THE LIVING CITY® REPORT CARD

2011

An assessment of the environmental health of the Greater Toronto Area

PREPARED BY:

GREENING GREATER TORONTO

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Greening Greater Toronto is an initiative of the Greater Toronto CivicAction Alliance (CivicAction), a multi-sectoral coalition of thousands of civic leaders committed to acting collectively to tackle tough issues and big opportunities facing the Toronto region.

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With more than 50 years experience, Toronto and Region Conservation Authority (TRCA) works with our partners and many engaged citizens to understand, enjoy and look after our natural environment and realize our vision for a cleaner, greener and healthier place to live.

In kind contributions from:

BCG
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OUR LIVING CITY AT THE CROSSROADS

Carbon emissions, air and water quality, waste management, land use and biodiversity are the environmental measures of a flourishing living city. This report card captures their state of health across the Greater Toronto Area (GTA).

The Greater Toronto CivicAction Alliance's (CivicAction's) Greening Greater Toronto initiative and Toronto and Region Conservation Authority (TRCA) have collaborated to produce this independent analysis, which builds on Greening Greater Toronto's 2008 environmental report, and on TRCA's watershed report cards. The 2011 edition is the next in a series of periodic assessments of our region's environmental performance that gives us a yardstick to check against and delivers an ongoing call to action.

The Living City® Report Card and its companion Scorecard are the work of many experts, including in-kind contributors from The Boston Consulting Group. It delivers a unique analysis of the drivers that influence the GTA's environmental performance, assesses where we're making progress, sets out short and long-term targets, and assigns grades by rating current environmental conditions against the long-term targets. It goes on to identify opportunities for action by GTA leaders, organizations and residents.

So how are we doing? We're doing well in some areas: breathing cleaner air, using less water, and diverting more waste from landfill since our previous reports. We're doing poorly in others: managing commercial waste and stormwater, and controlling sprawl and traffic congestion.

Some of our recent improvements can be traced back to reduced economic activity during the recession. When the economy recovers, we risk losing some of our environmental gains. Our region's challenge is to collectively seize the opportunities we have through our growth while protecting the health of our people, our natural systems and the region's long-term economic, social and environmental sustainability.

SUCCESSES

The big win for air quality and reduced carbon emissions comes in large part from Ontario's replacement of coal-powered electricity with cleaner sources. Sulphur dioxide emissions have gone down 44 per cent since 2005 and carbon emissions from electricity generation have dropped 46 per cent in the same period.

Flood risks have been significantly reduced due to improved mapping, policy updates and natural vegetation cover. Municipal water conservation efforts have also been successful, with per capita consumption decreasing nine per cent from 2006. We expect this success to continue as municipalities invest in greater water metering and introduce innovative ways to save water.

Municipalities have made residential waste diversion a priority, and the diversion rate of single-family households has increased by 13 percentage points since 2006. We expect further progress as programs in multi-unit residential buildings roll out.

CHALLENGES

Much of the GTA's growth has occurred in low-density suburban areas, which has led to increased congestion on our roads and highways, and road salt concentrations in some rivers that are threatening aquatic life. With high growth rates expected to continue, congestion and air pollution will get worse unless we plan for higher density living and strong, well-funded regional transportation systems.

Our natural ecosystem provides benefits and services which are under significant threat, despite their crucial contribution to our health and well-being. The report reveals a widespread and substantial nature deficit with continued flood risks to people and property, loss of forests and a shrinking number of wildlife species. Over 60 per cent of the plants and animals that originally thrived in the GTA are fewer in number or have disappeared completely, while 77 per cent of the urbanized areas under TRCA's jurisdiction (see map on page 7) have no stormwater management—the single greatest factor affecting water quality and the health of our river systems.

Lastly, over 60 per cent of the GTA's waste comes from commercial sources, yet very little data exists on how much of it is diverted from landfill. The lack of data is a barrier we need to remove.

CALL FOR COLLECTIVE ACTION

The community of leaders involved with Greening Greater Toronto and TRCA stand behind a vision of a GTA that flourishes economically, socially and environmentally. We urge governments, civic leaders and our diverse communities to rethink how we build and sustain our urban areas, and collectively act on this vision. We ask civic leaders to contribute their leadership and resources, communities to share the wisdom and ingenuity at work in their neighbourhoods, and governments to align their priorities and investments with these efforts across the GTA.

This report card identifies opportunities for action. It highlights the need for accountability, informed policy development and coordinated planning, investment and support to leverage these opportunities. Priorities include:

Energy – better manage demand and increase use of cleaner energy alternatives.

Transportation – invest more rapidly and extensively in public transportation to accommodate economic and population growth and increase use of alternative fuels and electric vehicles.

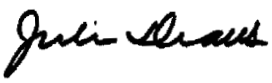
Water – implement stormwater management programs.

Non-residential Waste – collect comprehensive data on commercial waste and expand reduction and diversion programs.

Land Use – create and support development standards that promote intensification.

Natural Vegetation Cover – secure and improve natural, undeveloped areas and restore urban forests.

We are pleased to present The Living City® Report Card and Scorecard as a tool that helps point the way. We look to our governments, civic leaders and residents to step forward, take action and together realize the GTA's great potential.



Julia Deans
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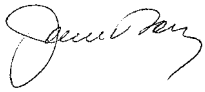
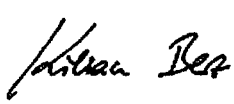


John Tory
Chair, CivicAction

and the co-chairs of Greening Greater Toronto:



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HOW TO READ THIS REPORT CARD

The Living City® Report Card is an assessment of the current environmental health of the GTA. Within each of the report's six measures are indicators that describe current conditions. For example, we measured air quality by examining the extent of sulphur dioxide, volatile organic compounds, particulate matter and nitrogen oxides in the air.

The report card makes three key assessments for each indicator in our region:

1. a **progress arrow** that shows recent trends in the condition of the indicator;
2. a **letter grade** that indicates current conditions based on long-term regional targets; and
3. **short and long-term** regional targets to improve conditions.

PROGRESS ARROW

The progress being made in the GTA is illustrated with an arrow for each indicator. The arrow shows the progress made since the last Greening Greater Toronto report in 2008 or the watershed report cards published by TRCA.

- Much better
- Better
- No change
- Worse
- Much worse

LETTER GRADE

The letter grade is a measure of the current conditions versus the long-term regional target. It is not a grade on progress to date. The grade gives an indication of how far we need to go to achieve an aspirational, but achievable, long-term goal. The grading criteria are outlined within the report card and vary by indicator. The general criteria for the GTA and/or TRCA's jurisdiction are as follows:

GRADE	DESCRIPTION
A	Best achievable and at target
B	Good with minor action required
C	Average with moderate action required
D	Poor with major action required
F	Very poor with significant action required

TARGETS

There are two targets reported for each indicator: a short-term 2016 target and a long-term target.

2016 target – This is a regional target that can be reached if current programs continue and/or new feasible programs are quickly implemented.

Long-term target – This regional target is based on local or national targets where they already exist, or expert opinion on an appropriate target for the GTA taking into consideration global benchmarks and the desired healthy long-term state for the GTA. The long-term targets represent aspirational goals for the GTA, and are set irrespective of progress made to date.

LEADERSHIP

In many cases there is work underway that will ultimately improve the condition of the environmental indicators we've measured. The report card identifies planning, policy and implementation actions underway by the Government of Ontario, municipalities, conservation authorities, businesses, educational institutions, community groups and individuals that will result in positive change in the future.

OPPORTUNITIES

Action is required by everyone to achieve a sustainable city region. The report card outlines major next steps that will guide policy, investment and education to improve conditions in each of the report card's key topic areas.

DRIVER TREES

Many factors influence the report card's six key measures of environmental health. The report card includes a driver tree for each measure to illustrate how these factors are interconnected and to identify the largest contributors to the health of the indicators. Driver trees tell us where we need to assign priority and action.

DEEP DIVES

Experts have contributed further commentary on three topics considered crucial to a flourishing city region; including transportation, waste management and ecosystem services.

GEOGRAPHIC AREA COVERED

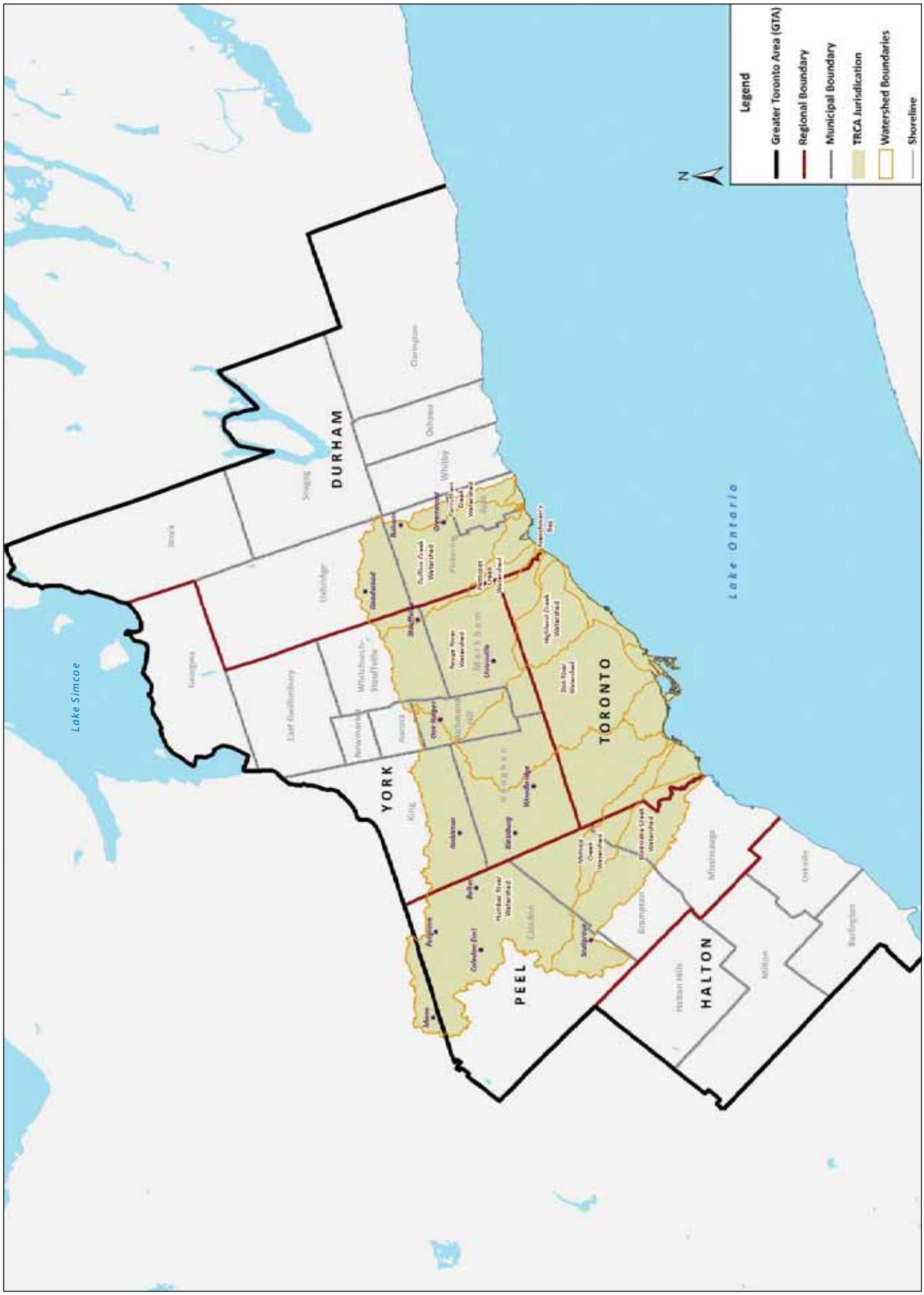
Information in The Living City® Report Card is presented either for the GTA or for the geographic boundaries of TRCA (see study area map) depending on available data.

The GTA is the largest metropolitan area in Canada—home to six million people and counting—with a population expected to grow to nine million by 2036.[1] It spans an area of 7,125 square kilometres and includes the City of Toronto and the surrounding regional municipalities of Durham, Halton, Peel and York.

TRCA's jurisdiction is 2,506 square kilometres and includes the City of Toronto, parts of the Regions of Durham, Peel and York and a small portion of the Township of Adjala-Tosorontio and Town of Mono. It includes nine river systems—from the Etobicoke Creek in the west and Carruthers Creek in the east—and approximately 60 kilometres of the Lake Ontario waterfront.

1 Ministry of Finance. "Population Projections Update" (Spring 2010).

STUDY AREA MAP



CARBON

The vast majority of climate experts consider climate change the most serious environmental issue facing humankind, and addressing it at the local level is vital.

WHY DOES CARBON MATTER?

Carbon emissions from producing and consuming oil, coal and gas for our power plants, factories, homes and vehicles are causing changes in the global atmosphere that threaten to disrupt human economies and societies everywhere.

The vast majority of climate experts consider climate change the most serious environmental issue facing humankind. Addressing climate change at the local level is important for three reasons.

First, the level and pattern of carbon emissions are largely determined by decisions made at the local level. Local governments in Canada exert direct or indirect control and influence on more than half of Canada's national carbon emissions; it is not possible to effectively address the threat of climate change without the active engagement of local governments.

Second, local actions to reduce carbon emissions lead to other local benefits: financial savings, cleaner air, business development, job creation and improved transportation, to name a few. The cities that pursue emissions reduction and environmental improvement strategies today will be the most prosperous, healthy and sought-after communities of tomorrow.

Third, many of the most effective and sustainable solutions to reducing carbon emissions depend on local circumstances and can be developed only with local knowledge in the community, from the bottom up.

Carbon

PROGRESS

CURRENT CONDITION vs. TARGET

D

Progress: **Better—10 per cent decrease largely due to coal phase out.**
Grade: **Major action is required. Further energy conservation and investment in transportation required to reach long-term target.**

Carbon emissions are measured as tonnes of carbon dioxide equivalents (CO_2e). This measure incorporates emissions of CO_2 as well as other gases, like methane and nitrogen oxides, which have greater warming effects than CO_2.

Carbon emissions depend on a variety of factors. Some are beyond easy control, like geography and weather. Other factors change slowly and require large investments, such as infrastructure, technological efficiency and energy inputs. Many are a result of personal decisions and behaviour related to standard of living, population density and consumer technology use.

In the GTA, carbon emissions are due mainly to:

- gasoline and diesel fuel burned in cars and trucks;
- natural gas burned in homes, businesses and factories to keep buildings warm; and
- gas and coal burned in power plants that provide the GTA with electricity.

GRADING CRITERIA FOR CARBON

Grade	Million Tonnes of Carbon Dioxide Emissions
A	< 15
B	15 – 25
C	26 – 40
D	**41 – 55**
F	>55

CARBON EMISSIONS FOR THE GREATER TORONTO AREA

Carbon Emissions (Million Tonnes of CO_2 Emissions)	2005	2008	2009
Electricity	11.96	9.50	6.49
Natural Gas	16.14	16.68	16.86
Gasoline	16.55	16.20	15.84
Diesel	5.73	5.46	5.10
Jet Fuel	4.36	5.05	5.05
Waste	1.47	1.59	1.58
Industrial Processes	3.44	2.93	2.93
Total	**59.65**	**57.41**	**53.85**
Population (millions)	5.556	5.974	6.114
Per Capita Emissions	**10.7**	**9.6**	**8.8**

Fossil fuels make a smaller contribution to electricity supply in the GTA than they do in most other places. This means that transportation fuel use and the natural gas consumption by buildings are the two largest sources of carbon emissions in the GTA, with electricity the third largest.

PROGRESS

The GTA's total carbon emissions declined between 2005 and 2009, falling from 59.7 million tonnes CO_2e emissions (Mt CO_2e) to 53.9 Mt CO_2e.[1] Trends varied by sector, with emissions from electricity consumption, ground transportation and industrial processes falling, while emissions from combustion of natural gas, waste and aviation increased.

- Reduction in carbon emissions from electricity consumption in the GTA is primarily due to a shift in the supply grid to less carbon-intensive sources, though there has been a decline in consumption as well. Electricity consumed in the GTA declined from 57,000 gigawatt hours (GWh) in 2005 to 54,000 GWh in 2009,[2] while the emission factor (the amount of emissions produced per unit of electricity created) decreased significantly from 210 tonnes of total carbon dioxide emissions (t CO_2e) per GWh in 2005 to 120 t CO_2e per GWh in 2009.[3] Consequently, carbon emissions from electricity have decreased by 46 per cent since 2005. This trend is expected to continue as Ontario phases out coal from the electricity supply mix.

- Gasoline consumption, based on sales data, declined by four per cent from 2005 to 2009.[4] Personal vehicle fuel consumption depends on the number and distance of trips, the transit modal share, the fuel efficiency of the vehicles and the penetration of lower carbon alternatives to gasoline. The expectation of higher gasoline prices in the future will stimulate a move to more fuel-efficient vehicles and less trip making. It also appears that per capita personal vehicle travel in the GTA may be slowing down due to trends in demography, where people settle, economic activity and increased traffic congestion.

- Diesel consumption for 2008 and 2009 is difficult to establish. We have assumed the GTA trend mirrors the provincial trend of an 11 per cent decline.[5] The overall effect of these gas and diesel consumption changes was a decrease in the GTA's ground transportation emissions, from 22.3 Mt CO_2e in 2005 to 20.9 Mt CO_2e estimated for 2009.

- The amount of industrial processing that takes place in the GTA has been in decline for decades as the urban economy has shifted toward the service sector, and direct carbon emissions from industrial processes continued to decline over the 2005 to 2008 period, by 15 per cent.[6]

- Emissions reductions from industrial processes, transport and electricity were, however, partially offset by a 3.3 per cent increase between 2005 and 2008 in emissions from the combustion of natural gas, which provides most of the heating to buildings in the GTA.[7]

- Emissions from waste management, both from landfills and incineration, rose by eight per cent between 2005 and 2008.[8] This is primarily due to an increase in the amount of waste sent to landfill, which rose from 3.25 million tonnes (Mt) in 2005 to 3.52 Mt in 2008.

- Another sector experiencing increased carbon emissions is aviation. Aviation emissions are reported based on the volume of jet fuel loaded onto planes at airports within the GTA.[9] For example the number of passengers using Pearson International Airport increased from 29.9 million in 2005 to 32.3 million in 2008, declining to 30.3 million in 2009, and there has been an increase in long-haul flights—both contributing to an increase in carbon emissions from aviation of 16 per cent.[10]

1 The methodology for this study is described in Kennedy *et al*. "Methodology for Inventorying Greenhouse Gas Emissions from Global Cities," Energy Policy (2010): 37(9). It is generally consistent with methods used for other cities or urban regions. The total includes scope 2 emissions from electricity use in cities, plus scope 3 emissions from out-of-boundary waste disposal and aviation.
2 These values include local distribution line losses.
3 The grid emissions factor for 2009 will not be officially available until spring 2011.
4 Gasoline consumption for the GTA is calculated from retail sales data provided by Kent Marketing, with an adjustment for the ratio of total provincial gasoline sales to provincial retail sales. Kent's data for 2009 shows that gasoline sales in the GTA are continuing to decline; and this is consistent with many North American markets, which are flat or declining. Note, that Kent reports a 0.2% increase in provincial retail gasoline sales from 2008 to 2009, while Statistics Canada reports a 2% increase in consumption based on refinery data.
5 GTA diesel consumption for 2005 was previously estimated by scaling up from City of Toronto data.
6 Industrial process emissions do not include emissions from the combustion of fuels by industry; these are included under energy related emissions. Industrial process emissions in the GTA have been only determined from facilities that emit over 100,000 t CO2e per year, which are required to report to Environment Canada. Data for 2009 is currently not available.
7 Data on other fuels used for heating of buildings such as fuel oil and wood has not been collected for the GTA.
8 Waste emissions are estimated using a theoretical yield gas approach. IC&I waste is scaled to total residential waste generated based on Statistics Canada's Biennial Waste Survey and IC&I diversion is assumed to be 18%. Other assumptions include LFG capture efficiency of 75%, 60% DOCf and 10% oxidation. Incineration emissions calculated using IPCC (2006) guidelines.
9 Only data from Pearson International Airport was used for this study. The quantities of fuels loaded at other airports, e.g., Toronto Island Airport, are assumed to be negligible in comparison.
10 Other factors affecting the volume of jet fuel consumed include the retirement of less fuel efficient planes and an increase in the aircraft load factor as airlines consolidate their flights.

