Save the Rouge Valley Systems Inc.

Natural Heritage Protection Under OPA 129

Performance Evaluation

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1 Introduction

1.1 Study Background

Dougan & Associates is a firm of terrestrial ecologists specialized in natural heritage planning and management in urban settings. We were originally retained by the City of Toronto in late February, 2000 to provide expert opinions on terrestrial resource matters related to development proposals on the Oak Ridges Moraine in the Town of Richmond Hill, originally under the Town's Official Plan Amendment 200, and subsequently under individual development applications. When the City was denied party status at the Ontario Municipal Board hearing regarding the former OPA 200 lands (aka Yonge East/West lands), they made this research available to Save the Rouge Valley Systems Inc., which had party status.

The present study consisted of document review and a field research project to assess the performance of the Town of Richmond Hill's "Environment First" approach to new development on OPA 129, located immediately north of the former OPA 200 lands. At the time, development proposals for Yonge East/West were intended to conform to the environmental standards set in OPA 129. Therefore a review of the performance of these standards was seen as an appropriate test of whether they represent a superior approach to natural heritage protection for urban development on the Oak Ridges Moraine.

1.2 The Oak Ridges Moraine – A Major Regional Corridor

The Oak Ridges Moraine is an inter-regional landform with highly significant physical, biotic and cultural complexity, with its limits defined not simply on the basis of soils, topography and distinctive landforms (such as kame moraine and kettles), but also in consideration of the extensive functions and their planning protection (surface drainage, groundwater, landform identity, and terrestrial and aquatic ecology). The Moraine forms a significant **corridor** containing natural heritage features including wetlands, major forests, and valley systems.

Corridors are landscape features that help connect diverse natural habitat features such as woodlots, meadows and wetlands. Corridors can vary in size (width and length) as well as quality (species diversity and structure). For example, corridors can range from very narrow and species-poor hedgerows of varying maturity, to larger and wider amalgamations of vegetation communities set in countryside. Large scale corridors often follow physiographic features such as major valleylands, escarpments, or moraines.

Corridors are known to offset the impacts of habitat fragmentation, by increasing connectivity. Habitat fragmentation occurs when a large, continuous tract of habitat is broken into progressively smaller remnants, separated by land uses that are often unfavorable to species reliant on the original vegetation cover. A high degree of fragmentation has occurred throughout southern Ontario, including the lands contained in the OPA 129 area, to the extent that movement of some wildlife and many native plant species is now restricted.

Benefits of corridors include:

1. facilitating the re-introduction of plant and animal populations to areas after local extinctions
2. maintaining the genetic health of a species at the population level by affording opportunities for individuals to intermingle between populations
3. facilitating the dispersal of offspring to new habitats in the post-breeding season

4. facilitating the seasonal migration of wildlife species between different habitat types to fulfill life cycle requirements (such as forest-dwelling amphibians that breed in wetlands in early spring)
5. allowing plants to disperse their seeds via animal vectors, or along continuous habitat connections.

Although the relative advantages of corridors outweigh potential disadvantages, it is important to understand them:

1. Increased immigration rates may reduce genetic variation between certain isolated populations
2. Undesirable non-native species of plants and animals may spread along corridors into undisturbed habitats
3. Corridors and linkages may facilitate the spread of disease between core habitat areas
4. Use of corridors may increase exposure of some species to their predators.

The understanding of the functioning of corridors is based almost exclusively on scientific studies conducted in rural or natural settings. There has been virtually no scientific study of corridor performance in urban or settled areas, which are known to have profoundly different landscape dynamics than rural areas. Therefore, under certain circumstances there is reason to believe that corridor functions present in rural settings may be constrained in urban settings.

Corridor functions operate at three levels or **scales** on the Moraine, ultimately creating the setting and context of understanding for local features found in the OPA 129 lands.

Inter-Regional/Continental

- ***This level provides long term vitality for ecosystems, allowing diverse species to migrate, sometimes over long distances (100 km or more), to new locations in response to changes in habitat cover, local land use, natural population fluctuations, and climatic changes. The functioning at this level requires diverse opportunities for movement as well as access to major core areas (min 100 ha to 100,000 ha) where major populations exist.***
- Direct linkage to other major natural heritage systems: Niagara Escarpment, Trent-Severn, Frontenac Axis (Algonquin Park to Adirondacks); The NOAH System (Niagara Escarpment-Oak Ridges Moraine – Algonquin to Adirondack Heritage System);
- Location in the headwaters of the Humber, Don, Holland and Rouge Rivers.

Meta-scale

- ***This level helps to sustain sub-populations of species in a fragmented landscape, ensuring that if one sub-population becomes extinct ('winks out') that the habitat can be re-colonized over time, maintaining the vitality of the population in the long term. The functioning at this level requires low 'landscape resistance' to facilitate species movements between habitat areas.***
- Philips Lake, Bond Lake and Bog, Lake Wilcox Kettle Wetlands and Uplands, Lake St. George, Jefferson Forest, Maple Uplands and Kettle Wetlands, Happy Valley Forest, Glenville Hills, York Region Forest and Black River Wetlands;
- Concentrations of internally-drained catchments and associated kettle wetlands which sustain breeding of migratory forest amphibians in largely rural landscapes;
- Concentrations of highly diverse wetlands and upland habitats.

Local

- ***This level allows local movements between diverse habitats that most wildlife species require to fulfill their regular needs for breeding, foraging, and seasonal migration (e.g. amphibians residing in upland forests moving to kettle wetlands to breed). The functioning at this level requires either low landscape resistance, or adequate corridors and linkages where plant and animal species can move between habitats without major interference.***
- Presence of larger kettle lakes (e.g. Lake Wilcox, Philips Lake, Bond Lake) with established ecological significance and locally connected by smaller habitats and agricultural fields;

- Presence of smaller kettle wetlands, woodlots, riparian corridors and successional cover separated by agricultural fields in a largely rural setting (i.e. low landscape resistance);
- Connections to other core areas along adequate corridors (e.g. Rouge River).

In terms of corridor functions, scale and natural diversity, the Moraine is comparable to the Niagara Escarpment, a geologic feature that has been protected under the Niagara Escarpment Plan, and recognized as a Biosphere Reserve by UNESCO. The Moraine contains extensive tracts of forest cover, and unusual wetlands associated with headwater discharge zones, kettle lakes and kettle bogs. Key recharge zones in the Moraine are associated with some of the largest remaining natural forest and wetland areas in Ontario south of the Precambrian shield. These habitats support plants and animals, many of which require large undisturbed natural areas (OMNR 2000).

The Moraine is part of an extensive and complex hydro-geologic system of provincial significance which yields baseflow in streams, sustains high quality natural habitats and wildlife populations within and beyond the area of proposed development, and provides potable water resources for at least 250,000 residents and thousands of livestock. The Moraine contains the headwaters of 35 creeks and rivers including the Rouge, Credit, Don, Humber, Duffins, Oshawa, Lynde, Bowmanville, and Ganaraska Rivers, forming a regional network of ravines and across the Greater Toronto Area. The only coldwater fisheries in the GTA are associated with the upper reaches of streams fed by the Moraine. Over the past 50 years the City of Toronto has invested in the long term planning, protection and enhancement of these important resources in partnership with federal, provincial, and regional governments and agencies. Similarly, streams flowing north from the Moraine sustain coldwater fisheries and the Lake Simcoe fishery.

