. In addition, relevant recommendations of watershed management plans approved subsequent to the approval of this Plan will be incorporated by amendment into this Official Plan.

3. Watershed Planning

The Township shall ensure the preservation and enhancement of a healthy natural environment. To this end:

- the need to prepare a subwatershed plan for any given area should be determined in consultation with the Cataraqui Region Conservation Authority, the Ministry of Environment and Energy, and the Ministry of Natural Resources;
- the terms of reference for a subwatershed plan shall be determined in consultation with the Cataraqui Region Conservation Authority, the Ministry of Environment and Energy, and the Ministry of Natural Resources, prior to the preparation of the plan;
- an appropriate public consultation process will occur; and
- subwatershed plans for undeveloped areas should have regard to the portion of the affected watershed that has already been developed or committed for development.

3.1 Collins Watershed Plan

A watershed plan has been prepared for the Collins Creek watershed by the Cataraqui Region Conservation Authority in consultation with a number of agencies. Land use planning decisions shall be carried out in accordance with the recommendations of this watershed management plan, as listed below:

- require general minimum lot water frontage of 66 metres (216.5 feet) and a minimum setback with protective vegetated unmowed buffers for fish habitat of 15 metres (50 feet) from the banks of streams and 30 metres (98 feet) from the banks of lakes. (Agricultural uses would be permitted and streambank protection and rehabilitation should be undertaken on a voluntary basis by landowners.);
- recommend that best management measures and targets for new development be followed;
- recommend that further studies be undertaken to identify significant woodlands and corridors and that, following the completion of these studies, the identified areas be designated; and
- state that fully serviced new development in the urban area will be encouraged.

APPENDIX E

**General Land Use Policies
for Resource Lands in the Maitland Valley Watershed**

GENERAL LAND USE POLICIES FOR RESOURCE LANDS IN THE MAITLAND VALLEY WATERSHED

The Maitland Valley Conservation Authority will recommend that all permanently flowing watercourses, stream corridors, river valleys, headwaters areas, wetland areas, upland forests, and Lake Huron Shoreline be designated as natural environment areas. The Authority will also recommend the designation of any flood plain that is not cleared for agriculture as natural environment and that recharge areas be designated for compatible development type uses (agriculture if there is a high capability or as upland if present), or for open space.

1. WATERCOURSES

DEFINITION

A watercourse is a creek, stream, river, or agricultural drain which transports surface water and ground water discharge water. These include permanently and intermittently flowing naturally occurring watercourses that may or may not have been altered as well as permanently and intermittently flowing artificial watercourses.

VALUE AND FUNCTION

Watercourses play a key role in the hydrologic system by transporting surface runoff and ground water discharge as well as providing habitat for various flora and fauna species living in the aquatic ecosystem. The physical and biological characteristics of the watercourse must be maintained so as to not disrupt the habitat and therefore potentially harm the aquatic ecosystem. For these reasons the Authority recommends that the following policies be incorporated into municipal planning documents.

POLICY

i) Land Use Policy

All permanently flowing and natural intermittent watercourses should be placed in a natural preservation designation so that the landowners are aware of the importance of these areas. Watercourses should be maintained and protected from uses that would destroy or degrade them. Intermittent artificial agriculture open drains should be shown on the land use schedule but could be designated as part of the agriculture land use designation rather than natural environment.

ii) Development Policy

NEW DEVELOPMENT: Only those building and structures associated with the conservation of the natural environment should be permitted ie. habitat improvement structures and erosion control structures as well as essential public and private services which by necessity must be located in these types of areas ie. bridges and roads. Appropriate measures should be incorporated into the design and construction of essential and compatible structures to ensure there will be no long term impacts that would destroy or degrade the ecology of the watercourse as well as minimize any short term impacts. New development must not adversely affect upstream and/or downstream properties with respect to loss of life, property damage or social disruption.

EXISTING DEVELOPMENT: No expansion or intensification of a non-compatible or compatible use unless measures are incorporated into the design and construction to ensure that there will be no negative long term impacts on the ecology of the watercourse. Measures must also be taken to minimize any short term impacts. This expansion of development must not have the potential to adversely affect upstream and/or downstream properties with respect to loss of life, property damage or social disruption.

1.1 RIVER VALLEYS/STREAM CORRIDORS

DEFINITION

These areas are the protective zones or buffers located adjacent to watercourses. A river valley is a clearly defined landform whereas a stream corridor is an artificial or arbitrary setback or buffer from the watercourse. An arbitrary setback is only used in cases where the topography is flat and there is no defined valley slope or flood plain.

VALUE AND FUNCTION

River valleys and stream corridors protect the watercourse from surrounding land uses while at the same time protect the surrounding land uses from the watercourse ie. flooding.

These corridors enhance water quality and the aquatic habitat by; filtering out sediment and taking up nutrients from runoff; natural vegetation helps to shade the watercourse which keeps the water cool; and provides food in the form of organic material. River valley and stream corridors also provide habitat and transportation corridors for wildlife.

The vegetation in these corridors must be maintained for the beneficial impacts on the watercourse and to prevent erosion and land slumping. Encroachment must be prevented in order to avoid the hazards of flooding and erosion and the potential for loss of life and property damage. For these reasons the Authority recommends that the following policies be incorporated into municipal planning documents.

POLICY

i) Land Use Policy

NEW USES: All river valley/stream corridor areas should be placed in a natural preservation designation. Buildings and their associated infrastructure should be located outside the river valley or stream corridor to preserve and maintain these areas as natural environment.

EXISTING USES: Non-compatible uses(residential, industrial, commercial, and intensive recreation) having the potential to cause long term degradation to the ecology of the area should also be placed in a natural preservation designation and not permitted to expand or intensify the use.

ii) Development Policy

NEW DEVELOPMENT: Only those buildings and structures associated with passive recreation and the conservation of the natural environment should be permitted ie. habitat improvement structures and erosion control structures as well as essential public and private services which be necessity must be located in these types of areas ie. bridges and roads. Appropriate measures must be incorporated into the design and construction of the development to ensure that there will be no long term adverse impacts on the ecology of the corridor. Measures must also be taken to minimize any short term impacts. Development should not be permitted to adversely affect upstream and/or downstream properties with respect to loss of life, property damage or social disruption.

