



Don River Watershed Plan

Land and Resource Use – Report on Current Conditions

2009

Prepared by: Toronto and Region Conservation

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1.0 Introduction

The Toronto and Region Conservation Authority (TRCA), in consultation with the multi-stakeholder Don Watershed Regeneration Council and watershed municipalities, is developing a watershed plan for the Don River. This watershed planning process has been initiated in response to a number of recent policy and planning developments, including the need to fulfill York Region's watershed planning requirements under the *Oak Ridges Moraine Conservation Plan* (ORMCP) (Ontario Regulation 140/02) and to update the original management strategy outlined in *Forty Steps to a New Don* (Metropolitan Toronto and Region Conservation Authority (MTRCA), 1994).

Building on the *Forty Steps*' approach, the goal of this watershed plan is to produce updated management strategies that will protect what is healthy, regenerate what is degraded, and take responsibility for the Don. The strategies will help guide decisions affecting the watershed in order to protect and improve its ecological health. Recognizing the significant watershed planning work that has already been completed, and given that there is a limited amount of undeveloped land remaining within the Don River watershed boundaries, this study will focus mainly on filling information gaps, examining ways of achieving sustainable land and resource use, and providing direction to implement regeneration priorities.

This watershed plan's technical background reports on current conditions will serve to scope and characterize the watershed planning process and cover a range of subject areas, including groundwater quality and quantity, surface water quantity, low flows and water use, surface water quality, fluvial geomorphology, aquatic systems, terrestrial systems, nature-based recreation, cultural heritage, and land and resource use.

Forty Steps contained a detailed description of land use in the Don River watershed as of 1994. This report on land and resource use begins with an updated summary of population and demographics, current land use patterns, opportunities for greenfield development and redevelopment and infilling, an overview of servicing and resource use, and concludes with key issues and management considerations for the watershed plan. Given that the Don Watershed is 80%¹ urbanized (2002 aerial photos), the report focuses on the form and function of urban land uses and the remaining open space and natural heritage system, and discusses opportunities for protecting and enhancing what is healthy and securing and regenerating what is degraded.

TRCA's *Living City* vision sets out five attributes of sustainable communities: healthy environment (air, water, land, waste); green planning and building; economic vitality; education, public awareness and leadership; and social or community well being. These attributes form the backdrop of the following discussion of current land and resource use in the Don River watershed.

2.0 Watershed Location and Demographics

The Don River watershed is the most highly populated watershed in the Greater Toronto Area (GTA) and in TRCA's jurisdiction. It includes major portions of the City of Toronto and the City of Vaughan, and smaller portions of the Towns of Markham and Richmond Hill; the latter three

¹ Urbanized land uses *do not* include forest, meadow, wetland, open water, and agriculture.

municipalities are in the Regional Municipality of York (Figure 1). The watershed's 360 square kilometres span from the Oak Ridges Moraine in the north, to the Lake Ontario shoreline in the south.

Since the 1994 *Forty Steps* plan was released, the Don River watershed population has grown from 800,000 to 1.15 million (derived from the 2001 Statistics Canada Census of Population). York Region, in particular, has seen rapid population growth over the last ten years (Table 1). In fact, the Region has one of the highest population growth rates in all of Canada. Growth rates in the Town of Markham, Town of Richmond Hill, and City of Vaughan ranged from 50% to 80% between 1996 and 2006.

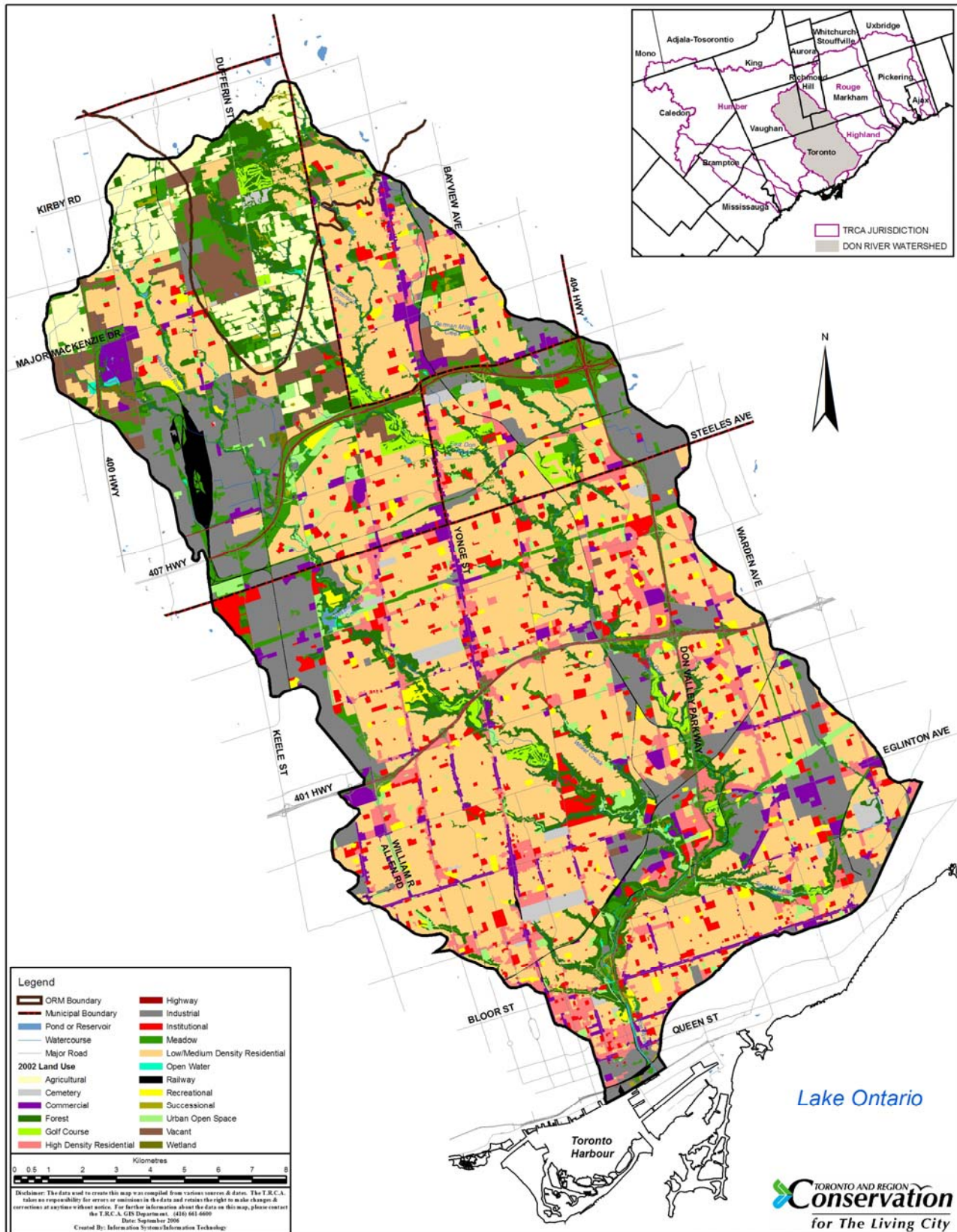
Table 1: Population growth rates in Don River watershed municipalities (1996-2006).

Municipality	Statistics Canada Census of Population			
	1996 Population	2001 Population	2006 Population	% Population Change 1996-2006
York Region	592,445	729,254	892,712	50.6
City of Vaughan	132,549	182,022	238,866	80.2
Town of Richmond Hill	101,725	132,030	162,704	59.9
Town of Markham	173,383	208,615	261,573	50.8
City of Toronto	2,385,421	2,481,494	2,503,281	4.9

Population growth in the City of Toronto has been slower, just 5% over the last 10 years. Even with the new provincial requirements for intensification, the City's growth rates are forecast to remain similar to those of the past (see Table 2). York Region municipalities are expected to continue to grow rapidly. However, as the Don River watershed is almost entirely built out, future population growth will come from increasing development density rather than continued greenfield development expansion. The provincial *Growth Plan for the Greater Golden Horseshoe* identifies four Urban Growth Centres within the Don watershed: Richmond Hill/Langstaff, Yonge-Eglinton, North York, and a portion of downtown Toronto (Ontario Ministry of Public Infrastructure Renewal, 2006) (Figure 2).

The role and impact of immigration continues to be seen in the changing cultural fabric of the watershed's residents. In 2001, the prevalent ethnic origins in the Don River watershed remained Canadian or British heritage (23%), followed by Jewish (8%) and Chinese (8%). Of the recent immigrants (i.e., those who immigrated to Canada between 1996 and 2001), the predominant countries of origin were: China (14%), Iran (8%), Philippines (7%), Russia (7%), and Pakistan (6%). The remaining new immigrants came from over 35 different countries.

Figure 1: 2002 land use in the Don River watershed.



In 2001, about 23% of Don residents were under the age of 20, about 63% of residents were in their working years (between the ages of 20 and 64), and 14% were 65 or older (in their retirement years).

Table 2: Distribution of population and employment for Don River watershed municipalities in the Greater Golden Horseshoe, 2001-2031 (figures in 000s).

	Population				Employment			
	2001	2011	2021	2031	2001	2011	2021	2031
City of Toronto	2,590	2,760	2,930	3,080	1,440	1,540	1,600	1,640
Region of York	760	1,060	1,300	1,500	390	590	700	780

Source: Hemson Consulting Ltd., “The Growth Outlook for the Greater Golden Horseshoe”, January 2005

3.0 Planning Policy Context

Use of the Don River watershed’s land and water resources is largely guided by public policy (Table 3). In the Province of Ontario, federal, provincial, and municipal governments are all involved in land use planning. The federal government has limited involvement, but where federal legislation does apply, it is binding on provincial and municipal governments.

The primary piece of legislation governing land use planning in Ontario is the *Planning Act* (Revised Statutes of Ontario (RSO) 1990, c. P. 13). For resource use related to public infrastructure and large private infrastructure projects, Ontario’s *Environmental Assessment Act* (RSO 1990 c. E. 18) is the principal review mechanism. More recently introduced legislation now playing a substantial role in the management of land and resources in the Province are the *Oak Ridges Moraine Conservation Act* (SO 2001, Chapter 31), the *Greenbelt Protection Act* (SO 2005, Chapter 1), and the *Places to Grow Act* (SO 2005, Chapter 13) (Figure 2). In addition, the *Provincial Policy Statement* (PPS) was revised in 2005; the PPS expresses land and resource use matters of provincial interest to be implemented through municipal land use planning; it includes matters highly relevant to watershed health such as Section 2, “Wise Use and Management of Resources” and Section 3 “Protecting Public Health and Safety (Ontario Ministry of Municipal Affairs and Housing (OMMAH), 2005b). With respect to public safety, under section 3.1 of the PPS (Natural Hazards), the province established Special Policy Areas (SPAs) to accommodate development and redevelopment within flood vulnerable areas. Both SPAs’ and flood vulnerable areas’ significance to watershed planning and urban development is discussed in the following section of this report.

Table 3: Legislation, regulations, policies, plans and programs affecting land and resource use in the Don River watershed.

Institutional Arrangement	Primary Purpose	Lead & Assisting Roles
Federal		
Fisheries Act	To protect Canadian Fisheries Waters; to prohibit the Harmful Alteration, Disruption or Destruction of fish habitat (HADD)	Fisheries and Oceans Canada (DFO); TRCA, for sub-section 35(1), in accordance with Level III agreement with DFO
Navigable Waters Protection Act	To protect Canadian Navigable Waters from interference with navigation	Transport Canada; TRCA directs proponent to Transport Canada
Migratory Bird Convention Act	To implement a convention for the protection of migratory birds in Canada and the U.S.A.; main prohibition is the destruction of wildlife habitat during nesting season	Environment Canada; TRCA staff provide advice that the removal or pruning of trees should take place outside of the nesting season, however, it is the responsibility of the proponent to ensure compliance with the Act
Species at Risk Act	To protect wildlife species at risk in Canada	Environment Canada; TRCA directs proponent to Environment Canada
Canadian Environmental Assessment Act	To establish a federal environmental assessment process; applies to projects for which the federal government holds decision-making authority, as proponent, land administrator, a source of funding, or regulator	Canadian Environmental Assessment Agency; TRCA provides technical clearance
Provincial		
The Planning Act	To provide for a land use planning system led by provincial policy	Municipalities are approval authorities; TRCA is a commenting agency under the Act
The Provincial Policy Statement (PPS)	Municipal land use planning decisions must be consistent with matters of Provincial interests outlined in the PPS; defines Natural Heritage, Natural Hazards (and Special Policy Areas - see sub-section 3.1 below)	Ministry of Municipal Affairs/Municipalities; TRCA provides technical clearance on Natural Heritage and Natural Hazard components of the PPS
Ontario Environmental Assessment Act	To provide for the protection, conservation and wise management of the environment; applies to public sector projects and major private sector projects	Ministry of the Environment; TRCA provides technical clearance

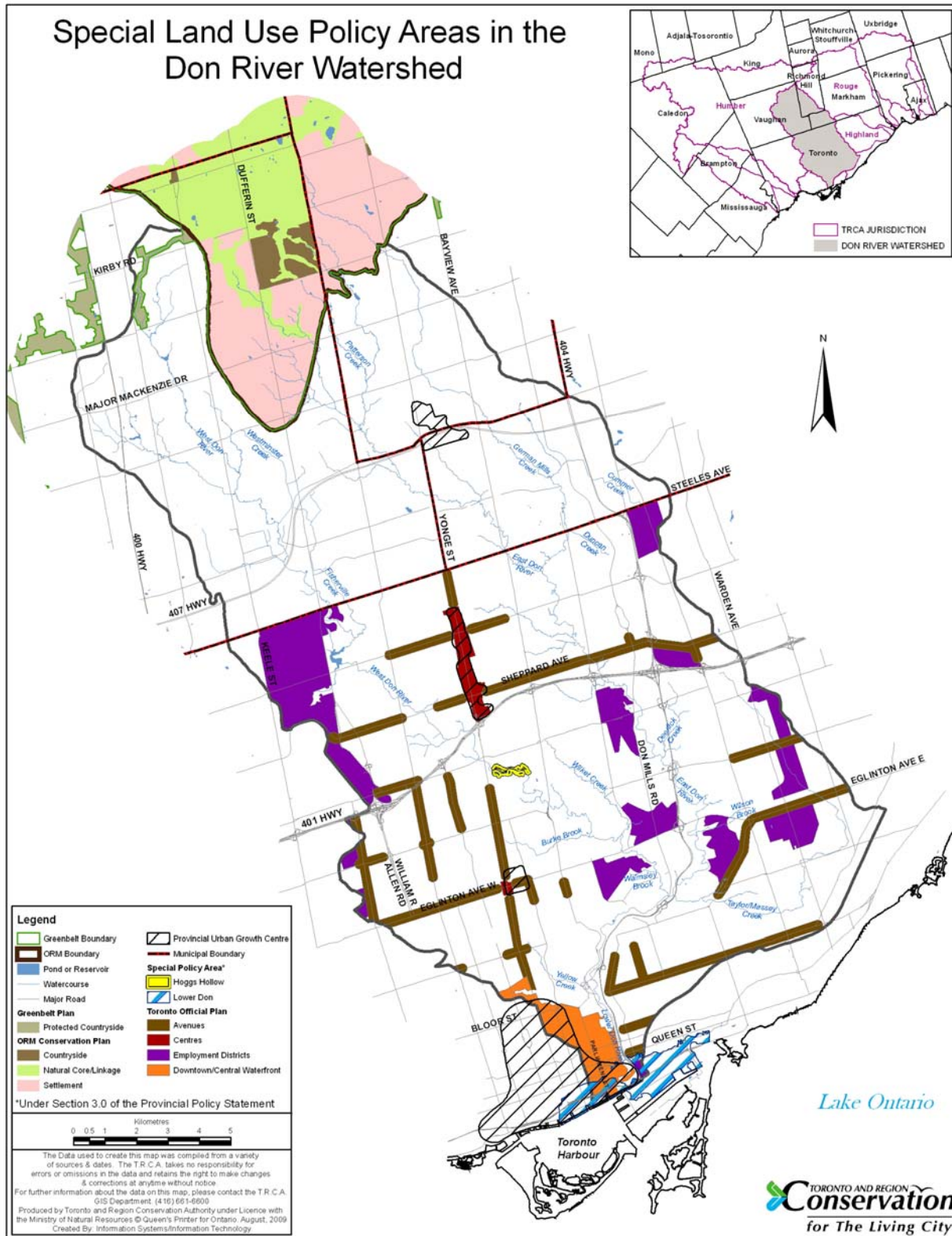
Institutional Arrangement	Primary Purpose	Lead & Assisting Roles
Greenbelt Act and Plan	To designate a Greenbelt Area and establish a Greenbelt Plan; to protect about 1.8 million acres of environmentally sensitive and agricultural land in the Golden Horseshoe from urban development and sprawl. It includes about 800,000 acres of land within the Niagara Escarpment and the Oak Ridges Moraine Plan Areas and additional lands designated as “Protected Countryside”	Municipalities; TRCA provides technical clearance
Oak Ridges Moraine (ORM) Conservation Act and Plan	To provide land use and resource management planning direction to decision makers, landowners and other stakeholders on how to protect the Moraine’s ecological and hydrological features and functions	Municipalities; TRCA provides technical clearance
Places to Grow Act and Plan	To enable decisions about growth to be made in ways that sustain a robust economy, build strong communities, promote a healthy environment and a culture of conservation;	Municipalities; Conservation Authorities to provide technical advice where applicable
Lakes and Rivers Improvement Act	To the management, protection, preservation and use of the waters of the lakes and rivers of Ontario and the land under them.	Conservation Authorities on behalf of Ministry of Natural Resources, except for works involving a dam
Ontario Water Resources Act – Section 34 Permits to Take Water – Section 53 Certificates of Approval for SWM facilities	To provide for the conservation, protection and wise use and management of Ontario’s waters; an MOE Permit is required for water takings (ground and/or surface) of over 50,000 litres per day; an MOE Certificate of Approval is required for stormwater management facilities	Ministry of the Environment; TRCA provides technical clearance
Clean Water Act	To protect existing and future sources of drinking water	Ministry of the Environment; Municipalities; and, Conservation Authorities
Building Code Act	Governs standards for the construction and demolition of buildings	Municipalities; TRCA provides technical clearance
Municipal		
Regional and Municipal Official Plans, Zoning By-laws, Site Plan Control (requirements of <i>Planning Act</i>) including tree and ravine and natural feature protection by-laws, growth management & sustainability plans, natural	To allow for the orderly development of a municipality, while incorporating and implementing Provincial planning direction (PPS, ORM Act, Greenbelt, etc.)	Regional Municipalities; Local Municipalities; TRCA provides input to the development of these municipal policies, plans and by-laws