Despite its large scale, the glacially and fluvially deposited materials that form the physical substrate of the Moraine make it more vulnerable to degradation than the Escarpment, which is formed from bedrock. The prevalence of shallow bedrock on the Escarpment has constrained agricultural and urban development activities, with the result that natural ecosystems including forests, wetlands and other communities have persisted extensively along the Escarpment. The Moraine, on the other hand, has been subjected to high levels of disturbance from agriculture, aggregate extraction, and encroachment by urban development.

1.3 OPA 129 Study Area

As part of research for the Richmond Hill OMB hearing, Dougan & Associates researched the status of implementation of natural heritage protection measures under Official Plan Amendment 129, which is an area of new development and redevelopment located immediately north of the lands that were under consideration at the OMB hearing held between May 2000 and May 2001. Figure 1 indicates the location and boundaries of OPA 129, Study Areas A to D, and selected Draft Plan Areas containing proposed or built developments as of 2000. Figure 1 also indicates the locations of Environmental Protection Areas (EPA's) 1 and 2 as designated in OPA 129 in the context of existing development.

1.4 Study Rationale

In November 2001, the Province passed the Oak Ridges Moraine Protection Act to address the lack of approved policies at the regional and provincial levels with respect to protection of the Moraine. This policy vacuum existed in 1995 at the time when the OMB ruling concerning OPA 129 was made, making it very difficult for municipalities to provide effective protection for regional natural features, and often forcing environmental issues to be dealt with on a case by case basis through Official Plans, related amendments, and Ontario Municipal Board hearings. In this context, and despite its limited jurisdiction, OPA 129 was an attempt to establish a number of progressive municipal policies intended to better protect the significant environmental features and functions in an urban setting.

The "Environment First" principles as defined in OPA 129, represented the standards which the Town of Richmond Hill adopted for development on the Oak Ridges Moraine, and were the criteria against which development in this urban area could be defensibly measured. The OMB decision regarding OPA 129 ruled that monitoring of the outcome of OPA 129 development would be required before further expansion of urban uses on the Moraine in Richmond Hill would be permitted. **Consequently, the main objective of the present study was to review urban developments, both underway and completed on OPA 129 lands, and assess how effective the "Environment First" principle has been in avoiding impacts to natural features and functions.**

Notably, this study was hampered by the task of accessing the voluminous documentation intended to fulfill OPA 129 requirements, during the adversarial OMB hearing. Based on contacts with administrative staff at the Town, we discovered that several impact assessment documents intended to guide the implementation of "Environment First" for some OPA 129 lands were no longer on file with the Town. These are intended to guide implementation and monitoring, so it is clear that the "Environment First" approach faced information management difficulties on the part of the Town. Despite the explicit requirement for monitoring under the Board-approved OPA 129 Plan, no natural heritage monitoring reports were released by the Town or developers between September 1996 (when OPA 129 was adopted) and when our research was completed in October 2000.

2 Context

2.1 OPA 129: Historical Context

Official Plan Amendment 129 was presented to Town of Richmond Hill Council on November 18th, 1993. Subsequent appeals made by development interests represented by Bond Lake Estates, Villak Holding Company, Calgas Investments, Whitchurch Common Group and others challenged the amendment before the Ontario Municipal Board (OMB). The decision of the OMB regarding Official Plan Amendment No. 129 in the Town of Richmond Hill, issued on July 10, 1995 (File Nos. 920094 and 940001), addressed some of the fundamental environmental issues at stake in this area (see following section) and was adopted as an official amendment on September 23rd, 1996 (amendment no. 0940001). However, a number of environmental and planning issues remained unresolved, and it was on these grounds that additional appeals were made by landowners and land agents (specifically the land developers under the corporate names of Drynoch Estates Ltd., Oak Ridges Farm Co-Tenancy, 1133373 Ontario Ltd., and Bond Lake Investors Inc.) triggering another Ontario Municipal Board Hearing that began on May 1st, 2000.

2.2 OMB OPA 129 Decision

The July, 1995 OMB decision (File Nos. 920094 and 940001) played a pivotal role in the interpretation of "Environment First" principles for OPA 129. The following quotations summarize some key principles, insights and standards relating to the issues and intent of the decision in regard to environment and development in OPA 129. We have emphasized key concepts emerging from the Decision.

"**Mr. Lederer** (counsel for Town) argues for the Town that the Environment First idea means that, **in consideration of several competing values, all of which may have merit, the priority must be given – the benefit of the doubt as it were – must be given to environmental merit before and above any others**." [pg. 81]

"**Ms. Babcock** (Planning Commissioner for Town) stands by the view that in an Environment First Plan, **community design objectives cannot take precedence over environmental objectives**." [pg. 81]

"The Board accepts the prospect that this site [EPA 1 wetland] will continue to be used for a crossing of the natural area in this vicinity. One need not be much more than an average observer of human nature to accept a proposition on its face. Designating it an EPA 1 will not prevent people from crossing one way or another in this location. **Permitting development nearby that will house children and other pedestrians will only increase the number of potential EPA trespassers. Ignoring the impact of this will only aggravate the existing condition of unmanaged, environmentally damaging crossings**." [pg. 81]

"The Board has some sympathy with the plight of Elmway Developments [landlocked by EPA's], but we cannot alter the **accidents of geography**. There is nothing in the evidence to justify a departure from the accepted policy relating to EPA 1's, except the hardship that it causes to this land developer. The hardship is regrettable, but the policy is a necessary consequence of accepting the principle of Environment First. The necessity is demonstrated in the evidence of the degradation that has occurred in the past and in the demonstrated need for a serious commitment to the **protection, enhancement and restoration that must occur in the future if any further development is to be permitted in this planning area**. This is accepted logic and the philosophy of OPA 129, and the Board is compelled to apply it consistently and fairly."[pg. 83]

"According to the evidence of Dr. Coleman, **which he did not change even though he did not persist in his original recommendation** [10m buffers], Buffer Areas serve a vital purpose in Plan as spatial separators between development and natural features" [pg. 92]

3 Study Methods

3.1 Background Documents

As background for the present study, a review was undertaken of applicable environmental policies and guidelines in place at the time of OPA 129 approval. This included provincial, regional and municipal documents: Provincial Natural Heritage Policies, the Draft ORM Guidelines, the Region of York Official Plan, OPA 129, and the OMB Decision. Documents produced on behalf of land developers were reviewed (where available) including Functional Servicing Plans, Environmental Impact Statements, Draft Plans and Subdivision Agreements. These documents were obtained where available from the Department of Planning and Development of the Town of Richmond Hill. As noted in Section 1.4 above, several key documents were apparently no longer on file with the Town, and were not reviewed. Detailed final development plans, such as lot grading plans, were not examined. The key references for information on natural heritage conditions and strategies was the Gore and Storrie Phase II Environmental Studies for OPA 71 (1993), and Environmental Features Plans which were included in the Functional Servicing Plans for Areas A to D.

The emphasis of the document review was to gain a clear understanding of various definitions and interpretations of "Environment First", and to gain an understanding of the standards set in the OMB Decision, Subdivision Agreements, FSPs, and impact studies, in order to better understand field conditions.

3.2 OPA 129 Field Performance Assessment

The ultimate objective for the study was to prepare a Performance Assessment for the OPA 129 approach to "Environment First". This was created within the framework of the principles, policies, and strategies in place at the time, as described later in this report.

Field evidence of "Environment First" performance was obtained in an investigation of residential development sites in OPA 129 that were already occupied by residents as well as those still under construction. A photo record was assembled to document typical conditions affecting natural heritage features. Photo documentation was conducted by D&A staff between late March and mid-October 2000. Some additional photographs were obtained from other parties including local residents and members of STORM and SRVS. April 2000 aerial photographs (1:10,000 scale, obtained from J.D. Barnes Limited) were used to supplement field studies. Some incidental information was also collected from local residents encountered during site surveys.

