

1. The Need for a Natural Heritage Strategy

Headwaters are where rivers are born.

In the City of Vaughan, water soaks into the height of land on the Oak Ridges Moraine north of Kirby Road, dipping south to Rutherford Road in the east. Clean, clear, cold water seeps from the ground where the water table intersects the surface, collects into the upper reaches of the Don and Humber Rivers, and flows downstream to the Great Lakes. As the water travels toward the Lake, its quantity and quality changes, reflecting the surrounding land use and altering the character and health of the water on which we rely so heavily for drinking, recreation, and natural habitat.

The quality of habitat within our watercourses depends on numerous factors including: underlying geology, human disturbance, and natural processes. Historically, forest cover, meadows, and wetlands would have surrounded streams and rivers in southern Ontario. First Nations once farmed and fished here. With the arrival of European settlers there has been an expansion of agricultural activities, increased settlement, followed by urbanization, commercialization and industrialization with concurrent development of transportation systems. The cost of our human success can be read in the changes in the patterns and functions of natural systems in the City.

It all starts with the water: groundwater flowing through the City sustains terrestrial (e.g., forests, fields wetlands and wildlife), and aquatic (e.g., rivers, streams and fish) habitats and provides humans with domestic, municipal, commercial and industrial water supplies. In maintaining and renewing our forests and wetlands, they in turn, clean our water as well as our air. Trees help to control wind and noise, regulate temperature and precipitation, increase the life span of roads and buildings, maintain privacy, improve human psyche and reduce “city rage”. It is estimated that in Oakville, the price of benefits provided by the trees alone exceed \$2,000,000 annually (Oakville Parks and Recreation Department, Forestry Section 2007). The David Suzuki Foundation estimates that ecosystems in the Greenbelt, such as wetlands and forests, provide \$2.6 billion in natural capital annually (Wilson, 2008).



Everything is connected. It has long been accepted that there is benefit in protecting specific natural heritage features (e.g., wetlands, wildlife habitat and watercourses). We now understand that, in order to protect our quality of life, we must protect systems (e.g., York Greenlands, the Greenbelt). Our treatment of the natural environment has significant consequences to our social and economic environments, and a healthy social and economic environment requires managing our natural environment with equal investment of resources.

Vaughan is embarking on a new sustainable future, and this summary aims to highlight the natural heritage features and functions from which people benefit. A more detailed description of the existing natural environment within the City of Vaughan is provided in Appendix C. The purpose of this document is to describe the rationale for a Natural Heritage Network within the context of the City of Vaughan Official Plan, and the methodology used to identify the Network.

I believe that humanity and the rest of the natural world are at a cross-roads. Down one road is a terrible fate for all involved, down the other is sustainability, and sustainability that will last for hundreds of years to come.

Eric Sanderson, Ph.D., Associate Director of the Landscape Ecology and Geographic Analysis Program at the Wildlife Conservation Society

1.1 City of Vaughan: Catalogue of Natural Heritage

The document “Natural Heritage in the City of Vaughan: Background for the Official Plan – Draft Existing Conditions Report” (AECOM 2008) (Appendix C) is a technical document that provides an overview of the natural environment context for the City of Vaughan. It is a summary of existing background information by discipline that seeks to identify linkages among disciplines (e.g., surface to groundwater, watercourses to fish habitat; woodlands and wetlands to wildlife habitat). These core features are the anchors over which the Natural Heritage Network has been draped. It is expected that this technical document will inform subsequent studies to justify applications for land use change and management planning exercises. The footprint of natural heritage features has undergone dramatic change in southern Ontario since European contact post 1600. Forests have been removed to make room for agriculture, homes, roads and commercial development; wetlands have been filled; streams and rivers have been realigned and channelled; and species composition through fragmentation of habitat and subsequent invasion by non-native invasive species.

“We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect.”
~ Aldo Leopold

The City of Vaughan still enjoys a relatively rich assemblage of Natural Heritage Features which includes a linked system of watercourses, woodlands, wetlands and wildlife habitat. These features have been inventoried and mapped by Toronto and Region Conservation Authority (TRCA) in desk-top exercises and ground-truthing activities. Terrestrial Natural Heritage Systems (TNHS) have been identified for both the Humber and Don Watersheds. Additional information has been provided by the Ontario Ministry of Natural Resources (OMNR) through wetland and ANSI evaluations, by individual consulting firm reports, York Region’s Significant Woodlands Study and by the City of Vaughan through the OPA 400 Subwatershed Study, and woodland assessment studies.