Institutional Arrangement	Primary Purpose	Lead & Assisting Roles
heritage system policies and significant area designations in OPs		
Conservation Authorities		
Conservation Authorities Act	The objects of an authority are to establish and undertake, in the area over which it has jurisdiction, a program designed to further the conservation, restoration, development and management of natural resources other than gas, oil, coal and minerals	Conservation Authorities; many watershed partners
TRCA		
Ontario Regulation 166/06 (Development, Interference with Wetlands, and Alterations to Shorelines and Watercourses)	To prevent or restrict development in areas where the control of flooding, dynamic beaches, pollution, or the conservation of land may be affected	TRCA
Programs & Strategies		
Valley and Stream Corridor Management Program (VSCMP)	To prevent new development that poses risk to life and property associated with flooding, erosion and slope instability, or development that is not compatible with the protection of these areas in their natural state.	TRCA; municipalities, to the extent the program is incorporated into their Official Plans (OPs)
Environmentally Significant Areas Study ²	Identifies areas of environmental significance based on specific criteria and suggests direction for their recognition and management; VSCMP identifies ESAs as areas where development is not permitted; and, where an ESA is contiguous to a valley or stream corridor, all of it should comprise a public open space block	TRCA; municipalities, to the extent the program is incorporated into their OPs
Terrestrial Natural Heritage System Strategy	To identify the natural heritage system and to set targets for increasing natural cover within TRCA's jurisdiction	TRCA; municipalities, as it is anticipated to be incorporated into OPs

Note: "TRCA technical clearance" is as it relates to natural hazards and natural heritage

² TRCA is not actively expanding this program, however TRCA is still advocating for the protection of existing, identified ESAs. This program is superseded by the Terrestrial Natural Heritage System Strategy.

Figure 2: Special land use policy areas in the Don River watershed. ³



³ Figure 2 does not show municipally designated growth centres in the York Region portion of the Don watershed, because these municipalities were actively undertaking growth studies at the time of writing and these areas were considered to be in flux.

3.1 Flood Vulnerable Areas and Special Policy Areas

Under the *Planning Act*, municipal land use decisions must be consistent with the Natural Hazards policies of the PPS (OMMAH, 1990), to ensure that any new development is directed away from areas where there is an unacceptable risk to public health, safety, or property. Managing the natural hazard of flooding in Ontario is achieved through various means, but largely through planning and development legislation. Complementary to the PPS, is TRCA's "Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation", Ontario Regulation 166/06 under the *Conservation Authorities Act* (RSO 1990 c. C. 27), and TRCA's *Valley and Stream Corridor Management Program*.

Prior to the implementation of a provincial flood hazard policy, communities historically developed around water for transportation, power or commercial purposes and, hence, led to the existence of flood vulnerable areas. Under the provisions of the PPS, the Ministers of Natural Resources (MNR) and Municipal Affairs and Housing (MMAH) may designate an area within a community that has historically existed in the flood plain, as a Special Policy Area (SPA). SPAs address the significant social and economic hardships to the community that would result from the strict adherence to provincial policies concerning development in a flood plain. The intent of the SPA designation is to provide for the continued viability of existing uses to sustain these communities provided that flood hazard management measures are taken, such as flood-proofing, flood remediation, and risk reduction.

Any change within an SPA, above and beyond what has already been approved by the Province, must be supported by both the MMAH and MNR. In this regard, a comprehensive flood risk assessment plan would be required to define how additional risk to both life and property, that is created through land use changes, can be managed by the municipality. In the absence of a risk management plan, changes in land use and intensification potentially increase the liability for all public bodies. Through the development review process, TRCA ensures that the specific technical requirements of SPAs are satisfied prior to approval by municipalities and/or the Province.

Currently, there are two provincially designated SPAs within the Don watershed: Hoggs Hollow, southeast of the intersection of York Mills Road and Yonge Street, and the Lower Don SPA, around the mouth of the Don River (Figure 2). Notably, substantial portions of the Lower Don SPA are currently undergoing flood protection work (these are described in Section 3.2 of this report).

In the Don watershed, there remains other flood-vulnerable areas containing existing development that are not designated SPAs. Intensification of such historic communities in the flood plain through the Province's *Growth Plan for the Greater Golden Horseshoe (Places to Grow)*, presents a potential conflict with the avoidance of development in flood prone areas. For example, Richmond Hill/Langstaff Gateway, located around the intersection of Highway 407 and Yonge Street in Richmond Hill and Markham, is designated an Urban Growth Centre in *Places to Grow*, and portions of existing development within this area are within the flood plain of the Don River. TRCA will need to work with the Province, the Town of Richmond Hill and Markham, and developers to reconcile this conflict, through flood studies, flood remediation and flood proofing measures, and seeking opportunities for intensification outside the flood plain.

Similarly, existing residential neighbourhoods, commercial and industrial areas that are within other flood vulnerable areas will be subject to the pressures of intensification and redevelopment as part of the growth management exercise through municipal official plans. The challenge that exists will be to balance the need to accommodate an increasing population in a sustainable way, and to do so in a way that manages the risks that relate to flooding. A sustainable community will also need to be a disaster-resilient community. Additional information on flood vulnerable areas can be found in the Current Conditions Report on Hydrology/Hydraulics and Stormwater Management.

Tied to the municipal growth management exercise, is the need to evaluate the effects of development beyond the existing official plan designations and the potential to increase the frequency and severity of flooding within existing flood vulnerable areas. Regular review of flood plain modeling assumptions, which trigger updates to flood plain mapping, is required to ensure flood hazards are accounted for, and to confirm appropriate stormwater management controls are implemented as growth proceeds.

3.2 Environmental Assessments in the Lower Don Special Policy Area

Two major projects are envisioned to address flooding and other concerns in the lower reaches of the Don River. The Lower Don River West project will see the creation of a major landform to provide flood protection for 210 ha of land west of the River near Lake Ontario. Creation of the landform will ultimately lead to the removal of the flood protected lands from the Lower Don SPA designation. A Class Environmental Assessment was completed under Ontario's laws and construction is underway. Secondly, the Don Mouth Naturalization project is the subject of an ongoing Individual Environmental Assessment under federal law. This project will develop a preferred alternative for the naturalization of the Don River mouth, including the Keating Channel, and flood protection for 230 ha of the Port Lands area. Potentially, this work could also lead to the removal of more lands from the Lower Don SPA designation. Completion of both of these projects will require ongoing political, social, and financial support from all levels of government and the public.

4.0 Current Conditions in the Don River Watershed

4.1 Land Use

The Don River watershed extends over 36,041 ha (about 360 km²) covering parts of the City of Toronto and the City of Vaughan, Town of Markham, and Town of Richmond Hill in the Regional Municipality of York. Approximately 80 % of the watershed is in urban land use, with 4 % in rural use and about 16 % under natural cover. Steeles Avenue is the boundary between the City of Toronto and York Region, running east-west through the center of the watershed. Within the watershed are found a plethora of mixed urban uses, transportation corridors, and open spaces (Table 4, Figure 1).

Medium density residential is the most widespread land use in the watershed (41.2%), which includes single detached homes, semi-detached homes, and townhouse complexes with manicured lots. High density residential lands cover another 5.6% of the watershed, which include townhouse complexes with small manicured lots, and apartment and condominium complexes. In total, 46.8% of the watershed has been devoted to residential development. Residential development is distributed fairly evenly across the watershed.

At 15.7%, the next most prevalent type of land use in the watershed is natural heritage, consisting of forests (8.2%), meadows (6.8%), successional lands (0.5%), and wetlands (0.2%). Forests are generally found along the valley and stream corridors, while meadows and successional lands tend to be located near industrial areas and along transportation corridors. Wetlands are rare in the watershed, having largely been drained or developed; those remaining include the Provincially Significant East Don Valley Wetland and King-Vaughan Wetland Complexes, and the locally significant Keele Wetland.

Industrial is the next most prevalent type of land use in the watershed, accounting for 11.4% of land cover. Industrial areas are characterized by large warehouses, combined industrial-commercial buildings with flat roofs, storage yards and transfer stations, and large parking and circulation areas. Both north and south of Steeles Avenue in the West Don River subwatershed, industrial development dominates in the western portion of the watershed, as far south as Eglinton Avenue and north to Rutherford Road in Vaughan. Additional industrial parks are found along valley corridors in the City of Toronto mainly south of Highway 401, and in a patch at the eastern edge of the watershed north and south of Steeles Avenue. Notably, the watershed hosts a portion of the Port Industrial Area of Toronto in the Lower Don.

Institutional and commercial land uses, together, cover another 9.4% of the watershed. Commercial and institutional land uses, which include office buildings, big-box store complexes, variety stores, restaurants, and public facilities, are fairly evenly distributed across the watershed. Office buildings, big-box stores and large public facilities are often characterized by vast parking areas and manicured green space. York University, located along the western edge of the watershed, and the Canadian National Institute for the Blind, both in the Lower West Don subwatershed, are the largest institutional uses.

There is little undeveloped land left in the Don River watershed. Agricultural lands covered just 4.6% of the watershed in 2002; vacant lands accounted for 3.1%. Much of the land that was undeveloped or rural in 2002 has already entered the development planning process. Between 2002 and March 2006, at least an additional 2,155 ha of land, covering 6% of the watershed, were the subject of greenfield development planning applications. The development status of these lands, largely found in the Upper West Don River and Upper East Don River subwatersheds (on and off the Oak Ridges Moraine), is described in more detail in Section 4.1.2.

Urban open space covers 2.9% of the watershed, encompassing manicured, semi-manicured, and maintained urban areas, including some treed areas, open park areas, and large boulevards. An additional 1.5% of the watershed is devoted to recreational land uses, which include recreation centres, sports play complexes, and their grounds. Golf courses cover 1.1% of the watershed's land area, and are all located adjacent to watercourses.

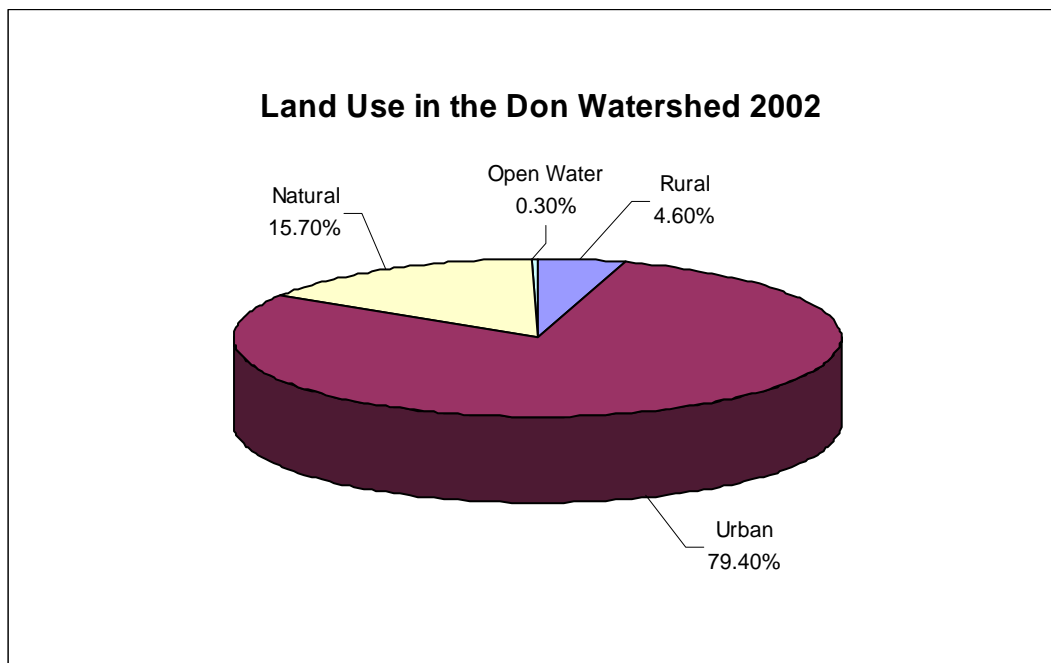
Table 4: Land Use in the Don River watershed (based on interpretation of 2002 aerial photos).

Land Use ¹	Don River watershed		Upper West Don River		Upper East Don River		German Mills Creek		Lower West Don River		Lower East Don River		Taylor/Massey Creek		Lower Don River	
	Area (ha)	Area (%)	Area (ha)	Area (%)	Area (ha)	Area (%)	Area (ha)	Area (%)	Area (ha)	Area (%)	Area (ha)	Area (%)	Area (ha)	Area (%)	Area (ha)	Area (%)
Medium-density residential	14,850	41.2	1,534	25.0	2,234	35.7	1,538	39.7	2,849	44.8	2,590	46.6	1,406	49.2	2,700	54.1
Industrial	4,096	11.4	1,252	20.4	104	1.7	675	17.4	891	14.0	495	8.9	429	15.0	250	5.0
Forest	2,936	8.2	284	4.6	977	15.6	219	5.6	640	10.1	385	6.9	152	5.3	279	5.6
Meadow	2,452	6.8	791	12.9	520	8.3	467	12.0	221	3.5	248	4.5	80	2.8	122	2.5
High-density residential	2,009	5.6	45	0.7	128	2.0	158	4.1	299	4.7	624	11.2	165	5.8	591	11.8
Institutional	1,796	5.0	131	2.1	197	3.1	166	4.3	497	7.8	344	6.2	159	5.6	301	6.0
Commercial	1,585	4.4	219	3.6	130	2.1	146	3.8	280	4.4	303	5.4	214	7.5	293	5.9
Agriculture - cultivated	1,382	3.8	608	9.9	692	11.0	82	2.1	0	0	0	0	0	0	0	0
Vacant	1,104	3.1	417	6.8	562	9.0	78	2.0	27	0.4	18	0.3	1	0.03	2	0.1
Urban open space	1,041	2.9	215	3.5	118	1.9	100	2.6	231	3.6	162	2.9	97	3.4	119	2.4
Recreational	559	1.5	52	0.9	71	1.1	44	1.1	125	2.0	125	2.3	40	1.4	101	2.0
Highway	430	1.2	74	1.2	46	0.7	103	2.7	63	1.0	102	1.8	9	0.3	35	0.7
Golf course	412	1.1	0	0.0	237	3.8	18	0.4	78	1.2	68	1.2	13	0.5	0	0
Cemetery	375	1.0	16	0.3	74	1.2	18	0.5	90	1.4	10	0.2	65	2.3	102	2.0
Railway	359	1.0	234	3.8	16	0.3	13	0.3	14	0.2	20	0.4	15	0.5	46	0.9
Agriculture - pasture	282	0.8	168	2.7	89	1.4	24	0.6	0	0	0	0	0	0	0	0
Successional	191	0.5	32	0.5	45	0.7	23	0.6	20	0.3	35	0.6	12	0.4	25	0.5
Open water	106	0.3	21	0.4	14	0.2	5	0.1	21	0.3	19	0.3	1	0.03	25	0.5
Wetland	77	0.2	40	0.7	11	0.2	4	0.1	9	0.1	11	0.2	1	0.02	2	0.04
Total	36,041	100.0	6,133	100.0	6,265	100.0	3,880	100.0	6,353	100.0	5,558	100.0	2,859	100.0	4,993	100.0

¹ Land use has been interpreted from 2002 aerial ortho images using on-screen digitizing at scales between 1:2,000 and 1:10,000. A 2005 edition of a MapArt book was used for verification of land use category.