The field approach included the preliminary identification of areas with recent and completed development on aerial photographs, followed by field visits to all areas. Development activities continued subsequent to the April 2000 photography, and these were documented up to October 2000. Access to the study sites was along subdivision roads, trails and through public open space behind residential lots.

Field situations were assessed according to categories defined in Table 1.

Table 1: Performance Assessment Categories

Impact Category	Assessment Measures
Buffer Adequacy	Buffer adequacy is based on the ability of the specified buffer to mitigate a) immediate impacts of construction and b) long term conflicts between residential uses and natural area features and functions. Potential conflicts include alteration of buffer landscape, compost dumping, noise, spread of exotic species, etc.
Adequacy of Lot Design	There should be adequate depth to residential backyards to permit backyard space for active recreation and typical infrastructure (decks, grassy area, gardens, pools, storage sheds) unconstrained by proximity to adjoining natural areas.
Landform Conservation	Adequate buffers and setbacks should be provided to ensure that major land features are not impacted by major grading, and that the interfaces between built areas and natural features are gradual and naturalized.
Habitat Protection Measures	Snowfencing or hoarding used to identify and protect natural areas and functions during construction, the maintenance of this protection throughout construction, and prompt remediation of problem sites based on active monitoring.
Erosion Control	Erosion control filter fencing, straw bale and rock check dams, maintenance of these measures, and prompt remediation of problem sites based on monitoring.
Minimal Exposure of Subsoil	The interim re-vegetation of large sites that have been stripped of topsoil and graded, where development may not occur for several months.
Maintenance	Protective measures that are in consistently good condition due to active monitoring and periodic action on deficiencies.
Exotic Species	Use of native species in naturalized buffer and linkage plantings, and avoidance of exotic species that are known to become problematic in natural habitats.
Refuse	The presence of garbage, either wind-blown or intentionally dumped, in construction areas and in natural areas close to existing development.
Injury to Vegetation	The presence of obvious damage to woody vegetation, as evidenced by broken branches, torn bark or exposed roots in proximity to active development sites.

4 Findings

4.1 Policy Framework

Between the late 1980's and mid-90's, provincial policy was undergoing a significant transition, with the release of the Draft Implementation Guidelines on the Oak Ridges Moraine in 1991, the Wetland Policy in 1992, and the Comprehensive Set of Policy Statements in 1995. Additional documents summarizing scientific information on the state of settled landscapes in southern Ontario, the natural heritage framework concept, and numerous background studies on the protection of the Moraine, were also released during this period. These affected the applicable environmental policies and guidelines at all jurisdictional levels, with the official policies setting ground rules and an implementation approach for natural heritage planning. Table 2 summarizes the key guiding documents for natural heritage planning and management that were current at the time of OPA 129's passage in 1995.

Table 2. Environmental Policy and Guideline Documents Relevant to OPA 129 Lands.

Document	Source	Date
Implementation Guidelines: Provincial Interest on the Oak Ridges Moraine Area of the Greater Toronto Area (Draft)	OMNR, MOE & MMAH (in consultation with representatives of the Conservation Authorities within the GTA)	June 1991
Wetlands Policy Statement	OMNR & MMAH	November 1992
Options for Tomorrow: Alternative Planning and Design Approaches for the ORM	Oak Ridges Moraine Background Study No. 6. (Ecologistics Ltd.)	1993
Official Plan Amendment No. 129, North Urban Development Area Secondary Plan	Town of Richmond Hill Planning Department	Read: Nov. 18, 1993 Approved by OMB: Sept. 23, 1996
A Greenlands System for York Region (Final Report)	Prepared by Gartner Lee Ltd. & Berridge Lewinberg Greenberg for the Regional Municipality of York Planning Department	May 1994
Implementation Tools: An Evaluation of Potential Legislative, Planning and Administrative Tools to Implement an Oak Ridges Moraine Area Strategy	OMNR (Oak Ridges Moraine Background Study No. 15)	October 1994
Decision of the Ontario Municipal Board Regarding Official Plan Amendment No. 129 in the Town of Richmond Hill	OMB	July 10, 1995
York Region Official Plan	York Region	ROPA#1 Oct. 19, 1995

In 1997, the Comprehensive Set of Policy Statements was replaced by the abbreviated Provincial Policy Statements (PPS). The present study does not discuss the implications of this change as it was not in effect at the time that OPA 129 was enacted. However, key natural heritage principles of the PPS were voiced in the 1991 Implementation Guidelines, in particular the 'maintain and enhance' guideline, and the consideration of landscape connectivity.

The documents which we consider to be the ultimate expressions of principles and commitments guiding the planning and implementation of natural heritage protection under an "Environment First" approach include Official Plan Amendment 129, the 1996 OMB Decision, and the Conditions of Draft Approval for individual subdivisions. These are highlighted in Table 3.

Table 3. OPA 129 Subdivision Agreements Reviewed

Agreement No.	FSR Study Area(s)
19T-81038	A & C
19T-85093	A
19T-89012	A
19T-97095	A
19T-89042	A
19T-90051	A & C
19T-90047	A
19T-94022	A
19T-88038	B
19T-86100	B
19T-94032	C
19T-88046	C
19T-89105	C
19T-88083	C
19T-87002	C
19T-93027	A & C
19T-90021	D
19T-84043	D
19T-93029	D

4.2 The 'Environment First' Commitments

OPA 129 established "Environment First" as the foremost principle for the North Urban Development Area (NUDA) "from which all other land use policies derive" (Section 1.5). The amendment stated that "new development only be permitted based upon the ability to meet the principles, objectives and policies for the sub-watershed and environmental areas" (Section 1.5). So, the question that follows is, what is the content of these principles, objectives and policies, and, more importantly, has the permitted development been able to adhere to them?

OPA 129 defined the principle of "Environment First" or Environmental Sustainability as:

> *"the requirement that any development in the community be undertaken in a manner which preserves and enhances the integrity of the natural environment and natural systems" including surface and groundwater systems, aquatic, wetland and terrestrial habitats, landforms and "natural connections to areas within and beyond the built-up portion of the community" (Section 2.1). The established objective related to this principle requires that "these areas and linkages be identified; that buffers be adequate to protect the areas from impacts of development; that allowable uses and intrusions be defined; that securement and stewardship of environmental lands be undertaken and that criteria for impact assessment for adjacent development be identified".*

OPA 129 recognized the five Environmental Areas established in the Gore and Storrie Phase II Environmental studies for OPA 71 (1993). These are:

1. Environmental Protection Area 1 (EPA 1)
2. Environmental Protection Area 2 (EPA 2)
3. Buffers

4. Zones of Influence
5. Ecological Restoration Areas

Environmental Impact Studies (EIS) were required for all new development impacting any of these areas and OPA 129 sets specific objectives or criteria for each of the five categories as well as the EIS documents.

1. EPA 1
- Definition: lands containing most of the significant plant and wildlife species known to be present in the NUDA
- Restrictions: no development or land disturbances
- Exceptions: stream bank erosion protection, fish/wildlife/conservation management, minor encroachments along existing road/utility corridors or environmentally sensitive unpaved pedestrian paths, minor storm drainage works or overflow valves required for conservation
- EIS: required for exceptions

2. EPA 2
- Definition: mainly regenerating woodlots that include linkages to EPA 1 and minor watercourses draining into East Humber River
- Restrictions: no development
- Exceptions: stream bank erosion protection, fish/wildlife/conservation management, minor encroachments along existing road/utility corridors or environmentally sensitive unpaved pedestrian paths, minor storm drainage works or overflow valves required for conservation (EIS required)
- Permissions: land disturbances allowed if results in net environmental benefit on site or within sub-watershed
- EIS: required to show how disturbance will be minimized during construction & post development, include a Tree Conservation Plan, provides alternative site development options, identifies how trees will be protecting during and post-construction, provides for replacement of trees removed or damaged unnecessarily .