EXISTING DEVELOPMENT: Non-compatible development should also be placed in a natural preservation designation and only permitted to expand or intensify the development if the applicant can demonstrate that the river valley slope is stable and can support the proposed expansion and that the site is not located within the Regulatory flood line (see Flood Plain Policies). Also, measures must be incorporated into the design and construction of the building or structure to ensure that there will be no long term impacts that would destroy or degrade the ecology of the corridor as well as measures must also be taken to minimize any short term impacts. This expansion of development should not be permitted if it will adversely affect upstream and/or downstream properties with respect to loss of life, property damage or social disruption.

Compatible development could be permitted to expand provided that measures are incorporated into the design and construction of the building or structure to ensure that there will be no long term impacts that would destroy or degrade the ecology of the corridor as well as minimize any short term impacts. This expansion of development should not be

permitted if it will adversely affect upstream and/or downstream landowners in terms of loss of life, property damage or social disruption.

iii) Exception criteria

The following conditions are used to determine if a proposed land use or development change will meet the above land use or development policy. The land use or development can occur if:

- 1) there are no flood plain conflicts
- 2) the area is covered by upland vegetation and there will be no adverse impacts on the ecology of the forest (see exception criteria for Upland Forests)
- 3) a geotechnical report confirms that:
 - a) there will be no increased erosion of the slope due to changes in surface drainage
 - b) the slope is stable at present time
 - c) the added weight of development will not cause slope instability, taking into account the changes in soil moisture from septic systems and/or modified drainage
 - 4) the site is suitable for a sewage system to be installed.
 - 5) there will be no long term impacts on the health of the aquatic ecosystem

4. RECHARGE AREAS

DEFINITION

Recharge areas are the locations where surface water is conducted to an underground aquifer (ground water). Recharge areas can be lakes, ponds, gravelly or sandy soils, and porous rock formations. For the purposes of the Authority's policies, we are only defining those recharge areas that have a high potential for ground water contamination. For example, ground water recharge areas with a high potential for ground water contamination usually have a permeable soil layer that is underlain by a gravelly or sandy deposit which allows rapid infiltration of surface water.

VALUE AND FUNCTION

Recharge areas play a key role in the hydrologic cycle by replenishing ground water and maintaining the level of the water table. They are also responsible for water filtration and removing some impurities as it enters the ground and therefore maintaining ground water quality.

In order to continue the functioning of surface and ground water systems, filter water and minimize the potential for ground water contamination, the Authority recommends that the following policies be incorporated into municipal planning documents.

POLICY

i) Land Use Policy

NEW USES: Recharge areas should be designated as natural preservation, open space, or agriculture. Recharge areas should only be designated for agricultural use if the land has a high capability for agriculture (Class 1-3). Recharge areas may also be designated for estate residential or extractive resource use provided the applicant has a hydrogeological assessment prepared to indicate that ground water and nearby streams will not be polluted or the supply of water diminished due to the proposed use. The report must also indicate that the soils are suitable for the long term treatment of sewage effluent, if the area is to be serviced by septic systems.

EXISTING USES: Non-compatible uses (residential, commercial, industrial) should be designated as natural environment and only permitted to expand or intensify the use if the applicant has a hydrogeological assessment prepared which indicates that ground water and nearby streams will not be polluted or the supply of water diminished by the proposed expansion. The report must also indicate that the soils are suitable for the long term treatment of sewage effluent, if the area is to be serviced by the septic systems.

ii) Development Policy

NEW DEVELOPMENT: Buildings and structures associated with agriculture, parks, estate residential, or extractive resources may be permitted. Precautions must be taken with agricultural practices associated with fertilizer and pesticide use as well as sewage and manure handling systems. These types of structures should be located, designed and constructed to ensure no adverse long term impacts on ground water will occur. Hydrogeology studies should be required for all extractive operations and estate residential developments proposed in potential recharge areas to determine whether the ground water and nearby streams will be polluted or the supply of water diminished. The report must also indicate that the soils are suitable for the long term treatment of sewage effluent, if the area is to be serviced by septic systems.

EXISTING DEVELOPMENT: Non-compatible uses (residential, commercial, industrial) should only be permitted to expand or intensify if the findings of a hydrogeological assessment are that the ground water and nearby streams will not be polluted or the supply of water diminished by the proposed expansion. The report must also indicate that the soils

are suitable for the long term treatment of sewage effluent, if the area is to be serviced by septic systems.

Compatible development may be permitted to expand or intensify provided that the applicant has hydrogeological assessment prepared which indicates that ground water and nearby streams will not be polluted or the supply of water diminished by the proposed expansion. The report must also indicate that the soils are suitable for the long term treatment of sewage effluent, if the area is to be serviced by septic systems.

1.2 UPLAND FORESTS

DEFINITION

Upland forests are the climax vegetation of the watershed and include the dominant forest types of the Northern Hardwood and Maple-Beech communities.

VALUE AND FUNCTION

Forests play a key role in the biological, climatic, soil, and hydrologic environments. They provide a habitat for a diverse flora and fauna; improve local climates; enrich the soil; balance the water regime through transpiration and water retention; reduce erosion, sedimentation, flooding and drought; as well as absorb carbon dioxide and other nutrients and return oxygen to the atmosphere.

In order to maintain the ecological integrity of these habitats and the associated environmental benefits of healthy woodlots, the Authority recommends that the following policies be incorporated into municipal planning documents.

POLICY

i) Land Use Policy

NEW USES: Forests should be placed in a natural preservation designation.

EXISTING USES: Non-compatible uses (residential, commercial, industrial, and intensive recreation) should be designated as natural environment uses provided that the forest is still healthy and regeneration is taking place. Expansion or intensification of non-compatible uses should not be permitted without an assessment of the impact of the proposed use on the long term ecological integrity of the forest.

ii) Development Policy

NEW DEVELOPMENT: Only building and structures related to compatible uses that will not result in the destruction or degradation of the forest ecosystem should be permitted ie. picnic shelters, and maple syrup shack.