Overall, urban areas (residential, industrial, urban open space, etc.) make up the greatest proportion of land cover in the watershed, followed by natural cover, rural and open water, as illustrated in Figure 3.

Figure 3: Distribution of land use in the Don River watershed (2002).

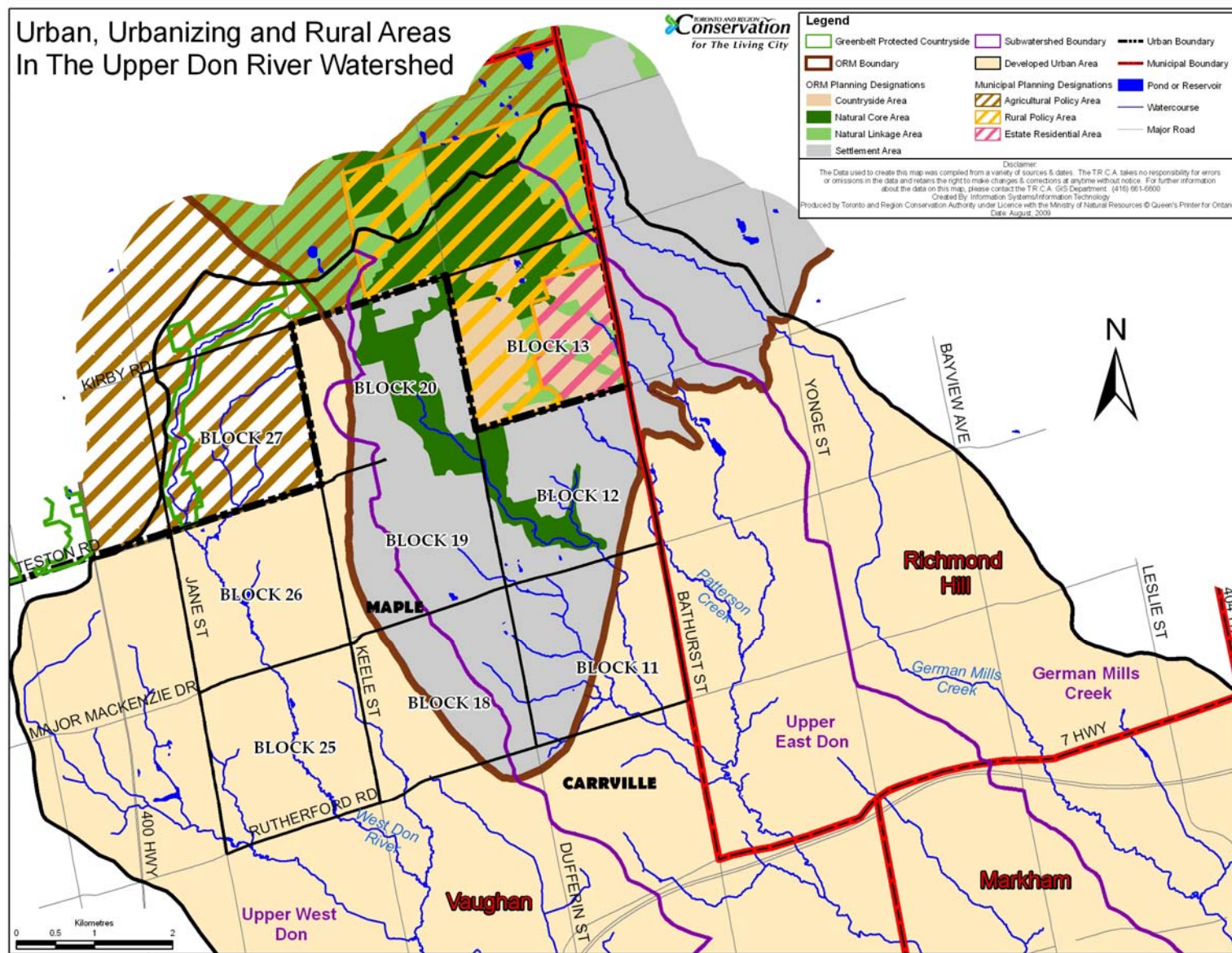


Although the majority of the Don watershed is urbanized (Urban Area), there is a minor portion still undergoing conversion from agricultural land to urban development (Urbanizing Area). This is primarily in the blocks containing settlement areas, as designated in the ORMCP. An even more minor portion remains rural (Rural Area). The Rural Area consists of two full blocks (referred to by the City of Vaughan as “Block 27” west of Keele Street and “Block 13” east of Dufferin Street, both north of Teston Road), and three partial blocks (all on the northern side of Kirby Road), in the upper part of the Don watershed (see Figure 4). Land use in the Urban, Urbanizing and Rural Areas of the Don watershed are all described in the following sections of this report. The discussion describes various areas of the watershed, their predominant past and future land uses and associated issues and opportunities, with a focus on natural heritage and natural hazards, as examples.

4.1.1 Trends in the Urban Area

The entire City of Toronto and Town of Markham portions of the Don River watershed can be characterized as urban. The full spectrum of urban development characterizes this densely populated section of the watershed, including low, medium and high density residential, commercial, industrial, and institutional uses. The provincial *Growth Plan for the Greater Golden Horseshoe* identifies four Urban Growth Centres within the Don watershed: Richmond Hill/Langstaff, Yonge-Eglinton, North York, and a portion of downtown Toronto (Ontario Ministry of Public Infrastructure Renewal, 2006) (Figure 2). In other areas, land use change is relatively gradual and is restricted to redevelopment of “brownfield” and “greyfield” parcels and infill projects. There are several instances where development pressure has led to employment lands being converted to residential or mixed uses, or existing, obsolete sites, such as commercial and retail complexes, being expanded and refurbished.

Figure 4: Urban, urbanizing and rural areas in the upper Don River watershed.



South of Steeles Avenue

South from Steeles Avenue, to the river mouth at Lake Ontario, watercourses in the Urban Area tend to be situated in well-incised valleys that can be heavily vegetated or highly manicured and experiencing significant erosion. The watercourses themselves range from a relatively natural condition to having large channelized segments and armoured banks. Numerous stormwater and combined sewer outfalls dot the watershed, typically located at the edge of watercourses, discharging directly to these streams. Within broad valley or stream corridors in the Urban Area, some historical development exists adjacent to, or within, the flood plain.

Where old land uses (i.e., those pre-dating TRCA's *Valley and Stream Corridor Management Program*) in the Urban Area, in both the City of Toronto and the City of Vaughan, abut valley and stream corridors, the majority are developed to top of bank, or encroach into the valley. It is common to find land uses in the Urban Area with natural valley landforms substantially altered to accommodate structures and parking, through historical piping, cutting, filling, and retaining walls. Moreover, the presence of non-native plant species is prevalent in the landscaping component of these land uses, so that they predominate over native plants and trees in much of the Urban Area's natural cover. This has led to a degradation of natural spaces through diminished size, shape, connectivity, and quality of natural cover. Problems of flooding, erosion and poor water quality have also been exacerbated by manipulating, hardening, or enclosing valley and stream corridors in favour of development.

In the current context of land use planning, where a new land use change is proposed under the City of Toronto Official Plan (OP), it is required that much larger consideration be given to the natural environment than in the past. The City's OP recognizes that, "strong communities and a competitive economy need a healthy natural environment" (City of Toronto, 2006b). To this end, the OP identifies a natural heritage system and provides policies to protect the system. Further, land use change must be based on "protecting, restoring and enhancing the health and integrity of the natural ecosystem" (City of Toronto, 2006b). Overall, the emerging trend is to recognize natural areas as a critical component in the development process, so that redeveloping a site with a new use and new structures can occur in tandem with restoring and enhancing the natural areas of the site.

Toronto's OP states that it will guide future growth to areas that are well served by public transit, the existing road network, and have a number of properties with redevelopment potential. The OP defines four areas within the watershed that are slated to accommodate growth: Downtown, Centres, Avenues, and Employment Districts, which largely coincide with identified Urban Growth Centres in the Province's *Growth Plan for the Greater Golden Horseshoe* (Ontario Ministry of Public Infrastructure Renewal, 2006) (Figure 2). Some of these identified areas and Official Plan policies have been appealed to the Ontario Municipal Board.

As the Downtown, Centres, Avenues and Employment Districts are expected to accommodate population and employment growth in the planning period, they offer the greatest potential for

improving stormwater management, re-naturalization, and sustainable design improvements through the development planning process. Specifically, the redevelopment of large areas of surface parking and urban roofs presents a key opportunity (Belaieff, 2002). The asphalt used to pave surface parking lots and traditional materials used to construct roofs contribute to increased runoff, pollution levels, and energy demands, as the surfaces absorb solar energy and reradiate it as heat, and do not allow the absorption of rainwater. The City is continuing to develop its Green Development Standard, which applies to a range of building types. This tool will be instrumental in guiding improved building and site design. Furthermore, the City has developed a bylaw governing and requiring the construction of green roofs on new buildings.

The Downtown portion of the watershed is bounded by Bathurst Street to the west, Dupont Street to the north, the Don River to the east and the Waterfront to the south. The Downtown/Central Waterfront is expected to evolve as a healthy and attractive place to live and work, and accommodate major office, commercial, and residential development. Given that the Don watershed portion of Downtown, with the exception of the active park system and the West Don Lands redevelopment site, is almost entirely impervious surface and is serviced by combined stormwater and sanitary sewers, opportunities for site-level improvements to stormwater management or re-naturalization are limited. Improvements to stormwater management will likely come from lot level re-use strategies associated with rain harvesting and end-of-pipe technologies identified in the City's *Wet Weather Flow Management Master Plan* (WWFMMP) (Marshall Macklin Monaghan, 2003). This plan was developed to improve water quality, and control volumes of runoff, and combined sewage effluent where applicable (see Section 5.4 for more information).

Naturalization compatible with flood protection in the downtown will occur on the Don River Park portion of the West Don Lands development to be located east of Parliament Street and south of King Street East. See section 3.2 for information on two major infrastructure projects underway in the Lower Don.

Centres, in Toronto's OP, are defined as places with excellent transit accessibility and where jobs, housing and services will be concentrated in dynamic mixed use settings with different levels of activity and intensity. Also meant to be focal points for surface transit routes, Centres should draw people from across the city and from outlying suburbs to either jobs within the centres, or to rapid transit connections. Within the Don, North York Centre is focused on the Yonge Street corridor between Highway 401 and Cummer Avenue; North York Centre has been redeveloping with high rise commercial/residential development since the early 1990's and numerous new developments are in various stages of the construction and planning process. Yonge and Eglinton Centre is located within a small area at the four corners of Yonge Street and Eglinton Avenue; Yonge and Eglinton Centre is currently redeveloping with new residential and commercial uses, including two large energy-efficient condominium developments. Both of these Centres include a range of urban conditions including commercial office buildings, high rise apartments, traditional main street shopping, and under-developed former strip commercial uses and parking lots.

Similar to the Downtown area noted above, Centres are almost entirely impervious surface, and therefore opportunities for site-level improvements to stormwater management or re-naturalization are limited. Improvements to stormwater management will likely come from lot level re-use strategies associated with rain harvesting and end-of-pipe technologies identified in the City's WWFMMP.

Avenues, in the OP, are important corridors along major streets where growth through re-urbanization is anticipated. In general, the Avenues are anticipated to accommodate more intensive development supported by public transit, urban public spaces and street trees but with relatively little land for parking lots, naturalized park dedication and reforestation. The main opportunities for site level improvements in the Avenues occurs through sustainable building design and construction practices that reduce stormwater flows, reduce the use of water, reduce waste and promote recycling, use more energy efficient designs and incorporate green roofs and designs that reduce the heat island effect. Growth along Avenues will be guided by Avenue Studies that may, or may not, include intensified uses. Avenues in the Don River watershed include portions of Bathurst, Yonge, and Dufferin Streets; Avenue Road; Wilson, Finch, Eglinton, and Sheppard Avenues, and others.

The OP's Employment districts are large districts comprised exclusively of lands that can accommodate substantial growth in jobs. Most of these districts are characterized by manufacturing, warehousing and product assembly activities, while some are exclusively commercial office parks. Within the watershed, Employment Districts cover blocks of land in the areas south of Steeles and west of Dufferin, along the East Don River south of the 401, and near the harbour. Most of these Employment Areas have little or no stormwater controls and are adjacent to, or bisected by, the Don River and its tributaries.

Opportunities for site level improvements to stormwater management or re-naturalization are greater in the Avenues and Employment Districts through redevelopment. Options include: 1) improving stormwater quality and quantity using lot-level controls, including green roofs; 2) greening large parking lots with bio-swales and shade plantings; 3) reducing the amount of impervious surfaces through park dedication and reforestation; and 4) transferring valley lands and associated vegetation to public ownership through the planning process. There are also opportunities to incorporate energy efficient designs.

Neighbourhoods and Apartment Neighbourhoods areas of the City of Toronto are not designated for growth, however some physical changes will occur over time as enhancements, additions and infill housing occurs on individual sites. Environmental sustainability in these areas will be promoted by investing in naturalization and landscaping improvements, tree planting and preservation, sustainable technologies for stormwater management and energy efficiency and programs for reducing waste and conserving water and energy. These directions are supported by the City's Official Plan. Furthermore, a number of Apartment Neighbourhoods in the Don watershed are located adjacent to large open and natural areas. The City's Tower Renewal initiative will provide opportunities for green buildings and improvements to the natural environment.

North of Steeles Avenue

The Urban Area of the Don watershed extends north of Steeles Avenue, up to Rutherford Road in the west and up to 19th Avenue in the east in York Region. Comprised of mixed use communities dominated by low density residential development, Thornhill, Richvale and South Richvale represent some of the older, established sections of the City of Vaughan and the Towns of Richmond Hill and Markham.

Some Thornhill and Richmond Hill neighbourhoods are experiencing redevelopment of smaller homes into significantly larger executive homes. Intensification results in a larger building mass in many cases, although several of these older homes had larger lots than are found in the newer developing areas. In many cases, there are small tributaries throughout these older neighbourhoods, where flood plain information was not always available. Where redevelopment does occur, TRCA staff ensure that flood risks do not increase as a result.

The largest proportion of industrial land use is found on either side of Steeles Avenue, along the Keele Street corridor in the west and the Highway 404 corridor in the east. These long-established industrial business parks experience some infilling and redevelopment with newer industrial uses. Yet for new and old industrial use, a consistent characteristic of this type of development is the high proportion of impervious surface necessary for truck loading, circulation areas and the like. Indeed, some of the highest estimates of percentage of impervious cover in the Don watershed are coincident with a predominance of industrial land use.

Key Issues in the Urban Area

With proactive planning for intensification, the four urban growth centres could serve as models for the achievement of positive outcomes for overall watershed health.