Overall, the per capita carbon emissions for the GTA have decreased from 10.7 t CO_2e to about 8.8 t CO_2e from 2005 to 2009. Most of this decline is due to Ontario's replacement of coal-powered electricity with cleaner sources. There has also been a decline in per capita gasoline consumption, and a smaller drop in per capita natural gas consumption.

In general, fuel (and electricity) consumption will decline during a recession, all else being equal; however, fuel and electricity use also reflect government policies to promote efficiency and lower carbon sources. There are also changes in GTA's demographics, housing and travel patterns and economic structure that are contributing to the reduction in emissions growth. For example, heating and transportation associated with a household occupying a downtown condominium are typically much less than the same household occupying a detached home in the suburbs.

LEADERSHIP

- Ontario's Coal Phase Out Plan has had significant impact on emissions from the electricity grid; however, as coal is completely phased out and partially replaced with natural gas, natural gas will become a bigger contributor to carbon emissions.

- Vehicle fuel economy and consumer choices are improving, but need to go further. A continued rise in fuel prices will stimulate a move to more fuel-efficient vehicles; however, additional measures will be needed to drive significant change.

- Enwave's deep lake cooling system cools much of downtown Toronto, using up to 90 per cent less energy than conventional cooling systems.[11]

- The GTA's largest commercial property owners and commercial tenants are participating in Greening Greater Toronto's Commercial Building Energy Initiative and agreeing to collective energy reduction targets.

- Building certification programs, such as Leadership in Energy and Environmental Design (LEED®) and Building Owners and Managers Association's Building Environmental Standards (BOMA BESt), provide standards for property owners to aspire to on many environmental metrics, including energy conservation. As of June 30, 2010, the GTA had 143 certified green buildings, making the GTA the national leader in this category.

- Through its leadership in Partners in Project Green, TRCA is working with its partners to engage over 2,500 companies in the Pearson Eco-Business Zone to improve energy efficiency. In 2009, these efforts resulted in a combined savings of over 5.4 mega watts (MW) of electricity and 3.6 million cubic metres of natural gas.

- One of Greening Greater Toronto's initiatives, the Greening Canada Fund, enables Canadian corporations to offset some of their carbon emissions by investing in local communities through projects that benefit the environment. The Fund purchases credits from organizations across the country that are reducing their own carbon emissions through energy efficiency or renewable energy projects (e.g., Toronto District School Board sold credits to the Fund for energy reductions at more than 200 schools). The Fund is managed by Green Power Action.

- A group from CivicAction's Emerging Leaders Network has launched Project Neutral, which will undertake a pilot project with residents to transition a neighbourhood to carbon neutrality.

- In 2010, 1,234 schools in 40 Ontario school boards certified as EcoSchools by demonstrating reduced energy use, waste minimization, school ground greening and ecological literacy. The City of Toronto EcoSchools have taken up the Zerofootprint Challenge—a program that helps students track their school buildings' energy and water use and compete to reduce their environmental impact.

11 Enwave Energy Corporation.

TARGETS

2016: Reduce emissions from 1990 levels by six per cent by 2012 and 30 per cent by 2020 (as targeted by the City of Toronto).[12] This would imply roughly 18 per cent reduction (45 Mt CO_2e) by 2016.

Long-term: Reduce emissions to 80 per cent below 1990 levels by 2050 (11 Mt CO_2e).

In the GTA as a whole, emissions in 2009 are about one per cent below their estimated 1990 levels. Recent momentum in reducing the GTA's emissions makes the challenge of achieving the deep reductions recommended by climate scientists easier than it would otherwise be, but longer term reduction targets in the range of 30 to 80 per cent present a transformational challenge.

Comparison with a few global cities indicates we can achieve significant rates of reduction with a focused and persistent effort. Hong Kong, New York City, Singapore and Stockholm have all experienced ongoing declines in per capita emissions.

ANNUAL RATES OF DECLINE IN PER CAPITA CARBON EMISSIONS FOR THE GTA AND FOUR GLOBAL CITIES[13]

City	Reporting Period	Annual Rate of Decline
GTA	**2005 – 2009**	**4.4%**
Hong Kong	1993 – 2008	1.5%*
New York City	2005 – 2008	3.4%
Singapore	1993 – 2000	0.5%
Stockholm	2000 – 2005	3.0%*

* Uncertain if marine or aviation emissions are included

12 City of Toronto "Toronto targets climate change and clean air," http://wx.toronto.ca/inter/it/newsrel.nsf/7017df2f20edbe2885256619004e428e/56707ba3e4c15d66852572a7005f6ae2?OpenDocument. These targets are in line with IPCC recommendations and the Canadian obligations under the Kyoto Protocol.

13 References for Global Cities:
Stockholm; http://international.stockholm.se/PageFiles/145186/application_european_green_capital.pdf
Singapore; http://unfccc.int/national_reports/non-annex_i_natcom/items/2979.php
NYC; http://www.nyc.gov/html/planyc2030/downloads/pdf/greenhousegas_2009.pdf
Hong Kong; http://www.epd.gov.hk/epd/english/climate_change/files/Climate_Change_Booklet_E.pdf

CARBON
PRIORITY OPPORTUNITIES

- Increase use of alternative heating technologies such as thermal energy storage, ground source heat pumps, combined heat and power, and district heating initiatives.

- Clean the electricity supply grid further through the expanded use of alternative energy facilitated by smart grids and distributed energy generation.

- Expand commercial building retrofits, data management and support systems, such as the Greening Greater Toronto's Commercial Building Energy Initiative, LEED® and BOMA BESt. Educate commercial property owners and tenants about the financial and environmental merits of decreasing energy consumption and advocate for building code upgrades in the development sector.

- Build awareness about energy consumption in the residential sector and introduce meaningful incentives for residential retrofits and high-efficiency appliances.

- Consider financing options to implement existing residential retrofit programs such as the Tower Renewal Project, including performance based solutions, where energy service companies are remunerated based on the success of the project.[14]

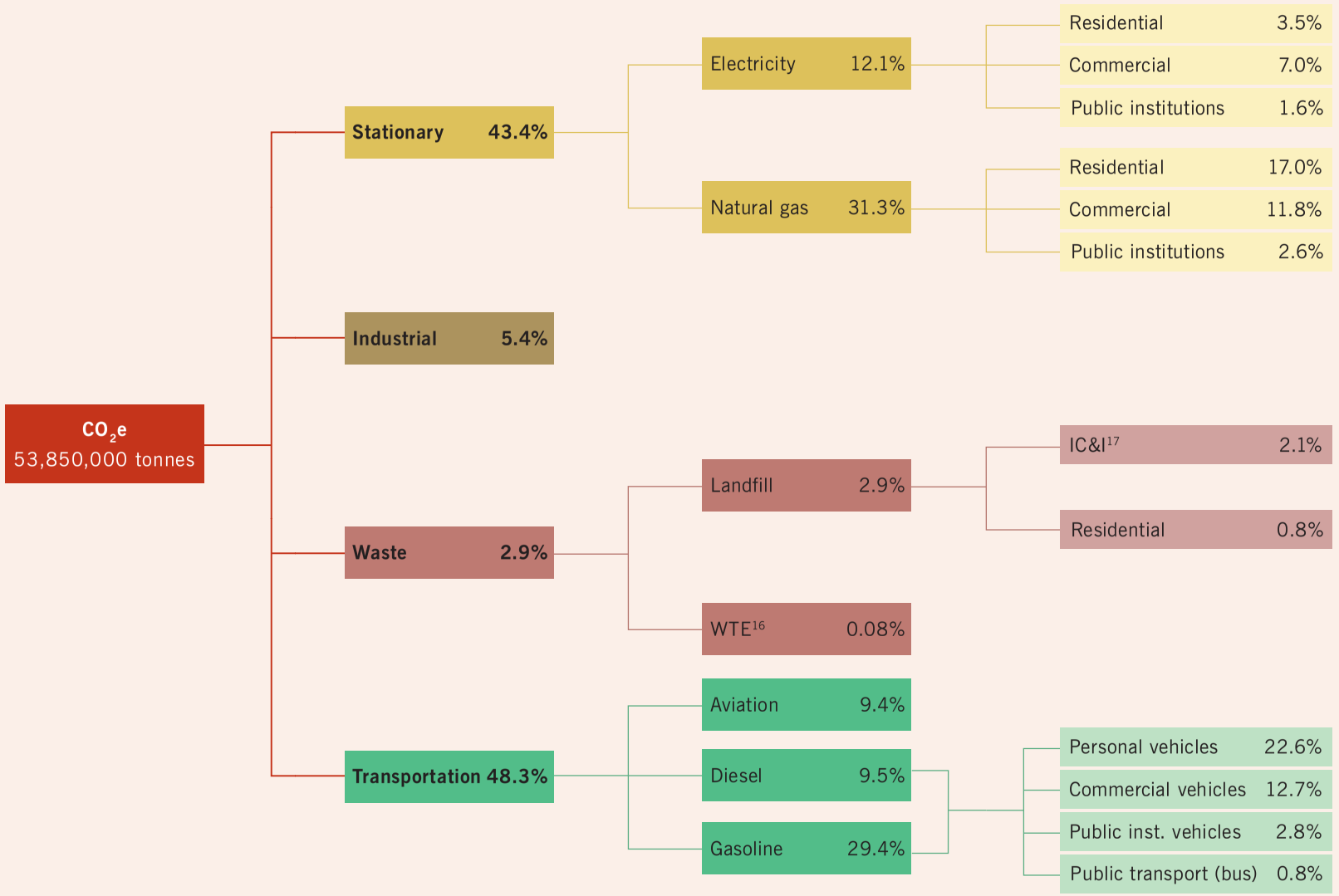
- Introduce and implement alternative forms of funding for regional transportation plans (for more on this issue, see Deep Dive, page 68).

- Boost the attractiveness of alternative forms of transportation by improving the service and regional coordination of current transit offerings. Employers can encourage employees to make smart transportation choices through transportation demand management plans.

- Increase the use of non-gasoline vehicles in the GTA. Opportunities exist for the use of natural gas, biodiesel and biomethane to fuel heavy-duty vehicles (e.g., buses and refuse trucks), as well as some applications for passenger vehicles. Taxi fleets would also benefit from the use of hybrid or electric vehicles, as evidenced by the Toronto Atmospheric Fund's Hybrid Taxi Pilot Program.[15]

14 Energy Services Association of Canada.
15 Toronto Hybrid Taxi Pilot, Toronto Atmospheric Fund, October, 2009.

CARBON DRIVER TREE - Contributors to GTA's emissions

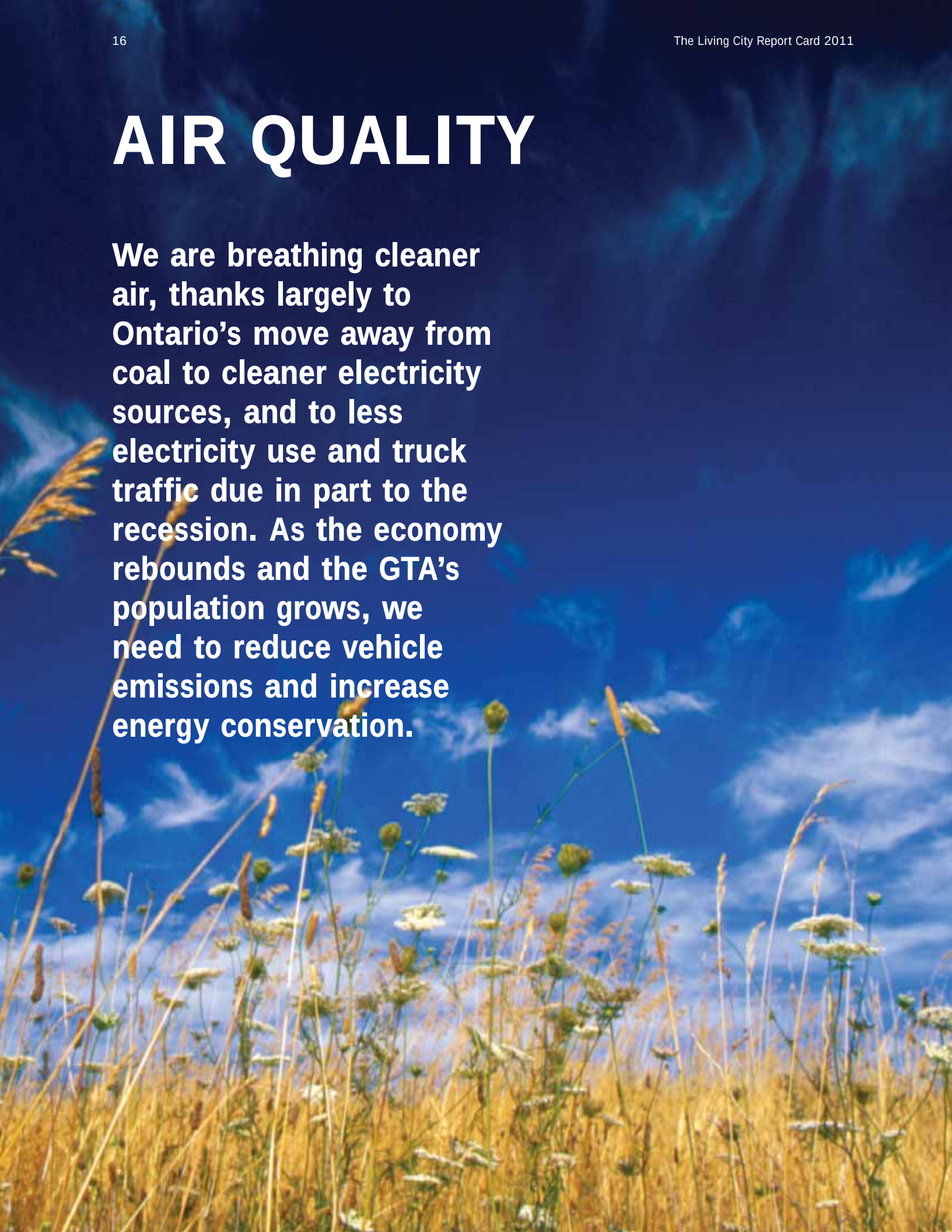


16 Waste to energy.
17 Industrial, commercial and institutional.

Source: Toronto Atmospheric Fund, Ministry of Energy, Bullfrog Power, Statistics Canada, National Pollutant Release Inventory, Ontario Energy Board, Kent Marketing and The Boston Consulting Group analysis.

AIR QUALITY

We are breathing cleaner air, thanks largely to Ontario's move away from coal to cleaner electricity sources, and to less electricity use and truck traffic due in part to the recession. As the economy rebounds and the GTA's population grows, we need to reduce vehicle emissions and increase energy conservation.



WHY DOES AIR QUALITY MATTER?

Air quality affects all of us. Every year, air pollution contributes to respiratory problems, lost work days, increased hospital visits and the premature deaths of thousands of Canadians. These health effects are putting a strain on the economy and the health care system. Excessive levels of ozone, acid gases and other pollutants are also responsible for an alarming decrease in plant and aquatic life. For this report card, we focus on four indicators of air quality: Sulphur Dioxide (SO_2), Volatile Organic Compounds (VOCs), Particulate Matter ($PM_{2.5}$) and Nitrogen Oxides (NO_X). These pollutants, characterized as Criteria Air Contaminants, have been shown to cause respiratory and heart problems, cancer, complications with the central nervous system, and damage to plant and animal life.[1]

The good news is that GTA air quality has improved since 2005. Emissions of all four pollutants have decreased for a variety of reasons. The single largest driver of this has been the Ontario government's Coal Phase Out Plan, which aims to eliminate coal-powered electricity production from the Ontario grid by 2014.

Economic conditions and world-wide shifts in industrial production have also played a role in decreasing pollutant emissions in the GTA. The economic recession of 2008 was likely responsible for noticeable declines in industrial activity, electricity demand and commercial vehicle traffic, all of which decreased emissions. As the economy rebounds, increased industrial activity, electricity demand and transportation fuel consumption could reverse many of the improvements witnessed since 2005.

The GTA has an opportunity to use recent improvements in air quality as momentum to drive future success. To maintain and improve our air quality as our economy and population grow, we need a regulatory environment that continues to encourage the development of green industry, energy and transportation. Businesses and residents can also do their part by making smart energy and transportation choices every day. By doing all of this, we can help turn growth into an environmental strength, making the GTA a global environmental leader.

1 Environment Canada, http://www.ec.gc.ca

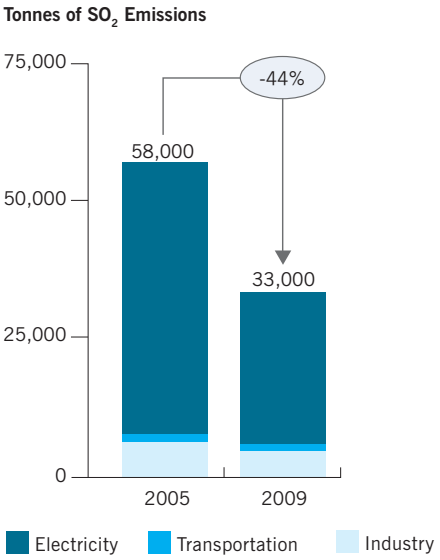
Sulphur Dioxide (SO_2)

PROGRESS ↑ | CURRENT CONDITION vs. TARGET C

Progress: **Much better—44 per cent decrease due to coal phase out.**
Grade: **Moderate action is required. Completion of coal phase out required to reach long-term target.**

Sulphur Dioxide (SO_2) can cause adverse effects on the respiratory systems of humans and animals, damage vegetation, and contribute to acidification of aquatic and terrestrial ecosystems.[2] The GTA's main source of SO_2 emissions—over 80 per cent—is electricity production from coal combustion. In 2009, GTA SO_2 emissions were approximately 33,000 tonnes.[3] Of this, 26,500 tonnes (82 per cent) can be attributed to electricity production, while 4,500 tonnes (14 per cent) came from industrial operations within the GTA.

GRADING CRITERIA FOR SO_2	
Grade	**Emissions (tonnes)**
A	<10,000
B	10,000 – 24,999
C	**25,000 – 39,999**
D	40,000 – 55,000
F	>55,000



PROGRESS

SO_2 has decreased significantly from the 58,000 tonnes emitted in 2005. The 44 per cent decrease in emissions is almost entirely attributed to the Ontario government's Coal Phase Out Plan; from 2005 to 2009, coal-powered electricity went from 19 per cent of Ontario's electricity production to 12 per cent.[4]

TARGETS

2016: Emissions of 7,000 tonnes—an 80 per cent decrease from 2009 levels. The target reflects estimated SO_2 emissions with a coal-free electricity grid. To reach it, we need to complete the Ontario Coal Phase Out Plan, which is currently on pace for 2014 completion.

Long-term: Maintain 7,000 tonnes per year. Maintaining the reductions realized by the coal phase out will require energy conservation, investment in aging energy infrastructure and continued growth in renewable generation sources, as outlined in Ontario's 2010 Long-term Energy Plan.

2 Environment Canada, http://www.ec.gc.ca
3 Most electricity production (and thus emissions) occurs outside of GTA boundaries; however, emissions from electricity production have been included to the extent that GTA demand drives production.
4 Ontario Energy Board, based on May 2008-April 2009 generation mix as listed in the "Market Surveillance Report" (July 2009).

Volatile Organic Compounds (VOCs)

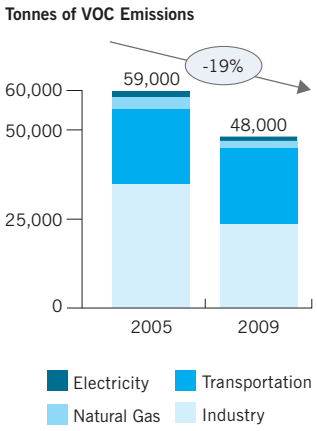
PROGRESS

CURRENT CONDITION VS. TARGET

D

Progress: **Better—19 per cent decrease mainly due to declining industrial emissions.**
Grade: **Major action is required. Investment in transportation required to reach long-term target.**

Volatile organic compounds (VOCs) are organic (carbon-based) liquid and gases, such as gasoline, formaldehyde, solvents, chlorofluorocarbons, and paints and coatings. Many VOCs are known to have direct toxic effects on humans, and can cause cancer as well as neurological problems.[5] The main sources of VOCs in the GTA are transportation (63 per cent) and industry (34 per cent). In 2009, approximately 48,000 tonnes of VOCs were emitted in the GTA.