EXISTING DEVELOPMENT: Non-compatible development should be designated as natural environment if the forest is still a "healthy" ecosystem. Non-compatible uses should not be permitted to expand or intensify the use without an ecological assessment being prepared. The assessment should indicate that the proposed expansion will not adversely affect the ecological integrity of the forest.

iii) Exception Criteria

Definition of a "healthy" forest: There is tree regeneration occurring and there are no gaps in the age classes of trees. There is the presence of ground cover and smaller herbaceous plants. There should be a diversity of tree and plant species and they should be relatively free of disease and insect infestations. The forest must also be of a large enough size that it will continue to exist. If it is too small, there is often not enough genetic resources left for trees and plants to continue to regenerate.

The following conditions are used to determine if a proposed land use or development change will meet the above land use or development policy and maintain a healthy forest. The land use or development can occur if an ecological forest assessment finds:

- 1) it is not a "healthy" forest.
- 2) that the forest, or sections of the forest, are suitable for the proposed use. The forest is suited if there will not be any adverse impacts on the ecology and long term functioning of the forest from:
 - a) direct clearing or,
 - b) indirect effects of compaction, salt, modified drainage patterns, edge creation and disruption or other contaminants from the proposed development
- 3) if the forest is suited for the development, the report must recommend the area that are suited for the development, and at what density this development should occur to maintain the "health" of the forest.

1.3 FLOOD PLAIN

DEFINITION

The flood plain is the area located adjacent to a watercourse that would be inundated by water from runoff events due to excessive precipitation or snow melt under a Regional Storm flood event. The Regulatory Flood level in the Maitland watershed is the Regional Storm flood event. The Regulatory flood in the Nine Mile River watershed is the 1 in 100 year storm event (1% chance of happening in any given year).

VALUE AND FUNCTION

The flood plain is part of the hydrologic system and serves the role of storing and passing runoff which is beyond the capacity of the watercourse. Flood plains also serve as habitat and transportation corridors for wildlife.

In 1988 the Provincial Government adopted the Provincial Flood Plain Planning Policy Statement which contains general land use and development policies. The intent of the policy is to protect the environment and to ensure that the risk to life and property are minimized.

In order to preserve the ecology of the flood plain and to reduce the potential for loss of life and property damage, the Authority recommends that the following policies be incorporated into municipal planning documents.

POLICY

1.3.1 Rural Applications

i) Land Use Policy

NEW USES: Flood plain lands should be reserved for those uses that would not be damaged by flooding, will not increase the potential for loss of life, flooding, or pollution, upstream or downstream or result in the loss of native flood plain vegetation. These uses include natural environment, open space or agriculture (class 1-3 capability for agriculture)

EXISTING USES: Non-compatible uses should be designated as natural environment or agriculture and should not be permitted to expand or intensify the use unless a flood plain survey indicates that the use; is not in the flood plain; and/or that it will not create any upstream or downstream flooding, pollution problems or increase the potential for loss of life.

Compatible uses may be permitted to expand or intensify the use provided a flood plain survey indicates that the development will not create any upstream or downstream flooding, pollution problems or increase the potential for loss of life and the structure is floodproofed.

ii) Development Policies

NEW DEVELOPMENT: Permitted structures are those associated with agriculture, the natural environment, and essential municipal utilities such as roads and bridges as well as erosion control and habitat improvement structures, which by necessity must be located in the flood plain. These types of structures should be located, designed, and constructed so as to not increase the potential for upstream or downstream flooding, pollution, affect the conservation of land, be damaged by floodwaters or increase the potential for loss of life.

EXISTING DEVELOPMENT: Non-compatible development should not be permitted to expand or intensify the use unless a flood plain survey indicates that the development will not cause any increase in upstream or downstream flooding, pollution, affect the conservation of land, or increase the potential for loss of life and that the structure can be adequately floodproofed.

Compatible development may be permitted to expand or intensify the use provided a flood plain survey indicates that the development will not cause any increase in upstream or downstream flooding, pollution, affect the conservation of land or increase the potential for loss of life and can be adequately floodproofed.

1.3.2 Urban Applications

i) Land Use Policy

NEW USES: Flood plain lands should be maintained in a natural state and only compatible uses such as natural environment, passive recreation, and essential municipal services should be permitted. Non-compatible uses may be permitted to encroach into the flood fringe areas of the flood plain where the municipality and the Authority have adopted a flood plain planning policy based on the two zone or special policy area concept.(see Fill and Construction Regulation Policies). Only compatible uses may be permitted to locate in the floodway portion of the flood plain.

EXISTING USES: Non-compatible uses (residential, commercial, industrial, and intensive recreation) should not be permitted to expand or intensify their activities. Consideration may be given for expansion if the proposed use will not increase the potential for flooding upstream or downstream flooding, pollution, affect the conservation of land or increase the potential for loss of life and are adequately floodproofed.

Compatible uses may be permitted to expand or intensify as long as they will not increase the potential for flooding upstream or downstream, create pollution, affect the conservation of land or increase the potential for loss of life and are adequately floodproofed.

ii) Development Policy

A) Floodway Lands

NEW DEVELOPMENT: Buildings and structures associated with essential private and municipal services such as roads, bridges, flood/erosion control and habitat improvement structures should be permitted. Such structures should be located, designed, and constructed so as to not increase the potential for increased flooding upstream or downstream on the site, create pollution, or affect the conservation of land and that are adequately floodproofed.

EXISTING DEVELOPMENT: Non-compatible development should not be permitted to expand or intensify the use unless a flood plain survey is undertaken and the results of which indicate that the development is not located in the floodway and/or that it will not increase the potential for flooding upstream or downstream of the site, create pollution, affect the conservation of land or increase the potential for loss of life.

Compatible development may be permitted to expand or intensify the use provided a flood plain survey indicates that the development will not increase the potential for flooding upstream or downstream of the site, create pollution, or affect the conservation of land and are adequately floodproofed.