The natural heritage system traverses Toronto's designated Centres, Avenues, and Employment Districts. Therefore, these designations, along with the OP's environmental policies, provide opportunities for revitalization of the natural system, as well as the Employment Districts. But while designation of these areas will create a positive trend, other aspects of the OP may create issues. For example, some of the OP's "Avenues" proposed for urban intensification are located within the flood plain of the Don River. In these cases, the Avenue Studies to be completed for those in flood prone areas will need to consider flooding hazards and flood reduction or remediation measures when evaluating redevelopment options. Further upstream in the Towns of Richmond Hill and Markham, an urban pocket, known as Richmond Hill/Langstaff Gateway, is designated for intensification and is within the flood plain of the East Don River. Richmond Hill/Langstaff Gateway is located around the intersection of Highway 407 and Yonge Street and is listed as an Urban Growth Centre in Ontario's *Growth Plan for the Greater Golden Horseshoe*. It is not a designated Special Policy Area. Similar to the flood vulnerable "Avenues" in the Toronto, the Richmond Hill/Markham node must examine opportunities for flood remediation early in the growth planning process.

The older system of storm and sanitary sewers in the Urban Area also carries with it an issue for watershed health. As mentioned, some watercourses contain storm sewer outfalls that outlet directly to the watercourse with no opportunity for filtering pollutants or diffusing high velocity flows. Redevelopment proposals should incorporate some type of upgrade to the site's stormwater management scheme (e.g. Installation of an oil-grit separator; establishment of a vegetated outfall channel). Based on its WWFMMP, the City of Toronto has approved a stormwater policy that guides redevelopment designs to achieve improved stormwater management.

Since the Urban Area makes up most of the Don watershed, urban trees, found among all of the yards, parks and boulevard components of the Area's long established uses, are tremendously important in providing shade and habitat, clean air, erosion prevention, and a reduction in flood peaks. However, the ecological functions of the urban forest and the opportunities for improvement and linkage with the natural heritage system need to be better understood. A major challenge in urban forestry is preventing the spread of the invasive Asian Longhorned Beetle. The beetle has been found in the west central portion of the Don watershed in the cities of Vaughan and Toronto. The Emerald Ash Borer, another invasive pest, has not yet been found in Toronto, but may spread to the area.

4.1.2 Trends in the Urbanizing Area

North of Rutherford Road to Kirby Road in Vaughan, in the upper portion of the Don watershed, former agricultural land is now being urbanized. Vaughan's "block planning process," established through its official plan, means urban-designated concession blocks are studied for their environmental, social, and economic feasibility to be developed. In approximately the last ten years in Vaughan, seven blocks have been approved for development and built out with mostly single family residential subdivisions. The blocks in the western portion of the watershed (Blocks 32 and 33) were developed first, with Blocks 10, 11, 12, and 18 on the eastern side of the Don watershed being more recently approved and developed. Blocks 11, 12, and 18 are still under construction at the time of writing (it should be noted that Block 11 contains a 58.87 hectare parcel that will not be developed, as it was donated to the Nature Conservancy of Canada by its private landowner). Blocks 19 and 20 in the upper part of the watershed (between Major Mackenzie, north to Kirby Road and between Keele Street and Dufferin Street to the east) comprise OPA 332, an older approved Secondary Plan; these blocks were more recently approved for industrial (Block 19) and residential subdivisions (Block 20), but contain several older, established areas of industrial use and estate residential subdivisions.

Block 20 within OPA 332 contains the recently approved "Dreamworks" subdivision that is located half on, and half off, the Oak Ridges Moraine. Through the subdivision approval process, the Keele Locally Significant Wetland (LSW), the valley corridor (an Environmentally Sensitive Area), and a wildlife corridor connecting these two features, were all protected, enhanced, and publicly secured.

Just south of the Dreamworks subdivision, on the former landfill and composting lands, is being constructed a regional-scale active park that will include soccer fields, baseball diamonds, botanical gardens, and walking trails.

In the Town of Richmond Hill, the Urbanizing Section takes up only a small portion of the Don watershed. Just east of Bathurst Street and north of 19th Avenue (Gamble Road), the Duke of Richmond block (OPA 138), is being built out with low density residential subdivisions.

Key Issues in the Urbanizing Area

Lands in the Urbanizing Area have had a long history of agricultural use. As this area was settled in the late 19th and early 20th centuries, large scale clearing of natural features occurred. As a result, the quantity of natural cover remaining in the Urbanizing Area is relatively low, and is generally restricted to valley and stream corridors, where soils were too wet for farming, or where woodlots were preserved as sources of wood.

Valley slopes and watercourses that are not well defined are common in the upper part of the watershed, where many headwater streams are located. A large number of these streams have been altered and stripped of natural vegetation, or drained, as a result of past agricultural practices. This makes them less likely to be perceived as natural features warranting protection, despite being integral to the health of the watershed. Therefore, their protection and enhancement has become a considerable challenge in the face of development pressure.

New development on large “greenfield” sites is common in the Urbanizing Area and is preceded by site preparation works that invariably entail stripping topsoil. Often, stripping is completed long before construction commences on a number of large parcels assembled within a newly approved “block”, leaving a substantial amount of land vulnerable to the effects of wind and rain that carry sediment to adjacent watercourses and other natural features. Frequently, sediment accumulates beyond the capacity of typical erosion and sediment controls (ESCs), leaving them in a state of disrepair. Shortening the duration between top soil stripping and construction, stabilizing soils promptly after stripping, and proper maintenance of ESCs, would help curtail this cycle of impacts. At present, while ESCs are a requirement of municipalities and TRCA, both parties have limited ability to oblige contractors to begin construction immediately after top soil stripping.

It is evident that the overriding form of development in the Urbanizing Area, offered to accommodate the GTA’s population boom, is single family low density residential. This form of development has resulted in subdivision designs and population densities that cannot easily support public transit, so that residents in these communities generally rely on automobiles as their primary means of transportation. This contributes to traffic congestion, poor air quality, and the proliferation of impervious surfaces associated with roads, driveways and parking areas.

The more recent development that has taken place in the Don watershed’s Urbanizing Area has had the benefit of more progressive environmental policies than existed in the past (e.g.

the Dreamworks subdivision in Vaughan's Block 20 previously described). Thus, there are fewer instances of developments encroaching into valleylands, and of channelized, hardened watercourses in the Urbanizing Area, than in the downstream Urban Area. More than in the past, the OP requirements of Urbanizing Area municipalities, ask proponents to consider the impacts of their development proposals on surface water, groundwater, and terrestrial and fish habitats. Therefore, new development typically employs comprehensive stormwater management schemes and, at times, naturally vegetated buffers. Indeed, comprehensive stormwater management plans are now a typical municipal requirement for new development. Vegetated buffers between new developments and valleyland are less typically required by municipal OPs and zoning by-laws, and for the most part only promote or encourage buffers. As a result, the majority of new development abutting Don watershed valley and stream corridors in the Urban Area (areas of development pre-dating more restrictive environmental policies), has either narrow (1 to 4 metres) buffers or no buffers. This has led to degradation of the valley edge adjacent to residential and industrial subdivisions.

Land use planning policy affecting the protection of natural heritage systems continues to evolve. By now all municipalities have adopted policies or council resolutions requiring a minimum ten (10) metre buffer outside of the development block adjoining a valley and stream corridor, in accordance with the TRCA's Valley and Stream Corridor Management Program. Proponents commonly dedicate these natural heritage blocks, consisting of natural features and buffers, into public ownership.

While these new policies are a positive trend for natural heritage protection, it should be noted that much of Vaughan, Richmond Hill and Markham's designated urban areas are already either "built out", or are approved for development. In this way, the natural features affected by this development will not benefit from the new municipal standards, if the development approvals pre-dated their introduction. Further, while a 10-metre buffer contributes to ecological health, a natural heritage system that defines buffers based on site-specific ecological criteria, is a more ecologically sound method for protecting, enhancing and connecting natural features to create a natural heritage system.

4.1.2 Trends in the Rural Area

The remaining two full blocks, situated in the upper part of the Don watershed in the City of Vaughan, comprise the Rural Area, ie. Block 27 west of Keele Street, and Block 13 east of Dufferin Street, both north of Teston Road), along with three partial blocks (all on the northern side of Kirby Road) also in Vaughan.

The Rural Area contains agricultural land uses, estate residential subdivisions, Maple Downs Golf Course, a cemetery, and large tracts of natural land cover (mature and immature forest, meadows, and wetlands). The majority of natural land cover that remains in the Don watershed is located the Rural Area. Indeed, the Rural Area includes the only section of the watershed that falls within the *Oak Ridges Moraine Conservation Plan* and *Greenbelt Plan* areas. Here, provincial policies restrict the types of land use changes that can occur (see Figure 2 and Table 3). Outside of these areas, the types of development permitted to occur in the Rural Area are governed by the Vaughan Official Plan (OP). Vaughan's OP designates the western portion of

this Rural Area as “Agriculture Area” and contains policies to protect these lands’ agricultural purposes in the long term; the Rural Area’s eastern portion is designated “Rural Use Area” with some “Estate Residential”. Policies in the Rural Use Area permit forestry, conservation and farm related uses. Limited rural industrial, commercial, recreational, cemetery and institutional uses are also permitted, but are subject to an assessment of the effects of the proposed use on farm operations (City of Vaughan Official Plan, 2003).

Key Issues in the Rural Area

Much of the new urban development within the Urbanizing Area is occurring on former agricultural lands, thereby diminishing the availability of large contiguous parcels of land for large scale crop production. In the Rural Area, many farmers were under pressure to sell their land to speculators. Consequently, the viability of remaining agricultural operations within these areas was challenged. The *GTA Agricultural Action Plan* suggests that a potentially more viable direction for agricultural operations within the GTA would be to cease production of crops that are land intensive, in favour of specialty crops, which can be produced on smaller blocks of land and sold for greater profits to specialty GTA markets (Regional Planning Commissioners of Ontario, 2005).

Because it is a local source of food, and considering its value to the economy, it is important to protect the GTA’s remaining farmland. The York Region OP states that there are approximately 4,300 jobs in the agricultural industry in York, and the annual product value totals \$152 million. The success of agriculture in the GTA would be more solidified if the demand from local markets was expanded. Currently, much of the GTA’s food service industry (grocery stores, catering companies, restaurants) stocks imported farm grown products. The more locally grown food is in demand by the local market, the more successful agriculture will be as an enterprise. In turn, if farming were to be a more profitable endeavour, farmers would less likely be enticed to sell their land to speculators and perpetuate urban sprawl (Strahlbrand, 2006).

As development within the Urbanizing Area progresses northwards, abrupt transitions between low density residential developments and rural land uses are beginning to occur. The Rural Area is likely to be considered for urban expansion by the City of Vaughan when looking to accommodate population growth sometime in the near future. This adds pressure for anticipated land use change and has contributed to land speculation.

The natural cover that is found in the Rural Area will be especially important to protect for the long term given that the highest groundwater recharge rates are found in this section of the watershed, and natural cover provides a more precautionary approach for sustaining and protecting natural systems function (see the current conditions reports on Geology and Groundwater Resource and Terrestrial Natural Heritage for more information).

4.2 Servicing and Resource Use

Wise use of non-renewable and renewable resources is a key building block of sustainable communities. Many crucial services provided by municipalities and others are largely based on resources like land, water, and energy; the use of these resources is often closely tied to the

type and form of development. Provincial and municipal planning policies are increasingly moving towards a more compact urban form that will make for more efficient resource consumption and facilitate provision of services like public transit. There is also a growing trend towards solving resource problems locally, such as in waste disposal and energy generation.

4.2.1 Transportation

At present, Don watershed residents are heavily dependent on private automobiles for transportation (Table 5). In 2001, over 80% of York Region residents drove a car, truck or van to get to work; an additional 7% rode as passengers. The reliance on private vehicles was lower in the City of Toronto, where 52% of residents drove to work and 5% rode as passengers. Public transit was used by 33% of Toronto residents and 9% of York residents. Walking and bicycling to work was less common, accounting for just 7% of Toronto residents and 2% of York residents.

Table 5: Mode of transportation to work based on Statistics Canada 2001 Census of Population data.

Mode of Transportation	% of Population		
	City of Toronto	York Region	Ontario
Car, truck, van as driver	52.2	80.4	72.6
Car truck van, as passenger	5.4	7.1	7.1
Public transit	33.8	9.4	12.8
Walked or bicycled	7.7	2.4	6.6
Other method	0.9	0.7	0.9

Public transit ridership fluctuates as a result of a number of factors (Table 6). York Region has seen a 35 % increase in ridership between 2003 and 2006 due to assuming GO Bus routes, general population and employment growth, as well as an increase in service area and hours due to implementation of VIVA (York Region, 2006). Toronto's ridership has been more stable; downward fluctuations in 2002 and 2003 have been attributed to the economic slowdown after the terrorist attacks of September 11, 2001, SARS, and the hydro blackout (City of Toronto, 2005b).

Table 6: Number of transit passenger trips per person 2001-2006.

Municipality	Number of transit passenger trips per person in the service area in a year					
	2001	2002	2003	2004	2005	2006
York Region	11.18	10.52	12.18	15.53	16.51	18.0
City of Toronto	161.9	158.6	153.2	156.5	159.8	N/A

Sources: City of Toronto, 2005b; York Region, 2006.

Expanding the use of public transit and encouraging more pedestrians and cyclists can minimize energy consumption and air pollution, and contribute to a more sustainable urban community. To that end, York Region has prepared a *Pedestrian and Cycling Master Plan*, supported by a study on increasing “active transportation” (i.e., cycling and walking) in the

Region (Decima Research, 2006). Similarly, the City of Vaughan has adopted a Pedestrian and Bicycle Master Plan. The City of Toronto also has a bike plan (City of Toronto, 2001). Increasing development density and building more compact, walkable neighbourhoods may also lead to changes in the mode of transportation of watershed residents.

Future transportation and transit programs and investments in the Don watershed will be guided by the Province's *Growth Plan for the Greater Golden Horseshoe*, municipal official plans, and regional and municipal transportation master plans as they may be updated from time to time. In general, the transportation master plans identify new and improved facilities needed to serve future growth, present strategies to encourage the use of non-automobile modes of transportation, and outline ways to make the best use of existing transportation infrastructure.

Metrolinx, a regional transportation authority, was created in 2006 to coordinate planning and implementation of an integrated, multi-modal transportation network in the Greater Toronto and Hamilton Area. In 2008 Metrolinx released its Regional Transportation Plan (RTP), named *The Big Move: Transforming Transportation in the Greater Toronto and Hamilton Area (GTHA)*. This document represents a landmark achievement, in that for the first time it presents a common vision for transportation in the region. The RTP aims to relieve congested roads and overtaxed transit systems, thus improving economic competitiveness through reduced delays, protect the environment through greater energy efficiency and improve overall quality of life. This RTP will greatly influence the development of transportation networks in the Don watershed.

Roads and Highways

Given a burgeoning population, the GTA's plans for upgrading and expanding its road network are ongoing as part of comprehensive transportation master plans. Several major transportation routes flow through the Don River watershed (Figure 1). The 400 series highways, rail lines, and rail transfer stations account for 2.2% of land use in the watershed. Pressure exists for new and expanded highways and roads to relieve traffic congestion.

Within the Don watershed, York Region has recently widened and reconstructed Teston Road from Dufferin Street in the west to Bathurst Street in the east. As part of this project, Dufferin Street was also widened to accommodate a left hand turn to Teston Road. Currently, there is no other major road construction in the Don watershed in York Region, as the Region is in the process of updating its Transportation Master Plan, last released in 2002. Accordingly, the lower tier municipalities are developing their transportation master plans but are waiting for approval from York Region through their master plan.

York Region approved its first Transportation Master Plan (TMP) in 2002 (Cansult Limited and Marshall Macklin Monaghan, 2002), which anticipated that the performance of the road system would degrade to unacceptable levels without policies and plans to significantly improve transit modal split and develop more sustainable land use development plans. The emphasis of the

plan was to support the four designated Regional centres (Markham, Richmond Hill, Vaughan City Centre, and Newmarket) located along the major transit corridors of Yonge Street and Highway 7. In 2006 York Region began an update to the TMP to ensure that continuing transportation decisions for an integrated network can be made within the context of recent development trends and legislative changes. For example, the province's *Growth Plan for the Greater Golden Horseshoe* designates York's four regional centres as Urban Growth Centres. The goal of the TMP update is to ensure that the future transportation network can support growth in a sustainable manner while ensuring consistency with the policies of the *Green Belt Plan* and *Oak Ridges Moraine Conservation Plan* for new infrastructure (Cansult Limited and Marshall Macklin Monaghan, 2002).