GRADING CRITERIA FOR VOCs	
Grade	**Emissions (tonnes)**
A	<15,000
B	15,000 – 29,999
C	30,000 – 44,999
D	**45,000 – 60,000**
F	>60,000

PROGRESS

- Total VOC emissions in the GTA decreased 19 per cent from 59,000 tonnes in 2005 to 48,000 tonnes in 2009. The decrease was driven by a large reduction in emissions from industry as well as a small decrease in emissions from transportation, which were likely due in part to the economic downturn between 2005 and 2009. As the economy rebounds and population grows, the decline is expected to slow or reverse.

- From 2005 to 2009, VOCs from GTA industrial sources decreased 38 per cent from 26,000 tonnes to 16,000 tonnes due to a combination of emission control efforts by individual businesses and decreased industrial activity.[6] While it is difficult to quantify the impact of each of these factors, experts believe that the bulk of the reduction is a result of decreased industrial activity due to a continued shift toward a more service-driven economy as well as recessionary pressures.

- Personal vehicles (i.e., gasoline powered vehicles) are one of the main sources of VOCs in the GTA. From 2005 to 2009, gasoline sales declined four per cent,[7] likely due to a combination of increased gas prices, the economic recession, and improved vehicle fuel efficiency. Over the same period, total passenger vehicle (gas-powered) kilometres travelled is estimated to have increased by about two per cent or one billion kilometres.[8]

TARGETS

2016: Emissions of 45,000 tonnes or a five per cent reduction from current VOC levels. Reaching this will require significant changes in the transportation habits of GTA residents.

Long-term: Emissions of 11,700 tonnes, or a 75 per cent decrease from current levels. Achieving this will require greater use of cleaner vehicles and improved transit infrastructure linked to supportive land use planning.

5 Environment Canada, http://www.ec.gc.ca
6 Emissions from industrial sources obtained from the National Pollutant Release Inventory, Environment Canada.
7 Gasoline consumption for the GTA is calculated from retail sales data provided by Kent Marketing, with an adjustment for the ratio of total provincial gasoline sales to provincial retail sales.
8 Vehicle kilometres travelled estimated using GTA gasoline sales and estimated average fuel efficiency for the GTA passenger fleet using fuel efficiency data from the Environmental Protection Agency.

Particulate Matter ($PM_{2.5}$)

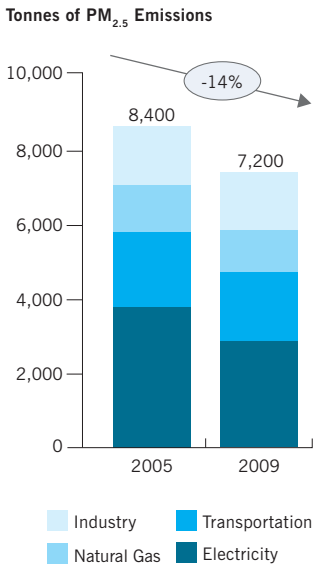
PROGRESS

CURRENT CONDITION vs. TARGET

C

Progress: **Better—14 per cent decrease due to coal phase out and declining diesel consumption.**
Grade: **Moderate action is required. Completion of coal phase out required to reach long-term target.**

Particulate matter (PM) consists of airborne particles in solid or liquid form. Of greatest concern are PM particles with a mass median diameter of less than 2.5 microns, or $PM_{2.5}$. These are small enough to be carried deeply into the lungs; exposure to elevated levels of $PM_{2.5}$ can cause respiratory and heart problems.[9] $PM_{2.5}$ mainly comes from combustion sources, such as natural gas or coal-powered electricity production, gasoline and diesel engines and industrial processes. In 2009, GTA emissions of $PM_{2.5}$ were approximately 7,200 tonnes.



GRADING CRITERIA FOR $PM_{2.5}$	
Grade	**Emissions (tonnes)**
A	<2,500
B	2,500 – 4,999
C	**5,000 – 7,499**
D	7,500 – 10,000
F	>10,000

PROGRESS

- Since 2005, $PM_{2.5}$ emissions have decreased 14 per cent, driven by a decrease in emissions from electricity and transportation sources.
- $PM_{2.5}$ emissions from electricity decreased primarily due to the Government of Ontario's Coal Phase Out Plan.
- Combustion of diesel fuel is a large source of $PM_{2.5}$ emissions from transportation. The decline in $PM_{2.5}$ emissions from transportation is the result of an 11 per cent decrease in GTA diesel sales,[10] which reflects lower commercial trucking activity and is likely a result of the recession.

TARGETS

2016: Emissions of 5,000 tonnes, representing a 30 per cent decrease from 2009 levels. The target will be reached through the coal phase out and focused efforts to reduce emissions from transportation. While the coal phase out is on track for a 2014 completion, reducing transportation emissions in the face of population and economic growth will require significant changes in the transportation habits of GTA residents.

Long-term: Emissions of 1,700 tonnes, or a 77 per cent decrease from current levels. This target is based on the City of Toronto's 2007 target to reduce Criteria Air Contaminants by 80 per cent from 2004 levels by 2050.

9 Ontario Ministry of the Environment, http://www.airqualityontario.com
10 Difficult to establish 2009 GTA sales; assumed GTA diesel sales decline mirrors provincial trend of 11%

Nitrogen Oxides (NO_x)

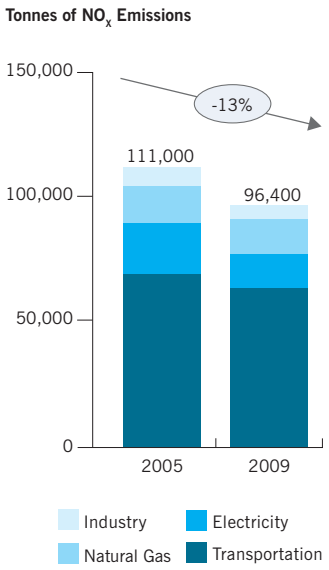
PROGRESS

CURRENT CONDITION VS. TARGET

D

Progress: **Better—13 per cent decrease due to coal phase out and declining diesel consumption.**
Grade: **Major action is required. Investment in transportation required to reach long-term target.**

Nitrogen oxides (NO_x) are formed primarily through combustion processes during electricity production and in vehicle engines. NO_x is known to have adverse effects on the respiratory systems of humans and animals, can cause damage to vegetation, buildings and materials, and contributes to acidification of aquatic and terrestrial ecosystems.[11] In 2009, GTA NO_x emissions were approximately 96,400 tonnes. In the GTA, the transportation sector accounts for 66 per cent of total NO_x emissions.



GRADING CRITERIA FOR NO_x	
Grade	**Emissions (tonnes)**
A	<25,000
B	25,000 – 49,999
C	50,000 – 74,999
D	**75,000 – 100,000**
F	>100,000

PROGRESS

- NO_x emissions decreased 13 per cent from the 111,000 tonnes emitted in 2005. The biggest improvements were emissions from transportation and electricity.
- The transportation related decrease was driven by an 11 per cent decrease in GTA diesel fuel sales. Lower diesel consumption is a reflection of decreased commercial trucking activity, and was likely a result of the recession. As the GTA economy rebounds, the decreasing trend in NO_x emissions from transportation will likely flatten out.
- Emissions from electricity decreased due to the Government of Ontario's Coal Phase Out Plan. As coal is completely phased out and replaced by natural gas, NO_x emissions will not decrease as quickly as other pollutants, as natural gas is more NO_x intensive than other pollutants.

TARGETS

2016: Emissions of 91,500 tonnes, or five per cent less than current levels. Reaching this will require the removal of coal-powered electricity, as well as significant changes in the transportation habits of GTA residents.

Long-term: Emissions of 22,000 tonnes, or 77 per cent less than current levels, based on the City of Toronto 2007 target to reduce Criteria Air Contaminants by 80 per cent from 2004 levels by 2050. Reaching the long-term target will require greater use of cleaner vehicles and changes to transportation infrastructure in combination with supportive land use planning strategies.

11 Environment Canada, http://www.ec.gc.ca

LEADERSHIP

Electricity Conservation

- The Ontario Energy Board's time-of-use pricing is designed to smooth electricity consumption patterns and reduce peak demand, which decreases the need for coal and natural gas-fired facilities.
- Enwave Energy's deep lake water cooling system in Toronto is the world's largest, and air conditions much of downtown Toronto, using up to 90 per cent less energy than conventional systems.[12]
- LEED® and BOMA BESt certification programs provide new and existing commercial buildings with tools to improve energy efficiency.
- The GTA's largest commercial property owners and tenants are participating in Greening Greater Toronto's Commercial Building Energy Initiative. Participants representing 40 per cent of total GTA office space are committing to a unique collaboration and agreeing to collective energy reduction targets.

Electricity Supply

- The Government of Ontario's Coal Phase Out Plan has and will continue to clean the Ontario power grid, with a target of zero per cent coal-powered electricity by 2014.
- The Ontario Power Authority's Feed-in Tariff Program has spurred investment in renewable energy. Over the next three years, Ontario is expecting to install 10 times the number of solar panels that existed across all of Canada at the end of 2009.[13]

Transportation

- Metrolinx has developed a regional integrated transportation plan for the Greater Toronto and Hamilton Area. According to Metrolinx, full implementation will decrease passenger transportation emissions per capita by 50 per cent over 25 years.
- Ontario's Drive Clean Program mandates vehicle emissions testing which reduced particulate matter emissions from transportation by 234 tonnes in 2008.[14]

12 Enwave Energy Corporation.
13 "California vote illuminates Ontario's energy future," Toronto Star (November 7, 2010).
14 Ontario Ministry of the Environment, http://www.ene.gov.on.ca
15 Municipalities, universities, school boards and hospitals.
16 Energy Services Association of Canada, http://energyservicesassociation.ca

AIR QUALITY
PRIORITY OPPORTUNITIES

The biggest driver of GTA air quality will be transportation. To reach our targets, we need to improve the service and regional coordination of transit choices and increase the use of non-gasoline vehicles. Opportunities also exist to reduce our electricity demand and further clean our energy supply.

Electricity Conservation

■ Educate property owners and tenants on the merits—both environmental and financial—of energy conservation. Bringing landlords and tenants together to drive change in existing commercial buildings will lead to regulatory changes in building codes that will drive significant conservation.

■ Continue with existing retrofit programs. Governments can demonstrate leadership through retrofits within the MUSH[15] sector and demonstrate benefits of performance-based solutions, where energy service companies are paid based on the success of the project.[16]

Electricity Supply

■ Update transmission and distribution systems to accommodate distributed generation and renewable energy. Distributed generation in combination with smart grids will be the biggest opportunity to further clean Ontario's energy supply.

■ Expand district heating and cooling within the GTA.

Transportation

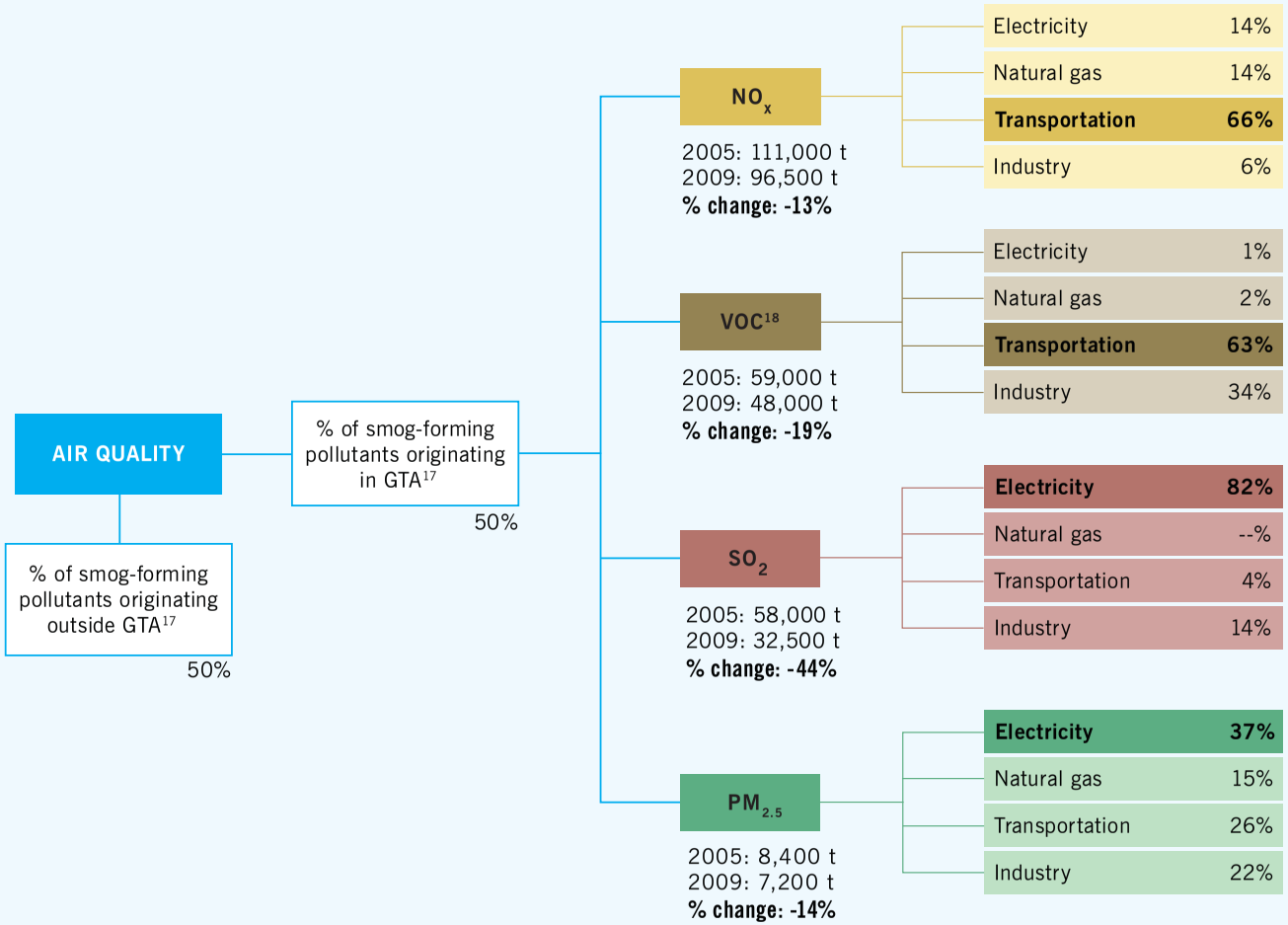
■ All three levels of governments need to work cooperatively to implement and create new revenue-generating mechanisms and alternative funding sources to ensure the implementation of GTA transit expansion plans (For more on this issue, see Deep Dive on page 68).

■ Improve service of current transit to motivate more people to use it; create a seamless system with integrated services and fares across the GTA.

■ Increase use of alternative fuels such as biomethane, biodiesel and natural gas in heavy-duty vehicles (e.g., buses, refuse and delivery trucks) as well as passenger vehicles, and incorporate electric vehicles into corporate and municipal fleets.

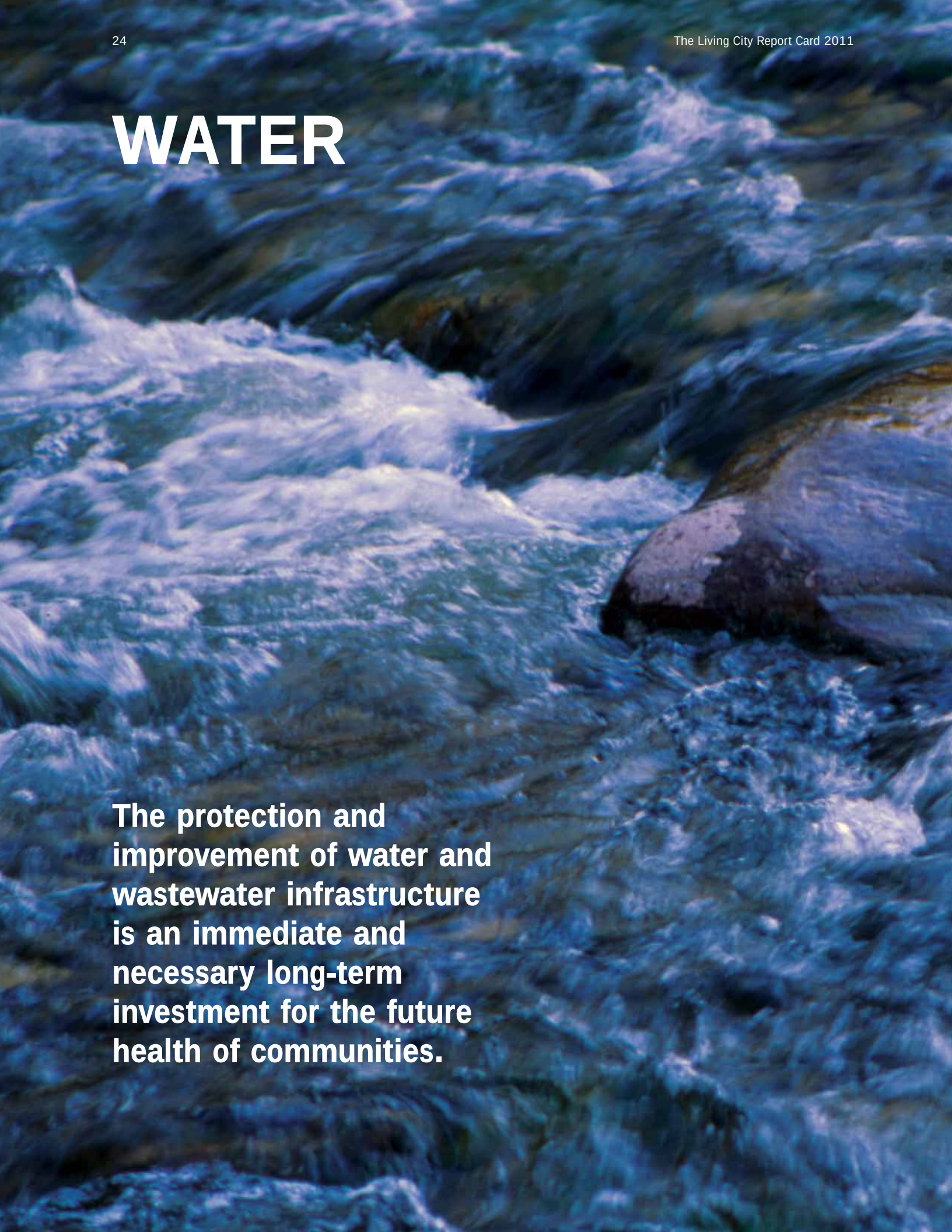
■ Link land use planning to transportation through the use of development incentives and community improvement plans.

AIR QUALITY DRIVER TREE - Contributors to GTA's carbon emissions



17 Overall figure; not necessarily the same for each pollutant listed.
18 Volatile organic compounds (chemical compounds that enter the atmosphere).

WATER



The protection and improvement of water and wastewater infrastructure is an immediate and necessary long-term investment for the future health of communities.

WHY DOES WATER MATTER?

Most rivers start as trickles seeping from the ground and wetlands—cold, clear and stable. Along the way, as water flows south from the Oak Ridges Moraine and Niagara Escarpment to Lake Ontario, rivers become wider, warmer and slower, are more heavily laden with sediments, and carry an increasing amount of pollutants. This reflects an unhealthy relationship with the adjacent lands. Many of our urban areas were built during a time when drainage was to be quickly moved to the nearest water body without consideration of the consequences to flow, quality or habitat. In the end, water is contaminated which has significant negative effects on residents of the GTA: there is the high cost to clean it; it makes beaches unfit for swimming; it negatively affects human health; and pollutants kill plants and animals.

Roadways, parking lots, sidewalks, roofs and other hard, artificial surfaces are covering a growing percentage of the landscape in our watersheds—the areas that drain into river systems—while the quality of natural cover that slows down runoff has been declining. As a result, melting snow and heavy rain transform quiet, slow moving rivers into roaring, eroding, destructive forces in just minutes.