B) Flood Fringe Lands

NEW DEVELOPMENT: Buildings and structures associated with compatible uses as well as those structures permitted on floodway lands. Residential, recreational, commercial & industrial structures may be permitted provided that they do not increase the potential for flooding upstream or downstream of the site, create pollution, affect the conservation of land or increase the potential for loss of life and that if can be floodproofed (see Fill and Construction Regulation Policies) and erosion control and pollution control measures are incorporated into the design.

EXISTING DEVELOPMENT: Development may be permitted to expand or intensify provided that it is floodproofed (see Fill and Construction Regulation Policies) and it will not increase the potential for flooding upstream or downstream of the site, create pollution, affect the conservation of land increase the potential for loss of life.

1.4. HEADWATER AREAS AND AREAS OF HIGH WATER TABLES

DEFINITION

Headwater areas, discharge areas, or springs, are sites where ground water is flowing out of the ground.

Areas of high water tables are locations where the ground water level is at or within a few feet of the ground surface, but is not considered a wetland. Therefore, they may not be suitable for sewage treatment systems since there is a high potential to contaminate ground water.

VALUE AND FUNCTION

Headwater areas are important components of the hydrologic cycle because they store and transport water to the surface. Headwater areas contribute to the base flow of watercourses. A constant base flow is required to maintain aquatic flora and fauna. Areas with a high water table maintain a water level near the surface providing the appropriate conditions for wetland areas to develop.

In order to maintain healthy aquatic and terrestrial ecosystems the Authority will recommend that the following policies be incorporated into municipal planning documents.

POLICY

i) Land Use Policy

NEW USES: Headwater Areas should be placed in a natural preservation designation.

Areas of high water tables may be designated for agriculture (class 1-4), natural environment, or passive recreation. They may also be designated as estate residential and extractive resources if a hydrogeology report is prepared and it indicates that ground water and nearby stream will not be polluted or the supply of water diminished due to the proposed expansion and the soils are suited for the long term treatment of sewage effluent.

EXISTING USES: Non-compatible development should not be permitted to expand or intensify the existing use without a hydrogeological report being prepared. The results of this report must indicate that ground water and nearby streams will not be polluted or the supply of water diminished due to the proposed expansion.

Compatible development should be permitted to expand or intensify the use provided a hydrogeological report is prepared. The results of this report must indicate that ground water and nearby streams will not be polluted or the supply of water diminished due to the proposed expansion. The report must also indicate that the soils are suitable for the long term treatment of sewage effluent if the area is to be serviced by septic system.

ii) Development Policy

NEW DEVELOPMENT: In headwater areas buildings and structures associated with the natural environment may be permitted as long as they will not disrupt the flow or result in contamination of the ground water or result in any long term negative impacts on the ecology of the area.

In areas of high water tables only buildings and structures associated with compatible uses should be permitted. Buildings and structures for agricultural manure storage facilities, estate residential or extractive resources may be permitted provided that a hydrogeology report is prepared which indicates that ground water and nearby streams will not be polluted or the supply of water diminished due to the proposed development.

EXISTING DEVELOPMENT: Non-compatible buildings and structures should not be permitted to expand or intensify without a hydrogeological study being prepared. This report must indicate that ground water and nearby streams will not be polluted or the supply of water diminished due to the proposed development and that the proposed development will not have any long term negative impacts of the ecology of the area.

Buildings and structures associated with compatible uses may be permitted with appropriate design considerations to maintain the value and function of the area.

1.5 WETLAND AREAS

DEFINITION

Wetlands are seasonally or permanently covered by shallow water. The four types of wetlands in the watershed are swamps, bogs, marshes and fens, with the dominant type being wooded swamps. The presence of water has caused the formation of hydric soils which support water tolerant vegetation and the subsequent formation of organic soils.

VALUE AND FUNCTION

Wetland areas are part of the biotic system and provide habitat for many flora and fauna species and conduct nutrient cycling. They also have a role in the hydrologic system through

evapotranspiration and surface water storage and detention and therefore reduce peak flows and aid in maintaining base flows.

In 1992 the Provincial Government adopted the Provincial Wetlands Policy Statement which contains general land use and development policies. The intent of the policy is to achieve no loss of Provincially Significant Wetlands (class 1-3).

In order to preserve these types of ecosystems, the Authority recommends the following policies be incorporated into municipal planning documents.

POLICY

i) Land Use Policy

NEW USES: Should be placed in natural preservation designation.

EXISTING USES: Non-compatible uses should not be permitted to expand or intensify use.

ii) Development Policy

NEW DEVELOPMENT: Only buildings and structures associated with the natural environment should be permitted. Approval should be based upon the development being designed so that it will not impair the value and function of the wetland. A 100 foot development setback or buffer should also be established around wetland areas. Non-compatible development should not be permitted to encroach into this buffer until an impact assessment report has been prepared by the applicant. Such an assessment must demonstrate that the proposed development will have no long term impact on the ecology of the wetland.

EXISTING DEVELOPMENT: Non-compatible buildings or structures should not be permitted to expand in wetland areas. An impact assessment should be required prior to allowing any expansion of non-compatible development located within the 100 foot buffer.

Buildings and structures associated with compatible uses will be permitted provided that the ecology of the wetland will not be adversely affected over the long term.

APPENDIX F

Legislation and Policies Applicable to Subwatershed Planning

Legislation and Policies Applicable to Subwatershed Planning

In the past, watershed management policies were directed primarily at the prevention of flooding and erosion control. Recently, attention has begun to shift towards other environmental resources of the Subwatershed including water quality, fisheries, wildlife, wetlands and woodlands. This attention has resulted in the development of policies for the protection of fisheries, wetlands, stream buffers and other environmental resources. Environmental studies like the NCR Subwatershed Plan have been carried out to assess existing environmental as well as water related conditions, investigate the impact of sub/watershed development and other land-use activities and develop policy for the protection of natural resources.

Many policies already exist for the protection of water and environmental resources. Others like those found in the new Planning Act (1995) are being developed on an ongoing basis. It should be noted that most of the existing policies and procedures developed under the old Planning Act (1983) have remained in effect with the passing of the new Planning Act (1995). A brief discussion about the application of existing legislation and procedures to the NCR Subwatershed is presented below.