The Town of Richmond Hill's Transportation Master Plan (iTrans Consulting Inc., 2006) proposes widening collector roads, Highway 404, and arterial roads such as 16th Avenue, Major Mackenzie Drive, Bathurst Street, Bayview Avenue and Leslie Street, while accommodating High Occupancy Vehicle (HOV) lanes on each on the arterial roads. The Town of Markham's Transportation Planning Study, released in 2002, discusses options of widening Leslie Street, Warden Avenue, Kennedy Road and McCowan Road; the extension of Yorktech Drive between Woodbine Avenue and McCowan Road; widening of Main Street South to four lanes between Highway 7 and Highway 407, and along Main Street North between Highway 7 and 16th Avenue by 2011.

Key Issues for Roads and Highways

While crossings of valley and stream corridors and other natural areas are highly disruptive to their ecosystems, safe road access between communities is a necessity in an urbanizing region. In order to maximize natural heritage protection while meeting transportation needs, options for alternative routes to crossing watercourses should be explored, and where a crossing is deemed to be the only option, impacts of crossings should be mitigated as much as possible. Further, instead of considering impacts of each new crossing in isolation, ideally, municipalities, the Province, and other agencies involved in the EA process and growth management should consider the cumulative impacts that each new crossing together with existing crossings, creates for the GTA's natural heritage system.

Some new watercourse crossings that were constructed, replaced or repaired in the Don watershed in the past, did not require an EA, since many road projects are part of new subdivision development. Traditionally, the studies required by proponents to design these crossings did not adequately consider the natural environment. As a result, crossing structures were often designed and constructed with narrow openings that generally did not accommodate regional storm flood flows, pedestrian passage, wildlife passage, or the natural meander belt of the subject stream. Over time, this frequently resulted in impacts to crossing structures due to flooding and erosion. In turn, hardening of stream bed and banks was necessary to prevent crossing structures from being further undermined, which in turn, created further physical and ecological impacts. This scenario is especially common in the Urban Area of the watershed, where considerable cost has been borne by the City of Toronto for repair to undersized culverts and bridges and the erosion protection works along adjacent streambanks; in the older, built up areas of Vaughan, Markham, and Richmond Hill, the situation is similar.

More recently, greater efforts are being made to design crossing structures to accommodate the natural form and function of the watercourses they cross. This is accomplished by installing larger spans that do not intrude into the bed and banks of a stream; moreover, best efforts are made to find a crossing location where streambank erosion and meanders are least problematic. In this way, monies are spent in the short term by developers for larger crossings/open-footed culverts/bridges, avoiding the costs incurred by municipalities for repair and maintenance for erosion impacts, and the residual damage to aquatic and terrestrial functions.

Public Transit

The Metrolinx Regional Transportation Plan proposes transportation projects for the next 25 years, including a significant public transit expansion (Metrolinx, 2008). Some of the major projects affecting the Don watershed include: the Transit City Light Rapid Transit (LRT) Plan, expansions in service on the Richmond Hill GO rail line and an extension of the Yonge Street subway north to Highway 7. The Toronto Transit Commission's Transit City LRT Plan identifies a Don Mills LRT system between Bloor-Danforth subway line and Steeles Avenue along Don Mills Avenue and an Etobicoke-Finch LRT and Eglinton Crosstown LRT with east-west routes along Finch and Eglinton, respectively. The projects set out in the Metrolinx plan build upon projects and programs of the municipal transportation master plans.

A number of the programs recommended in the original 2002 York Region TMP had the financial support of the provincial and federal governments. Introduced in 2005, the Viva rapid transit network is a notable project funded by both senior levels of government. This rapid transit system services areas along Yonge Street and provides connection between Aurora, Newmarket, Vaughan, Richmond Hill, Markham, and Toronto; Viva links York Region with the City of Toronto, GO Transit, and the transit systems of Peel and Durham Regions. Predictions were that 7 million riders would use this system in the first year, moving 7,000 car trips a day off arterial roads. Early reports revealed that York Region Transit and Viva Rapid Transit ridership increased 10.8 per cent through the end of July 2006. More than 9.6 million riders used the transit services between January and July compared to 8.6 million in 2005; most recently, it was reported that ridership grew 10 per cent during April 2007 (*Novae Res Urbis* - Greater Toronto Area Edition, June 27, 2007).

As part of the update to its Transportation Master Plan, York Region adopted Sustainability Principles for Transportation which will guide the plan's development. These principles promote transit supportive development, energy efficiency, climate change mitigation and put pedestrians and transit first. Similarly the City of Toronto's Official Plan contains significant policies to concentrate growth and build on its existing transportation infrastructure. As previously noted, the Toronto Transit Commission's (TTC) Transit City Plan identifies several transit route expansions that affect the Don watershed.

The City of Toronto's *Don Valley Corridor TMP* (City of Toronto, 2005a) focuses almost exclusively on improvements to existing public transit within the corridor. The plan recognizes

that road widening and new roads are largely infeasible, and identifies a series of public transit improvements, including new bus routes and GO Transit stations, high occupancy vehicle lanes, minor connections between existing bus routes, and transportation demand management strategies.

Key Issues for Public Transit

Public transit options are limited for the upper Urban and Urbanizing Area of the watershed, so that commuters rely heavily on private automobile usage. York Region statistics show that more than 70% of households have access to two or more vehicles and that over 1.2 million trips are made by York residents on an average weekday. Of these trips, approximately 64% have both an origin and destination within the Region. Statistics also show that during the morning peak travel period, 47% of work trips generated by York residents were destined to the City of Toronto, resulting in congested north-south arterials and freeways in the southern portions of the Region. For all morning peak travel period trips, 79% were by automobile, 8% were by public transit, 7% were made by walking and cycling and the remaining 6% were school bus trips (York Region Transportation Master Plan, 2002).

Many of the communities in the Urbanizing Area, and even the newer communities in the Urban Area, have been developed with population densities that can support only the lowest forms and service levels of public transit. Moreover, the Areas' street design and alignment often make the logistics of developing high order transit corridors (dedicated transit right-of-ways) a challenge. Where public transit service does exist, the considerable distance that residents must walk to access it can be a deterrent to its use.

The expansion of the GO Transit system, the introduction of York Region's Viva transit system, the TTC's Transit City Plan and the Metrolinx Regional Transportation Plan are positive initiatives that will make public transit more attractive to commuters. These transit initiatives, together with efforts to plan and develop more "transit friendly" communities would constitute a more comprehensive solution to avoid the disproportionate reliance on automobiles.

4.2.2 Water and Wastewater

Significant upgrades to water and waste water systems in the Don watershed have been necessary to meet the demands of the GTA's growing population. As the Rural Area dwindles to a small portion of the watershed, most of it is beginning to function on a municipal water supply, while little is relying on private wells.

Drinking Water

The City of Toronto provides treated drinking water from Lake Ontario to the urbanized areas of Markham, Vaughan, and Richmond Hill. Toronto's water supply system consists of four water filtration plants, eighteen pumping stations, ten major underground storage reservoirs, four elevated storage tanks, about 510 kilometres of trunk watermain and 5,015 kilometres of distribution watermain. The City runs four water treatment plants; three are located on the Lake

Ontario shoreline and the fourth is on Centre Island. On average, Toronto distributes 1.43 billion litres of water daily (Toronto Water, 2004).

In 2005, Peel Region also began contributing water to communities in York Region. The provincial government and Peel Region entered into agreements with York Region whereby the water supply to Vaughan, Markham, Richmond Hill and Aurora is drawn from Lake Ontario through Peel Region and Toronto filtration plants (York Region, 2005b). In rural areas, individual private wells provide water supply. York Region is responsible for water supply, production, treatment, storage, and trunk distribution. The City of Toronto and Peel Region provide water supply to the southern portion of York Region and are responsible for treatment. York Region operates and maintains 14 water pumping stations, 37 storage facilities (elevated tanks and reservoirs), 39 production wells and close to 150 kilometres of transmission mains.

In 2004, York Region completed an update to its *Long Term Water Project Master Plan* (MacViro Consultants Incorporated and United Utilities Canada Limited, 2004). The Master Plan's preferred solution to service an anticipated 1.3 million people by 2026 is planned long-term investment in infrastructure of more than \$470 million, to increase external and internal supply capacity and water treatment capacity, and expand pumping and transmission facilities.

York Region is currently conducting an EA process to address the need for expansions to existing water supply systems servicing the expanding communities in Stouffville, Kleinburg, and King, but none of these are in the Don watershed. Because the drinking water infrastructure for communities in the Don watershed is already in place, most projects tend to be for infrastructure replacement or repair. Indeed, infrastructure improvements, such as new pumping stations and watermains, are planned for Vaughan and Richmond Hill in the Don watershed through 2008 (York Region, 2005b).

Wastewater

The City of Toronto treats 1.3 billion litres of wastewater daily, at four wastewater treatment plants, one of which is located in the Don Valley. The North Toronto Treatment Plant serves about 55,000 connected residents in the City of Toronto. When over capacity, excess wastewater flows through the North Toronto Trunk Sewer to the Ashbridges Bay Treatment Plant. The North Toronto plant treats wastewater through primary settling, activated sludge treatment (secondary treatment), final settling, disinfection (using sodium hypochlorite), and phosphorus removal (tertiary treatment), prior to discharging into the Don River.

Most of York Region's wastewater is collected and transported via a large trunk sewer system, the YDSS, to the Duffins Creek Water Pollution Control Plant in Pickering, and is then discharged into Lake Ontario. Construction of the YDSS began in the late 1970s and early 1980s after the Province declared that no additional sewage treatment plants should be built on the Humber, Don, and Rouge Rivers. YDSS serves Newmarket, Aurora, Richmond Hill, Vaughan and Markham. York Region is currently expanding the YDSS to accommodate growth, in accordance with its *YDSS Master Plan Study*. Within the remaining rural portions of the

Regions of York, private sewage systems (septic tile bed systems) are operated by individual landowners.

Both the City of Toronto and York Region have sewer use bylaws, regulating the strength and composition of wastes released into the municipal sewer system.

Expansion of the YDSS is ongoing for the Urbanizing Areas of the Humber and Rouge watersheds, but is not planned for the Don watershed. The last expansion of the YDSS in the Don watershed was the Bathurst Collector/Langstaff Trunk Sewer Project (York Region and Durham Region, 2005). Currently, similar to water infrastructure, York Region's wastewater projects in the Don watershed generally deal with maintenance and repair of the existing sewer system.

Key Issues for Water and Wastewater

Like infrastructure for transportation, water and sewer infrastructure is permitted within natural areas by environmental legislation. The *Environmental Assessment Act* functions to help avoid or mitigate the harmful effects of infrastructure projects on the environment. The Environmental Assessment (EA) required for recent expansions to the YDSS in the Rouge Watershed demonstrated the wide ranging impacts that major infrastructure projects can have on the environment. Current plans to extend the YDSS and to increase groundwater withdrawals to accommodate new urban development are now using a more informed approach about how to avoid or mitigate environmental impacts to the host watersheds.

At the subdivision level, a significant amount of dewatering can be required in order to install underground servicing that will connect to the main water and sewer pipes. TRCA staff work with subdivision developers and their consultants to manage dewatering for servicing through mitigation techniques, such as the use of anti-seepage collars and ensuring dewatering discharge is evenly dispersed, filtered, and sufficiently setback from a watercourse.

In order to lengthen the life of current water supplies and wastewater systems, sustainable use of water resources is critical. Municipalities are endeavouring to address unsustainable rates of use within their jurisdictions, as evidenced by ongoing plans and studies to increase efficiency and educate residents. Indeed, in response to controversy over its major infrastructure projects, York Region formed a multi-stakeholder group to provide advice on a sustainable development strategy for growth management, infrastructure planning and environmental protection, including water budgeting. One of the themes that the Region's Stakeholder Advisory Group asserted would inform York Region Infrastructure Master Plan updates was to consider land-use/infrastructure system alternatives that minimize impact on the natural environment; and, to identify "zones of exclusion" that represent high priority environmental areas (Seetaram, D./Towards Sustainability in York Region Advisory Group, 2006).

The City of Toronto has prepared a comprehensive Water Efficiency Plan (City of Toronto Works and Emergency Services, 2002). The Plan outlines the current water system and demand for water, forecasts future water demand, evaluates water efficiency measures,

analyses the costs and benefits of water efficiency, and presents implementation and monitoring information. The goal of the plan is to reduce water demand by 15% (220 ML/day) by 2011. As part of its Water Efficiency Program, Toronto Water is implementing a variety of water conservation programs, including residential and business rebate programs (e.g., for toilets, washing machines, industrial/commercial/institutional capacity “buy back” program) and educational programming. From 2001 to 2006, Toronto has realized reductions in its actual peak day water demand and annual average day water demand of 273 ML/d and 79 ML/day, respectively (City of Toronto, 2007).

York Region has been implementing its Water for Tomorrow program, delivered in partnership with its lower tier municipalities and other local stakeholders since 1998. The goal of the program is to save more than 19 million L (4 million gallons) of water each day (MacViro Consultants Incorporated and United Utilities Canada Limited, 2004). Key elements of the program include a leak detection and repair program, water use audit and retrofit programs for households and businesses, and educational programming. By September of 2003, the Water for Tomorrow program had resulted in a savings of 15.1 million litres of water per day. The residential/commercial retrofit program resulted in installation of over 99,000 low-flow showerheads and over 231,000 early closing toilet flappers. The industrial/institutional audit program led to a potential savings of over 1.4 million litres of water per day, and the leakage reduction program saved over 2.39 million litres of water per day. York Region’s Water Efficiency Master Plan Update (RSMi, 2007) reports an overall sustained savings of 20.33 ML of water per average day, which surpasses the original program goal. The Water Efficiency Master Plan Update recommends new and/or updated programs for public education and water conservation measures. New goals for education and water conservation measures will be set once the program implementation plan is completed and approved by council.

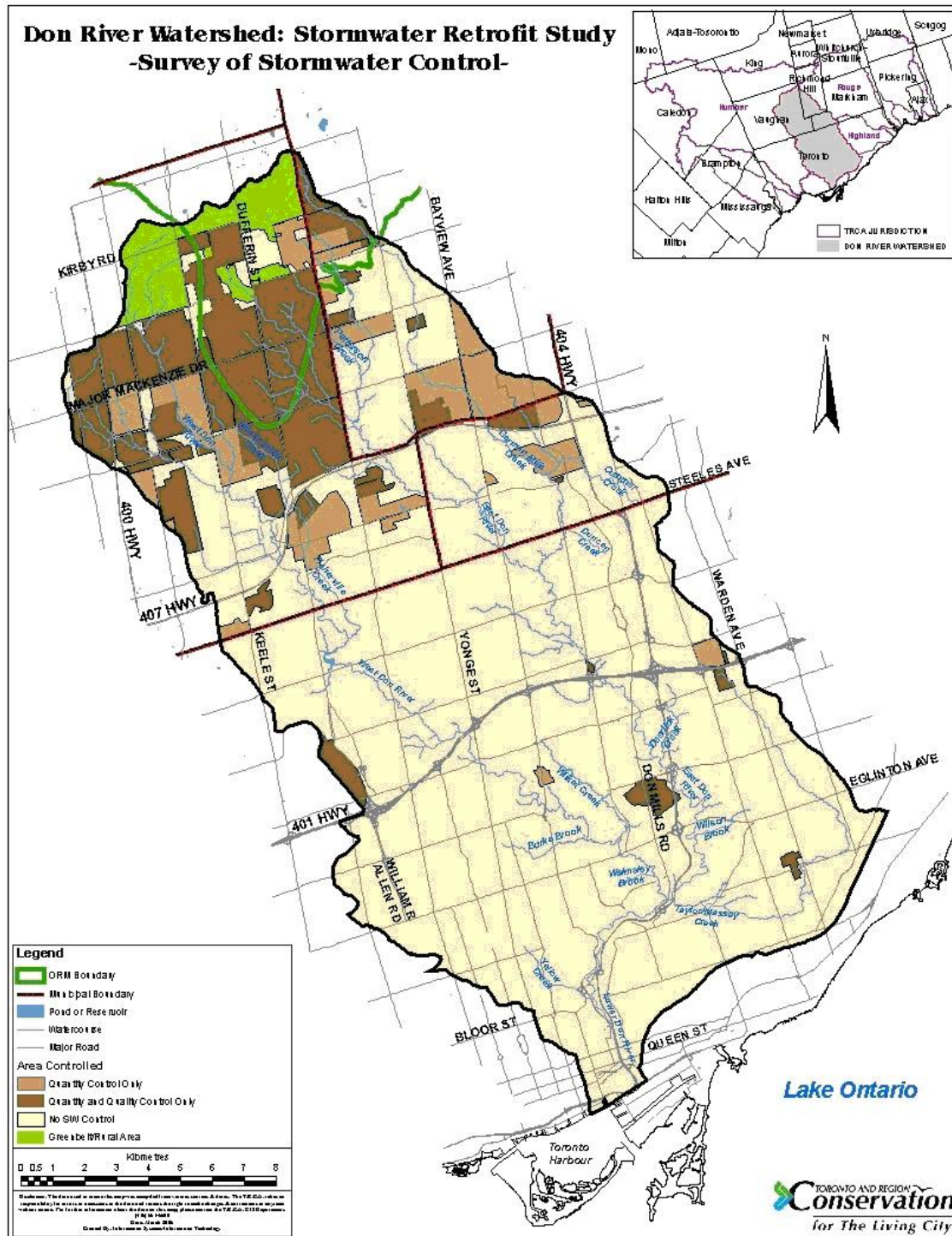
While these municipal programs are largely motivated by decreasing costs associated with water supply, the end result of such strategies can produce both financial and environmental benefits. Indeed, a portion of revenue from municipal water bills is contributed to TRCA, on a regular basis, for protecting and enhancing its watersheds.