There needs to be more attention paid to river flow including restoring the natural storage capacity, slowing rapid runoff into watercourses, and evening out the high and low flow rates. Adequate low flow levels during dry periods must be maintained to ensure a river's ecological functions are preserved and the quality of its aquatic habitats maintained.

Groundwater and wetlands still supply much of the dry weather flow or baseflow in the headwaters of our rivers. However, in urban areas, the discharges from storm and combined sewers, effluents from water treatment plants and runoff from hard surfaces make a larger contribution to dry weather flow than do natural sources. These unnatural water sources are not of the same quality or temperature as natural inputs, and can have a negative impact on aquatic ecosystems.

Effective stormwater controls are essential in moderating the maximum flow of a watercourse to safeguard people and personal property from erosion and flooding. Stormwater ponds, green roofs, downspout disconnections and pollution prevention are important water quality and quantity solutions. Investing in natural vegetation cover is also an important answer to improving water quality and quantity. Lastly, because our understanding of the various factors impacting water quality is constantly evolving, ongoing investment in monitoring and research is needed to evaluate new threats to water quality as they arise to produce adaptive responses.

Water Quality

PROGRESS ↔

CURRENT CONDITION vs. TARGET C

Progress: **No change in overall quality.**

Grade: **Moderate to significant action is required. Investment in water and wastewater infrastructure required to reach long-term target.**

Some water quality problems are common across TRCA's jurisdiction: fertilizer, pet wastes and other nutrients, for example, flood into streams, causing algae to bloom and aquatic wildlife to suffer. Each winter and spring, melting snow can mean a salty bath for many aquatic plants and animals. With salt being spread on more and more roads, parking lots, sidewalks and driveways, chloride levels in our waterways have increased significantly since the 1960s. The chloride washed into urban streams can peak at more than 10 times the level that is known to cause chronic effects to many aquatic species.

The frequency of beach closures due to bacterial contamination may be improving, particularly on Centre Island and Ward's Island, and near the Rouge River and the Scarborough Bluffs. The beaches with the highest postings due to high bacterial levels are, not surprisingly, located close to river mouths where much of the contaminants are discharged. Beaches were posted as unfit for swimming 28 per cent of the time from 2005 to 2009 across 10 locations in TRCA's jurisdiction.[1] This is down from 34 per cent since last reported in 2008.

According to TRCA's Regional Watershed Monitoring Program's latest results (2010), the rivers in TRCA's jurisdiction receive an overall WQI score of 59, although half of the rivers get WQI score ranging from 37 to 77. The lowest WQI scores go to the rivers with the highest concentrations of urban development, while the water quality in the headwaters receive the highest grades.

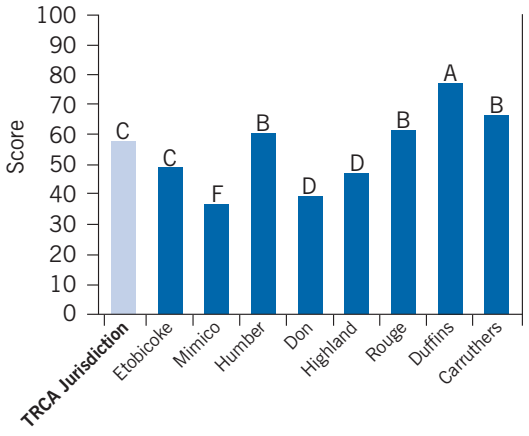
1 Monitoring nearshore water quality in Lake Ontario is the responsibility of the Environmental Monitoring and Reporting Branch of the Ontario Ministry of Environment (MOE). Data collected by MOE, Environment Canada and universities is currently being analyzed and is not available for "The Living City® Report Card." Results are expected in the latter part of 2011 and will be reported in other documents.

GRADING CRITERIA FOR WATER QUALITY

Grade	Average WQI[1]
A	>70
B	60 – 70
C	**50 – 59**
D	40 – 49
F	<40

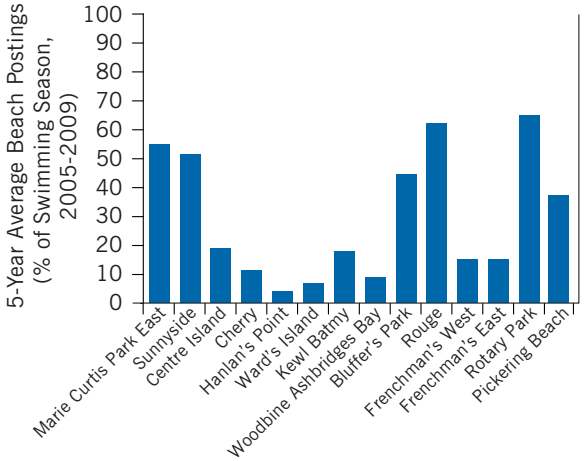
1 The Water Quality Index (WQI) is based on the level of contamination, magnitude and frequency of excessive input for eight signature pollutants—chloride, *E. coli*, phosphorus, nitrogen, ammonia, nitrate, copper and zinc—sampled at 36 locations throughout TRCA's jurisdiction.

Water Quality Index Scores by Watershed*



*Data not available for Petticoat Creek.

5-Year Average Beach Postings



Frenchman's Bay and Rotary Park based on 4 years of data. Pickering Beach based on 3 years of data. Toronto strike in 2009 reduced number of sampling days.

PROGRESS

- The more people, the more roads, the worse the water quality. Levels of chloride from road salt, *E. coli* bacteria, trace metals and other residential and industrial pollutants in rivers are much higher in urban areas.
- There has been some success: the switch to unleaded gas in the 1970s has cut the amount of toxic lead contaminating local streams by 90 per cent or more. Significant decreases in phosphorous and some trace metals have also been observed.
- Extreme weather is a characteristic of climate change. Heavy rains continue to flush a wide assortment of toxic materials into watercourses, so serious preventative measures are essential.

LEADERSHIP

- The City of Toronto launched a 25-year *Wet Weather Flow Master Plan* in 2003 to reduce and ultimately eliminate waterborne pollutants associated with stormwater.
- The Government of Ontario, municipalities and TRCA are tracking water quality as part of the Regional Watershed Monitoring Program and *Wet Weather Flow Master Plan*. Building on long-term records, the data is used to identify potential pollution threats and focus remediation efforts on high risk issues.
- The City of Toronto initiated the Don River and Central Waterfront Project to improve water quality along the lower Don River, inner harbour and central waterfront.
- Under the Lake Ontario Tributary Toxics Assessment Program, the Government of Ontario, TRCA and researchers at the University of Toronto are tracking the sources and pathways of water-borne trace metals, organics and other toxic pollutants being carried into Lake Ontario.
- Since the 1990s, TRCA's Rural Clean Water Program has helped farmers and rural landowners protect water quality with new management practices such as properly storing manure, decommissioning wells, restricting livestock from waterways and maintaining septic systems.

TARGETS

2016: No further deterioration of the current water quality conditions at all monitoring sites (Water Quality Index Score of 50 to 59).

Long-term: Water quality for TRCA's jurisdiction reaches an average WQI score of 70 or higher, with improvements seen in each watershed.

OPPORTUNITIES

- Protect and improve water and wastewater infrastructure as an immediate and necessary long-term investment for the future health of communities. Some municipalities have made encouraging commitments that need to be supported and kept. The capital costs to remove sewer cross connections, restore habitat and implement other improvements under the City of Toronto's *Wet Weather Flow Master Plan* are estimated at $42 million per year over the next 25 years. Annual operating and maintenance charges total an additional $16 million each year. Similarly, over $16 million has been allocated to the Town of Richmond Hill's *Stormwater Management 10-Year Capital Plan*.
- Reduce chloride contamination by implementing provincial and municipal salt management plans for public roads and reducing salt use on private parking lots and sidewalks.
- Enforce regulations and by-laws by Ontario's Ministry of the Environment (MOE) and municipalities to prevent spills, illegal dumping, discharge of contaminants to storm sewers and the use of toxic substances on private and public property.
- Maintain a water quality monitoring network with financial assistance from MOE, municipalities and conservation authorities to track contaminants and identify the emergence of new threats to public health and aquatic life.
- Increase public education about the impacts of pollutants on aquatic systems and human health, and potential solutions.

Water Quantity

Flood Management		Stormwater Management	
PROGRESS	CURRENT CONDITION vs. TARGET	PROGRESS	CURRENT CONDITION vs. TARGET
↗	C	↗	F

Flood Management

Progress: Better—flood risk in TRCA's nine watersheds is minimized.

Grade: Moderate action is required. Risks have been significantly reduced but ongoing investment is needed to reach long-term target.

Stormwater Management

Progress: Better—but still slow progress.

Grade: Significant action is required. Large investment is needed to reach long-term target; particularly for retrofits in the City of Toronto.

Managing the quantity of water in our rivers and streams is vital to protecting our watersheds—the areas that drain to river systems. Baseflow is the constant and relatively clean flow in a river system that is supplied primarily by groundwater discharge and the gradual release of water from wetlands. It is the amount of water in rivers during periods that are not influenced by high rainfall runoff or snowmelt. Baseflow levels need to be maintained to protect aquatic habitat, replicate the pre-development hydrologic cycle, and moderate storm flow highs to prevent flooding and erosion.

GRADE	GRADING CRITERIA FOR FLOOD MANAGEMENT		GRADING CRITERIA FOR STORMWATER MANAGEMENT
	Flood Vulnerable Clusters*		% of Urban Area with Controls
A	<20	A	>80%
B	20 – 25	B	70% – 80%
C	**26 – 30**	C	60% – 69%
D	31 – 35	D	50% – 59%
F	>35	**F**	**<50%**

*30 concentrated areas with a high number of flood-vulnerable areas have been identified as flood vulnerable clusters and do not include 14 within Special Policy Areas.

REGIONAL MUNICIPALITY	PORTION OF TRCA WITHIN REGIONAL MUNICIPALITY (URBAN)	STORMWATER CONTROL (URBAN)
	Area (Ha)	%
Durham	6,025.69	20.9
Peel	22,511.09	31.8
Toronto	61,140.08	4.9
York	29,710.98	54.4
TOTAL	**119,387.84 Ha**	**23%**

The watersheds of the GTA are considered flashy. Too little natural ground cover and too much concrete and asphalt means runoff from storms or melting snow can quickly swell local watercourses. More frequent and powerful thunderstorms, a characteristic of climate change, can result in almost instantaneous maximum discharge of a watercourse at a given location.

Stormwater management policies were introduced in the 1980s to mitigate the impacts of increased runoff at maximum flow rates. However 77 per cent of urban areas within TRCA's jurisdiction still do not have adequate stormwater controls. As a result, high flows in watersheds have generally been maintained and flooding minimized. However, 36,000 people still live within flood-vulnerable areas (30 areas identified as clusters) in TRCA's jurisdiction. Flooding in these areas could cause up to $3.1 billion dollars in residential and non-residential property damage.

PROGRESS

- Long-term monitoring shows that mean baseflow is increasing in all watersheds (except Mimico Creek) due to the influence of stormwater retention ponds, leaky sewer pipes, less lawn watering and inputs of poor quality water from other sources.

- Depending on the watershed, baseflow accounts for 28 to 62 per cent of the total annual flow. This percentage is typically higher in the headwaters, where groundwater discharge occurs. In the lower reaches, discharges from storm sewers, combined sewers and wastewater treatment plants dominate total flow.

- Mean total discharge—the amount of water entering Lake Ontario—is increasing from 0.3 per cent per year in the Humber River to 2.9 per cent per year in the Highland Creek due to the spread of more impervious surfaces.

LEADERSHIP

- TRCA identifies flood-vulnerable areas, implements remedial works and flood protection programs, issues flood warnings and coordinates flood response with municipal partners.

- The GTA Flood Group, made up of eight conservation authorities, provides a consistent approach to flood forecasting and warning.

- TRCA and its municipal partners require all new developments to provide modern stormwater controls. TRCA's recently completed *Low Impact Development Stormwater Management Planning and Design Guide*, helps to improve stormwater management practices.

- The City of Toronto's *Wet Weather Flow Master Plan*, adopted in 2003, lists stormwater projects to be implemented over the next 25 years to improve water quality and protect infrastructure from flooding and erosion.

- The City of Toronto's Green Roof By-law requires new commercial, institutional and high density residential developments to install green roofs for improved water management.

- Many 905 municipalities have initiated stormwater retrofit studies which provide a long-term framework for implementing stormwater quality and quantity, and erosion controls within urbanized areas.

TARGETS

2016: No increase in the number of flood-vulnerable clusters. Reduction in the number of structures at risk. Urban area with stormwater management increases from 23 per cent to 35 per cent.

Long-term: Less than 20 flood-vulnerable clusters. Reduction in the number of structures at risk. Greater than 80 per cent of urban areas have stormwater management.

OPPORTUNITIES

- Take additional steps to reduce the effects of wet weather flows (including snowmelt), by improving existing municipal water and wastewater infrastructure, and creating new facilities to manage and treat runoff.

- Implement small-scale stormwater practices and site-design approaches, such as bio-retention, green roofs, permeable pavement, rainwater cisterns and other methods that maintain or restore natural hydrologic functions by promoting infiltration and evapo-transpiration of rainwater.

- Keep abreast of technological advances to improve flood forecasting and warning, identify priority sites to reduce the number of people affected and the potential cost of damage due to flooding, undertake flood remediation projects, develop municipal outreach programs and a five-year emergency management plan, implement those plans in the event of a flood event, administer relief and recovery programs in the aftermath of a flood event and initiate a public flood awareness campaign.

- Continue restoration efforts by TRCA and its partners (e.g., planting trees and shrubs along watercourses) to increase the natural function of terrestrial and aquatic areas. More vegetation helps reduce the impacts of storm events, reduce erosion potential, and protect water quality by reducing the transport of nutrients, bacteria and other contaminants into streams.

- Continue community engagement and participation in reducing runoff on private properties (e.g., rainwater collection).

Water Consumption

PROGRESS

CURRENT CONDITION vs. TARGET

C

Progress: **Better—in just three years, per capita water consumption in the GTA has dropped nine per cent.**

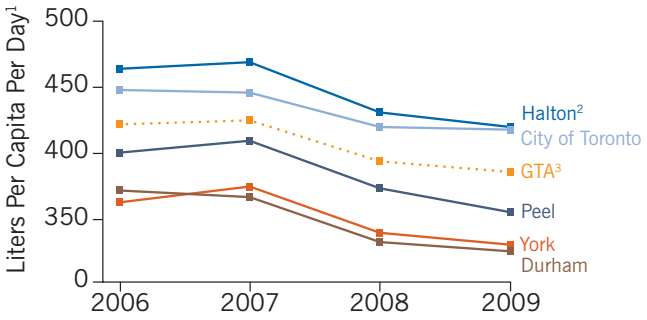
Grade: **Moderate action is required. Continued rollout of current regional programs to reach long-term targets.**

The GTA is one of the fastest growing city regions in North America. The current population of six million residents is expected to grow to 6.8 million by 2016 and to over nine million by 2036.[2] Although the region is blessed with a plentiful supply of fresh water, we need to reduce our water consumption per capita in the GTA to reduce infrastructure investments and the cost of treating and distributing additional water to meet increased future demand.

GRADING CRITERIA FOR WATER CONSUMPTION

Grade	Litres Per Person Per Day
A	<300
B	300 – 349
C	**350 – 399**
D	400 – 450
F	>450

Water Consumption Per Capita



1 Total water production, measured before unaccounted for water loss (leeks, seepage, firefighting, etc.).
2 Only 2009 Halton data available. Assumed average growth of other regions for 2006–2008.
3 Population weighted average.

PROGRESS

- Each of the individual regions of the GTA has recognized the need for water conservation and implemented water-saving programs. While factors outside of regional control—such as hot weather or general economic conditions—can affect water use, the persistently downward trend in consumption indicates conservation efforts are working. It is important to note that structural differences across municipalities (industry, employment, demographics, etc.) account for some of the variation across the GTA.

- In 2009, average GTA water consumption was 386 litres per person per day (Lpd), which represents a nine per cent reduction from the 422 Lpd used in 2006. This per capita figure includes all water sent to the distribution system for residential and non-residential use, and is measured before accounting for significant water loss due to leaks, seepage, or fire flows. Water loss results from older infrastructure, and is estimated to account for five to 15 per cent of production across the GTA. In 2009, residential demand accounted for approximately 60 per cent (or 232 Lpd) of water use, with the remaining 154 Lpd driven by non-residential demand.

- Per capita consumption is expected to continue to decrease. New conservation opportunities will arise from universal metering of homes, collaboration between regions, and implementation of Ontario's *Water Opportunities and Conservation Act,* (2010).

2 Ministry of Finance. "Population Projections Update" (Spring 2010).

LEADERSHIP

- In 2010, the City of Toronto began installing smart water meters to allow for wireless and accurate tracking of household water use and enable quicker detection of water loss. Similar systems have decreased consumption by 10 to 15 per cent per household in other cities. The meters also permit time-of-use pricing, although there are no current plans to implement this.[3]

- Regional water conservation plans from GTA municipalities share a number of common elements, including: rebates for high-efficiency toilets and washers installed in single-family and multi-unit homes; free outdoor landscaping audits or water-efficient landscaping demonstration centres; free or discounted rain gauges and/or rain barrels; free or discounted water audits for industrial, commercial and institutional (IC&I) facilities; IC&I capacity buyback programs; replacement of old and leaking pipes; and education and awareness programs.

- Ontario's *Water Opportunities and Conservation Act,* requires municipalities to prepare and submit to MOE detailed sustainability plans for municipal water, wastewater and stormwater services. Municipalities and government ministries also need to prepare water conservation plans, meet conservation targets and consider the efficient use of water when purchasing goods and services.

- In the past 12 years, water festivals in the Regions of Durham, Peel and York have educated over 125,000 on water conversation and efficiency.

- Amsterdam, widely recognized as a global leader in water conservation, has installed household water meters in over 50 per cent of homes. According to Amsterdam water officials, the simple fact that residents are aware of how much water they are using has resulted in a 10 to 15 per cent reduction in water use per home.[4] During 2009, Amsterdam rolled out time-of-use water pricing, with results pending.

- Vancouver plans on reaching its aggressive 33 per cent reduction target through universal metering, time-of-use pricing, rainwater capture, efficiency rebates, educational and marketing programs.[5]

TARGETS

2016: Reduce per capita consumption by 10 per cent from current levels, down to 347 Lpd. The target is consistent with regional as well as North American reduction targets.

Long-term: Per capita consumption of less than 300 Lpd (residential and non-residential combined). This represents a reduction of 22 per cent from the current GTA average.

OPPORTUNITIES

- Municipalities can work with MOE to develop conservation opportunities under the new *Water Opportunities and Conservation Act*. The Act can require municipal water sustainability plans and establish performance targets for municipal water services.

- Install smart water meters by regional water providers in all GTA households.

- Continue regional leak detection programs to limit water loss, using full system analysis to identify leaks that will be cost-effective to repair.

- Combine regional resources for education and awareness initiatives to save money and increase the reach of the programs.

- Share best practices between GTA regions to accelerate conservation efforts and create new conservation opportunities.

- Move forward with regional conservation plans and programs.

3 "Toronto water meters to get smart," Toronto Sun (April 26, 2010).
4 European Green City Index: Assessing the Environmental Impact of Europe's Major Cities, 2009 Siemens.
5 "Vancouver 2020, A Bright Green Future."

WATER
PRIORITY OPPORTUNITIES

- Protect, maintain and improve water and wastewater infrastructure to manage stormwater quality and quantity.