3. Buffer Areas:
- Definition: to provide transition between natural features and adjacent development and "shall be a minimum of 10 m (33 ft) around all EPA 1 and EPA 2 lands" although the exact size, extent and uses of buffer are to be defined through approved FSP's or EIS'. Where included in the net development area, lots must be of sufficient size so that buffer areas "can be retained in a natural state or planted with native species subject to a conservation plan" (Section 3.2.4).
- Exemption: road permitted in buffer area adjacent to EPA 1 on lands south of Sunset Beach Rd. and west of Bayview Ave. (part lot 64, Con.1 EYS) if EIS assures minimized impacts
- It is implied that development is permitted if an EIS shows no negative impact.

4. Zones of Influence:
- Definition: all lands within 120 m of a PSW as well as between individual wetlands in a PSW complex or 30 m around locally significant wetlands, although exact size, extent and location identified by EIS in accordance with FSP or EIS.
- Permissions: Development allowed if EIS demonstrates no negative impact

5. Ecological Restoration Areas:
- Definition: conceptual linkages between natural areas, but exact nature, extent and location to be identified through EIS

OPA 129 also provided for Landform Conservation, which is generally beyond the scope of this study, and specifics related to Woodlands and Tree Conservation, although protection of trees outside of the five environmental areas is only encouraged "wherever possible" but not required.

The EIS criteria set out are clear and require the following (as per Section 3.2.1(d)):

I. define the **boundaries** of the environmental areas on the site;
II. describe the **relationship** of these environmental areas to the proposed development and adjacent lands;
III. demonstrate if, how and where development can proceed **without negative impact** to the environmental area(s);
IV. prepare a **management plan** to demonstrate how the natural areas will be protected, and/or enhanced during the period of construction;
V. **comply with any Provincial requirements** for impact studies as set out in the Provincial Policy Statements or Guidelines, such as the Wetlands Policy Statement and Oak Ridges Moraine Implementation Guidelines.

Notably, the basis for determining the extent of allowable environmental impact is the achievement of a **"net environmental benefit"** (Section 3.2.1(i)). This is defined in Section 8 as ""the result of an activity or series of activities that involve a loss of existing natural features or functions that is compensated for and enhanced in terms of the replacement of the same feature or functions or the establishment of different features and functions considered to add quality and enhancement to the overall natural system".

In addition there are "follow-up" requirements that are the responsibility of Council with respect to restoration and monitoring. For environmental lands or features that are damaged, disturbed or destroyed "Council will require restoration or enhancement" (Section 3.2.1(h)). Council is also required to prepare an annual Staging of Development Report that identifies impacts on the environment and the results of environmental monitoring, as well as a report on the environment in the NUDA every 3-5 years using environmental indicators developed with the Region, TRCA and MNR.

The Functional Servicing Plans (FSP's) prepared for OPA 129 Areas A to D (see References) summarized existing conditions with respect to physical conditions in the affected study area, and the proposed approach for development of servicing infrastructure (local roads, water supplies, sanitary sewers and stormwater management). Environmental Impact Studies (EIS) for individual developer holdings within the FSP study area were appended to the FSP's which documented existing natural heritage systems, potential impacts of the proposed development, mitigation techniques, and significance of predicted impacts after mitigation. Some EIS were mostly reliant on existing background information, while others integrated new field data. In general, field studies were limited to a single season.

Some EIS' contained rationales to adjust the boundaries of some EPA's, or to eliminate them. The assessment of impacts encompassed predicted effects of changes to hydrology, water quality and groundwater, key roads close to EPA's, impacts to wildlife, removal of habitat, water quality, effects on tree rooting zones, introduction of urban activities, and alteration of fish habitat. Recommended mitigation approaches included:

- buffers (generally 10 meters but occasionally greater due to irregular natural area boundaries)
- fencing of lots backing onto EPA's
- 'sensitivity clauses' on title of lots
- pet control by-laws
- rehabilitation or restoration plantings
- recommendations for trail placement and surface treatments
- construction protocols to protect vegetation and minimize soil erosion
- stormwater Best Management Practices to match predevelopment conditions
- natural channel design of affected streams

- environmental inspection during construction
- use of indigenous vegetation in plantings
- measures to control human access
- post-development inspection, monitoring and management

EIS reports all concluded that the implementation of these mitigation measures would result in "no net impacts", and in some cases, "positive benefits" derived from urbanization. Buffers that exceeded 10 m were principally comprised of EPA 2 lands, contrary to OPA 129 objectives.

The Subdivision Agreements obtained from the Town are summarized in Table 3. In general these contain consistent clauses regarding the studies and standards which developer s are required to fulfill, which reflect many of the EIS recommendations. Some relevant standard clauses are presented in Appendix B.

In addition to the relevant policies and guidelines, the FSP's, EIS' and Draft Plan Conditions, Landplan Collaborative Ltd. prepared "*Homeowner's Manual Oak Ridges – Partners in Conservation*", an educational brochure for new residents on behalf of land developers and the Town of Richmond Hill. This document identified residents as the "key players in environmental conservation" in Oak Ridges. The guide advised residents on:

- forming 'neighbourhood watch' groups to protect natural features
- maintaining buffers and treed areas in a natural state
- keeping rear yard fences in good repair, precluding access to EPA's except where planned and designated
- keeping compost out of EPA's
- keeping to designated trails
- pet controls
- avoidance of invasive plant species
- careful use of pesticides, detergents, and petroleum products
- awareness of restrictions on lot titles
- educational programs offered by the town and others

In general, the FSP, EIS, Draft Plan Conditions and homeowner brochure were similar in scope and details to those currently in use in most major municipalities in southern Ontario. The EIS were principally reliant on data from the Gore and Storrie Phase II Environmental Studies for OPA 71 (1993), with minimal updating of field information. In our experience, subwatershed-scale information such as that provided in the Gore and Storrie study is intended to guide secondary planning; most municipalities require more detailed site-specific studies in support of draft plan submissions.

There was a variable level of detail in the EIS documents, and usually only summary documentation of site specific features rather than more detailed accounts with species lists. The EIS were focused on site-specific circumstances, and generally did not present a cumulative effects view of the future ecosystem, beyond a prediction of "no net effects". Most EIS did not refer to scientific literature in their consideration of matters affecting landscape ecology, alternative approaches, impacts or mitigation.

Some EIS were written with clear third-party objectivity on contentious issues, while others glossed over information that might place the approaches advocated under closer scrutiny. For example, one EIS which addressed multiple development areas, repeatedly noted that there were no provincially vulnerable, threatened or endangered species present in the habitats under discussion; however there was no discussion of regionally or locally significant species, or species with specialized habitat requirements, despite the fact that the protective measures and linkages should specifically address the needs of these species in order for the natural heritage system to function effectively.