4.2.3 Stormwater Management

The control of stormwater runoff is achieved through implementation of management criteria for flooding, water quality and erosion. Increasingly, the focus of stormwater management is on maintenance of the natural hydrologic cycle, as a means of mitigating the effects of urbanization on the ecological integrity of a watershed.

About 13% of the urbanized area of the watershed has stormwater controls in place with at least quality and quantity control functions. Some of these provide for erosion control to current TRCA criteria. Of the remaining 87 % percent of the urban area, 75 % percent has no controls in place for the treatment of stormwater runoff, and 7 % has water quantity control only, typically in the form of dry ponds (see Figure 5). These differences in the level of control are indicative of the age of development within the watershed and also reflect the change in management approaches that has occurred over time.

Figure 5: Stormwater management in the Don River watershed.



About 26 % of the Don River watershed is serviced by combined sanitary and stormwater sewers, largely south of Eglinton Avenue (CH2M Hill and MacViro, 2003). There are four main trunk sewers and 33 combined sewer overflow (CSO) outfalls, where untreated storm and sanitary sewer discharges can flow into the Don River and its tributaries when the intake capacity of the sewage treatment plant is exceeded. Untreated stormwater, discharges from CSOs, and illegal cross-connections between the sanitary and stormwater sewer systems, all impact water quality in the Don River and its tributaries.

Watershed municipalities have identified opportunities to improve stormwater management in the Don via the City of Toronto's *Wet Weather Flow Management Master Plan* and 905 municipalities' stormwater retrofit studies. The City of Toronto is developing an environmental assessment study which proposes to twin the Coxwell sanitary trunk sewer and further define the system of underground storage facilities needed to contain stormwater outflow until it can be properly treated. A more complete discussion of stormwater management issues in the Don River watershed can be found in the Current Conditions Report on Hydrology/Hydraulics and Stormwater Management.

4.2.4 Solid Waste

Since closure of the Keele Valley Landfill site in the Don River watershed, waste from the City of Toronto and York Region is exported to Michigan in the United States. The introduction of various waste diversion programs such as blue box programs, organic waste collection, and access to transfer stations, has helped reduce quantities of waste going to landfills in recent years. Waste not diverted from landfill is exported to Michigan. The City of Toronto has also initiated an individual Environmental Assessment to address management of the 360,000-400,000 metric tonnes of solid waste that is expected to remain each year after recycling and composting programs are fully instituted.

In 2006, the City of Toronto announced that it would be purchasing the Green Lane Landfill and sending its waste there, located in Southwold Township in the County of Elgin, southwest of the City of London, Ontario. With an aggressive diversion plan, the purchase provides Toronto with new disposal capacity for a minimum of 15 years. The City's contract for waste disposal in Michigan will continue until the end of 2010. In 2007 the City approved the creation of a 3Rs Working Group and a Residual Waste Working Group to provide input and advice on the design and implementation of policies and practices to help achieve the goal of 70% diversion from landfill.

The City of Toronto is also seeking a location for a facility that treats organic materials from the "Green Bin" program. Thus far, two of the ten potential locations identified are within the Don watershed: the North Toronto Treatment Plant is located in the flood plain of the Don River Valley; it is east of Bayview Avenue and north of the Don Valley Parkway; and, the Dufferin Waste Management Facility is southwest of Finch Avenue and Allen Road. With respect to the North Toronto Treatment Plant, TRCA staff have commented to the City of Toronto that new

industrial development in a flood plain is contrary to the *Provincial Policy Statement*, TRCA's *Valley and Stream Corridor Management Program*, and *Forty Steps to a New Don*. Although this project does not require an EA, City staff are endeavouring to conduct the site selection process in an open and publicly accountable manner, which includes an evaluation of environmental, social and economic criteria; staff have also committed to address sustainability in the design of the facility.

York and Durham regions are jointly undertaking an EA to consider their disposal options termed, *Residual Waste Planning Study*. After an evaluation of alternatives, the preferred approach for dealing with wastes was found to be 60 to 75 percent diversion of wastes coupled with thermal treatment (i.e., incineration) of residual wastes with recovery of materials from the ash (MacViro Consultants and Jacques Whitford Limited, 2006a).

In terms of waste generation, per capita generation by residents in the City of Toronto in 2003, was estimated to be 247 kilograms (Toronto Community Foundation, Toronto's Vital Signs 2004). In 2005, York Region generated 340 kilograms of waste per capita (York Region Joint Waste Diversion Strategy, 2006). Both municipalities have increased the percent of residential solid wastes they are diverting from landfill and/or incineration, through recycling and organics collection programs (Table 7). From 2003-2005, the period of time for which comparable data was available, both municipalities' residential diversion rates increased by 8%. While this table presents aggregated municipal diversion rates, it should be noted that some individual municipalities in York Region, such as Markham, have had particularly successful rates of diversion.

Table 7: Residential solid waste diversion rates 2001-2006 in Don watershed municipalities.

Municipality	Percentage of residential solid waste diverted from landfills and/or incinerators					
	2001	2002	2003	2004	2005	2006
York Region	N/A	N/A	23.9	24.9	31.9	40.8
City of Toronto	27	28	32	36	40	42

Sources: City of Toronto, 2005b; York Region, 2006.

Key Issues for Solid Waste

Generation of waste materials and the manner in which they are disposed can have a direct impact on ecological, economic, and human health. Waste disposal has the potential to negatively impact watershed health in a number of ways, including contamination of surface and groundwater resources, production of green-house gases, and loss of greenspace and natural habitat, due to the land-consumptive nature of landfill sites.

According to the Ontario Ministry of Environment statistics, there are about 47 abandoned landfills in the Don watershed, many of which are located in valleys adjacent to the River (for more information, consult the Current Conditions Report on Surface Water Quality). All of these landfills were active prior to the establishment of Ministry of the Environment regulations on the design of landfills to protect surface and groundwater resources. Hence, liners or leachate collection systems were likely not installed. Because abandoned landfills are essentially vacant

land parcels in need of remediation, they present an opportunity similar to abandoned aggregate sites for potential rehabilitation to a natural state. Studies completed in support of a rehabilitation plan would need to assess and address any residual leachate issues.

In order to reduce the negative impacts of waste disposal in landfills, municipalities within the Don River watershed are attempting to increase the amount of waste diverted from landfill sites through reuse, recycling, and composting of waste materials.

The City of Toronto has a number of residential waste diversion programs, including blue box recycling and a green bin (i.e., organics) collection program. In 2005, the City diverted more than 346,000 tonnes or 40% of residential waste from landfill, up from 36% in 2004 (Butts, 2006). In 2001, the City of Toronto created the Waste Diversion Task Force 2010. The Task Force was asked to consult with the people of Toronto and design a solution for meeting the following targets: 30% diversion of household waste from landfill by 2003; 60% waste diversion by 2006; and, 100% waste diversion by 2010. Toronto has exceeded its target, achieving a rate of 32% waste diversion from landfill in 2003 and a rate of 36% waste diversion in 2004. In 2004, the City implemented its “green bin” organic waste collection program that is currently being expanded city-wide.

York Region has programs in place for source separation and diversion of “Blue Box” recyclables and household organics. Moreover, the Region’s preparation of a long term waste management strategy will emphasize waste diversion, examine waste disposal alternatives, and explore waste as a potential resource. York Region’s waste diversion rate, from recycling and an organics separation program, rose from 24% between July and September 2004, to 33% in the same period in 2005 (York Region, 2005a).

4.2.5 Energy

Ontario’s electricity supply comes from a number of different sources that include nuclear energy, renewable power, coal and natural gas. According to the Ontario Ministry of Energy, the province has 30,000 megawatts of electricity generating capacity, but many existing power facilities are aging, and 80 per cent will need to be refurbished or replaced over the next 20 years. The government has brought online 3,000 megawatts of new supply and plans to bring an additional 10,000 megawatts online by 2010; this will result in more new generation capacity than any other jurisdiction in North America (Ontario Ministry of Energy website, 2007).

However, the Ontario Power Authority estimates that demand will begin to exceed available supply by 2014. By 2025, they estimate the energy gap will be about 10,000 megawatts. Alternative forms of energy must then be explored in order to fill this gap in a sustainable way. In 2008 the Ministry of Energy and Infrastructure directed the Ontario Power Authority to review and amend its Integrated Power System Plan.

In 2005 it was estimated that 34% of Ontario’s electricity supply was generated from fossil fuel burning power plants (coal and natural gas), while 41% was generated by nuclear power plants, and 23% through renewable sources including hydro, solar, wind and biomass burning (OME, 2007). Examples of alternative energy forms currently in use include Ontario Power

Generation's nuclear plant in Pickering (3,104 megawatt capacity) and the Pickering Wind Generation Station (1.8 megawatt capacity). There are also at least two biogas plants in the GTA, including one at the old Keele Valley landfill site in the Don watershed. Toronto Hydro operates a wind turbine (750 kilowatts) at Exhibition Place and a pilot solar power plant (36 kilowatts) on Commissioners Street in the City of Toronto. In 2006, the Ontario government set a goal of having 34% of its electricity supply from renewable power generation sources by 2025 (OME, 2007).

In 2005, total electricity consumption for Toronto was 26,372,168 megawatt hours (MWh), with a total electricity peak demand of 4,936 MW (IndEco Strategic Consulting Inc., 2006). Low-rise residential users accounted for 22% of total electricity consumption, large users (monthly peak demand greater than or equal to 5,000 kW) accounted for 10%, and the remaining general service users (i.e., small businesses, bulk-metered residential users) accounted for 68%. Natural gas consumption was 4.3 billion cubic meters in 2004; 34% was consumed by residential users, 20% by apartment users, 29% by commercial users, and 17% by industrial users.

The City of Toronto's Climate Change, Clean Air and Sustainable Energy Action Plan – Moving from Framework to Action, *Change is in the Air* (City of Toronto, 2007) sets out bold directions for the City, its residents and businesses to reduce greenhouse gas emissions, clean the air, and ensure a sustainable energy future. The plan identifies a number of actions including: a Live Green Toronto program to encourage Torontonians to adopt more environmentally friendly lifestyles and reduce energy use, a framework to renew Toronto's concrete high-rise residential buildings (Tower Renewal program), a pilot program for residential solar hot water heating, a one-window source of energy and environmental information, a plan to promote local food production, community energy planning, a plan to double Toronto's tree canopy, the development of a strategy to adapt to climate change, and a plan to shift taxis and limousines to low emission or hybrid technology.

York Region's preferred alternative for dealing with garbage in the future incorporates incineration of wastes, which is anticipated to result in net energy generation of 86,180 MWh (MacViro Consultants and Jacques Whitford Limited, 2006b). In this way, wastes could be exploited as a local, renewable fuel source. York Region has also conducted energy audits of many of its regional facilities, resulting in a savings of \$251,000 in 2004 (York Region, 2004). Local municipalities within York Region have also been leaders in a variety of energy related initiatives. For example, Markham has established its Energy Conservation Office in 2005 with a vision to position the Town as a leader in energy conservation.

Key Issues for Energy

Despite growing awareness of the relationship between energy use and poor air quality and global climate change, energy consumption continues to climb. In 2005, total electricity consumption for Toronto was 26,372,168 megawatt hours (MWh), with a total electricity peak demand of 4,936 MW (IndEco Strategic Consulting Inc., 2006). Rotating blackouts have been predicted for the City by 2008, unless energy conservation is maximized and 500 MW of new

generation capacity is built by 2010. In response, the City of Toronto is currently developing an Energy Plan which will set short and long term priorities to move towards greater energy sustainability (IndEco Strategic Consulting Inc., 2006). The City has a number of current initiatives aiming to increase energy sustainability, including development of a Renewable Energy Action Plan, partnerships with the building and transportation sectors to promote energy efficiency, a Fuel Cell Generation Project, the Green Roofs Program, retrofits to City buildings, and the Mayor's Megawatt Challenge (IndEco Strategic Consulting Inc., 2006).

Energy conservation programming has also been directed at residents. For instance, GTA health units and other partners have developed *20/20 The Way to Clean Air*, an initiative designed to help residents reduce their home energy use and vehicle use. With increasing concern that global oil production may soon, or might already, have peaked, there will be increasing need to develop local, renewable energy sources and make lifestyle and urban planning decisions that will minimize energy use. Current community design does not facilitate local renewable energy generation or distribution, although the installation of "Energy Star" appliances in new residential subdivision developments is becoming more common in the GTA. In particular, Markham Centre, a new community developing in the Rouge Watershed in Markham, is an example of how energy efficiencies can be considered more fully at the community design scale by planning for district energy and setting targets for energy efficiency. Markham Centre aims for a 30% reduction in energy demand overall, in comparison with a typical urban development.

4.3 Ratings for the Sustainable Land and Resource Use Indicators

The objectives for sustainable land and resource use in the Don River watershed are to:

- Manage stormwater to protect people and the health of streams and rivers;
- Improve sustainability in urban form at community and building site scales, and
- Practice sustainable resource use by individuals, households, businesses, institutions and governments.

The indicators, measures, targets and overall ratings for the current conditions in the watershed are presented below. Note that the indicator and measure for the stormwater management objective is presented in the current conditions report on Surface Water Hydrology, Hydraulics and Stormwater Management, and that additional measures for the water demand indicator are presented in the current conditions report on Baseflow and Water Use Assessment.

In evaluating current watershed conditions, a rating system was adopted based on categories of "poor", "fair", and "good". Where the measures and targets were quantitative and data permitted, ratings were assigned, in part, to reflect the per cent satisfaction of the target. Comparisons to conditions in other watersheds in TRCA's jurisdiction were made and informed evaluations where data were available, to reflect relative conditions. Where measures and targets were qualitative, or data were lacking, evaluations were subjective and based on professional judgment.

Objective: Improve sustainability in urban form at community and building site scales		Overall Rating
		Fair
Indicator	Measure	Target
Community design	TBD	TBD
Green buildings	% of new or retrofit public buildings designed to achieve green building certification (e.g., LEED, Green Globe, City of Toronto Green Development Standard)	100% of new or retrofit public buildings designed to achieve green building certification
Transportation	# transit trips per person, per year	Increase the number of public transit trips per person, per year
	% mode of transportation to work (% of trips made by: car, truck, van as driver; car, truck, van as passenger; public transit; walk/bicycle; other)	Decrease the percent of single person trips to work made by car, truck or van

This objective was rated “Fair” overall, based on the “Fair” rating given to the transportation indicator, which was the only indicator rated at this time.

Community design

A technically defensible measure for evaluating and tracking the sustainability of community design has yet to be developed. A measure relating to a forthcoming “LEED for Neighbourhoods” certification may be developed in the future. At this time, the measure, target, and overall rating for the community design indicator is “To be determined”.