Flood/Erosion Control

- The Ontario Conservation Authority Act (1980) permits Conservation Authorities to regulate any works that may impact upon a stream or river, primarily to ensure public safety against flooding or erosion and to provide for maintaining existing stream systems. To achieve these purposes, the SNRCA has its own "Fill, Construction and Alteration to Waterways Regulations" (1994) tailored to the needs of the South Nation River Watershed.
- Lakes and Rivers Improvement Act (1980) is used by the Ministry of Natural Resources to administer works directly affecting streams and rivers with a similar purpose as above. The "Public Lands Act" is also used by the Ministry to regulate works on major watercourses.
- Ontario's "Urban Drainage Design Guidelines" (1987) outline guidelines for use in developing areas to prevent impacts on receiving streams through urban development.
- The RMOC Official Plan (1989) provides Storm Water Management Policies for the management storm water quality and quantity to control erosion, flooding, sedimentation and pollution along and in the watercourses of the RMOC, including the NCR. The City of Gloucester's Official Plan (April 1992) includes Storm Water Management Policies and requirements for Master Drainage Plans which will conform to the RMOC's Storm Water Management Policies and

provincial policies and statements. The Township of Osgoode's Official Plan (February 1991) requires that the preparation of Master Drainage Plans and/or Stormwater Design Plans may be requested where the need is warranted.

- The Environmental Assessment Act under Class EA procedures, regulates the construction of flood and erosion control facilities.

Water Quality

- The use of groundwater and surface water is administered by the Ministry of the Environment for consumption, industrial process or irrigation. Although the Ministry has been primarily concerned with the quantity of water used, more emphasis is being placed on the protection of ground and surface water quality.
- Stormwater Management Practices Planning and Design Manual (June 1994) prepared by the Ministry of the Environment and the Ministry of Natural Resources provide guidelines for use in urban development areas to control the quality of storm runoff and protect receiving streams.

Natural Resources

- The Canada Fisheries Act, originally enacted in 1867, protects fish habitat in three ways. It addresses waterway obstructions, prohibits fish habitat disturbances, and prohibits pollution of fish habitat.
- Canada's Policy for the Management of Fish Habitat (1986) is designed to achieve net gain of habitat nationally through strict adherence to the guiding principle of "no net loss" of fish habitat when site specific land-use changes are contemplated.
- The administration and enforcement of federal fisheries legislation and policy in Ontario is the responsibility of the Ontario Ministry of Natural Resources (OMNR). The OMNR has developed Fisheries Management Plans which direct the long term fisheries management direction for all surface waters in the province, including the Carleton Place Area Office. The Area Fisheries Management Plan applies to the NCR Subwatershed and sets principles for the protection and rehabilitation of local fisheries.
- The "Fish Habitat Protection Guidelines for Developing Areas" (OMNR March 1994), the "Aquatic Habitat Mitigation and Compensation Reference Manual" (OMNR February 1994), the "Aquatic Habitat Compliance Reference Manual" and "A Summary of Policies and Guidelines for the Protection of Aquatic Habitat in Ontario" (OMNR October 1993) address a broad spectrum of information pertaining to aquatic habitat protection and management directly relevant to the NCR Subwatershed.
- The Ontario Environmental Assessment Act provides for the protection of environmental resources for any type of capital works projects.

- The old Planning Act (1983) regulates the manner and type of development that can take place as part of a proposed land-use change. The new Planning Act (1995) "promotes sustainable economic development in a healthy natural environment within the policy and by the means provided under the Act". Environmental resources are explicitly addressed via a " Comprehensive Set of Policy Statements (OMMA 1994) " which detail six policy areas and associated goals to be dealt with in municipal land-use planning.

APPENDIX G

**A Summary of the Comprehensive Set of Policy Statements
Planning Act 1995**

Summary of the Comprehensive Set of Policy Statements - Planning Act 1995

A. Natural Heritage, Environmental Protection and Hazard Policies:

Goal 1 of this Policy is to *protect the quality and integrity of ecosystems, including air, water, land and biota; and, where the quality and integrity have been diminished, to encourage restoration or remediation to healthy conditions.*

Environmental features affected by this Policy include the following:

- Sensitive groundwater recharge areas, head-waters (discharge areas) and aquifers;
- Significant ravine, valley, river and stream corridors;
- Significant portions of the habitat of endangered and threatened species and adjacent lands, in some instances;
- Significant portions of the habitat of vulnerable species, significant natural corridors, significant woodlands, areas of natural and scientific interest, shorelines of lakes, rivers and streams, and significant wildlife habitat and adjacent lands, in some instances;
- Fish habitat;

Goal 2 of this Policy is to *ensure that wetlands are identified and adequately protected through the land use planning process and to achieve no loss of provincially significant wetlands.*

Environmental features affected by this Policy include the following:

- Provincially significant wetlands and adjacent lands, in some instances.

Goal 3 of this Policy is to *ensure that development is not permitted in areas where site conditions or location may pose a danger to public safety or public health or result in property damage; and to encourage a coordinated approach to the use of land and the management of water in areas subject to flooding in order to minimize social disruption.*

Environmental features affected by this Policy include the following:

- Regulatory shorelines and adjacent lands, in some instances. The regulatory shoreline is comprised of the regulatory flood standard, the regulatory dynamic beach standard, and the regulatory erosion standard;
- Riverine floodplains.

B. Economic, Community Development and Infrastructure Policies:

The goal of this Policy is to *manage growth and change to foster communities that are socially, economically, environmentally and culturally healthy, and that make efficient use of land, new and existing infrastructure, and public services and facilities.*

Environmental features affected by this Policy include the following:

- Prime agricultural areas, notably speciality crop lands;
- Significant landscapes, vistas and ridge lines;
- Significant cultural heritage landscapes.

D. Agricultural Land Policies:

The goal of this Policy is to *protect prime agricultural areas for long-term agricultural use.*

Environmental features affected by this Policy include the following:

- Prime agricultural lands, classes 1 to 3;
- Mineral aggregates.