According to Town staff, there were no natural heritage monitoring reports on file for OPA 129 lands as of October 2000. The witness statement (dated July 4, 2000) of Owen Scott, a landscape architect working for the Yonge West developers for the Yonge East/West OMB hearing, indicated that some monitoring had occurred within OPA 129 Study Area A. He stated that the quantitative monitoring system for wetland vegetation was abandoned because it was found to be unworkable and "*subject to vandalism or natural disaster occurrence*". It was replaced with "*surveying and photographing a number of selected locations*" i.e. a qualitative approach. Baseline monitoring of wetland birds and amphibians was conducted in the summer season of 1997 and therefore was incapable of detecting the critical breeding populations. Sampling (presumably in the proper periods) was initiated in 1999, after development was well underway. Despite these and other problems, Mr. Scott concluded "*The 1999 survey results are not conclusive vis-à-vis changes due to recent construction, as no reasonable comparison can be made between the 1992(i.e.* Gore & Storrie) *and 1999 surveys. However, it can be inferred that there is little likelihood of negative impacts to bird and/or amphibian life due to construction.*" Based on our own observations in Study Area A in 2000, we observed extensive evidence of conditions that would inhibit amphibian migration and breeding (see following section).

4.3 Field Performance Assessment

Field assessments conducted between March and October 2000 generated a file of 273 photographs. Reference photographs as well as those of problem situations and conditions were taken in areas of active development, in the vicinity of recently completed developments, and in longer-established residential neighbourhoods. Some impacts encroaching beyond the OPA 129 lands onto Yonge East/West sites were documented. Overall photo locations are summarized on Figure 1, and Table 4 presents a summary of issues photo-documented, in particular draft plan areas that were under active development at the time of fieldwork. Table 5 summarizes general observations on the type and extent of situations observed based on the fieldwork and air photo analysis. Appendix A contains a selection of 33 colour photographs, covering a representative range of sites and issues.

The results as summarized in Table 5 indicate both positive and negative trends in efficacy of natural heritage protection and management:

- EPA 1 areas have been retained outside of development; however, development and/or construction activity has encroached into EPA 2 areas.
- Obvious efforts have been made to improve post-development connectivity, including planted linkages, placement of stormwater facilities to increase the mass of naturalized cover, and construction of 'toad tunnels'.
- The natural area retained within development is too limited compared to overall landscape area, and the existing/new linkage connections are too fragmentary to ensure that natural species and functions can prevail in an urbanized context. The relative impervious surface area, which is a key indicator of functional dominance, clearly exceeds the total area of preserved natural landscape.
- Inadequacies of lot and buffer design represent the most serious source of construction and occupancy impacts. Many lots backing onto EPA's were clearly too small to permit routine backyard activities and practices without directly and indirectly affecting adjoining natural features and habitat functions.
- The 'minimum 10 m buffers' were not consistently implemented with respect to naturalized cover, management, fencing or gating, and within the built areas there was no evidence of buffer enforcement. The number of lots and residents involved is probably too daunting to achieve broad compliance despite efforts such as the homeowner brochure.
- Inadequate implementation, monitoring and maintenance of primary protective measures (erosion control and habitat protection) were the most pervasive problems on lands under active development. Sedimentation was noted in wetland and forest EPA's that would be difficult if not impossible to mitigate; these impacts will degrade features, prevent wildlife utilization, and generate the need for '**micro-management**' over time assuming the town or others are committed

to take remedial action (as mandated in OPA 129). These impacts compound the effects of changes in land use, initiating decline of the ecosystems represented within the EPA's.

- Deficiencies in design and site management practices during development (lack of interim treatment of exposed subsoils, insensitivity to landform, and use of exotic species in 'naturalization') were relatively widespread, and compound the effects of inadequate maintenance of primary protective measures (see above).

Stormwater management facilities that were completed or under construction in OPA 129 at the time of fieldwork have integrated existing wetland EPA's into the extended detention areas. We identified a number of problems in OPA 129 facilities that support the long-standing opinion among wetland specialists that natural wetlands and their functions are not compatible with urban stormwater management. Major sediment events, and urban runoff pulses, were clearly evident wherever wetlands were located downstream of stormwater facilities.

Our staff have been actively engaged in the inspection of residential developments and construction sites since the mid-1970's, and in development monitoring for periods of up to five years at given sites. We consider the condition of the active development sites observed in OPA 129 to be comparable to those in most other municipalities that we have observed off the Moraine. There was considerable variability observed between active development sites, with environmental management of construction ranging from acceptable to inadequate. Table 4 indicates the draft plan areas where the widest range of deficiencies were identified. Post-development conditions were more uniform but obvious inadequacies exist in terms of lot size, buffers, and ultimately the ability of the developed landscape to sustain pre-development natural features and functions. The significance of these inadequacies is discussed in more detail in the following section.

There are key differences between the OPA 129 lands and other settings in southern Ontario, including the topographic complexity of the Moraine sites, and the extensive presence of sensitive natural features i.e. kettle wetlands and associated vegetation fringes. These features are more vulnerable to permanent damage based on their topography, catchment hydrology, size and vegetative character than, for example, contiguous forested valleylands, or tableland woodlots with relatively gentle topography.

Table 4: Summary of Performance Issues Identified Within the Active OPA 129 Development Areas (March to October 2000)

		Observed Impacts									
Study Area	**Subdivision Draft Plan No.**	**Inadequate buffering**	**Substandard lot design**	**Landform conservation**	**Habitat alteration / destruction / disturbance**	**Erosion / Sedimentation**	**Exposed soils**	**Substandard maintenance**	**Exotics**	**Refuse**	**Injury to vegetation**
A	19T87095	X	X	X	X		X		X	X	
A	Fidele & DePede (number not available)	X	X		X				X		
A	19T89042	X	X	X	X	X	X	X		X	
A	19T89012	X	X	X	X	X	X	X		X	
A	19T89042	X	X	X	X	X	X	X		X	X
A	19T90051				X						
B	19T88038	X				X	X	X		X	
B	19T86100							X			
C	19T88046					X		X	X		
C	19T88083					X					
D	19T93029	X			X	X				X	
D	19T84043	X		X	X	X		X			X
D	19T88038			X	X	X	X	X			
D	19T88083								X		

Table 5: Summary of Observations in OPA 129 Study Area

Planning and Design	Buffer Adequacy	Buffers are of insufficient size, form and function to protect adjacent natural features; in many cases they are incapable of buffering against construction impacts let alone future resident impacts Buffers lack basic components required to offset resident impacts. Standards for fences are variable, gates are permitted, and naturalized barriers have not been established. The above-noted conditions were widespread in OPA 129
	Habitat Conservation	Evidence of removal or damage to of habitats in EPA's and linkages was observed This above-note condition was not widespread in OPA 129 Natural wetlands have been incorporated into SWM facilities; this does not appear to meet OPA 129 standards.
	Landform Conservation	Significant grade changes were noted between lots and natural features e.g. differences of several metres between natural features and adjoining lots These conditions were fairly widespread in OPA 129
	Adequacy of Lots	Major groupings of lots backing onto various categories of natural features are of insufficient size to discourage encroachments onto adjoining natural features The above-noted condition was considered widespread in OPA 129
Construction	Erosion Control	Sediment control measures (filter fences, check dams) were in evidence in most active development sites within OPA 129, but were inadequate or in disrepair in locations adjacent to natural features, resulting in sediment deposition to adjacent EPA's Significant sediment flows from SWM facilities into natural wetlands were observed. Deficiencies in sediment control were widespread in OPA 129
	Debris Management	Discarded, windblown or surplus building materials were observed in natural features adjacent to all development sites.
	Exposure of Subsoil	Large areas of subsoil were exposed and unvegetated for prolonged periods, some apparently for more than a year based on air photo evidence and field studies
	Habitat Protection Measures	Evidence of protective measures using snowfencing and/or sediment fencing was widespread but with notable exceptions Maintenance of protective measures appears uneven and sporadic Natural features have been subjected to minor to major damage from grade modifications, filling, sediment deposition, and refuse dumping. There were inconsistencies in protection observed within some developments e.g. fences removed for temporary access, and not replaced Toad tunnels have been repeatedly blocked during and post construction Grading and disturbance of natural features was observed outside the approved limits of development (i.e. on Yonge East and West).
	Maintenance	Regular inspection & maintenance of protective features does not appear to be a standard practice in OPA 129 developments
Homeowners	Maintenance of Buffers	Homeowner impacts to buffers were common included mowing, damage to trees, exotics plantings, and compost dumping In some areas these impacts extended beyond the buffer into the protected EPA. Buffer enforcement, management, or signage was not evident in built areas
	Exotic Species	Inappropriate plant species were observed within buffers and natural areas This condition was most widespread in longer-established residential areas and along recreational paths.
	Refuse Control	Garbage, debris and compost dumping were widespread. Construction debris was still evident in natural features beside completed developments No evidence of local cleanup efforts in natural features was observed
	Pets	Dogs in fenced backyards were prevalent, sometimes several on a single lot No cats were encountered