Green buildings

Green building certifications, such as LEED, Green Globe or the City of Toronto Green Development Standard, have only been in existence for about six years, therefore only a few certified buildings have been built to date. For example, there are about 15 LEED certified commercial (public and private) buildings in the Greater Toronto Area (CAGBC, 2007). However, there are about 50 prospective LEED commercial buildings in the final design and construction stage and another 128 buildings registered with the Canada Green Building Council (CAGBC) for design and construction in the Greater Toronto Area. A Don watershed

example is the City of Vaughan Civic Centre, designed with consideration for Gold LEED certification standards. In 2006, York Regional Council approved LEED Silver as a minimum sustainable design and construction standard for new Regional facilities being built. Markham Council agreed in 2008 to continue to target minimum LEED Silver for all new municipal buildings and additions/renovations to municipal buildings and confirmed LEED Silver as the minimum standard for all new medium and high density residential developments. As of October 2008 the City of Toronto had recorded over 100 developments that referred to the City's Green Development Standard in their applications. Due to the newness of green building certification, a rating has not been assigned to this indicator at this time.

Transportation

The trends in transit trips taken per person between 2001 and 2006 are presented in Table 6 in section 4.2.1. Data for the period of 2001-2005 were available for both City of Toronto and York Region. During that time, the number of transit trips taken per person annually has increased by 47% in York Region (York Region, 2006) and dropped by 1 % in the City of Toronto (City of Toronto, 2005b). The increase in York Region is a factor of expanded service areas and hours due to VIVA, as well as population growth and the assumption of GO Bus routes. In Toronto, transit use declined in 2002-2003 due to the economic slowdown after the terrorist attacks on September 11, 2001, SARS, and the hydro blackout, but the number of transit trips has been increasing from 2003 to 2005 (4%).

Reliance on private vehicle use in Don watershed municipalities remains high. The percent mode of transportation to work data for the City of Toronto and York Region is presented in Table 5 in section 4.2.1. In 2001, 52% of Toronto residents traveled to work as a driver of a car, truck, or van (below the provincial average of 73%), and in York Region the figure is 80%. This data based on the Statistics Canada 2001 Census of Population serves as 2001 baseline conditions for this measure. A rating for this measure could be assigned when the baseline conditions are compared with data from future Censuses.

The overall rating for the transportation indicator is "Fair". Improvements in transit service and ridership are offset by the heavy reliance on private automobiles.

Water demand

A rating of "Good" has been assigned to the water demand indicator, in recognition of the water savings achieved over the past six or more years through implementation of the City of Toronto and Region of York Water Efficiency Programs (see Section 4.2.2). However, given that the average residential water demand in the City of Toronto (252 litres per capita per day-lpc/d) and York Region (241 lpc/d) are still markedly higher than European rates (e.g. United Kingdom – 150 lpc/d), there is room for improvement in local water conservation practices (RMSi, 2007).

Solid waste diversion

Both York Region and the City of Toronto have increased the percent of residential solid waste they are diverting from landfill and/or incineration through recycling and organics collection programs (see Table 7 in section 4.2.4). Over the most recent four years of recorded data, York

Region has increased its diversion rate by almost 17% to 41% (2003-2006), while Toronto has increased its rate by 12% to 40% (2002-2005). The rating for the solid waste diversion indicator is “Good”, reflecting the considerable improvements municipalities have made over the last few years.

Objective: Practice sustainable resource use by individuals, households, businesses, institutions and governments		Overall Rating
		Fair
Indicator	Measure	Target
Water demand ¹	Peak and average day water use (ML/day) by municipality	Meet municipal targets for reduction in demand for water Reduce peak and average day demand by municipalities by at least 10% of projected levels ²
Solid waste diversion	% of residential solid waste diverted from landfill	Meet municipal targets for residential waste diversion: - 60-75% diversion of residential solid wastes in York Region ³ and 100% in City of Toronto diverted from landfill by 2010 ⁴
Energy sources and demand	% of total energy supplied by renewable sources	Meet Province of Ontario target of 10% of energy demand from renewable power sources (where drawn from grid) ⁵
	% change in per capita energy demand	Reduce energy demand by 15% per capita per year

¹ Additional measures for the water demand indicator are presented in the current conditions report on Baseflow and Water Use Assessment.

² City of Toronto, 2002; Resource Management Strategies Inc., 2007.

³ MacViro Consultants and Jacques Whitford Limited, 2006a.

⁴ Waste Diversion Task Force 2010, 2001.

⁵ Ontario Government, 2006. Note: Public sector may achieve higher targets (e.g., City of Toronto aims to meet 25% of its demand with renewable power sources).

This objective was rated “Fair” overall, based on an average of ratings for each of the three indicators discussed below.

Energy sources and demand

Given the increasing trend in energy demand and the current reliance on fossil fuel sources, a rating of “Poor” was assigned to the energy sources and demand indicator. This rating is expected to improve in future reporting cycles considering the number of recent local and provincial renewable energy development projects; the initiatives of local municipalities to

develop energy efficiency plans and actions for their own facilities; and participation in a variety of energy conservation programs (e.g. Mayor's Megawatt Challenge, private retail promotion of compact fluorescent bulbs and other energy saving technologies, etc.).

5.0 Moving toward Sustainable Land and Resource Use

The sustainability of an urban area is a function, in large part, of the way in which its residents, businesses, and institutions use renewable and exhaustible resources, such as land, water, and energy. For instance, Sahely et al. (2003) propose an "urban metabolism analysis" that considers inputs and outputs of energy, water, materials, and wastes, from an urban area as a measure of sustainability. Their analysis of the Greater Toronto Area (GTA) indicates that inputs increased at a greater rate than outputs between 1987 and 1999, and that increasing use of fossil fuels in the transportation sector indicates an inefficient urban form (e.g., high use of personal vehicles rather than public transportation).

Integral to the sustainable use of the Don watershed's land and resources is the triple bottom line (TBL) concept. TBL asks how the decisions we make today affect the prospects for environmental health, social well-being, and economic prosperity in the long term. The interdependence of these three spheres is evident when one considers the environmental degradation, economic costs, and diminished quality of life derived from previous unsustainable land and resource use. Recognizing this interdependence was not a requirement for development approval in the past. A lack of comprehensive scientific research, the presence of a booming economy, and a rapidly growing population, lead to acceptance and permission to manipulate the environment in favour of development. Eventually, science was literally able to learn from the mistakes of the past by using degraded natural areas as empirical evidence that urbanization that disregards the environment is unsustainable.

Due to a growing base of accepted scientific knowledge and updated, corresponding policies, new development and redevelopment is beginning to take place in a more sustainable way. Now, in order to avoid taking time to deal with the ramifications of short-sighted land and resource use planning decisions after they are made, more time is being invested in the initial stages of the planning process. The emergence of this new planning regime currently has momentum at both the provincial and municipal levels of government, reflected in the following recently introduced documents:

- The *Oak Ridges Moraine Conservation Act* and Plan (2001/2002)
- Provincial Policy Statement (2005)
- The *Greenbelt Act* and Plan (2005)
- Conservation Authorities' conformity (new Regulation for each CA) with the Generic Regulation under the *Conservation Authorities Act* (2006)
- The *Places to Grow Act* and *Growth Plan for the Greater Golden Horseshoe* (2005/2006)
- The *Clean Water Act* (2006)
- Amendments to the *Building Code Act* (2006)

- An extensive series of municipal initiatives, such as ravine and tree by-laws, by-laws requiring the construction of green roofs, growth management plans, environmental servicing plan requirements, stormwater retrofit programs, energy, water and waste conservation programs, investments in public transit, and sustainable community plans, guidelines and standards.

In addition, ICLEI (International Council for Local Environmental Initiatives) is a membership association of local governments and national and regional local government associations that have made a unique commitment to sustainable development. More than 475 local governments, representing nearly 300 million people worldwide, make up ICLEI; within TRCA's jurisdiction, and in the Don watershed, Toronto and York Region have become members of ICLEI (Local Governments for Sustainability (ICLEI) website, 2006).

In order to continue this momentum, it is vital to discuss how sustainable land and resource use can be achieved. This section highlights some key opportunities for enhancing the sustainability of land and resource use in the Don watershed. Greenfield development, but also infilling and redevelopment scenarios, more common to the Don watershed, offer opportunities to modify the urban form to enhance sustainability. The following is a discussion of how development limits, development design, infrastructure, and stormwater management can work toward this end.

5.1 Development Limits

In an urbanized watershed like the Don, the urban context has an enormous impact on natural heritage and influences how to define, protect, and enhance the terrestrial natural heritage system (TNHS) through the land use planning process. While some of the natural areas found in urban areas are not high quality from an ecological standpoint, they are highly valued by residents. Even marginal natural areas, that might not be considered significant in a less urbanized area, are important in an urban area, as they often represent the best there is and the only opportunity to make improvements. Within the Don watershed, the natural heritage system generally follows the river and its tributaries. The current state of the TNHS (forests, meadows, wetlands, and successional lands) in the Don watershed is described and evaluated in a separate current conditions report.

The limits of the TNHS within a development or redevelopment project should be delineated at the outset of the planning process, and should incorporate the following:

- areas in which development cannot occur due to natural hazards (flooding, dynamic beaches, and erosion);
- current natural areas warranting protection (including small and/or isolated and/or degraded features) and target areas (i.e. areas with potential for restoration, linked to existing natural areas) as securement of lands for regeneration adds additional strength to the larger system;
- where new development impinges on the boundary of the natural heritage system, a net environmental gain should be provided;

- an open space system that allows for active and/or passive recreation, that is integrated into both the built and natural system components;
- acquiring lands, or easements over lands, which can be connected to the system or which have important natural heritage value. Where lands within the system, which have important natural heritage value, cannot be dedicated into public ownership as part of the planning approval process, acquisition by a public body should be considered.

The creation of TNHS through the planning process is supported by the PPS, which states that, “The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, *recognizing linkages between and among natural heritage features and areas, surface water features and ground water features,*” and defines a “natural heritage system” as: “A system made up of natural heritage features and areas, linked by natural corridors which are necessary to maintain biological and geological diversity, natural functions, viable populations of indigenous species and ecosystems. *These systems can include lands that have been restored and areas with the potential to be restored to a natural state.*”

The natural heritage system of the Don watershed is supported by the urban forest in the watershed’s Urban Area. The importance of this type of natural cover cannot be overstated given the level of degradation existing in some valley and stream corridors of the Don where the more pristine components of the natural heritage system no longer reside. This has been well recognized in the City of Toronto through extensive street tree planting programs and by-laws which protect private trees. The City of Toronto estimates that urban forest currently covers about 20% of the City; its target is to increase coverage to 35%. However, the ecological functions of the urban forest and the opportunities for improvement and linkage with the natural heritage system need to be better understood. The second phase of the City of Toronto’s Natural Heritage Study will develop a science-based understanding of the urban forest and its role in the context of the City’s urban environment and natural heritage system (City of Toronto, 2006c). Furthermore, the City is evaluating the ecoservices provided by the urban forest and opportunities for enhancement using the Urban Forest Effects (UFORE) model. This work will contribute to understanding the importance of the urban forest in all urbanized portions of the Don watershed.

5.2 Development Design

Models of development design, referred to as sustainable community models, have emerged over the last two decades in response to urban sprawl. Sustainable community models include eco-villages, transit-oriented compact communities, co-housing, and new urbanism. Sustainable communities are considered to be more liveable than models of sprawl, are thought to foster a more social- and civic-minded environment, and to use natural resources more wisely (CMHC, 1997).

The integration of the features commonly associated with sustainable communities means that many of them reinforce each other. This is often referred to as a “solution multiplier”, whereby one feature strengthens the effectiveness of another. For example, higher density development

is more supportive of public transit, and this in turn helps to conserve green space and reduce auto related environmental and human health impacts.

Examples of sustainable communities have been designed and implemented in jurisdictions around the world, and they are beginning to be employed locally.

- Regent Park, a 28-hectare community that is being redeveloped over the next 10-12 years in the City of Toronto portion of the Don watershed, has strong environmental, social and economic goals. Specific targets are set for the reduction of energy use (75%), for water use conservation (35%), solid waste diversion (60%), and an 80% reduction in greenhouse gas emissions.
- A waterfront community development in Malmo, Sweden has received international attention for being on the forefront of sustainable design. It is designed to run on 100 percent renewable resources, and recycles water locally.
- The Eco-Village in Ithaca, New York is a co-housing project in a rural setting, which incorporates community-supported agriculture into the 70-hectare property. Innovative energy-efficient features include district heating. Renewable energy projects include photovoltaics in a portion of the houses.
- The new City of Brampton Official Plan encourages conservation of the natural heritage system using mechanisms such as cost sharing agreements, density bonusing and density transfers.
- The Town of Markham is planning a 400-hectare development within the Rouge Watershed, known as Markham Centre that is being guided by a set of performance measures to deliver their vision of a downtown core for Markham. It will be a higher density development with a distinctly urban character and streetscapes complemented by ample greenspace.

These examples are innovative approaches to built urban form and densities, stormwater management, energy and waste management, infrastructure standards, and environmental protection, which could be used for both greenfield and redevelopment scenarios. Most importantly, these case studies demonstrate that new approaches are being employed, and often with great success. Indeed, the marketing and sale of units in Markham Centre has revealed that commercial tenant demand for environmentally sound office space is robust. Not only do tenants want to be seen as promoting environmental protection, they are attracted by the lower operating costs created by energy efficient standards typical to Markham Centre office and retail space. According to the main developer for Markham Centre: “While following LEED standards can cost up to \$10 a square foot more in construction costs, reduced operating expenses can wipe out that extra upfront payout within a matter of a few years,” (Belford, August 1, 2006).

As well, some public bodies are exploring standards for green building design for multi-residential (apartments), industrial, and commercial buildings. For example, the City of Toronto has introduced the Toronto Green Development Standard, which they define as a set of features of site and building design that promotes better environmental sustainability of development. The Standard integrates existing municipal guidelines and targets with standards from private rating systems such as LEED and Green Globes. It is to be applied to new City-owned and affiliated projects but is also meant to encourage green development among the private sector, where it is to be a voluntary program in the initial year of implementation. Meanwhile, the City will be conducting further study and stakeholder consultation (City of Toronto, 2006d). So far, Toronto has learned that other jurisdictions in North America and abroad have employed the following various measures to implement green building design:

- Incentives – including cash, expedited approvals, or zoning variances such as increased densities
- Education – including permanent information centres, online resources, help lines, and seminars
- Public Sector Leadership – including mandatory green requirements for all public buildings or publicly funded green demonstration projects
- Mandatory Requirements – including modified building code and by-law requirements and mandatory green development standards

While many of these sustainable urban design principles can be applied to redevelopment projects, as well as Greenfield developments, there are emerging examples of dedicated “retrofit” programs for existing buildings or communities. For example, the City of Toronto’s Tower Renewal program aims to apply building upgrades and greening initiatives to high rise apartment buildings.

5.3 Infrastructure

Given that new development requires access to water, sewers, gas, electricity, telecommunication, and roads, the environmental impact of underground servicing tends to be coincident with the rate of development. Planning and installing infrastructure in a more sustainable way begins with the efficient use of urban services. The expansion and upgrade of existing servicing is likely to create less environmental impact than installing new servicing where none was located previously. Making efficient use of existing infrastructure is possible through redevelopment and intensification. Further, the water efficiency plans that Toronto, and York and Durham Regions are producing are also a positive contribution to sustainable use of resources, given that if less water is required for the population, less infrastructure will be needed in order to supply water to that population.

New technologies for non-traditional forms of water and sewer infrastructure, which are less land and resource consumptive, are being tested in the hope that future development can rely less heavily on traditional forms of servicing. Such technology is currently being developed at TRCA’s Kortright Centre for Conservation, where a fully self-sustainable house is being constructed. With the eventual perfection of these technologies at the local level, it is anticipated that they can be expanded to the subdivision, community and region wide scales.

Installing infrastructure while limiting environmental impacts also means choosing installation routes in the least sensitive areas; using technology that keeps dewatering to a minimum; designing lots and structures that return as much water to the ground as possible; and being diligent about sediment and erosion control. As well, it means bolstering “green infrastructure”, such as the natural heritage system that includes trails for pedestrians and cyclists. A positive instance of the latter is York Region’s recently approved partnership program to assist local municipalities, conservation authorities and other agencies in the development of pedestrian and cycling infrastructure projects (NRU, Greater Toronto Area Edition, June 27, 2007). A recent provincial initiative in the realm of public transit is their announced intention to “cap” review times for Environmental Assessments for public transit projects, in order to expedite their much-needed approval. Finally, with respect to roads and highways, High Occupancy Vehicle Lanes (HOV) have been touted as a fairly inexpensive yet effective tool to reduce congestion and pollution due to single occupant vehicle use; in this vein, the province recently announced plans to create a network of HOV lanes on the 400 series highways in the Golden Horseshoe; so far, one HOV lane is slated for the Don watershed by 2011, on Highway 400 north, beginning at Major Mackenzie Drive.