The Key Natural Heritage Features and Functions within the City of Vaughan are described in detail in Appendix C. They can be grouped into four main categories:

1. Bedrock and Surficial Geology, Hydrology and Hydrogeology;
2. Aquatic Habitat and Fisheries;
3. Terrestrial Habitats, Wildlife and Connectivity; and
4. Designated Areas.

1.1.1 Bedrock and Surficial Geology, Hydrology and Hydrogeology

Vaughan’s landscape is characterized primarily by a gently rolling plain composed of glacial soils (till and glaciolacustrine deposits) (Figures 3, 4, 5, Appendix C). The Oak Ridges Moraine, a significant geologic feature, makes up the northeastern part of the City designated the “Maple Spur”, a regional earth science Area of Natural and Scientific Interest. The Oak Ridges Moraine is a regionally important groundwater recharge area due to the porous nature of its constituent substrates. The important discharge areas within Vaughan are associated with river valley systems.



The hydrogeological features of Vaughan have important implications for planning. The proximity of infrastructure to recharge or discharge areas may affect water resources that are used by humans and support the natural environment. Reductions in upwelling in groundwater-fed wetlands can potentially reduce vegetation diversity, and reduced discharge into sensitive reaches of streams could create an impact to fish habitat and spawning grounds. Studies in source water protection, revisions to stormwater management criteria and support for The Living City Policies by TRCA have resulted in the mapping of significant recharge areas.

1.1.2 Aquatic Habitat and Fisheries

Watercourses are an important component of our landscape (Figures 6, 7 and 8, Appendix C). Streams, rivers, ponds and lakes provide valuable habitat for fish, amphibians (frogs, toads and salamanders), reptiles (turtles and snakes), insects and birds. Aside from the aesthetic values, watercourses also provide opportunities for recreational activities such as fishing, bird watching and canoeing that benefit people living in the watershed.

Portions of two watersheds fall within the City of Vaughan: the Humber River and Don River. The cleanest water in the City is associated with groundwater inputs from the Oak Ridges Moraine drained by these systems. The poorest water quality is associated with the more highly developed southern portion of the watersheds.

Forty-eight fish species have been found in the Humber River Watershed, compared to 35 fish species in the Don River Watershed. Two have been identified as Species at Risk¹ by COSSARO. The Redside Dace (*Clinostomus elongatus*) is a cool and cold-water insectivore, now listed as Endangered in Ontario. The Northern Brook Lamprey (*Ichthyomyzon fossor*) is a non-parasitic filter-feeder considered to be a Species of Concern.

1.1.3 Terrestrial Habitats, Wildlife and Connectivity

Natural cover in its many forms performs a multitude of ecosystem functions, most of which result in social and economic benefits to society as a whole. They include the provisioning of habitat for migratory birds and other wildlife species, improvement of air and water quality, reduction of stormwater runoff and erosion control, mitigation of urban heat island effects, sequestration and storage of atmospheric carbon, recreation, buffering of noise pollution, improved physical and mental health for residents, economic resources such as timber, berries and mushrooms and increase in property values close to natural areas. Although forest and wetland communities are frequently described as performing most of the described functions, meadow and thicket communities are also capable of providing many of these services. There is however a whole spectrum of performance capabilities according to natural cover type, and generally, communities with greater structural complexity (multiple vertical layers) and a greater woody component (trees) are most effective at providing these services. In addition to community type, the size and health (quality) of a community dictate the capabilities of a system to perform a particular function. Wetlands play an important role in our landscape and have a variety of key attributes including providing habitat for numerous species, flood control, water quality improvement, climate regulation, and recreational activities.



The City of Vaughan is in a transition zone between the Carolinian and Great Lakes – St. Lawrence floristic regions. The natural cover is predominately deciduous and mixed deciduous forest, with lesser amounts of meadow, thickets and wetland communities. Nineteen percent natural cover remains in the city, 16% of which is in the form of forest communities (TRCA 2007). Just over 1% wetlands remain in Vaughan, down from an estimated pre-settlement value of 5%. Just over half of the remaining natural cover within the city is in river valley systems. Forty-six percent of remaining cover is within the Greenbelt area of the city, of which 14% is on the Oak Ridges Moraine (Figures 10, 11, 12 and 13, Appendix C).