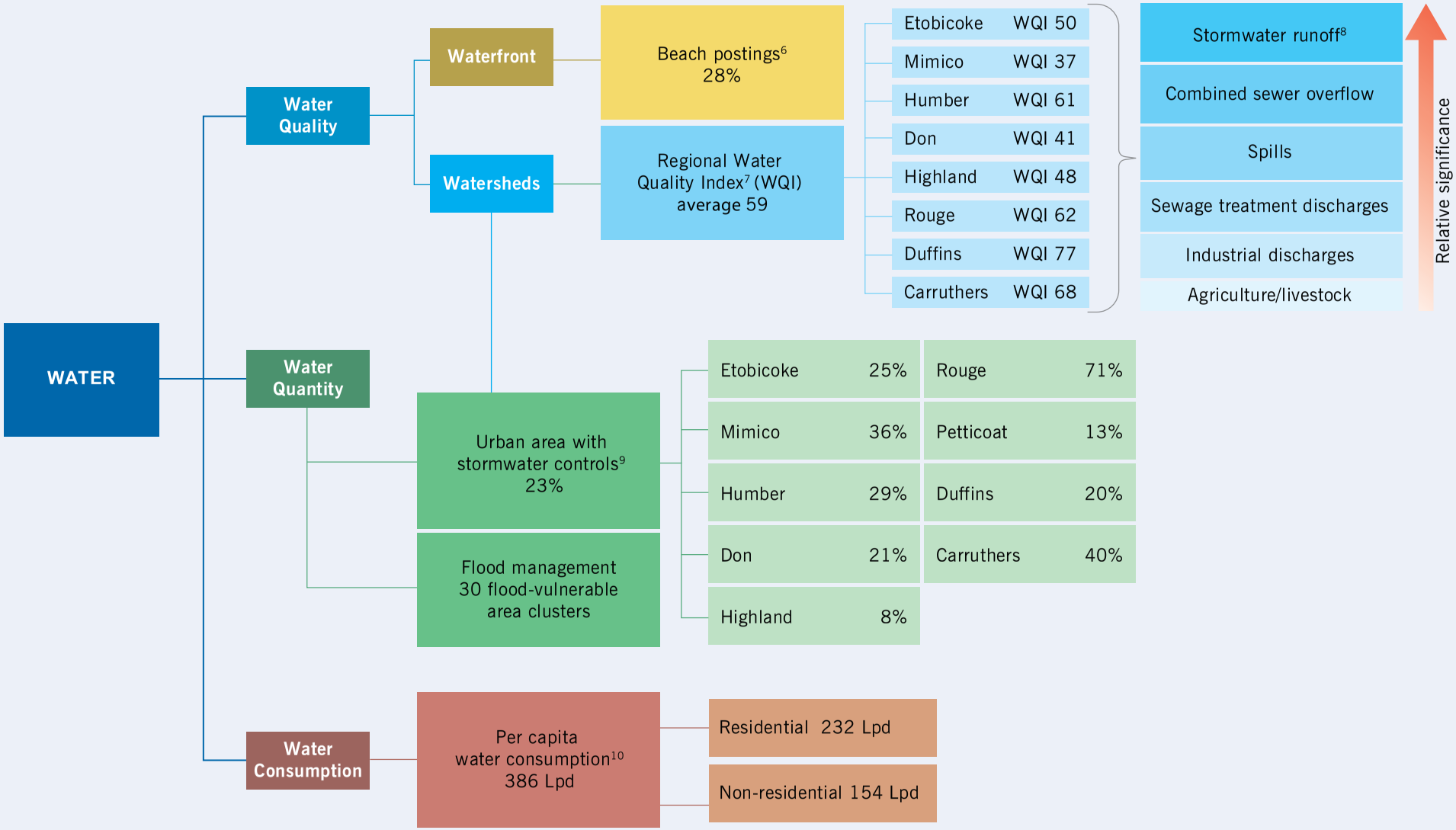
- Implement small-scale low impact stormwater management practices at source to maintain and restore natural hydrologic functions.

- Keep abreast of technological advances to improve flood forecasting and warning, provide emergency management planning, and reduce the risk to people and personal property due to flooding and erosion.

- Maintain water monitoring to track contaminants and identify the emergence of new threats to public health and aquatic life.

- Increase public engagement in pollution prevention, low-impact development approaches, flood awareness and best practices for reducing water consumption.

WATER DRIVER TREE - Contributors to the GTA's water



6 Rolling 5 year average 2005-2009 across 10 beaches; "Beach postings" indicated percentage of time beaches posted as unsafe for swimming.
7 Water Quality Index (WQI) values based on conditions at each of 36 sites monitored monthly in 8 watersheds during a 4 year period (2006 – 2009); Reflect magnitude, frequency and number of parameters exceeding water quality objectives.
8 Stormwater runoff includes salt.
9 Percentage of developed lands within TRCA jurisdiction with storm water quantity and quality controls.
10 2009 per capita water consumption in litres/person/day.

WASTE

Current residential diversion programs for single-family homes have enjoyed great success. Going forward, multi-unit residential buildings and non-residential waste diversion are major areas for attention and progress.

WASTE

WHY DOES WASTE MATTER?

Every year the GTA sends over three million tonnes of waste to landfill.[1] As our population continues to grow and our landfills get closer to capacity, it is critical that we take steps to reduce the amount of garbage generated and sent to landfills each year. Landfills are a waste of valuable land, produce carbon emissions and represent a wasted use of valuable materials that could have been reused, recycled and resold. If done properly, increasing the diversion of materials from landfill can save money, create jobs and help the environment.

Residential waste accounts for 35 per cent of landfill waste.[2] In the GTA, regional municipalities have done a fairly good job at diverting materials from landfill from single-family homes. In multi-unit residential buildings (MuRBs), diversion has been harder to achieve. Apartments and condominiums present many unique challenges to consider when establishing residential diversion programs and targets.

Industrial, commercial and institutional (IC&I) waste accounts for the other 65 per cent of landfill waste each year, and yet is largely overlooked.[3] Very little data is available on IC&I diversion or waste composition, making it difficult to develop programs and plans to address the situation. With information comes greater understanding of the challenges and solutions, and so there needs to be much greater reporting from the IC&I waste sector for improvements to occur, as well as to highlight success stories that currently go unnoticed.

Decreasing the environmental impact of landfills can come from producing less waste and diverting more of what we produce. The GTA will need the cooperation of residents, businesses and governments to implement the programs and create the infrastructure necessary to reach our long-term target and become a world leader in waste management.

For further information please refer to the Deep Dive on page 70.

1,2,3 GTA residential waste data provided by municipalities. Non-residential waste data estimated using provincial ratio to residential waste from Statistics Canada.

Residential Waste

PROGRESS

CURRENT CONDITION vs. TARGET

C

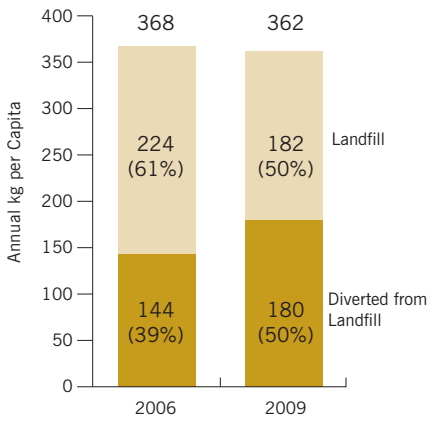
Progress: **Better—11 percentage points increase in diversion driven mainly by single-family households.**

Grade: **Moderate action is required. Large increase in multi-unit residential building diversion required to reach long-term target.**

Residential waste accounts for approximately 40 per cent of total waste generated and 35 per cent of waste deposited in landfills each year. In 2009, GTA residents generated 2.1 million tonnes of waste, or approximately 362 kilograms per capita. The overall residential diversion rate (single-family and multi-unit households combined) was 50 per cent, meaning approximately 1.05 million tonnes (181 kilograms per capita) of waste went to landfill in 2009.

GRADING CRITERIA FOR RESIDENTIAL WASTE	
Grade	**Waste Diversion**
A	80 – 100%
B	55 – 79%
C	**35 – 54%**
D	15 – 34%
F	0 – 14%

GTA Residential Waste 2006, 2009



PROGRESS

- Residential diversion has increased across the GTA. GTA residents generated 362 kilograms of waste per capita in 2009, down slightly from 368 kilograms in 2006. Overall residential diversion increased 11 percentage points, from 39 to 50 per cent. This means that in total, GTA residents reduced their impact on landfill by 42 kilograms per capita or 245,000 tonnes.

- Single-family households account for 80 per cent of all residential waste and drove the bulk of the increase in diversion, increasing from 45 to 58 per cent from 2006 to 2009.

- MuRBs account for 20 per cent of GTA residential waste. MuRB diversion increased from 13 per cent in 2006 to 16 per cent in 2009. MuRBs present several challenges that are not present in single-family homes, including lack of convenience and fewer recyclable materials (e.g., yard waste). In addition, tenants are not directly connected with municipal waste programs, which makes it difficult to create effective incentives that encourage recycling. These differences must be considered when designing programs and targets for MuRB diversion.

LEADERSHIP

Single-family Households

- Since 2006, most regions have implemented bi-weekly curbside garbage pickup combined with organics and recyclables collection. This has created an incentive for residents to divert more materials rather than having garbage build up over multiple weeks.

- Waste Diversion Ontario has developed collection programs for used tires, electronics and household hazardous wastes that are funded by the importers, manufacturers or brand owners of the products. The eco fees for many products handled under Ontario's Household Hazardous Waste Program were recently cancelled due to consumer concerns; however, the fees are still being charged for the nine designated materials that are still included in the program.

- In 2009, Peel Region's energy from waste facility converted 120,000 tonnes of disposed waste to energy.[4]

Multi-unit Residential Buildings

- A volume-based rate system for the City of Toronto MuRBs was introduced in 2008, designed to encourage owners to increase diversion within their buildings. The City of Toronto has been refining the rates to more closely align with rates charged by private collectors.

- Organic collection has been rolled out to approximately five per cent of the City of Toronto MuRBs, with pilot programs in other regions planned.

TARGETS

DIVERSION RATES AND TARGETS		
Source	**2009**	**2016 Targets**
Single-family households	58%	80%
MuRBs	16%	50%
Overall Residential	**50%**	**75%**

2016: Overall residential diversion of 75 per cent: single-family homes divert 80 per cent of waste; and MuRBs divert 50 per cent. Reaching these targets will save an incremental 92 kilograms per capita from landfill each year; with a projected 2016 population of 6.8 million people, that equates to over 600,000 tonnes.

Long-term: Approach zero waste diversion of greater than 80 per cent. Zero waste is a strategy that has been adopted (but not yet achieved) by many city regions around the world. The Grass Roots Recycling Network defines zero waste as "a philosophy and a design principle for the 21st Century. It includes recycling but goes beyond recycling by taking a whole system approach to the vast flow of resources and waste through human society."[5]

OPPORTUNITIES

- Increase the breadth of products covered by Extended Producer Responsibility programs. Make producers responsible for the full life-cycle cost of a product (currently they pay for 50 per cent of recycling program costs), or make producers fully responsible for meeting waste diversion requirements, allowing them to meet these requirements by joining a materials management scheme or by developing their own individual waste diversion plan.[6]

- Extend organics collection to all MuRBs, particularly in the City of Toronto where MuRBs account for over 50 per cent of all households. Organics from MuRBs are more vulnerable to contamination than those from single-family homes, so alternative processing strategies (mechanical biological treatment)[7] need to be considered.

- Increase organic processing capacity to accommodate increased diversion of organics.

4 Note: Ontario currently does not recognize energy from waste as a diversion method, so this has not been included in the Peel Region's diversion rate.
5 Grass Roots Recycling Network, http://www.grrn.org
6 "From Waste to Worth: The role of waste diversion in the green economy," Minister of Environment report on the Waste Diversion Act, 2002 review, (October 2009).
7 MBT is a generic term for a range of processes that may be used to treat residual waste (i.e., post curbside collection of source separated recyclables and organics) using a combination of mechanical separation and biological treatment.

Industrial, Commercial and Institutional Waste

PROGRESS ↔ CURRENT CONDITION vs. TARGET D

Progress: **No change—lack of data makes measurement and improvement difficult.**
Grade: **Major action is required. Reporting standards required as first step to reach long-term target.**

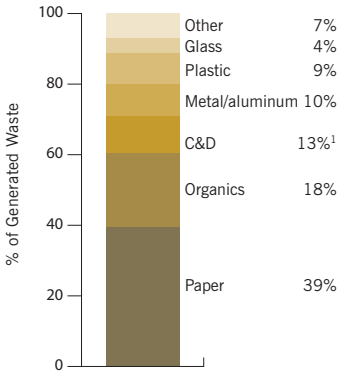
Although IC&I waste represents approximately 65 per cent of the waste going to landfill each year, there is very little data about its composition and sources. Statistics Canada reports an Ontario IC&I diversion rate of 13 per cent[8] for 2006, however, *Solid Waste & Recycling Magazine* reports a higher rate of approximately 18 per cent.[9] In either case, the rate is much lower than the rate for residential diversion. Applying the 18 per cent estimate to the GTA means that in 2009 the IC&I sector generated approximately three million tonnes of waste, diverting only 500,000 tonnes with the remaining 2.5 million tonnes going to landfill.

In addition to benefiting the environment, sending less waste to landfill can reduce organizations' costs and develop market opportunities for the processing and resale of recycled materials.

GRADING CRITERIA FOR IC&I WASTE

Grade	Waste Diversion
A	80 – 100%
B	55 – 79%
C	35 – 54%
D	**15 – 34%**
F	0 – 14%

Ontario IC&I Waste Composition



1 Construction and demolition
Source: RIS International Ltd.

PROGRESS

It is difficult to define a trend in IC&I waste diversion because of the lack of data and reporting requirements. There are many success stories of individual property owners and waste management firms that divert significantly more than the reported average rate; however, because there are no standardized reporting requirements, no reliable figures exist to measure overall IC&I diversion for the entire GTA.

LEADERSHIP

- Some believe that IC&I diversion is higher than what is reported at the provincial level; however, a lack of standardized reporting requirements makes this difficult to measure at an aggregate level.

Some large commercial property owners within the GTA have made significant progress in increasing diversion. Increased reporting and data availability will enable these success stories to be highlighted more often and replicated more broadly.

- The Simpson Tower in downtown Toronto became Canada's first zero waste office tower by achieving an audited diversion rate of 96.6 per cent in 2008. Owner Hudson's Bay Company and operator Ivanhoe Cambridge achieved this success through constant owner-tenant communication as well as mandatory multi-stream sorting (paper, multi-material, organics). Cleaning staff were instructed to not remove the waste if it had not been properly sorted.[10]

8 Statistics Canada, 2006.
9 "A proposed waste diversion levy," Solid Waste & Recycling Magazine (April 2009).
10 Ministry of the Environment, "The Simpson Tower: Canada's first zero-waste office tower."

- The TD Centre in downtown Toronto diverted 76 per cent of its waste in 2009. Owner Cadillac Fairview credits its corporate commitment to reducing waste, strong monitoring programs and close relationships with tenants for its diversion success.[11]

- The Recycling Council of Ontario's Waste Diversion Certification Program is working with Ontario's MOE to provide a reliable IC&I data source and produce objective waste diversion performance standards aligned with current legislation.

- San Francisco, a leader in residential and non-residential waste diversion, has a 2012 target of 80 per cent commercial waste diversion (zero waste by 2020).[12] The city credits strong data collection and some of the strictest waste regulations in the country for its success. In April 2009, mandatory organics recycling was introduced for businesses. The city also provides discounts on hauling bills to IC&I customers that reduce their landfill-bound garbage, and recycling and composting pick-up services are provided free of charge. By sorting waste, businesses can save hundreds to thousands of dollars each month.[13]

- Copenhagen, Denmark, focuses on source separation to divert waste. The city has strict agreements with waste contractors (both public and private) that ensure only separated waste is removed. If a business fails to separate its waste, it will not be removed.[14]

TARGET

2016: Fifty per cent diversion of IC&I waste. The IC&I sector can achieve this target by focusing on increasing diversion of paper and organics. Reaching the 2016 target will require increased source separation as well as increased organic processing capacity.

Long-term: Approach zero waste diversion of greater than 80 per cent. Zero waste is a mindset that requires producers and consumers to view the product life-cycle as a closed loop system, where all outputs are reused as inputs and no waste is created. Many cities around the world are targeting zero waste.

OPPORTUNITIES

- Develop a credible and accurate fact base for IC&I waste to establish true diversion rates and improve the focus of diversion programs.

- Make reporting for the IC&I waste management industry (Certificate of Approval holders) a requirement to improve information and allow for more focused diversion programs, and highlight successes and failures within the IC&I sector.

- Support and participate in existing and new programs. Many private companies now offer consulting, auditing and training services to generators to improve diversion. The Recycling Council of Ontario's Waste Diversion Certification Program will aim to provide measurement and certification for IC&I generators to become compliant with current regulations. The Ontario Waste Management Association is also developing voluntary waste auditing, training and certification standards for IC&I waste haulers.

- Reduce IC&I waste by considering disposal and diversion during procurement and request reduced packaging and full life-cycle handling of products. Moving towards zero waste requires producers to redesign products and processes to manage waste before products are made, rather than worrying about waste only after the user is finished with the product.

- Increase the organics processing capacity in the GTA and Ontario to handle current and expected increases in organics from the IC&I sector.

- Increase collaboration and communication between IC&I generators, haulers and processors, and promote recommencement of the *Ontario Waste Diversion Act* review.

- Increase cost of disposal (thereby motivating diversion) through landfill levies or material bans. Funds received from levies could be applied to educational, auditing and other diversion initiatives.

11 Cadillac Fairview: Green at Work Overview, Vol.2 No.1, Spring/summer 2006.
12 San Francisco Department of the Environment, "Strategic Plan 2010-2012."
13 Grist Cities of the Future, online article. "San Francisco watches its waste line" (October 12, 2010).
14 C40 Cities, Climate Leadership Group, Clinton Climate Initiative.

WASTE
PRIORITY OPPORTUNITIES

- Develop an accurate and reliable IC&I fact base to determine true regional diversion rates, highlight successes and failures, and improve program effectiveness.

- Improve source diversion of IC&I waste through education and awareness programs to increase communication between landlords, tenants and IC&I waste management firms.

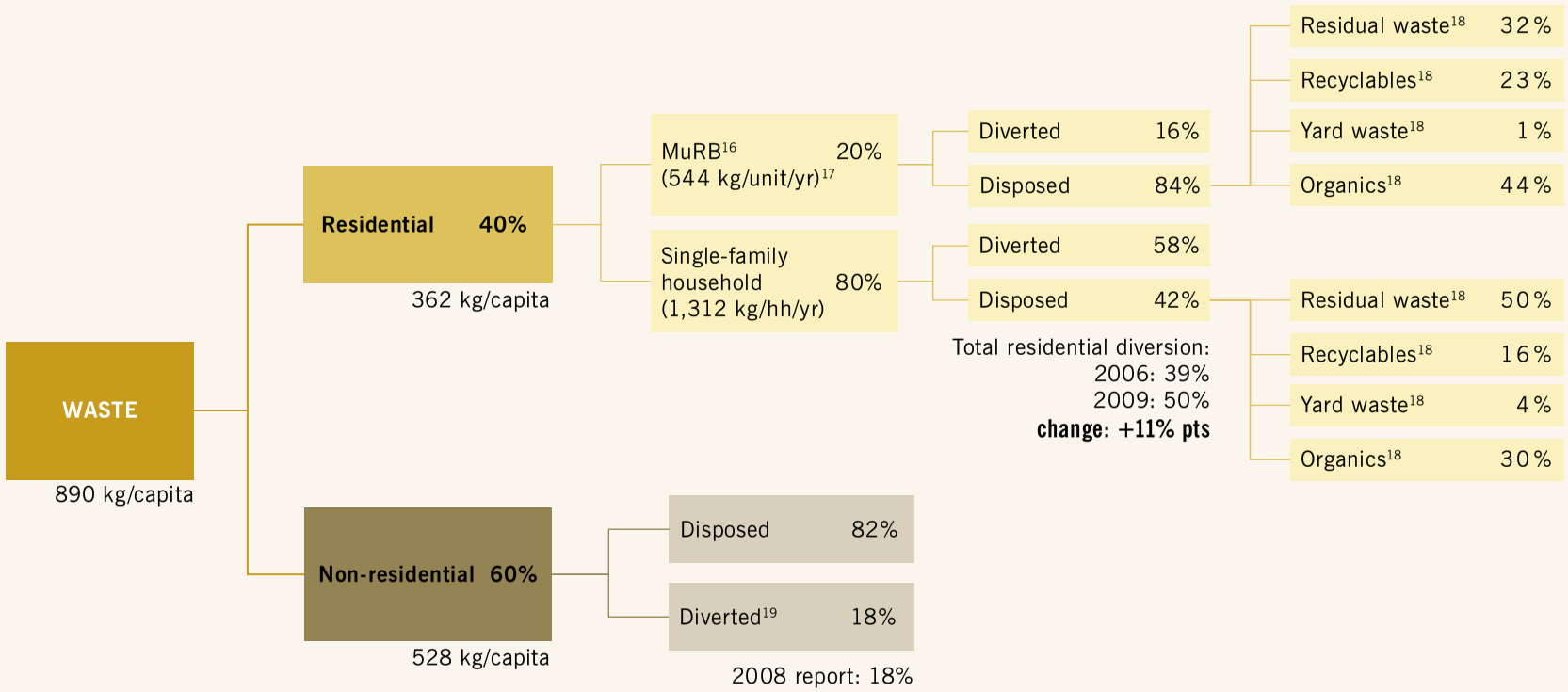
- Increase organics processing capacity in the GTA and Ontario.