F. Mineral Aggregate, Mineral and Petroleum Resources Policies:

Goal 1 of this Policy is to *ensure all parts of Ontario possessing mineral aggregates, an essential non-renewable resource to the overall development of any area, share a responsibility to identify and protect mineral aggregate resources and legally existing pits and quarries, to ensure mineral aggregates are available at a reasonable cost and as close to markets as possible to meet future local, regional and provincial needs.*

Environmental features affected by this Policy include the following:

- Mineral aggregate resources.

Goal 2 of this Policy is to *protect mineral and petroleum resource operations, deposits of minerals and petroleum resources and areas of potential mineral and petroleum resources for resource use.*

Environmental features affected by this Policy include the following:

- Mineral and petroleum resource deposits.

These policies are to be used by City of Gloucester and Township of Osgoode to help them determine what areas of the Subwatershed can and cannot be developed. A set of technical guidelines to implement each one of these policies will be made available to each municipality and all those organizations and individuals with an interest in land-use planning and development.

APPENDIX H

Summary of Technical Studies Required Prior to Development to Protect the Subwatershed Environment

Summary of Technical Studies Required Prior to Development to Protect the Subwatershed Environment

NATURAL FEATURES	NEIGHBOURHOOD PLAN	PLAN OF SUBDIVISION*	SITE PLAN*
<p>Ground Water Resources <u>Management Issues:</u></p> <ul style="list-style-type: none"> ■ Maintain ground water recharge. ■ Maintain baseflow. ■ Reduce potential for ground water contamination. 	<ul style="list-style-type: none"> ■ Test pits are required. 	<ul style="list-style-type: none"> ■ No additional studies are needed if Plan investigations indicate homogenous soil conditions with deep ground water levels. ■ Site-specific soils assessment may be needed to assist in siting storm water facilities. ■ Water supply studies may be needed depending on type and location of development. 	<ul style="list-style-type: none"> ■ No additional studies required. ■ Site-specific soils assessment may be needed to assist in siting stormwater facilities. ■ Water supply studies may be needed depending on type and location of development. ■ May need to assess influence of major grading. ■ Assess potential for dewatering and associated impacts.
<p>Surface Water Resources <u>Management Issues:</u></p> <ul style="list-style-type: none"> ■ Controlling sediment inputs during construction. ■ Controlling storm water from urbanized sites. ■ Maintain or improve quality of surfacewater leaving the Subwatershed. 	<ul style="list-style-type: none"> ■ No additional study required. 	<ul style="list-style-type: none"> ■ No additional studies needed if development does not affect nearby streams. ■ Monitoring of sediment and erosion controls during construction. ■ Monitoring of Best Management facilities will be needed. 	<ul style="list-style-type: none"> ■ No additional studies needed if development does not affect nearby streams. ■ Monitoring of sediment and erosion controls during construction. ■ Monitoring of Best Management facilities will be needed.
<p>Fisheries and Aquatic Habitat <u>Management Issues:</u></p> <ul style="list-style-type: none"> ■ Minimizing erosion and sedimentation of streams. ■ Maintenance of baseflows in streams. ■ Maintenance of upstream/downstream linkages. 	<ul style="list-style-type: none"> ■ Define extent of headwater tributaries within each block. ■ Stream surveys should be conducted to note: substrate type, streambank condition, vegetation, stream morphology and areas of potential enhancement. 	<ul style="list-style-type: none"> ■ No additional studies are required if road crossings will not occur. ■ Site-specific assessment of streams to determine where crossings are most appropriate and what type of crossing design should be used. 	<ul style="list-style-type: none"> ■ No study requirements.

(After Gartner Lee et al., May 1994)

* For development proposals in the rural areas of the Subwatershed, an Environmental Impact Statement (EIS) will be required at the Plan of Subdivision and Site Plan stage. The specific requirements of the EIS will be determined through consultation with the City of Gloucester, the Township of Osgoode, the RMOC and provincial resource agencies as required.

Summary of Technical Studies Required Prior to Development to Protect the Subwatershed Environment

NATURAL FEATURES	NEIGHBOURHOOD PLAN*	PLAN OF SUBDIVISION*	SITE PLAN*
<p>Wetland Resources Management Issues:</p> <ul style="list-style-type: none"> ■ Minimize disturbance of wetlands. ■ Incorporate buffers around wetlands to allow maintenance of wetland function. 	<ul style="list-style-type: none"> ■ No further study required. 	<ul style="list-style-type: none"> ■ No further study needed. 	<ul style="list-style-type: none"> ■ No further study needed.
<p>Terrestrial Resources Management Issues:</p> <ul style="list-style-type: none"> ■ Maintenance of linkages between tableland and valley corridors. ■ Maintain a mix of forested and successional landscape features. ■ Maintain biological diversity. 	<ul style="list-style-type: none"> ■ Review of aerial photographs to ensure that boundaries have not changed. ■ Determine degree of successional area between woodlots. ■ Develop conceptual plan for building envelopes within woodlots of minor environmental function. ■ Determine appropriate degree and location of human activities in and around wooded areas (this should be completed by City staff). ■ A general evaluation of restoration and rehabilitation opportunities should be completed at this stage. 	<ul style="list-style-type: none"> ■ Detailed field inventories should be undertaken by a terrestrial biologist during appropriate growing seasons (April to September). This inventory will include all vegetation, and wildlife species (birds, mammals, amphibians and reptiles). This inventory data will be needed to assist in the determination of appropriate buffer requirements. ■ Buffers will then be determined based on an evaluation of impacts to wildlife disturbance zone. ■ Restoration and rehabilitation opportunities should be further refined at this level. 	<ul style="list-style-type: none"> ■ More specific study will be done to identify opportunities for individual tree protection specific retention of vegetation on-site (protective barrier, identification).

(After Gartner Lee et.al., May 1994)

* For development proposals in the rural areas of the Subwatershed, an Environmental Impact Statement (EIS) will be required at the Plan of Subdivision and Site Plan stage. The specific requirements of the EIS will be determined through consultation with the City of Gloucester, the Township of Osgoode, the RMOC and provincial resource agencies as required.