1. A "species at risk" is any naturally-occurring plant or animal in danger of extinction or of disappearing from the province. Once classified as "at risk", they are added to the Species at Risk in Ontario (SARO) List.

Two regionally rare plant communities and 29 regionally rare plant species have been identified in the City. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and Committee on the Status of Species at Risk in Ontario (COSSARO) designated Endangered Butternut tree (*Juglans cinera*) has also been observed in a number of locations throughout Vaughan.

One hundred forty-seven bird, 12 amphibian, five reptile and 22 mammal species have been detected in the City of Vaughan, 22 of which are designated as Species at Risk (SAR) (COSEWIC and/or COSSARO) or Provincially Rare (Natural Heritage Information Centre [NHIC]). The SAR list is constantly under revision. The highest concentration of bird species occurs within the ESA and valleyland communities to the west of Pine Valley Drive and to the east of Keele Street on the Oak Ridges Moraine (ORM). Although there is a low incidence of wetlands in Vaughan, amphibians have been detected in most riparian areas along tributaries, except in the highly developed southeastern part of the city. However, the highest concentration of breeding amphibians (and reptiles) have been detected in the wetland, meadow and forest communities encompassed by the ESAs west of Pine Valley Drive and the valleylands of the Humber River.

“Identifying elements that favour ecosystem connectivity such as:

- increase protected area size;
- establish buffers and easements;
- reduce habitat fragmentation;
- provide migration corridors;
- conserve sources of propagules and colonists;
- conserve refugia for sedentary species; and
- reduce edge effects and increase opportunities for adaptation of protected area ecosystems to large-scale disturbances such as climate change.”

The Parks Canada approach also states that “ecological restoration is as much a process as it is a product. The actions of restoring an ecosystem bring people together, often in significant ways that lead to a renewed engagement between people and ecological processes” (Gann & Lamb 2006). These participatory and cooperative land management strategies are important components of a multi-scaled approach to halting and reversing ecosystem fragmentation. (Parks Canada 2008)

http://www.pc.gc.ca/docs/pc/guide/resteco/guide_e.pdf

Wildlife corridors are defined as linear features or vegetated strips that differ from the surrounding matrix, connecting two or more natural features within a landscape. Sometimes patches of vegetation or hedgerows act as stepping stones among larger features and help to connect the landscape for wildlife and plants. Corridors increase the effective size of core² areas within a fragmented landscape so that ecological processes and wildlife can function as

they would in areas with contiguous natural cover. Corridors in Vaughan exist in a north-south direction along the Humber and Don Rivers. However, these corridors are largely isolated from each other with little existing connectivity in the east-west direction. In central Vaughan, there is a north-south barrier as a result of urbanization that can be partly mitigated through stewardship programs promoting backyard biodiversity, and policies that limit intensification within the valley corridor.



Environmentally Significant Areas) (Figure 14, Appendix C). These designated areas often represent the best examples of a given natural feature within that region. The analysis of the natural heritage in the City of Vaughan

1.1.4 Designated Areas

The areas within a landscape that are identified as having unique or uncommon natural features are highlighted as designated areas (Areas of Natural and Scientific Interest,

2. Core areas are natural features of sufficient size and/or quality that they provide key ecosystem function and act as foundation blocks for natural heritage systems.

has followed the precautionary principle and incorporated the important natural features such as woodlands, wetlands and valley corridors. As a result, all of the designated areas have been incorporated into the Natural Heritage Network of the City of Vaughan.

Three Provincially Significant Wetlands (PSWs) have been identified in Vaughan: King-Vaughan Wetland Complex and Phillips-Bond-Thompson Wetland Complex, and East Humber Wetland Complex (Draft). An additional three wetlands have been identified as Locally Significant (LSWs): Tormore Wetland Complex, Hope Wetland Complex and Keele Wetland.

Six Life Science ANSIs have been identified in Vaughan ranging in size from 31 to 250 ha. The largest of the life science ANSIs, Maple Uplands and Kettle Wetlands includes a regionally significant Earth Science ANSI, the Maple Spur of the Oak Ridges Moraine. The ANSI includes a mixture of upland woodlands, kettle wetlands, old fields and shrub thickets.