- Reduce IC&I waste by considering disposal and diversion during procurement and requesting reduced packaging and full life-cycle handling of products.

- Increase the breadth of products covered by Extended Producer Responsibility Programs. Make producers responsible for the full life-cycle cost of a product (current blue box program producers pay for 50 per cent of program costs), or make producers fully responsible for meeting waste diversion requirements.[15]

15 "From Waste to Worth: The role of waste diversion in the green economy," Minister of Environment's Report on the Waste Diversion Act 2002 review (October 2009).

WASTE DRIVER TREE - Contributors to the GTA's waste

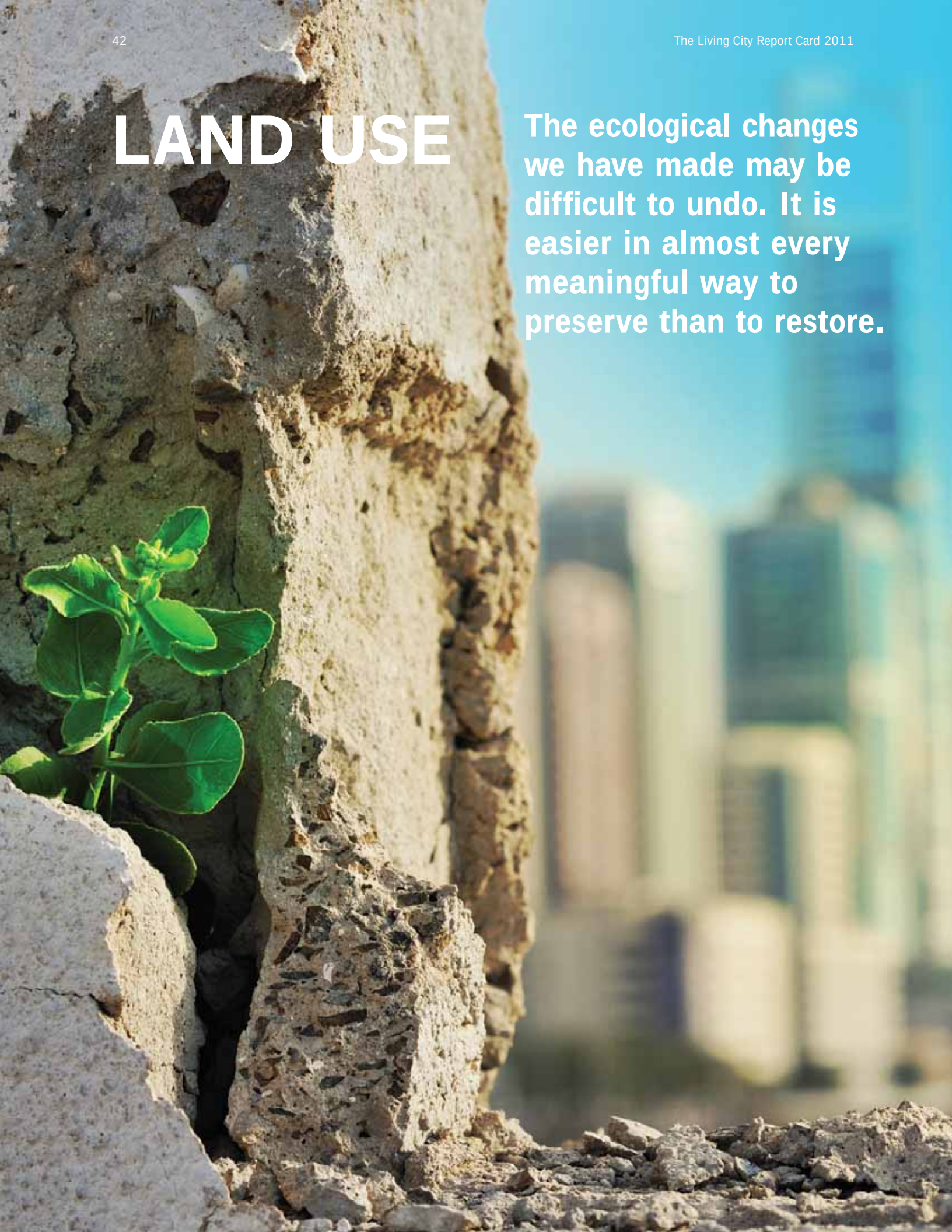


16 Multi-unit residential buildings.
17 Toronto MuRB data; assumed representative of all GTA MuRBs.
18 2007 City of Toronto waste audit.
19 No updated data available since last report.

Source: Waste Diversion Ontario, Ontario Waste Management Association, Solid Waste and Recycling Magazine, City of Toronto Solid Waste Management, Regional Waste Management Departments, RIS International Ltd. and The Boston Consulting Group analysis.

LAND USE

The ecological changes we have made may be difficult to undo. It is easier in almost every meaningful way to preserve than to restore.



WHY DOES LAND USE MATTER?

Managing land use to accommodate a growing population while protecting our natural infrastructure and the services it provides is a contemporary challenge facing every city region that is striving to achieve sustainability. What makes it challenging is the many existing and alternative uses for the spaces around us. Planning for land use requires careful consideration by many disciplines to make sure the land, and associated resources, services and facilities are used in ways that are ethical, orderly and complementary. In doing so, land use conflicts are avoided and communities are efficient and healthy. In this section, we assess six indicators related to sustainable land use planning: urban forest, greenspace, agriculture, food security, green buildings and development intensification.

By 2050, it's expected that 70 per cent of the world's population will be living in urban areas, a level unprecedented in human history.[1] For most of us living in the fastest growing region in Canada, this global trend comes as no surprise, with growing pains experienced daily.

It's not only the pace at which we're growing that requires our attention; it's also the manner in which that growth is occurring. Often characterized as sprawl, urbanizing landscapes can become gridlocked, car-dependent, polluted and concrete covered, generating a myriad of negative effects on the environment and human health. We risk compromising the protection of natural heritage, farmlands and public greenspace to meet the demands of economic progress and the needs of a growing population.

It is easier to protect than to restore. Mature forests do not spring up overnight. Vanishing species will not magically reappear. Years of contamination and misuse cannot be simply wiped away. Environmental restoration is technically complex, time-consuming and a considerable investment.

It is time to return to some of the planning principles that formed the older parts of our cities—walkable, transit oriented—and to incorporate new thinking about the importance of near-urban agriculture to support viable food production close to and within the city regions. In addition to addressing food security issues, near-urban agriculture contributes to a healthier and more productive population.

We must manage land use to enhance the natural infrastructure of the GTA and to improve energy conservation, environmental quality, health and recreation, among many other benefits.

1 Population Reference Bureau: Human Population – Urbanization: Washington, http://www.prb.org/Educators/TeachersGuides/HumanPopulation/Urbanization.aspx

Urban Forest[2]

PROGRESS: Not previously reported

CURRENT CONDITION vs. TARGET: C

Progress: **Not previously reported.**

Grade: **Moderate to significant action is required. Investment needed particularly in new suburban developments and commercial and industrial areas to reach long-term target.**

The urban forest includes the trees, shrubs and understorey plants (as well as the soils that sustain them) that grow on public and private property within a community or city. This may include natural forests and planted areas. By growing and protecting the urban forest, we are simultaneously improving local air quality, reducing stormwater runoff, mitigating the effects of climate change and increasing biodiversity. The extent of the urban forest is measured by calculating the Leaf Area Density, which represents the size, species, health and number of trees in an area.

GRADING CRITERIA FOR URBAN FOREST		
Description	**Grade**	**Average Leaf Area Density**
Excellent	A	>2.0
Good	B	1.50 – 2.0
Fair	**C**	**1.00 – 1.49**
Poor	D	0.50 – 0.99
Fail	F	<0.50

MUNICIPALITY	LEAF AREA DENSITY	GRADE
Ajax	1.27	C
Brampton	0.54	D
Caledon	1.23	C
Markham	0.91	D
Mississauga	0.78	D
Pickering	1.50	B
Toronto	1.60	B
Vaughan	0.97	D
Average	**1.10**	**C**

The major threats to the urban forest are invasive plant species (that restrict the regeneration of native trees and shrubs), exotic insect pests (such as the emerald ash borer and the Asian long-horned beetle), diseases, climate change, competing demands for growing space and unsustainable development activities (that degrade and compact soils). Restricted root zones and a lack of long-term care mean that many urban trees decline at a young age and do not reach their full potential for growth. It is large, mature trees that can provide communities with the greatest suite of benefits such as carbon sequestration, temperature mitigation and air cleansing. But the urban forest has little capacity to renew itself without active human intervention as natural regeneration is either not intended or impaired by public use, invasive species and disease.

Challenges vary across TRCA's jurisdiction. In the City of Toronto, many of the trees planted in the early 1900s have reached maturity and are beginning to decline. New residents in many suburban developments inherit poor quality, degraded soils that cannot support the vigorous growth of young trees or sustain them through summer drought conditions. Many native species cannot survive in the harsh growing conditions found in our urban landscape. As a result, across TRCA's jurisdiction, there is a lack of species richness and subsequent resilience in the urban forest.

The majority of the urban forest is privately owned. Consequently, community residents are the most important and influential stewards of the urban forest. Their preferences for trees and other vegetation will shape the structure and function of our urban landscape so it is important to focus on providing good information and desirable alternatives.

2 Urban Forest to be read in conjunction with Biodiversity.

PROGRESS

- The City of Toronto, with its many established neighbourhoods shaded by mature trees, supports the highest Leaf Area Density for an urban area in TRCA's jurisdiction. Leaf Area Density is lowest in the City of Brampton, followed by the City of Mississauga, both of which contain a high proportion of industrial land, including Pearson International Airport. Trees in new suburban developments in the City of Brampton, City of Vaughan, Town of Ajax and Town of Markham are planted with much younger trees and provide a comparatively small amount of leaf area.

- The extent of urban forest has only recently been established in some municipalities in the GTA region. More detailed trends will be measured in future report cards.

LEADERSHIP

- TRCA, in partnership with the Regions of Peel and York, Credit Valley Conservation, the Cities of Brampton, Mississauga, Pickering, Toronto and Vaughan, and the Towns of Ajax, Caledon, Markham and Richmond Hill, is conducting urban forest studies. These stakeholders are collaborating across organizations, departments and communities to raise the profile of the urban forest as natural infrastructure.

- The Town of Oakville produced an *Urban Strategic Management Forest Plan* (2008), recognized by the Canadian Forestry Association.

- The Green Infrastructure Ontario Coalition (GIO), of which TRCA is a founding member, recognizes the urban forest as natural infrastructure that is essential for healthy communities. GIO advocates for policy improvements at both the municipal and provincial level to facilitate natural infrastructure opportunities, as well as a shift in public and private investment that will lead to greater protection and enhancement of natural infrastructure.

- LEAF (Local Enhancement and Appreciation of Forests) provides a variety of urban forest stewardship programs for local residents that are designed to improve city life one tree at a time. These include the Backyard Tree Planting Program, the Tree Tenders Training Program and the Toronto Tree Tours.

- Local community groups are leading the way with on-the-ground stewardship action, conducting neighbourhood tree surveys, coordinating tree planting events, providing tree care and maintenance, and advocating for urban forest protection. Groups such as GreenHere, Beautification of Leslieville District (BOLD) and the Harbord Village Residents Association are a few examples of such grassroots leadership.

TARGETS

2016: Develop targets for Leaf Area Density in each municipality as urban forest management plans are developed. These targets will reflect the existing urban forest, available planting space, topography and population projections.

Long-term: The average Leaf Area Density for TRCA's jurisdiction is greater than two.

OPPORTUNITIES

- Advocate for leadership at the provincial level to ensure that municipalities have the tools required to integrate urban forest sustainably into urban planning and design at all scales.

- Complete urban forest studies for nine area municipalities and two regional municipalities in TRCA's jurisdiction by the end of 2011; continue to develop urban forest management plans and specific actions to protect and enhance the urban forest and its associated benefits.

- Engage elected officials, municipalities, the Government of Ontario, community groups and private landowners in the key actions needed to protect, enhance and manage urban forests.

- Prioritize the space and soil conditions needed for long-term tree health during the design and implementation of new development and retrofit plans. Create development standards for subdivision and streetscape design that protect existing forest habitat, require adequate tree cover and soil conservation, and eliminate conflicts between natural and grey infrastructure.

- Strengthen private tree protection by-laws to provide full protection to a greater number of trees. Allocate funding to urban forestry departments for additional enforcement officers and arborists dedicated to ensuring compliance with by-laws.

Greenspace

PROGRESS

CURRENT CONDITION vs. TARGET

C

Progress: **Better—7.5 per cent increase in TRCA-owned greenspace.**
Grade: **Moderate to significant action is required. Investment needed to secure public greenspace to reach long-term target.**

Greenspace, as defined in this report card, refers to publicly accessible lands, owned by conservation authorities, municipalities, the Governments of Ontario and Canada, and includes parks, ravines, nature reserves and hazard lands.

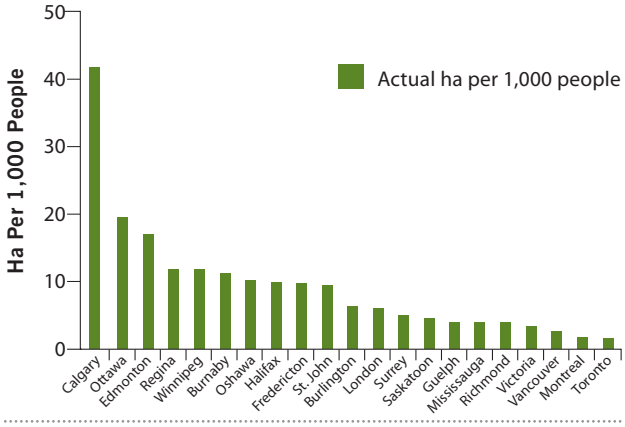
When exploring how much greenspace is considered enough to support a sustainable city region, many factors influence the desired ratio. For example, there is the type of greenspace, as well as its perceived quality, quantity, accessibility, use, community value and management protocols.

Cities across North America recommend varying amounts of greenspace: from 20 per cent of a city's area down to 2.5 per cent; from more than 20 hectares per 1,000 people to three hectares per 1,000 people; or public greenspace within a five to 10 minute walk for most residents.[3] Based on the above variables, there is no optimum standard for a city greenspace system. What is optimum depends on the urban matrix and the uniqueness of the city itself.

GRADING CRITERIA FOR GREENSPACE

Grade	Hectares Per 1,000 People
A	>20
B	14 – 20
C	**8 – 13.9**
D	3 – 7.9
F	<3

Greenspace in Canadian Urban Municipalities
Source: Adapted from Evergreen, Toronto.



In the Canadian planning profession, a generally accepted measurement for greenspace is the number of hectares per 1,000 people. The average ratio for 20 Canadian cities referenced above is approximately 10.1 hectares per 1,000 people. However, this average is skewed by Calgary which is high as a result of one large park. With the omission of this anomaly, the Canadian city average drops to 8.4 hectares per 1,000 people.[4]

TRCA's jurisdiction has 8.4 hectares of greenspace per 1,000 people consistent with the Canadian urban municipal average. The 2009 public greenspace inventory within TRCA's jurisdiction includes approximately 16,625 hectares TRCA-owned; 9,150 hectares municipally-owned; 446 hectares provincially-owned; and 908 hectares federally-owned. These lands are distributed across a 2,506 square kilometre area serving a resident population of 3.3 million people. TRCA's jurisdiction also includes 60 linear kilometres of the Lake Ontario waterfront stretching from the western limits of the City of Toronto to the Town of Ajax in the east.

3 The Trust for Public Land. 2006. *The Excellent Park System: What Makes It Great and How to Get There.* Washington: D.C.: As surveyed by the Trust for Public Land in 2010, the average ratio of hectares per 1,000 people from 80 major US cities surveyed was 17 hectares/1,000 people. With Canadian and United States' averages combined, a North American average equates to 12.5 hectares per 1,000 people. Trust for Public Land, 2010.
4 Lindsay, Lois. *Green Space Acquisition and Stewardship in Canada's Urban Municipalities: Results of a Nationwide Survey.* 2004. Evergreen: Toronto.

PROGRESS

- Since 2004 TRCA-owned greenspace has increased 7.5 per cent.
- While generally consistent with the Canadian average, the amount of public greenspace in TRCA's jurisdiction is notably lower than other large cities, such as Calgary, which has 43 hectares per 1,000 people, Ottawa, which has 19 hectares per 1,000 people, and Edmonton, which has 17 hectares per 1,000 people.
- TRCA's ratio of 8.4 hectares of greenspace per 1,000 people is far lower than some surrounding conservation authorities without the addition of lands owned by other levels of government.

LEADERSHIP

- Since 2001, the Region of Peel through its Greenlands Securement Project[5] and the Region of York through its Greening and Securement Strategy[6] helped to acquire 91 hectares and 594 hectares, respectively. The City of Toronto's Land Acquisition for Source Water Protection Program[7] has secured 327 hectares.
- The Region of Durham allocated $7.1 million in 2009 to conservation authorities for the Oak Ridges Moraine Conservation Fund. TRCA has acquired 175 hectares since 2002 as a result of this funding.
- The Oak Ridges Moraine Land Trust has helped to conserve 1,305 hectares of land on the Moraine.
- Waterfront Toronto aims to build the largest revitalization project in North America and establish the waterfront as a vibrant public destination. Recent accomplishments include 16 new or improved parks opened since 2005. Sugar Beach, Sherbourne Common and the Water's Edge Promenade opened in the summer and fall of 2010.
- TRCA has led waterfront remediation initiatives, including the securement of 1,367 hectares of land, waterfront trail development for 57 kilometres, and shoreline erosion protection for 17 kilometres for an estimated investment of nearly $65 million.
- Toronto Park People is advocating for better parks for all citizens and communities by facilitating citizen engagement with their parks and building a network of local community park groups.

TARGET

2016: With an expected population growth rate of 1.2 per cent per annum, as predicted by the Government of Ontario, TRCA and other public and private partners must acquire an additional 1,800 hectares within the next five years to maintain its current ratio of 8.4 hectares per 1,000 people.

Long-term: If population projections maintain a 1.2 per cent increase per annum to 2050, TRCA and other public and private landowners will have to acquire an additional 15,750 hectares of greenspace, to maintain the current ratio of 8.4 hectares per 1,000 people. To reach an A grade (greater than 20 hectares per 1,000 people) will require an additional 43,000 hectares of public greenspace by 2050.

OPPORTUNITIES

- Protect greenspace through municipal environmental planning policy, development approval recommendations and direct purchases.
- Partner with private landowners, land trusts and other similar organizations to protect properties having key natural heritage features through donations, bequests and conservation easements.
- Extend the inter-regional, Oak Ridges Moraine and waterfront trail systems to promote outdoor recreation and education, health, and alternative modes of transportation.
- Define and communicate the value of greenspace to society.

5 A Greenlands Securement Project was created to assist conservation authorities and other conservation organizations in Peel Region in implementing greenlands securement strategies aimed at protecting, preserving and enhancing the Regional Greenlands System, www.peelregion.ca/planning/greenlands/about.htm.
6 York Region's Greening Strategy helps ensure that our natural environment is healthy for current and future generations, http://www.york.ca/Services/Environmental/Greening+Strategy/default+greening+strategy.htm
7 http://www.toronto.ca/legdocs/mmis/2009/pw/bgrd/backgroundfile-20628.pdf.