5 Discussion

OPA 129 Policies, Documents and Process

The present study highlights the gap between possessing a progressive policy framework, intended to protect natural heritage as its highest priority, and the persistent dilemmas posed by suburban development. The gap begins with an assumption at Official Plan and OPA levels, that the sensitive habitats, species and ecological functions that have long persisted in an agricultural setting (based on data reported by Mayall (1938) for King Township), can be successfully integrated in close proximity to urban development. Local populations of sensitive species (such as forest-dependent migratory amphibians, and area sensitive songbirds) have successively 'winked out' or become extinct in GTA natural areas as the relentless process of suburban development has marched onward. Does the OPA 129 "Environment First" approach offer a significant improvement?

The subwatershed planning process leading to the OPA 129 plan, lengthy OMB hearing, and extensive documentation required for subdivision approvals, could be read as being a heavily-funded and diligent process leading to natural sustainability. In our opinion, apart from the "Environment First" captioning, the process is very similar to current development practices in other major municipalities in southern Ontario operating under Official Plans based on the Provincial Policy Statement. The lengthy process and its products reflect what has become an intensely adversarial process of micro-managing the loss of development yield. After the technical debates between consultants and agencies end, the natural landscape is given centre stage in marketing on flashy billboards and media ads touting forested glens and vistas. And there is little doubt that the home-buying public appreciates this landscape.

The documentation supporting development proposals in OPA 129 is voluminous, but not essentially different from the approaches in other major development areas. The field study and available science that formed the basis of the subwatershed level information (i.e. Gore & Storrie 1993) is now quite dated yet continues to be used as the primary resource to plan development. The EIS do not appear to have significantly updated the field data, and therefore would probably not meet municipal, regional or conservation authority guidelines in some jurisdictions in terms of level of detail. There are clear indications of issues and information that has been glossed over to avoid difficult mitigation situations. Recent literature should be brought into analysis, even if it raises serious questions about development or municipal objectives. A key problem is that the objectives of OPA 129, like those of the PPS, require that the EIS conclude at the end of the process that there are "no negative impacts". This places a consultant in a difficult bind, particularly when a client / proponent is unwilling to be flexible in response to real biological issues. Gestures such as the construction of 'toad tunnels' may sidestep the real issues of inadequate site specific baseline data, changing landscape functions and scale issues that should have been effectively addressed in the larger picture.

The matter of consultant independence is important if realistic, innovative and affordable solutions are to be found. Consultant teams on large development projects are managed by planners, lawyers and engineers, who scrutinize, query and often even package the findings, data presentation and opinions of team biologists. There is a tendency to expect all members of the team to 'sing from the same song sheet' and to become development advocates when discussing the proposal with the municipality and agencies. The completion of EIS and technical studies by consultants retained independently from the proponent's team is one approach that has been adopted in one municipality to reduce this conflict. The effective and

regular use of peer reviews is another approach. Consultants should always deal directly with agency staff, rather than second hand.

Many of the recommended mitigation measures (e.g. monitoring, stewardship, exotics control, pet control, buffer enforcement and management) create future burdens on municipal resources. In essence they represent an additional 'hazard' of land use generating future liability for action and remediation. This was acknowledged in the Town of Richmond Hill's Environmental Management Framework (1996) and Richmond Hill Corridor Study (1998), which outlined intricate steps and processes to design, monitor and maintain natural heritage after development despite elaborate protective and corridor measures, yet only partially mitigating (according to the Corridor Study) the impacts of the landscape level changes associated with urban development. Such recommendations have been around for more than a decade, yet most municipalities in southern Ontario still lack the qualified personnel (i.e. biologists and stewardship coordinators) and programs to even begin to address these issues. Large municipalities such as Toronto and Mississauga are struggling with these issues without a high degree of success due to their scale and complexity, according to staff who are on the front lines. The reliance on Conservation Authorities for expert support in these areas can create further approval cycles and delay program advancement. The downloading of responsibilities onto new residents is a trendy approach that also requires special handling by municipal and agency staff. It assumes community consensus, skills and maturity that are lacking in new development areas, and may further increase the liability base of municipalities.

The Landscape Matrix

Figure 1 gives a landscape view of the OPA 129 lands as they underwent development in April 2000. It is clear in this image that EPA 1 and 2 features (core natural areas and supporting features) occupy a minimal footprint area within the former agricultural and existing residential lands.

Forman & Godron (1986) defined the **landscape matrix** as: "*the most extensive and most connected landscape element type present, which plays the dominant role in landscape functioning*". In the predominantly rural landscape preceding OPA 129, the matrix was cultivated land, which dominated key ecosystem processes such as runoff, infiltration and nutrients. While not a perfect landscape from the standpoint of natural functions, this landscape did sustain quality species over many decades since forests were cleared.

As Figure 1 demonstrates, urbanization places construction and long term residential activity at the immediate doorstep of EPA 1 and 2 lands, and dominates runoff, infiltration and nutrient relationships in a profoundly different manner. Simultaneously, **landscape resistance**, which Forman (1995) described as "*the effect of structural characteristics of a landscape impeding the rate of flow of objects (species, energy, and material)*", has dramatically increased under urbanization. Salamanders that successfully crossed rural roads and frozen agricultural fields, now cannot climb the curbs of residential streets. Under these circumstances the role of remaining natural core and linkages obviously becomes paramount, assuming the desire to protect these ecosystem elements is genuine.

The agricultural matrix was also conducive to the movement and habitat needs of generalist species such as deer, coyotes, raccoons, skunks, toads, mice, chipmunks, and voles. Although these species are less sensitive (and several could benefit from urbanization), some common species such as toads, chipmunks and voles are negatively affected. Agricultural fields also have a relatively benign effect on native plant guilds including Trilliums, ferns and other woodland wildflowers. The urban matrix produces dramatic microclimate, hydrologic and biochemical changes, of a scale and magnitude that even the largest protected natural areas fall fully within the acute impact range of specific stressors.