Summary of Technical Studies Required Prior to Development to Protect the Subwatershed Environment

NATURAL FEATURES	NEIGHBOURHOOD PLAN	PLAN OF SUBDIVISION*	SITE PLAN*
<p>Creek and River Corridors Management Issues:</p> <ul style="list-style-type: none"> ■ Maintenance of uninterrupted creek and river corridors. ■ Maintain linkages between creeks, rivers and tableland areas. ■ Incorporating creeks and rivers into overall greenway strategy. 	<ul style="list-style-type: none"> ■ All defined and ill-defined streams should be identified and mapped at a 1:10,000 scale - based upon site assessment described under "Fisheries And Aquatic Habitat" section. 	<ul style="list-style-type: none"> ■ May be some site-specific study requirements. 	<ul style="list-style-type: none"> ■ May be some site-specific study requirements.
<p>Hydrology Management Issues:</p> <ul style="list-style-type: none"> ■ Minimize downstream flooding concerns. ■ Maintain or reestablish the natural hydrologic cycle. 	<ul style="list-style-type: none"> ■ A Master Drainage/Environmental Servicing Plan will be needed and will do the following: <ul style="list-style-type: none"> - demonstrate how existing drainage patterns are being respected. - determine appropriate best management practices. - define valley and streamcorridor limits. - determine appropriate erosion control measures. 	<ul style="list-style-type: none"> ■ Modelling of pre-to post peak flows. ■ Flood plain mapping is needed, if not already available. ■ Sizing of water quality facility. 	<ul style="list-style-type: none"> ■ Detailed analysis of runoff control facility.
<p>Landform Conservation Management Issues:</p> <ul style="list-style-type: none"> ■ Maintain landform character, vistas and panoramic views. ■ Minimize topographic change, mass grading, filling and excavation. ■ Minimize disturbance to steep slopes. 	<ul style="list-style-type: none"> ■ Landform planning to address planning and layout, siting design and erosion strategy. ■ Preliminary grading plan. ■ Assessment of building form and impact on the landscape. 	<ul style="list-style-type: none"> ■ Detailed siting plan, grading plan and erosion control measures showing how it conforms with landform conservation policies. 	<ul style="list-style-type: none"> ■ Detailed siting plan, grading plan and erosion control measures showing how it conforms with landform conservation policies.

(After Gartner Lee et.al., May 1994)

* For development proposals in the rural areas of the Subwatershed, an Environmental Impact Statement (EIS) will be required at the Plan of Subdivision and Site Plan stage. The specific requirements of the EIS will be determined through consultation with the City of Gloucester, the Township of Osgoode, the RMOC and provincial resource agencies as required.

APPENDIX I

**Aquatic Habitat Survey and Fish Community Sampling
Report for Shields and Findlay Creeks**

SHIELD'S CREEK

(NORTH CASTOR RIVER)

AQUATIC HABITAT SURVEY

A walking macro-habitat survey of Shield's Creek (tributary to the North Castor River) was carried out in August, 1994. The survey was confined to the reaches of the creek between Old Prescott Road (extreme upstream) and the Osgoode 7th Line Road, and consisted of identification of instream structural habitat components, and bank/riparian structural habitat components. The survey involved 9 days of field work for two staff (i.e., 18 days effort).

Habitat mapping was recorded using a standardized symbolic code series, with habitat assessed in 10m reaches moving in a downstream to upstream direction. Two evaluators are used, one to map instream features, the other bank features. Therefore, two map series are included in the file; one featuring instream, the other bank features.

Also included in the file is an overview document, indicating the general impressions of the field crew relative to the "quality" of the watercourse.

In general, Shield's Creek is a low-gradient, clay-based stream that shows signs of significant human alterations over a long period of time. Some portions remain in a "naturalized" condition, while other reaches have been repeatedly ditched, removing most of the habitat diversity and severely impacting the aquatic ecosystem. In the upper reaches, the creek flows through the village of Greely, and under provincial highway 31. This area appears to have been subjected to very large sediment events (likely continuous, and cumulative), very likely originating from storm sewers and ditches servicing developments and roads in the Greely area. Large summer accumulations of green algae throughout the stream are indicative of high nutrient loading.

The creek has a high degree of beaver activity, particularly in the reach downstream of highway 31. Surveyors noted a low abundance of macro-vegetation instream, with algae predominant over vascular plants. Shield's creek is quite high up in the North Castor watershed, and does not have many tributaries itself. Baseflow appears to originate in wooded area east of the village of Greely. The August 17/94 water temperature (baseflow conditions) at the Highway 31 culvert was 19.1 C, indicating a potential cold/coolwater source.

Erosion was noted as common along the creek channel, particularly in upper reaches. Runoff from fields was noted as a major factor in eroded banks. Instream substrate was identical in composition to the bank material throughout the stream, another sign of ongoing erosion.

The majority of bank vegetation along the stream was recorded as herbaceous weeds or small shrubs. Major woody vegetation, which would provide shading to the creek and thus a temperature mitigation effect, was not common.

The habitat mapping for Shield's Creek is attached.

FISH COMMUNITY SAMPLING

A 600 VDC backpack electroshocking unit was employed to carry out a standard 100m "sweep" of a section of Shield's Creek downstream of Highway 31. This area was considered typical of the stream in general; therefore, the community identified in this location should be indicative of the community throughout the system.

It should be noted that the catch data represents only a "snapshot" in time of the presence/absence of fish species in the creek. It is not necessarily valid as a representation of the relative abundance of various species, nor, obviously, the trends in species populations. Therefore, only a species list is presented.

Species Present:

Common White Sucker
Common Shiner
Creek Chub
Central Mudminnow
Northern Redbelly Dace
Finescale Dace
Pearl Dace
Brown Bullhead
Pumpkinseed
Fathead Minnow
Bluntnose Minnow
Slimy Sculpin
Stickleback

Total Species Identified: 13

The sampling crew noted high abundance of white suckers, shiners, and dace species, including multiple year-classes and young-of-the-year.

Twelve species is indicative of good diversity for a small creek system. Noteworthy is the absence of any brook trout, which have been repeatedly stocked in Shield's Creek in recent years. However, the presence of sculpin within the community is indicative of cool water of good quality. The high number of forage species present, and the absence of a true top piscivore in the community, holds some promise for the possible development of a brown trout population within the creek (similar to Poole Creek in Goulbourn Township).