Agriculture

PROGRESS

CURRENT CONDITION vs. TARGET

C

Progress: **Worse—8,749 hectare or 3.5 per cent decrease in farmland[8] from 2001 to 2006.**
Grade: **Moderate action is required to safeguard farmland inventory in order to reach the long-term target.**

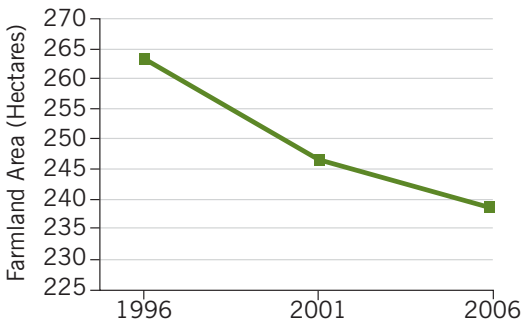
Despite the urbanization within its boundaries, the jurisdiction of TRCA[9] supports a strong and diverse agricultural sector which in 2006 comprised approximately 239,000 hectares of farmland, generated six per cent of provincial gross farm receipts and supported production of a diverse profile of commodities.

Although the area of farmland has been declining, this decline has slowed recently and there has been an increase in the value of production.

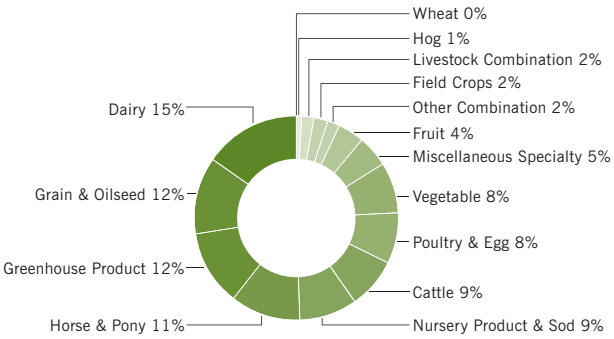
With rising interest in local food and concerns about food security and safety, having a large successful agricultural sector within TRCA's jurisdiction is a benefit to all residents. The diverse profile of production confirms that the crops being grown in the area include the mix of commodities required to support a diverse local food supply. In addition to providing a secure and safe food supply, agriculture in the area contributes to the viability, sustainability and livability of the jurisdiction. Agricultural land use retains rural character in an urbanizing landscape and allows residents to connect with and understand food production. The presence of rural lands in urban communities sustains natural habitat and corridors, provides carbon sinks, retains a green environment and provides visual relief from urban development.

GRADING CRITERIA FOR AGRICULTURE	
	% Change in Farmland Area
A	Increase greater than 5%
B	Increase of 0 – 5%
C	**Decrease of 1 – 5%**
D	Decrease of 5 – 10%
F	Decrease more than 10%

TRCA Farmland Area 1996-2006



2006 Commodity Profile By Gross Farm Receipts



PROGRESS

- In 2006 there were 239,000 hectares of farmland in TRCA's jurisdiction: a significant amount of land, capable of supplying food to a large population.
- Between 2001 and 2006, the area of farmland in TRCA's jurisdiction declined by 8,749 hectares or 3.5 per cent. This is slower than the 9.4 per cent rate of decline experienced between 1996 and 2001.

8 The term "farmland" refers to all land that was part of a farm operation at the time the Agricultural Census was conducted. It has nothing to do with land use designations.
9 TRCA's jurisdictional area is defined as all of the Regions of Durham, Peel and York and the City of Toronto for statistical reporting in this summary. The City of Toronto is reported under York Region.

- Between 2001 and 2006, the rate of decline differed in the three regions. Farmland in Peel declined by 3,700 hectares or nine per cent; in York it declined by 3,597 hectares or five per cent and in Durham it declined by 1,451 hectares or one per cent.
- TRCA's jurisdiction is home to a diversified production profile. The largest commodity, based on gross farm receipts (GFRs) in 2006, was dairy followed by greenhouse production.
- Despite a 9.4 per cent decline in the amount of regional farmland between 1996 and 2006, GFRs generated in the TRCA jurisdiction increased by $89 million. On a per hectare basis, this equated to an increase of $440 per hectare from 1996 to 2006; which indicates increasing productivity per hectare. GFRs generated in the TRCA jurisdiction represented six per cent of total provincial GFRs in 2006.
- Short-term lease agreements for land restrict production options and result in deterioration of the agricultural land base. Farmers will not cultivate crops requiring significant investment in infrastructure such as greenhouse, and fruit and vegetable, on land where they do not have secure, long-term tenure.

LEADERSHIP

- TRCA, in 2008, adopted a *Sustainable Near-Urban Agriculture Policy* and committed approximately 400 hectares of its land base for growing food throughout its jurisdiction.
- TRCA has developed four near-urban agriculture farm projects to allow young farmers and recent immigrants an opportunity to start farming.
- Regions of Durham, Peel and York, working in consultation with Agricultural Advisory Committees, are incorporating policies in their Official Plans which go beyond just the protection of the land base to including more flexible economic development policies that will support agriculture and increase the ability for farmers to be economically sustainable.
- Rouge Park Alliance and TRCA are working with farmers to establish long-term rental policies for public land that are supportive of productive agriculture.
- Greater Toronto Area Agricultural Action Committee is developing an agriculture and agri-food strategy to guide decision making, investments, strategic alliances and processes to support sustainable, profitable, dynamic and healthy agricultural development and enhancement of the agri-food value chain throughout the Golden Horseshoe and Holland Marsh areas.
- Ontario Farmland Trust educates people on the importance of agriculture and has established a mechanism to facilitate the registration of easements to protect land for agriculture. This adds an additional level of protection beyond standard land use control tools.

TARGETS

2016: No loss of farmland between 2006 and 2016.

Long-term: A greater than five per cent increase in the area of land being farmed.

OPPORTUNITIES

- Develop urban development policies that retain firm agricultural boundaries, promote compact development to preserve farmland and prohibit non-compatible uses in agricultural areas.
- Support revisions to the Government of Ontario's *Provincial Policy Statement* and other planning policies to support environmentally sustainable agricultural uses in utility corridors, floodplains and in community design.
- Protect critical mass of priority agricultural land by a strengthened *Provincial Policy Statement* and municipal designations.
- Support policy development that permits on farm uses, farmers markets and alternative means of food delivery and retail.
- Contribute to research on effective ways to integrate agriculture into an urban environment and to minimize conflicts between farm and non-farm residents.
- Support farmer adoption of voluntary and prescribed Beneficial Management Practices under the *Canada-Ontario Environmental Farm Plan*.
- Offer farmers secure leases on public land for a term of sufficient length to justify the investment in more capital intensive forms of production (i.e., fruit and vegetable).
- Provide GTA relevant educational opportunities regarding farm succession and make land available for new farmers.

Food Security

PROGRESS	CURRENT CONDITION vs. TARGET
Not previously reported	B

Progress: **Not previously reported.**
Grade: **Minor to moderate action is required. Investment needed to make healthy and affordable food more accessible to low-income residents.**

An active and successful agriculture and agri-food sector makes a significant contribution to the viability, sustainability and quality of life. There is growing recognition of the links between a healthy community and a sustainable and secure local food system.

GRADING CRITERIA FOOD SECURITY	
Grade	**Food Desert Average Score**
A	13 – 16
B	**9 – 12**
C	7 – 8
D	5 – 6
F	0 – 4

The state of food security—the availability of food in an area and an individual's access to it—has been an emerging concern in many North American communities. Neighbourhoods that do not have access within one kilometre to good quality and affordable food have been labeled food deserts.[10] These neighbourhoods are often socially-distressed and characterized by low average household incomes.

FOOD DESERT AVERAGE SCORES

Income Group	Perfect Score[1]	Peel	York	Durham	Toronto
<$25,000	5	5.00	5.00	5.00	2.74
$25 – 40,000	4	2.07	2.86	2.99	2.40
$40 – 50,000	3	1.59	0.87	1.18	1.85
$50 – 75,000	2	0.83	0.59	0.65	1.07
$75 – 100,000	1	0.20	0.16	0.16	0.51
>$100,000	1	0.07	0.00	1.00	0.51
	Total	**9.76**	**9.48**	**10.98**	**9.08**
	Average[2]	**9.83**			

Scoring is based on the per cent share of the population within walking distance of a grocery store, weighted by income group (lower income groups are weighted higher), and then an overall city score out of 16.
1 100% population within 1 km of food
2 TRCA Jurisdiction

Food deserts have become a prominent problem of the City of Toronto's priority neighbourhoods and inner suburbs—these are now communities of low-income families and new immigrants who are more dependant on public transit or walking to access food and other necessities.

Food deserts also contribute to increased carbon emissions as individuals become more dependent on personal vehicles and have to travel greater distances to access good quality and affordable food.

Food security contributes to healthy, more productive citizens, which eases demands on health care services. If policy makers wish to improve environmental conditions and the health, productivity and general prosperity of communities, eliminating food deserts is an important step forward.[11]

10 Whelan, A., Wrigley, N., Warm, D. & Cannings, E., "Life in a Food Desert" Urban Studies: 39(11), 2083-2100 (2002).
11 Martin Prosperity Institute, "Food Deserts and Priority Neighbourhoods."

PROGRESS

- Fifty-four per cent of residents in TRCA's jurisdiction[12] don't have access to good quality and affordable food, which is higher than comparative communities in Vancouver and Chicago.
- With the growing interest in local food and innovative ways to grow food, including roof top and community gardens, food security is being addressed.

LEADERSHIP

- Regional municipalities are revising their Official Plan policies to make provisions for regional food systems planning.
- TRCA, in partnership with the City of Toronto, has developed a 3.2 hectare urban farm in one of Toronto's priority neighbourhoods to help address food security issues.
- The Toronto Food Policy Council, in partnership with businesses and community groups, has developed policies and programs promoting food security in the City of Toronto.
- The Ontario Public Health Association and its partners are developing programs and advocating policies that promote food security in Ontario.
- Sobey's, a major grocery retailer, is opening Freshco stores in under-serviced food desert areas across the GTA, including the first major grocery store in Regent Park.
- The Metcalf Foundation has been working to jumpstart a sustainable food movement in Ontario, including commissioning Metcalf Food Solutions—a collection of reports offering strategies to promote local economic development and improve access to healthy and abundant locally produced food.

TARGET

2016: Increase the number of people within walking distance of a grocery store by seven to eight per cent in the two lowest income groups within TRCA's jurisdiction.

Long-term: No food deserts exist in TRCA's jurisdiction (e.g., food desert score is 13 to 16).

OPPORTUNITIES

- Revise *Provincial Policy Statement* and other planning policies to support the creation of space available for growing and processing food in food desert areas.
- Review and revise zoning by-laws in municipalities that don't already permit grocery stores to operate in large apartment buildings.
- Support policy development surrounding farmers markets and informal means of food delivery (e.g., farmers selling food from personal vehicles).
- Introduce retail loan programs that provide financial support and favourable loan conditions to developers that build space for grocery stores in identified food desert areas.
- Make land available for new farm operators; expand existing TRCA agricultural programs and continue to make public land available for agriculture on a multi-year basis.
- Provide program support for local organizations and food banks and provide immediate access to food and educational programs about food nutrition.
- Undertake research into systemic causes of food deserts and the augmenting factors that contribute to peoples' inability to shop for nutritious food.

12 TRCA jurisdiction for this study includes: City of Toronto, Regions of York and Peel and portion of Durham.

Green Buildings

PROGRESS: Not previously reported

CURRENT CONDITION vs. TARGET: Not Available

Progress: **Not previously reported.**

Grade: **Moderate to significant action is required. Investment needed for all new buildings, developments and major renovations to reach long-term target.**

GRADING CRITERIA FOR GREEN BUILDINGS

Grading criteria not available for this report

One of the cornerstones of a sustainable city region is a vibrant green building industry. In Canada, buildings are responsible for 33 per cent of all energy used, 50 per cent of all natural resources consumed, 12 per cent of the non-industrial water used and 35 per cent of the carbon emissions emitted. Green building practices in the design, location, construction, renovation and operation of our commercial buildings, institutions and homes can put a big dent in these totals. For example, LEED® certified buildings use 25 to 30 per cent less energy than the national average, BOMA BESt certified buildings use 11 per cent less energy and 18 per cent less water than the industry standard, and R-2000 homes require 30 per cent less energy to operate than conventional new homes and must be equipped with water-conserving toilets, faucets and shower heads.

The rating given to this indicator is a qualitative evaluation of available information on the number of green IC&I, high rise buildings and green homes, and a comparison to other large municipalities in Canada. Future ratings will be based on new information on actual building energy performance for all office buildings in the GTA.

CERTIFIED GREEN BUILDINGS, JUNE 30, 2010

	BOMA BESt[1] (L3 or L4) Certified	LEED®[2] Certified	Total Floor Space (m²)
Ajax	0	2	800
Brampton	2	1	54,100
Markham	8	1	408,500
Mississauga	20	2	407,700
Pickering	3	1	119,200
Richmond Hill	1	0	69,700
Toronto	72	24	3,672,300
Vaughan	1	5	84,300
Total	**107**	**36**	**4,816,600**

1 Building (BOMA BESt) certification program is administered by BOMA Canada. Only buildings achieving BOMA BESt level 3 or 4 certification (L3 or L4) are considered green buildings.
2 LEED® building rating system is administered by the Canada Green Building Council. All buildings achieving any LEED® certification level (Certified, Silver, Gold or Platinum) are considered green buildings.

PROGRESS

- Since 2005, a total of 143 green IC&I and high-rise buildings, with a combined floor space of almost five million square metres, have been certified in the region—with another 273 LEED® applications currently being processed.

LEADERSHIP

- Ontario leads all other provinces in green home building with 5,277 new homes certified to

the R-2000 standard since 1982, and 21,000 certified to meet ENERGY STAR® for New Homes criteria since 2005 (as of September 30, 2010). In 2009, 21 per cent of new home construction starts were built to meet the ENERGY STAR® for New Homes criteria, and the percentage continues to grow, indicating a significant shift in the mainstream housing market.

- The City of Toronto green building industry is by far the largest in Canada. With 96 certified green buildings, the City of Toronto easily surpasses both Vancouver (with 26) and Montréal (with 12).

- The City of Toronto has developed mandatory green standards for new buildings and is providing resources and financial incentives for energy efficiency improvements and renewable energy projects through the Better Buildings Partnership.

- TRCA is developing The Living City Campus® at Kortright in the City of Vaughan as a world class centre for sustainable technologies education, training, monitoring and evaluation.

- TRCA's Sustainable Technologies Evaluation Program (STEP) is promoting broader use of effective green building technologies through performance evaluations, assessments of barriers to implementation, and the development of design tools, guidelines, and monitoring and maintenance protocols and policies.

- Commercial building landlords and tenants are participating in Greening Greater Toronto's Commercial Building Energy Initiative and collectively committing to increasing energy efficiency.

- The World Green Building Council in Toronto, hosted by TRCA and Build Toronto has grown from a network of 12 countries to more than 80 in three years.

- The Greater Toronto Chapter of the Canada Green Building Council is delivering green building training and education programs across Ontario for building industry professionals involved in building design, construction, renovation, operation, demolition, financing and marketing.

TARGETS

2016: Maintain the current rate of growth of the green building industry and increase interest in certification programs.

- Quadruple the number of certified green IC&I and high-rise buildings in the region from current levels to 575.

- Achieve consensus on an energy use reduction target in office buildings that will be informed and supported by the work of Greening Greater Toronto's Commercial Building Energy Initiative, the Real Property Association of Canada, the Canada Green Building Council, the Building Owners and Managers Association and other partners.

- Fifty per cent of the annual new home construction starts meet ENERGY STAR® for New Homes or GreenHouse™ criteria.

Long-term: All new buildings, developments and major renovations are carbon neutral. They will implement innovative sustainable design strategies and generate on-site power from renewable sources or purchase renewable energy, as envisioned by the Architecture 2030 Challenge.

OPPORTUNITIES

- Adopt policies requiring all new government and institutional buildings to be built or managed to meet green building certification criteria.
- Accelerate retrofits and major renovations of existing public and private buildings to significantly reduce significant energy and water use.
- Improve coordination of green building initiatives to avoid duplication of efforts between governments, institutions and construction-related industries.
- Evaluate and promote building performance by governments, institutions and construction related industries according to the parameters or valuation methods relevant to developers, property managers, real estate agents, and occupants to improve the economic and human health rationale for using green building technologies and practices.

Intensification

PROGRESS

CURRENT CONDITION vs. TARGET

B

Progress: **Better—many promising developments in recent years, designed to focus growth in higher density areas but it's too early to quantify the impact.**

Grade: **Minor to major action is required. Inclusion of growth management policies that support intensification in the revised *Provincial Policy Statement* required to reach long-term target.**

To accommodate population growth in a sustainable way, the GTA needs to protect our natural environment from urban sprawl. Intensification is a growth management technique that aims to guide residential development away from natural areas and greenfield (undeveloped) sites towards existing urban areas.

Intensification increases current densities through the development of vacant or underutilized lands, infill development and the expansion or conversion of existing buildings.[13] Municipalities also need to identify urban growth centres, intensification corridors and major transit station areas as a key focus for development.[14]

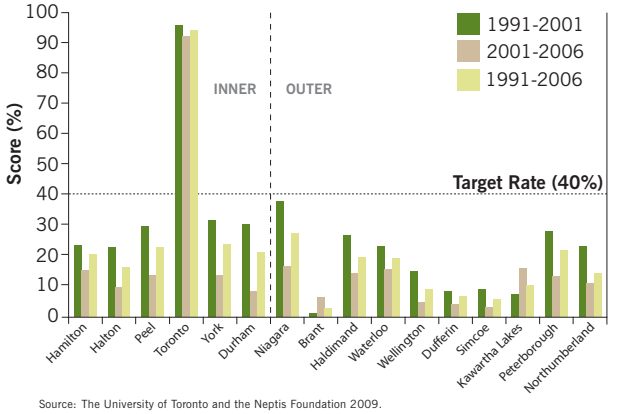
According to a study undertaken by the Neptis Foundation[15] (based on data from 1991 to 2006), the overall intensification rate in the GTA is approximately 35.6 per cent. This is largely due to the City of Toronto's extremely high rate of intensification of 94 per cent; Regions of Durham, Halton, Peel and York range 16 to 24 per cent.

GRADING CRITERIA FOR INTENSIFICATION*

Grade	Intensification Rate
A	>40%
B	**31% – 40%**
C	21% – 30%
D	10% – 20%
F	<10%

*Development within the existing built-up area as a percentage of total new development.

Fifteen-year Intensification Rate, Greater Golden Horseshoe, 1991 to 2006
Measured within the 1990 Built Boundary



Source: The University of Toronto and the Neptis Foundation 2009.

INTENSIFICATION RATE

Region	Rate
Durham	21%
Halton	16%
Peel	23%
Toronto	94%
York	24%

13 Ministry of Municipal Affairs and Housing, "Provincial Policy Statement" (2005).
14 Ministry of Public Infrastructure Renewal, "The Growth Plan for the Greater Golden Horseshoe" (2006).
15 The Neptis Foundation, "Implementing Residential Intensification Targets; Lessons from Research on Intensification Rates in Ontario" (February 2010).

PROGRESS

- The intensification target set out in the *The Growth Plan for the Greater Golden Horseshoe* (2006) requires 40 per cent of all residential development within each of the municipalities to be within the built up[16] area by the year 2015.

- Outside the City of Toronto, the other municipalities in the GTA have a considerably lower intensification rate, with Region of Durham at the low end at approximately 16 per cent and Halton, Peel and York in the low to mid 20 per cent range.

LEADERSHIP

The Government of Ontario has introduced several key initiatives to achieve greater intensification.

- Amendments to the *Planning Act* introduced better, tighter language, so that municipalities will correctly interpret policies with respect to intensification.

- *The Provincial Policy Statement* (2005) introduced stronger policies relating to the protection of rural land, natural areas and stronger direction of growth towards settlement areas.

- *The Growth Plan for the Greater Golden Horseshoe* provides direction for growth to existing urban areas by providing policies which increase intensification of the existing built up area with a focus on urban growth centres, intensification corridors, major transit stations, brownfield sites[17] and greyfield sites.[18]

- Additional tools for guiding development and preventing sprawl include the *Greenbelt Plan* (2005), the *Oak Ridges Moraine Conservation Plan* (2000) and Metrolinx's *Regional Transportation Plan* (RTP).