In 1982, the TRCA undertook an Environmentally Significant Area (ESA) study which aimed to “identify areas of environmental significance and to suggest direction for their direction and management”. A total of 24 ESAs were identified in Vaughan that represent features and functions of both ecological and/or geological importance.

The science of landscape ecology has demonstrated that while protection of ANSIs and ESAs is valuable, their function, resiliency and capacity for enhancement is greatly increased when the features are linked.

1.2 Need for a Natural Heritage Network

Water flows; wildlife moves; plants disperse. In order to maintain healthy ecosystem functions in the City of Vaughan, it is necessary to identify a scientifically defensible network of natural heritage features and functions. They must be maintained in order for the residents to continue to benefit from the ecosystem functions they provide, including habitat for rich and varied native biodiversity. Although planning for much of the City is complete, the pressure for new urbanization both in greenfield areas as well as infill of existing neighbourhoods will remain. There will be additional changes, especially in those areas of the countryside across which linkages currently exist. There is a need to identify pathways of connectivity among the protected areas to ensure that healthy ecosystems will endure.

1.3 Study Purpose

The City of Vaughan has undertaken an ambitious *growth management program under the banner of Vaughan Tomorrow*. Its core programs are Vaughan Vision 2020, the Environmental Master Plan (EMP) and the Official Plan Review supported by an array of Master Plans for Transportation, Water and Sewers, Stormwater and Drainage and Recreation, together with the identification of Cultural Heritage Landscapes, an Employment Sectors Strategy and a Long term Financial Planning Model. Vaughan Tomorrow “will identify and address the ongoing challenges and opportunities that will shape the future of the City of Vaughan”. <http://www.vaughantomorrow.ca/>

The new Vaughan Vision (2007) will result in:

A city of choice that promotes diversity, innovation and opportunity for all citizens, fostering a vibrant community life that is inclusive, progressive, environmentally responsible and sustainable.

Lead and Promote Environmental Sustainability. To preserve, protect and enhance Vaughan’s natural and built environment through responsible leadership and innovative policies, practices and education.

Green Directions Vaughan: The Community Sustainability and Environmental Master Plan (2009) provides the following objective with respect to Natural Heritage in the City:

2.2.4. Develop a comprehensive Natural Heritage Strategy that examines the City's natural capital and diversity and how best to enhance and connect it. As part of this action:

- *Develop an inventory of Vaughan's natural heritage, and identify opportunities for habitat restoration;*
- *Ensure that policies in the City's new Official Plan protect all ecological features and functions as per current provincial and regional policies, and also include consideration for locally significant natural features and functions*
- *Develop policies to create opportunities for near urban agriculture within Vaughan's rural areas, through policies described in the City's new Official Plan*

The identification of a Natural Heritage Network is a key component in support of the strategy.

The new Official Plan will provide guidance for the physical development of the municipality over a 25-year period while taking into consideration important social, economic and environmental issues and objectives. The Plan will provide a policy framework that will guide the following:

- Where new development can locate;
- How existing and future neighbourhoods will be strengthened;
- How Vaughan's environment will be enhanced;
- What (and where) municipal services, such as roads, water mains, sewers and parks, will be provided;
- When and where Vaughan will grow



The purpose of this document is to support the new Official Plan:

1. To provide a description of the natural heritage resources in the City;
2. To provide a scientifically defensible methodology for the identification of a natural heritage network; and,
3. To identify a Natural Heritage Network for the City of Vaughan.

The Natural Heritage Network is intended to clearly identify those elements to which land use policies will apply with the goal of protection and enhancement of terrestrial and aquatic biodiversity in the context of the provision of ecosystem functions.

2. Conservation Planning Context

Like Vaughan, the agencies and municipalities with whom Vaughan partner matured their approaches to defining and protecting natural heritage using a variety of strategies, policies and regulations. Key to the implementation of existing policies in the City, was the collaboration with the Toronto and Region Conservation Authority, York Region the Province of Ontario and the Government of Canada. TRCA launched its Toronto and Region Terrestrial Natural Heritage System (TNHS) Strategy, published watershed plans for the Don and Humber Rivers which included identified TNHS, implemented Ontario Regulation 166/06 - Development, Interference with Wetlands and Alterations to Shorelines and Watercourses and is revising its Valley and Stream Corridor Management Program (1994)