FINDLAY (KELLY'S) CREEK

GLOUCESTER

1994

Habitat Survey

The anticipated habitat survey of Findlay Creek was not carried out in 1994. Ongoing negotiations relative to the future development of lands in the Leitrim area, north and east of the Leitrim wetland, have now reached a stage where it is clear that considerable alterations will be made to the structure and habitat characteristics of Findlay Creek, upstream of Blais Road crossing. These alterations, the details and extent of which are not yet finalized, will proceed as conditions of a formal Fisheries Act agreement between the developers and MNR/DFO. The alterations will be aimed at facilitating proper drainage of the newly developed lands, while at the same time improving the morphology, flow regime, and overall aquatic habitat quality of the "coldwater" portion of Findlay Creek. Given this situation, it was decided that any data obtained in 1994 on stream habitat characteristics would be a moot point once the alterations proceed.

Considerable background studies and data have been compiled in connection with the proposed Leitrim developments, including a Master Drainage Plan and ESR's. Much of this has direct relevance to Findlay Creek, as the main outlet of drainage from the area. The reader is directed to the City of Gloucester for a comprehensive list of the information available.

Fish Community Sampling

The reach of Findlay Creek between Blais Road crossing, upstream to the Highway 31 crossing was electroshocked using a 600VDC backpack unit in August, 1994. A similar procedure was also carried out in August 1993. The primary objective of both of these surveys was to determine the presence/absence/rate of survival of brook trout stocked annually in Findlay Creek (April of 1993 and 1994). A secondary objective was to determine the species composition of the overall fish community in this "coldwater" section of the creek.

No brook trout were found in either the 1993 or 1994 surveys. The 1994 results seem to confirm 1993 suspicions that the survival of stocked brook trout yearlings in Findlay Creek is minimal, and a continuation of rehabilitation efforts using this salmonid species is not warranted. The creek does, however, still display a "cold" overall thermal regime (August mid-day water temperatures at Blais Road were 16 C in 1993, and 17 C in 1994), but with significant fluctuations to temperatures above 22 C after storm events (Leitrim ESR study, 1994). Similar to Poole Creek in Goulbourn Township, Findlay creek may have the

temperatures to sustain a marginal brook trout population, but the forage characteristics in the system may no longer be suited to brook trout, particularly juveniles. Accordingly, the Ministry of Natural Resources is now considering the use of brown trout, a more temperature-tolerant coldwater species suited to a fish-forage base, as a future top predator in Findlay Creek. Regardless of species, no further stocking of Findlay Creek will be carried out until the alteration proposed in the Leitrim development plan are carried out.

The fish community of Findlay Creek is comprised of:

Common Shiner
Bluntnose Minnow
Fathead Minnow
Northern Redbelly Dace
Pearl Dace
Creek Chub
White Sucker
Stickleback spp.
Logperch
Darter spp.
Mottled Sculpin
Mudminnow

The sampling crew noted presence of multiple year-classes, including young-of-the-year, of all species present. Also noted was the presence within the Creek Chub population of several very large individuals. This may be evidence that the chubs are acting as a top predator in the absence of a true large piscivore species.

Although not sampled, local residents report the presence of northern pike and "sunfish", likely pumpkinseeds, in the reach downstream of Blais Road.

APPENDIX J

**Resource Management Targets for the Hanlon Creek
and Credit River Watersheds**

Hanlon Creek Watershed Plan: Resource Protection Targets

In-stream conditions (not-end-of-pipe) for the following factors:

1. Stream Temperature: Using Brook Trout as the indicator species for cold-water fisheries, a maximum temperature of 22 degrees Celsius is required to support it.
2. Water Quality - water chemistry concentration levels:

Dissolved Oxygen	6.0 mg/l	Zinc	0.07 mg/l
Nitrate	3-5 mg/l	Phosphorus	0.10 mg/l
Chloride	100 mg/l (normal runoff)		
3. Baseflow: Meet the stream temperature targets of point 1 by maintaining a groundwater baseflow to total flow ratio similar to present conditions.
4. Groundwater Levels: No specific targets are to be set for groundwater levels until a profile of natural variability caused by climatic fluctuations can be compared in relation to long-term groundwater time trends so as to allow the prediction of future stream temperatures.
5. Streambank Erosion: Erosion targets should be to maintain existing moderated flow rates in equilibrium with the current channel configuration and show no acceleration of annual erosion recession rates subsequent to upstream land use change.
6. Terrestrial Resources: No encroachments and no emerging problems with vegetation are important, along with a bird survey every five years to determine changes in abundance and diversity of flora and fauna. Ecosystem integrity is a key component of a healthy watershed.
7. Fisheries: No emerging problems pertaining to fish habitat and no significant changes in the composition of the fish community and its structure. Brook Trout size should not decrease below present levels and should increase to some degree as rehabilitation and enhancement options are implemented.

Credit River Watershed Management Strategy: Resource Protection Targets

In-stream conditions (not-end-of-pipe) for the following factors:

1. Stream Temperature: Using Brook/Brook Trout as the indicator species for cold-water fisheries, a maximum temperature of less than 20 degrees Celsius is required to support it.
2. Water Quality - water chemistry concentration levels:
 - Dissolved Oxygen >5.0 mg/l
 - Metals <6.0 mg/l of soluble copper
 - Suspended Solids <5 mg/l dry; <100 mg/l wet
 - Phosphorus (total) <.03mg/l dry; <.09mg/l wet (25mm. event)
3. Baseflow: Meet the stream temperature targets of Point 1 and the water chemistry objectives of Point 2.
4. Groundwater Levels: Minimize the potential for erosion to occur by : promoting 60 metre riparian buffer strips; creating wetlands and forested areas; applying strict land use controls in valleylands and wetlands; minimizing stream/river crossings; and riparian canopy restoration to greater than 80%.
5. Terrestrial Resources: Protecting the wetlands, valleylands and natural features.
6. Recreation: Providing for recreational opportunities (swimming, fishing, provision of recreation facilities and passive recreational opportunities).
7. Fisheries: Maintaining and enhancing the coldwater fishery.