Buffers and Adaptive Management

Any discussion of development related impacts leads to consideration of buffers and development setbacks. On July 13, 2000, natural heritage experts for the Oak Ridges Moraine hearing came to the following agreement regarding the functions of a buffer, which consisted of the following:

- protection of natural heritage features from development & vice versa
- vegetation management
- trails
- control of invasive plants and animals
- providing habitat
- erosion control
- slope stability
- noise attenuation
- light attenuation
- chemical attenuation
- mitigation of encroachment
- temperature attenuation
- wind attenuation

In our experience, buffers from new development must operate at two stages to be effective:

> *Stage 1*: Prevent or minimize severe impacts to biological and ecological systems due to relatively sudden change in land uses i.e. physical changes to landforms and hydrology.
>
> *Stage 2*: Ensure the ongoing health and ecological integrity of biological and ecological systems in the context of ongoing human activities.

The ability of buffers to facilitate **adaptive management** is recognized as important in natural area management. Adaptive management was defined by Dunster and Dunster (1996) as *"A dynamic planning or modeling process that recognizes the future cannot be predicted perfectly. In response to these imperfect predictions, planning and management strategies are modified frequently as better information becomes available."* Peck (1998) discussed the value of adaptive management for the management of natural areas and implementation of conservation plans, and highlighted the need for a long term view and institutional commitment. Buffer planning should reflect an adaptive management approach which acknowledges uncertainties, evaluates alternative approaches according to objectives, subjects the chosen alternative to long term monitoring, and can later be adapted to ensure that objectives are achieved.

Buffers assigned in OPA 129 lands are generally 10 m; in some areas they are ostensibly greater, but the deeper 'buffers' often consist of EPA 2 lands, contrary to OPA 129 objectives. In general, 10 m buffers will not be effective at achieving most of the objectives identified by the experts, particularly those related to protecting and sustaining significant functions. A 10 m buffer is really an 'arboricultural' setback that may protect the roots and branches of edge trees. Although theoretically adequate to provide filtration of nutrients and sediments contained in post-development runoff from backyards, it is often inadequate to achieve interim management of hydrology associated with the residential development process. This was clearly evident in the OPA 129 development area where grading encroachments and breaches in erosion control were the most regular disturbances that we noted. Inaccuracies in topographic mapping, equipment scale and operator skills, site management and municipal lot grading requirements tend to render the natural feature the net loser. A 10 m buffer provides virtually no possibility for adaptive management in the short term, let alone the long term.

Corridors

OPA 129 plans incorporate a variety of existing and new corridors or linkages to connect core areas. There is substantial evidence as to natural corridor value under rural conditions, but minimal empirical knowledge as to how they operate under urban circumstances. Only two out of 80 relevant studies on corridors have even considered urban settings. There is ample empirical evidence that habitats located in close proximity to residential areas are subjected to high levels of encroachment and degradation, which most municipalities cannot address as they lack resources and qualified personnel. There is no reason to expect that the narrow linkages that are intended to replace the functions of the low resistance agricultural matrix can sustain ecological integrity. In our opinion the approaches expressed under OPA 129 convert natural features to 'green amenity areas' dominated by urban matrix functions, resulting in 'winding down' of their ecological integrity.

A related concern, clearly manifested on the OPA 129 lands, is the lengthy and often uncertain timeframe within which the conversion from agricultural land to a linked urban natural heritage system will occur. There is an implicit assumption that species and habitats can withstand the intense and lengthy development period before the final system achieves a level of completion and maturity when connective functions, previously afforded by the low landscape resistance agricultural matrix, theoretically begin to operate efficiently. The exposure of large areas of subsoil for a year or longer, failure to establish plantings of connective links in advance of development (see the witness statement of Owen Scott cited above) basically means that natural landscape functions are constrained or rendered inoperative for periods of months or years. Under the Federal Fisheries Act, development works affecting fish habitat are proscribed with seasonal limits to protect breeding and migration. There is no such protection for terrestrial organisms.

Wetland Protection

Kettle based wetland systems are closely defined by the function of the internal catchments that contain them. Even minor changes in runoff will alter wetland composition and structure; wetlands experience 'semi-tidal' water table fluctuations 10 to 30 times more frequently under urban than under non-urban conditions (Schueler 1992). This explains why species-rich wetlands convert to virtual monocultures when urbanization occurs. Reinelt and Taylor (2001) reported that natural wetlands with constricted outlets were subject to highest mean water level fluctuations under conditions associated with urbanization. Protection of entire catchments is the only approach likely to prevent degradation of these wetlands. Scientific research on amphibians and turtles has identified habitat needs which extend more than 120 m beyond the limits of wetlands. Dodd and Cade (1998) and Semlitsch (1998) cite amphibian species moving 700-900 m from breeding ponds. Wetlands, and kettle wetlands in particular, cannot be hydrologically or biologically protected from urban matrix functions using 10 m buffers.

Residential Encroachment

Encroachment by residential uses is a key matter which has profoundly affected remnant habitats in southern Ontario. It is an issue at various scales, whether in the context of farmland, or residential (estate, low density, or higher density). Matlack (1993) summarized the extent of human impacts into suburban forest fragments in northern Delaware, which included dumping of all types of compost, rubble and debris, pruning and vandalism of trees, extension of lawns, construction of huts and treehouses, campsites, and firewood gathering. In his study these impacts extended up to 70 m into forest fragments. Such impacts are a persistent problem in southern Ontario municipalities, and eventually require municipal intervention in areas comparable to OPA 129, as the following examples demonstrate.

An encroachment study in Kitchener (Taylor, 1992) examined residential encroachments into regionally-designated Environmentally Sensitive Policy Areas (ESPA's). Of 444 lots studied, encroachments were observed on 88% of lots. Types of encroachments onto 'protected' lands included:

- Extension of mowed, planted or cleared property
- Private laneways constructed
- Construction of fences
- Pool construction
- Construction of sheds, swing sets, composters
- Woodpiles and abandoned vehicles
- Construction of permanent buildings
- Dumping of yard debris and garbage, building materials
- Spread of exotic plant species

Since 1999 the City of Mississauga has dedicated four staff to document encroachments by residents onto City owned open space (E. Furgiule, pers. comm., 2001). They have documented more than 5,000 individual encroachments; by-law enforcement notices were issued to residents. The City has increased its liability coverage to protect itself from the risks associated with encroachment. In June 1999 the City adopted a tougher policy on Open Space fencing that includes provisions for publicly owned fences as private ownership often encourages encroachment.

In our own work on development sites, we have witnessed significant encroachments within 1-2 years after lot occupancy. In longer-established communities, we have observed major encroachments despite natural buffers exceeding 30 metres in depth. Residential encroachment is a fact of life in urbanized municipalities, causing negative changes to natural habitat quality, structure and functions including (Taylor, 1992):

- Structural changes – loss of native species, damage to physical structure, soil compaction and erosion;
- Functional changes – changes in nutrient cycling, microclimate, decomposition;
- Uncertain long term implications.

Exotic Species

Exotic or introduced plant species have emerged as a significant issue in natural area management in North America and globally. In general, species have spread from introductions, either through direct planting, or dissemination by wind, water or wildlife. They can affect forest, wetland or meadow communities. Urban Forest Associates and the Federation of Ontario Naturalists (undated) produced a list of more than 50 species considered to be problematic in Ontario.

The reasons that these species have become problematic are varied and in many cases not fully understood. Plants such as Periwinkle (*Vinca minor*) are intentional introductions that take over shaded forest and gradually eliminate diverse wildflower species. Very aggressive species such as Garlic Mustard (*Alliaria petiolata*) and Dog Strangling Vine (*Cynanchum* spp.) are less well understood, and represent a significant threat to valued native species such as the Trillium and other shade-adapted flora. Common Buckthorn (*Rhamnus cathartica*) is a shrub species that is upsetting normal forest succession processes, and a recent study (Schmidt & Whelan, 1999) indicates that its presence is affecting nesting success of songbirds. Norway Maple (*Acer platanoides*) is a widely planted exotic shade tree that is invading natural forests and contributing to erosion and habitat degradation on slopes and in ravines.