5.4 Stormwater Management

The evolving technologies in stormwater management (SWM) have been ongoing for several decades. Initial efforts in the 1970s and 1980s focused on flood control, followed by water quality and streambank erosion concerns in the 1990s. Most recently, comprehensive studies in SWM are examining watershed response with respect to urbanization’s impact on the complete water balance cycle, geomorphology, fish, and natural heritage.

The basic premise of this work is that the amount of stormwater runoff to receiving watercourses increases substantially with the introduction of impervious surfaces in greenfield development. When reviewing development applications, TRCA staff work with developers and their consultants to achieve a post-development water balance that matches the water balance at pre-development to the extent possible. Lot level controls are used in an attempt to accomplish a “post to pre-water balance”, including underground perforated pipes, directing clean run-off from rooftops to pervious areas (e.g., yards), and grass swales that all convey and help to infiltrate run-off. This requires flexibility in municipal standards given that such mechanisms are not typical features of subdivision lots. However, these best management practices (BMPs) are necessary if the host municipality desires to see the health of the watersheds maintained within their jurisdiction.

A suite of BMPs in stormwater management constitutes the “treatment train” approach. This approach entails capturing stormwater at the source (lot-level), conveying stormwater to increase infiltration (e.g., perforated pipes and ditches), and treating stormwater at end-of-pipe (e.g., stormwater management ponds). The treatment train approach attempts to replicate a natural cycling of water by encouraging infiltration, reducing runoff volumes and velocities, and filtering out pollutants carried in stormwater. It is anticipated that this will help reduce downstream erosion, replenish ground water supplies, and moderate the temperature of water to receiving streams. Other measures that work toward maintaining a natural water balance include:

- porous paving,
- shallow marshes,
- backyard ponds,
- green roofs,
- rain gardens,
- thicker topsoil layer,
- downspout disconnections,
- foundation drain disconnection,
- rain barrels,
- perforated pipes,
- tree and shrub plantings,
- infiltration trenches,
- soak-away pits,
- re-establish forests and riparian vegetation,
- municipal street cleaning,
- underground storage and cisterns,
- constructed wetlands,
- stormwater filtering systems,
- bio-retention basins,
- vegetated filter strips,
- grass swales,
- oil grit separators,
- retain or construct drainage ditches or infiltration,
- trenches to convey stormwater as an alternative to building curbs on roadways, and
- sediment control fencing.

Most of these concepts can be easily employed in the grading and construction or retrofit of both residential and industrial/commercial developments, and in redevelopment sites where space permits. Two of the above concepts are discussed here; the first is often promoted through residential retrofit programs, while the latter is feasible for multi-residential, industrial, institutional, or commercial construction with flat roofs.

Downspout disconnections: Roof leaders connect eaves troughs to the combined drainage system and/or storm and sanitary sewers. They contribute significant runoff during a storm event. Disconnection involves cutting off the downspout, plugging the old drain, installing an elbow, and letting the water run onto the lawn, garden, or rain barrel. This is effective in reducing direct runoff in areas that can handle runoff on-site.

Green Roofs: This involves layering soil and planting gardens on flat roofs. Green roofs absorb rain water and carbon dioxide and reduce off-site flows; in this way, they work against the greenhouse effect and conserve energy for the building below. They can be made into flower gardens or food gardens and can also contribute to biodiversity. The green roof industry in Canada is new, representing potential for new employment and economic growth.

The City of Toronto has shown particular interest in green roofs and in 2009 adopted a bylaw requiring and governing green roofs on new buildings. Ryerson University conducted a study into the costs and benefits of green roof installations in the City (Banting *et al.*, 2005). The study estimated the total available green roof area at 5,000 ha. The available green roof area included flat roofs on buildings with more than 350 m² of roof area, and assumed that at least 75% of the roof area would be greened. Installation of green roofs across the available area was estimated to result in an initial savings of \$313 million and an annual cost savings of \$37 million in reduced stormwater flows and combined sewer overflows, air quality improvements, and

reduced building energy use and urban heat island effect (Banting *et al.*, 2005). As a result, the City's Official Plan encourages installation of green roofs during development and redevelopment in Mixed Use Areas, Avenues, and industrial areas (City of Toronto, 2006b), and the City has a pilot program offering financial incentives for installation of green roofs.

Some of these techniques are increasingly being used in new developments, but could also benefit areas of existing development. However, SWM retrofits are a challenge for municipalities because of lack of available land and the sizable costs associated. In the Don watershed, Markham, Richmond Hill, and Toronto all have some level of stormwater pond retrofit programs, and the Vaughan has recently initiated one. Markham and Richmond Hill have completed SWM pond retrofit studies but have not yet implemented the studies' recommendations due to lack of funding. The City of Toronto has undertaken a major stormwater retrofit study known as the Wet Weather Flow Management Master Plan (WWFMMP). Built largely before modern stormwater management measures were required, the City has recognized the need to address problems of flooding, erosion, and pollution that have resulted.

The WWFMMP establishes a method to manage rainfall events on a watershed basis in a manner that recognizes the water as a resource to be utilized to improve the health of Toronto's watercourses and enhance the natural environment. The Plan aims to improve water quality and control the volumes of runoff from existing developed areas and control sewage effluent where applicable. Thirteen objectives have been set which fall into four categories: water quality; water quantity; natural areas/wildlife; and sewer system. The objectives are being met in conjunction with TRCA staff, who work with and jointly recognize the vast environmental, social, and economic benefits of the WWFMMP with City of Toronto staff. The City is now in the process of developing a strategy to implement the WWFMMP, which will include the introduction of by-laws, policies, projects, programs, a monitoring plan, an implementation plan, and funding mechanisms (City of Toronto website, 2006).

6.0 Summary of Key Issues and Management Considerations

This section summarizes the key issues that were derived from a discussion of current conditions and emerging trends in the previous sections of this chapter. Following a brief summary of each issue, a management consideration is presented to address each issue. The management considerations are guided by the discussion in Section 5.0 on moving toward sustainable land and resource use. Ultimately, these considerations may be included in the integrated watershed management plan for the Don watershed.

Key Issue: Intensification planned for flood prone areas

The Province's *Growth Plan for the Greater Golden Horseshoe* (2006) requires municipal official plans to be amended to intensify development in already built-up areas in order to accommodate growth without encouraging urban sprawl. Some of the "Urban Growth Centres" designated under the Growth Plan, and centres already slated for redevelopment and intensification in municipal OPs, are also areas within TRCA's Regulatory Flood Plain (ie. areas prone to flooding under the Regional Storm (Hurricane Hazel)). Notably, sub-section 14(4) of the *Places to Grow Act* states that, "if there is a conflict between a direction in the Plan and a

direction in a plan or policy (issued under Section 3 of the Provincial Policy Statement – Natural Hazards) with respect to a matter relating to the natural environment or human health, the direction that provides more protection to the natural environment or human health, prevails.”

Management Considerations

In accordance with sub-section 14(4) of the *Places to Grow Act*, TRCA should work with municipalities, the province, and developers, to reconcile the conflict inherent in intensifying development in flood prone centres, through appropriate flood studies, flood remediation and flood proofing measures, and seek out opportunities for intensification outside of the flood plain.

Key Issue: Outdated stormwater management system in need of retrofit

Many watercourses in the Don watershed contain storm sewer outfalls that outlet directly to the water with no opportunity for filtering pollutants or diffusing high velocity flows. Moreover, some areas of Toronto are serviced by combined storm and sanitary sewers, so that during heavy rainfall, sewage and stormwater runoff mix together and are outlet directly into the receiving watercourse and eventually Lake Ontario.

Management Considerations

Municipalities and TRCA should work together to develop and implement stormwater management retrofit plans such as the City of Toronto’s Wet Weather Flow Management Master Plan. Further, when reviewing applications for new development or infilling and redevelopment, staff should work with developers and municipalities to incorporate upgrades or retrofits to any existing stormwater management scheme (e.g. installation of an oil-grit separator; installation of lot level and conveyance stormwater controls, establishment of a planted outfall channel).

Key Issue: Loss of headwater drainage features/small streams to development

Valley slopes and watercourses that are not well defined are common in the upper part of the watershed, where many headwater drainage features/streams are located. A large number of these streams have been altered and stripped of natural vegetation, or drained, as a result of past agricultural practices. Their altered condition makes them less likely to be perceived as natural features warranting protection. Furthermore, while there is certainty about the natural functions of permanently flowing streams, the natural functions of non-permanently flowing headwater drainage features are still being investigated.

Management Considerations

TRCA staff should continue to advance the science and understanding of headwater drainage features in order to demonstrate their importance to the larger natural system, and to provide a consistent basis for their protection and enhancement in conjunction with development applications.

Key Issue: Non-transit-supportive development

The substantial proportion of single family low density residential developments in the upper part of the Don watershed has resulted in subdivision designs and population densities that cannot easily support public transit. This contributes to traffic congestion, poor air quality, and the proliferation of impervious surfaces associated with roads, driveways, and parking areas.

Management Considerations

Municipalities, through their OP policies and urban design guidelines, and TRCA through its commenting role under the *Planning Act*, should promote transit-supportive development design in development applications. For example, densities and road patterns supportive of effective transit services, the potential for future higher-order transit connections and regional transit connections; short walking distances to transit stops; proximity of a mix of land uses.

Key Issue: Defining the boundary of the natural heritage system

An evolution in policy has resulted in varying degrees of protection for the natural heritage system in urban areas of the Don River watershed. Historically, buffers were not required between new developments and valleylands or natural heritage features, however over time buffers were considered and encouraged to inform the limits of development. As a result, the majority of development abutting Don River watershed valley and stream corridors has either narrow buffers or no buffers. Now most municipal OPs affecting the Don River watershed require a 10 metre buffer from the limit of natural features to form a public open space block along with the natural feature. As the final stages of development occur in the watershed, experts are now considering that while a 10-metre buffer contributes to ecological health, it does not consider the feature in the context of a natural heritage system. To protect and improve the natural heritage system it is necessary to look at the function of a feature in the landscape, the size, shape, connectivity and negative influences of a new urban matrix.

Management Considerations

Municipalities are encouraged to recognize the Terrestrial Natural Heritage System (TNHS) for the Don River watershed that is being developed as part of this Watershed Plan. Further, TRCA staff should promote the Terrestrial Natural Heritage System Strategy (TNHSS) to demonstrate the importance of the entire system, as well as buffers, to mitigate the impacts of development. To this end, staff should support municipal plans that identify an expanded natural heritage system based on the ecological principles and criteria of the TNHSS and contain policies that require protection of the system in public ownership. Moreover, where it has been demonstrated that impacts to the system are unavoidable, a net environmental gain should be provided.

Key Issue: Adding to the natural heritage system with the Urban Forest

The natural heritage system of the Don watershed is supported by the urban forest. This is of particular importance in the highly urbanized portions of the watershed which constitutes much

of the Don. The importance of this type of natural cover cannot be overstated given the level of degradation existing in some valley and stream corridors of the Don where the more pristine components of the natural heritage system no longer reside. This has been well recognized in the Don watershed municipalities, many of whom have extensive street tree planting programs and by-laws which protect trees. However, the ecological functions of the urban forest and the opportunities for improvement and linkage with the natural heritage system need to be better understood.

Management Considerations

TRCA should support municipal initiatives to protect the urban forest through tree protection by-laws and tree planting programs. In this way, TRCA staff should provide technical assistance to the City of Toronto's second phase of their Natural Heritage Study intended to develop a science-based understanding of the urban forest and its role in the context of the urban environment and natural heritage system. Similar support should be given to other municipal natural heritage studies and efforts to evaluate and protect ecoservices provided by the urban forest. This work will contribute to understanding the importance of the urban forest in all urbanized portions of the Don watershed. Moreover, TRCA should continue to flag the problem of the Asian Long Horned Beetle (ALHB) through permit and planning applications that involve the movement of wood through, or out of, the area regulated for the ALHB by the Canadian Food Inspection Agency.

Key Issue: Top soil stripping exacerbating erosion and runoff

New development on large "greenfield" sites is common in the Urbanizing Area and is preceded by site preparation works that entail stripping top soil, and stripping is completed long before construction commences, leaving land vulnerable to the effects of wind and rain that carry sediment to adjacent watercourses and other natural features.

Management Considerations

TRCA staff should stage permits under its regulation to: minimize the area disturbed at any given time and the duration of time that an area is in a disturbed state; ensure erosion and sediment control plans are implemented at the start of construction (i.e., stage 1) and maintain and repair them as required, until construction is complete; where compliance is lacking, promote amendments to the Conservation Authorities Act that would enable TRCA Enforcement Officers to oblige compliance.

Key Issue: Diminishing amount of large parcels of agricultural land

Much of the new urban development within the Urbanizing Area is occurring on former agricultural lands, thereby diminishing the availability of large contiguous parcels of land for large scale crop production.

Management Considerations

TRCA should support emerging policies at provincial and municipal levels to accommodate future population growth in existing urban areas through redevelopment and urban intensification, thereby reducing pressure to convert remaining prime agricultural lands to urban uses; to support policies that permit agricultural land uses near urban areas to evolve according to changing market demands (e.g., potential future shift in production to more speciality crops, establishing more greenhouse operations and establishing more local farmers markets); and to support the establishment of community gardens where residents can grow their own fruits and vegetables.

Key Issue: Watercourse crossings with roads that hinder natural form and function and prevent wildlife/pedestrian passage.

Many crossing structures were designed and constructed with narrow openings that did not accommodate regional storm flood flows, pedestrian passage, wildlife passage, or the natural meander belt of the subject stream. Over time, this frequently resulted in the impacts to crossing structures due to flooding and erosion. In turn, stabilization of stream bed and banks was necessary to prevent crossing structures from being further undermined. More recently, crossing structures are being designed to accommodate the natural form and function of the watercourses they cross. This is accomplished by installing larger spans that do not intrude into the bed and banks of a stream; moreover, best efforts are made to find a crossing location where streambank erosion and meanders are least problematic. Although this new approach is beginning to be used more frequently, it is not a strict requirement for approval of a crossing.

Management Considerations

TRCA staff should strengthen its policy to require the design and location of all new watercourse crossing structures to accommodate the natural physical form and ecological function of a watercourse. Municipalities should recognize the potential costs of fulfilling this design requirement by establishing adequate development charges.

Key Issue: New development achieving a “post to pre-water balance”

When reviewing development applications, TRCA staff work with developers and their consultants to achieve a post-development water balance that matches the profile of the water balance at pre-development. Lot level and conveyance controls are used to achieve a “post to pre-water balance”, including disconnected roof leaders, underground perforated pipes, and grass swales. This requires flexibility in municipal standards given that such mechanisms are not typical features of subdivision lots.

Management Considerations

TRCA should strengthen its policy for new development with respect to achieving post-to-pre water balance and encourage municipalities to adopt standards that permit lot level controls in order to facilitate this achievement.

Key Issue: Expansion of water, sewer and transportation infrastructure

The *Environmental Assessment Act* functions to help avoid and/or mitigate the harmful effects of infrastructure projects to the environment. In order to minimize the need for expansion of the water and wastewater system into natural areas, sustainable use of water resources is critical. Municipalities are endeavouring to address unsustainable rates of use within their jurisdictions, as evidenced by ongoing plans and studies to increase efficiency and educate residents and businesses.

Management Considerations

Municipalities and TRCA should strengthen policies to direct infrastructure outside of natural areas for new development and encourage opportunities to remove existing infrastructure from natural areas when redevelopment occurs. Also, municipalities could require stricter minimum levels of water and energy efficiency to be met in new building designs as a condition for approval of new development. Finally, they could integrate incentive programs for implementing green building technologies into the development approvals process or municipal tax assessments.

Key Issue: Waste disposal is land consumptive, poses risks for surface and groundwater contamination, and production of greenhouse gases.

Waste disposal has the potential to negatively impact watershed health in a number of ways, including contamination of surface and groundwater, production of greenhouse gases, and loss of greenspace and natural habitat, due to the land-consumptive nature of landfill sites.

Management Considerations

TRCA staff should also support opportunities sought by the public or private sector that would explore waste as a potential energy source, but maintain that recycling and waste diversion programs should be the first choice strategy for addressing solid waste issues. TRCA should support municipal policies that would facilitate restoration of abandoned landfills to a natural state, which would in turn, bolster the natural systems of the watershed.

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