The spread of non-native species into natural ecosystems is in part a response to environmental stress. Our understanding of how stressors affect plant communities is limited. There is now evidence (van der

Heijden et. al., 1998; Read, 1998) that fungal microbes associated with the root tips of plants are closely tied to succession and the expression of plant community diversity. Disruption of such close relationships by urban-related stressors such as drought, compaction, hydrologic change, heat and nutrient deposition may undermine native plant communities, replacing diverse cover with exotic monocultures within a few years.

Havinga et. al. (2000) produced a strategic plan to manage invasive plants in southern Ontario in order to restore and sustain native plant communities; it entails a high level of site-specific micro-management for common exotic problem species in urban areas. Management of invasive plants is already proving a daunting task to municipalities in the GTA. The City of Toronto has conducted pilot studies on the control of a number of species including Garlic Mustard, Norway Maple, and Dog Strangling Vine in ravines and parks. The current literature on these species suggests that intensive control efforts, typically involving manual labour and herbicide treatment for five years or longer, are required to achieve control.

Obviously, the placement of residential uses at the doorstep of natural habitats is bound to expedite the movement of introduced plant species. Typically there is a rapid turnover of plant materials on residential lots; after occupancy a homeowner may introduce dozens of new species to their lot, discarding undesired plant materials into compost heaps, or into the buffer. Problem exotic species constrain the resources of municipalities in areas where intensive residential development interfaces with an extensive network of natural habitats. Cost-effective adaptive management using prescribed burns and herbicides is possible but politically infeasible due to inadequate buffers, requiring more labour-intensive methods. The buffers applied in OPA 129 are clearly inadequate to allow cost-effective adaptive management.

What Can be Done?

While much of the preceding discussion can be perceived in a negative light, it is obvious that changes are already being made in the way that natural heritage is planned and managed in urban settings. The Oak Rides Moraine Conservation Plan is just one such manifestation. Discussions of more realistic solutions are also ongoing in other communities across southern Ontario as these issues come forward in growth management studies, Official Plan reviews and Secondary Planning. Obviously the working model envisioned by the "Environment First" approach and Provincial Policy Statement must become more sophisticated and reality-based if the stated objectives are to be achieved. In our opinion, future risk management strategy planning should subscribe to at least three levels of natural heritage from the standpoint of future management:

1) **major features** sufficient in size (or capable of enhancement) to sustain basic integrity and functions without regular micro-management; these are primarily rural i.e. Moraine Escarpment countryside areas;
2) **mid-scale features** that can be rebuilt, buffered and enhanced to sufficient size to sustain mostly native/natural systems despite moderate human impacts, with regular maintenance. These are potentially compatible with urbanized settings, but are designed to allow meta-management and complementary land uses; larger features on the OPA 129 lands would have met this level in terms of scale and quality;
3) **backyard-level 'green amenity' features** that perform primarily aesthetic functions and may have seasonal value for migration etc., but are accepted as primarily urban-dominated spaces where maintenance efforts focused on building further integrity will be minimized. Although this is how most urban natural areas are treated today, ideally these should be created habitats suited for trails and backyard screening.

One initiative that may provide impetus for the achievement of protection of major and mid-scale features is the use of rural separators between major urban areas. The Halton Urban Structure Plan proposed an urban separator along the East Brach of the Sixteen Mile Creek in Milton, to separate the expanding

Milton community from Mississauga. The City of Cambridge has proposed a 'countyside' buffer between northwest Cambridge and the adjoining City of Kitchener. These separators would enable the maintenance of agricultural matrix conditions and functional corridors encompassing major concentrations of habitat.

Effective monitoring and adaptive management are key tools that will gradually clarify cumulative effects and approaches that are more sustainable. However there must be realistic space and opportunities provided for cost effective meta-management of major and mid-scale features in the hierarchy. Research on urban corridor systems is badly needed, in order to test the assumptions that have emerged from scientific studies predominantly based in rural settings. The incorporation of current research results, such as those emerging from studies of urbanization effects on natural wetlands in the Puget Sound basin, obviously need to be addressed with updated provincial and municipal standards for stormwater management. By these and other measures, approaches to natural heritage protection and integration can be expected to advance dramatically over the next 1-2 decades.

The reduction in the tendency of planners to intensify future micro-management needs would probably reduce the costs of planning, development, and follow-up management of natural heritage systems. An assessment of these costs and the timeframes associated with development planning and approvals under OPA 129 would be extremely useful in order to streamline the process.

6 Conclusions

Personnel in our firm have been engaged in the ongoing inspection and monitoring of residential and other construction sites since the mid-1970's. Despite the "Environment First" principle, development and natural heritage protection in OPA 129 resembles the approach in most municipalities under the provincial Policy Statement. Key natural heritage features are protected in principle, but their quality, functions and ecological integrity can be expected to change (wind down) over time due to a) change in matrix from low to high landscape resistance, b) corridors inadequate to compensate for increased landscape resistance, c) inadequate buffers in the light of existing knowledge on encroachment effects, and d) large scales of urban 'footprint' effects relative to the limited area of natural cover.

Measures to monitor and adaptively manage impacts are limited by inadequate buffering that we believe will constrain cost-effective management. Lack of municipal human & financial resources to monitor and maintain, and political constraints on pro-active management are predicted if the municipality and other agencies fully accept the responsibilities implicit in OPA 129 policies and objectives.

The performance review found deficiencies in information management, and a generally cumbersome load of information requirements that results a micro-management-focused development process. In its implementation, weaknesses are apparent in monitoring, maintenance and enforcement of standard protective practices. The failure to follow through to date with monitoring reporting, at least as of October 2000 when our data collection ended, indicates that there is not an adaptive process in place that will increase compliance with OPA 129 objectives and the OMB conditions over time. There was clearly some unevenness in objectivity in the supporting EIS documents provided by some consultants, and these documents generally were not adequately visionary in terms of future ecosystem quality and functions.

Stormwater management facilities that are completed or currently under construction in OPA 129 have integrated existing wetlands into the extended detention areas. We identified a number of problems in OPA 129 facilities including inadequate buffering, sediment loading and urban pulse effects that further support the long-standing opinion among wetland specialists that natural wetlands and their functions are not compatible with urban stormwater management. Given the current science on urbanization effects, we

believe there will be permanent changes to these wetlands over a period of years, affecting their ability to sustain reliant plant communities and wildlife.

Although natural heritage features and functions could be partially sustained under a regime of intensive intervention, using resident education, and community-based stewardship, it is unreasonable to expect that new residential communities will contain the skills, commonality of landscape values, and consensus necessary to carry out such a project. These attributes will take many years to develop, and in the interim the natural heritage system will decline irreversibly. Similarly, because the natural heritage system will only be completed and functional long after OPA 129 lands are completely built out, ecological integrity will already have declined irreversibly.

Changes such as the introduction of the Oak Ridges Moraine Conservation Plan are already underway. This report recommends a review of natural heritage objectives to reduce the future risk and liability exposures of municipalities and agencies. Effective adaptive management, meta-scale management, and updating of urban design standards based on available science, are all tools that can improve natural heritage protection. Urban separators offer an approach to protect 'countryside' as part of a hierarchy of environmental features. Finally, a comprehensive review of costs and timeframes for development vis-à-vis natural heritage planning would identify areas where burgeoning micro-management needs could be curtailed.

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