While these initiatives were established by the Government of Ontario, they also require the participation and support of municipal governments—at the upper, lower and single tier levels—to bring their planning documents into conformity with the provincial plans.

Recently, the Ontario Ministry of Municipal Affairs and Housing approved or partially approved the York Region Official Plan, Durham Region Regional Official Plan Amendment 128 and Halton Region Regional Official Plan Amendment 38, all of which provide policy guidance and identify where and how the 40 per cent intensification target will be met.

TARGETS

2016: Forty per cent intensification. The GTA's residential intensification rate must be consistent with the Government of Ontario's target of 40 per cent residential intensification for each upper tier municipality. *The Growth Plan for the Greater Golden Horseshoe* requires that each upper tier municipality update its Official Plan and establish how they will meet this 40 per cent target.

Long-term: Greater than 40 per cent intensification for each upper tier municipality, as outlined by the Government of Ontario.

OPPORTUNITIES

- Amend *The Provincial Policy Statement*, currently under a five-year review, to further solidify growth management policies that support intensification.

- Create and support municipal development standards which promote intensification. For example, the City of Toronto's Development Infrastructure Policy Standards (DIPS) establish standardized designs for new local residential streets and lanes, while its Infill Townhouse Design Guidelines protect streetscapes and integrate new development with existing housing patterns.

- Municipalities must support and encourage a transit-friendly environment. For example, neighborhoods designed in grid patterns are more supportive of transit. Street oriented uses and a mix of higher densities on arterial roads will encourage transit and intensification. As well, improved access between arterial roads and the interior of blocks will support transit use.[19]

- Identify the proper use for brownfield sites and provide stronger incentives for developing these areas. Incorrect zoning and policies can lead to underutilized areas that are prime intensification sites.

16 Built up area is defined in the "Growth Plan for the Greater Golden Horseshoe" as all land within the limits of developed urban area.
17 Brownfield sites include undeveloped or previously developed property that may be contaminated.
18 Greyfield sites include previously developed properties that are not contaminated. Usually (not exclusively) former commercial properties that may be underutilized, derelict or vacant.
19 Pim and Ornoy (2002).

LAND USE
PRIORITY OPPORTUNITIES

- Develop urban forest management plans that outline specific operational level actions needed to protect and enhance the urban forest and its associated benefits.

- Develop standards for subdivision and streetscape design that protect existing forest habitat, require adequate tree cover and soil conservation, and eliminate conflicts between natural and grey infrastructure.

- Protect greenspace through environmental planning policy, development approval recommendations and direct purchases, donations, bequests and conservation easements.

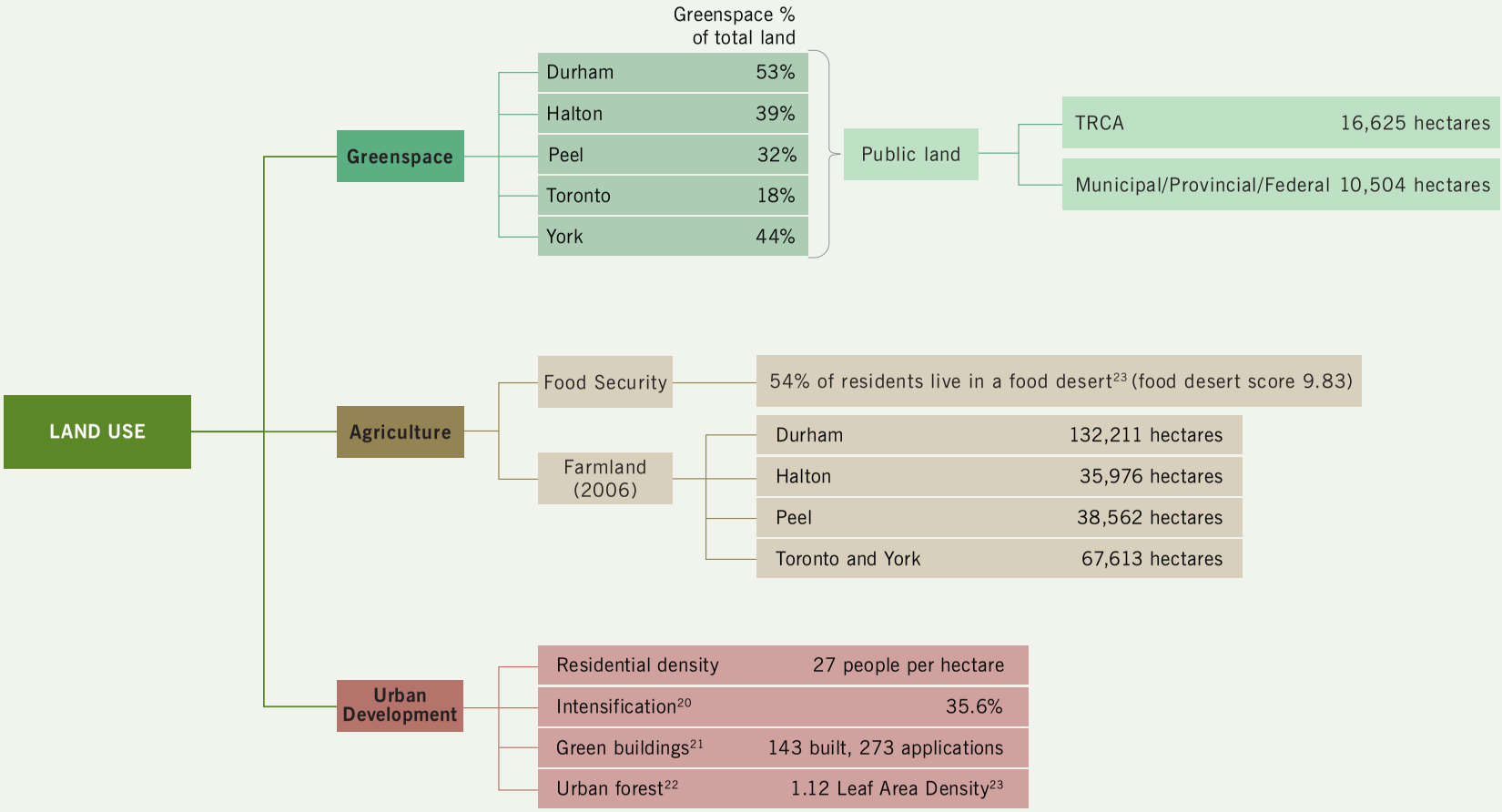
- Develop urban development policies that retain firm agriculture boundaries, promote compact development to preserve farmland and prohibit non-compatible uses in agricultural areas.

- Revise *Provincial Policy Statement*, planning policies and by-laws to allocate space for growing, processing, selling and distributing food in food desert areas.

- Adopt policies requiring all new government and institutional buildings be built or managed to meet green building certification system criteria.

- Support and solidify growth management policies that support intensification in the revised *Provincial Policy Statement.*

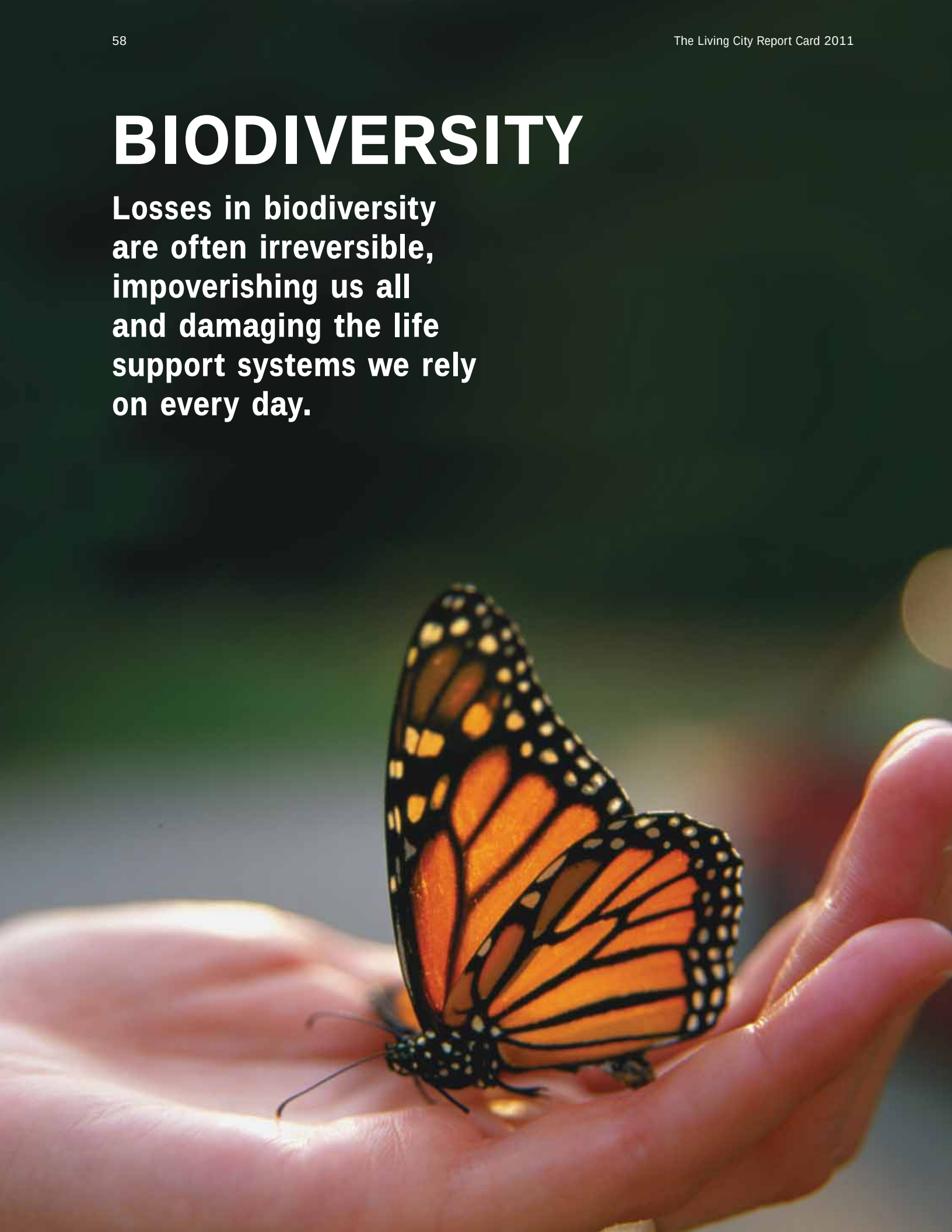
LAND USE DRIVER TREE - Contributors to the GTA's land use



20 New development within the existing built-up urban fabric as a percentage of total new development.
21 Green buildings that achieve any Energy and Environmental Design (LEED®) certification level or the Building Owners and Managers Association's Building Environmental Standards (BOMA BESt) level 3 or 4 certification (L3 or L4).
22 The urban forest includes the trees, shrubs and understorey plants, as well as the soils that sustain them, that grow on public and private property within a community or city.
23 Refers to TRCA's jurisdiction.

BIODIVERSITY

Losses in biodiversity are often irreversible, impoverishing us all and damaging the life support systems we rely on every day.



WHY DOES BIODIVERSITY MATTER?

Over 60 per cent of the terrestrial plants and animals in TRCA's jurisdiction have been identified as Species of Regional Conservation Concern[1] due to their small numbers and poor distribution. A city region that can't support species such as the monarch butterfly … or the barred owl … or the showy ladies slipper … is a less complex, and overall less healthy place to live. Costs to society and the economy will continue to increase by ignoring biodiversity.

We use three indicators to present the condition of biodiversity—fish, terrestrial plants and animals, and the quantity and quality of natural cover. Biodiversity, the variety of life on earth, is essential to sustaining the living networks and systems that provide all of us with goods and services, such as food, fuel and the mechanisms to control floods and recycle wastes. Most of the oxygen we breathe comes from plankton in the oceans and the lush forests around the globe. Our diet depends almost entirely on the plants and animals around us, from the pollinators that cause plants to bear fruit to the meat from both wild and farmed landscapes. The richer the diversity of life, the greater the opportunity for medical discoveries, adaptive responses to new challenges such as climate change, and economic development. At least 40 per cent of the world's economy and 80 per cent of the needs of the poor are derived from biological resources.[2] Biodiversity's contribution to our life is not just practical, physical and utilitarian; it is also spiritual and cultural. The diversity of the natural world has been a constant source of inspiration throughout human history, influencing traditions and the way our society has evolved.

A rich level of biodiversity indicates a properly functioning, stable and healthy ecosystem, the foundation of a sustainable community. But human activity is reducing the diversity of life and habitats at a greatly accelerated rate. There are many threats—habitat loss, the invasion of non-native species, pollution and overuse. Losses are often irreversible, impoverishing us all and damaging the life support systems we rely on every day. Diversity provides for adaptation to new challenges—some species will disappear while others will thrive. We need variety to ensure there is resilience to the changes that are inevitable.

Humans are part of nature's rich diversity and have the power to determine its fate.

For further information please refer to the Deep Dive on ecosystem services on page 72.

1 Species of Regional Conservation Concern: those species that are sensitive to urban development and/or require a specific habitat type or require a larger intact natural area.
2 Convention on Biological Diversity, http://www.cbd.int

Fish

PROGRESS ⟷

CURRENT CONDITION vs. TARGET C

Progress: **No change since last report.**

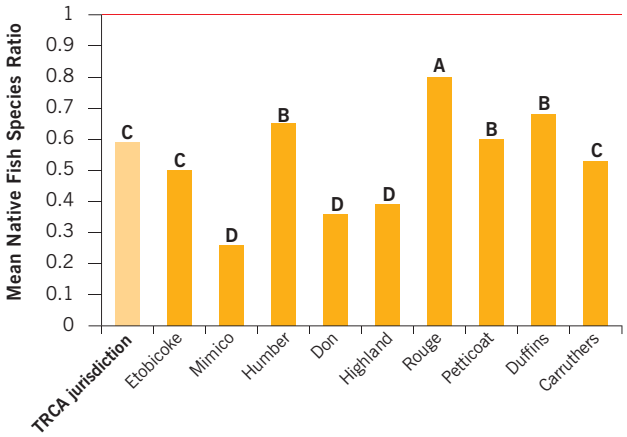
Grade: **Moderate to significant action is required. Condition varies from A to D across watersheds. Hydrology, water quality and physical habitat needs to be improved to reach long-term target.**

Changes in fish biodiversity reflect changes in the function and health of aquatic and terrestrial ecosystems. In most cases, these changes are directly linked to urban conditions. The number of native fish species collected at each monitoring station is compared to the number of native species we would expect to find in a healthy river or stream. A higher ratio of native species richness generally indicates a higher quality aquatic habitat.

Over the last decade, 53 different fish species have been identified in TRCA's jurisdiction. Of these, 44 are considered native. The most abundant are a variety of minnows, darters and suckers, including the blacknose and longnose dace, creek chub, and white sucker.

Among the nine non-native species, the common carp, goldfish, round goby and sea lamprey are all considered invasive. Invasive, non-native and stocked fish species make up just one per cent of the total number of fish captured and no more than 10 per cent of the catch at any sampling station.

GRADING CRITERIA FOR FISH	
Grade	**% of Expected Native Species**
A	>70%
B	60% – 70%
C	**50% – 59%**
D	<50%



Grades for Watershed Fish Biodiversity
Mean observed: expected native species richness ratio and the associated grade per watershed, and entire TRCA jurisdiction. Red line indicates desired ratio or the ratio one should observe if all habitat and water quality conditions were ideal.

As urbanization and road densities increase, the species richness falls. At the highest road densities, the number of species present has been reduced by more than half. Stormwater runoff associated with extensive growth since the mid 1980s is a major cause of water quality degradation and fish habitat destruction.

Scores for expected native species vary widely between watersheds, ranging from 80 per cent for the Rouge River to 26 per cent for the Mimico Creek. In general, sites within the lower, urbanized portions of watersheds have lower numbers of native fish species than expected when compared to headwater sites.

PROGRESS

- Data collected as part of TRCA's *Regional Watershed Monitoring Program* show no significant trend in the number of native fish species across TRCA's jurisdiction over the last nine years.
- Species richness generally increased in the Humber, Duffins and Carruthers watersheds over the same period.
- Improved Lake Ontario and nearshore water quality, together with better designed waterfront projects has seen a return to a nearshore fish community that has not been seen for close to 100 years.

LEADERSHIP

- Fisheries management plans, written in partnership between TRCA and Ontario Ministry of Natural Resources (MNR), employ planning tools to improve the ecological conditions.
- Over the last five years, up to $5 million has been invested by municipalities and TRCA using natural channel design concepts to improve degraded or highly altered reaches of streams at 31 project sites.
- TRCA is working with MNR and Fisheries and Oceans Canada on two endangered species recovery teams. A broad group of stakeholders and agencies is also working to restore the Atlantic salmon to Lake Ontario.
- Aquatic Habitat Toronto (AHT), led by TRCA, is a partnership of regulatory agencies with a vested interest in aquatic habitat improvement. While advancing the role of science in the management of aquatic habitat, AHT works with proponents of waterfront projects in the early planning stages to facilitate the approval process and help direct and design aquatic habitat compensation which will contribute to the improvement of the aquatic habitat on the Toronto waterfront.
- TRCA, Environment Canada, MOE and MNR are working together on the *Toronto and Region Remedial Action Plan* to eliminate beneficial use impairments and reverse the loss of fish and wildlife habitat.
- TRCA has developed a stormwater criteria document and a low-impact development guide that will help improve water quality and reduce the quantity of stormwater runoff in urbanized areas.
- Citizens, non-government organizations and community-based groups, such as Ontario Federation of Anglers and Hunters, Task Force to Bring Back the Don, Rouge Park Alliance, Trout Unlimited, Ontario Streams and the Black Creek Conservation Project, invest money and thousands of hours every year to protect and restore habitats.

TARGETS

2016: No further loss of fish biodiversity across TRCA's jurisdiction. Both short and long-term targets for fish biodiversity have been set in the fisheries management plans and/or watershed plans for the Etobicoke, Mimico, Humber, Don, Rouge, Duffins and Carruthers watersheds.

Long-term: Species richness scores for TRCA's jurisdiction have a greater than 70 per cent of the expected native species. Natural recruitment of Atlantic salmon will be re-established in the Duffins Creek, Humber River and Credit River.

OPPORTUNITIES

- Pursue a mix of in-stream habitat improvements, while maintaining or restoring the ecological function of the terrestrial landscape. This includes anglers helping to prevent the introduction of new invasive species; municipalities and conservation authorities continuing to improve stormwater management practices; and urban developers eliminating the deposition of sediments from construction sites into watercourses.
- Modify or remove hundreds of dams, weirs and other in-stream barriers that block the migration of fish species and interferes with their life-cycle needs to reproduce and survive. A conservative estimate to accomplish this in TRCA's jurisdiction is $50 million.

Terrestrial Plants and Animals

PROGRESS

CURRENT CONDITION vs. TARGET

C

Progress: **Worse—particularly in highly urbanized parts of the watersheds.**
Grade: **Moderate to significant action is required. Reforest, restore wetlands and manage non-native species to reach long-term target.**

The biodiversity of our terrestrial plant and animal species is a direct indicator of how well we are protecting and restoring our natural areas. The data show that conditions are deteriorating in the face of continued urban development, the invasion of non-native species and the impacts of climate change. Only the most adaptable, tolerant and opportunistic species have been able to maintain a foothold in the urban core.

GRADING CRITERIA FOR TERRESTRIAL PLANTS AND ANIMALS	
Grade	**Abundance and Sensitivity of Native Plants, Birds and Frogs**
A	Moderate to high abundance of Species of Regional Conservation Concern
B	Low to moderate abundance of Species of Regional Conservation Concern
C	**Moderate abundance of only species adapted to urban conditions**
D	Low abundance of only very tolerant or non-native species

While the data indicate declines in plant biodiversity are not as severe as those seen among bird and frog species, the respite may only be temporary. When conditions become unfavourable, birds leave to search out more appropriate habitat, while local frog populations may simply die out. Plants are not mobile, and while some may persist for a time, they will eventually decline and disappear.

While a grade of C for biodiversity of terrestrial plants and animals is sufficient cause for serious concern, the urban portions of TRCA's watersheds have scored an alarmingly low grade of D against long-term targets. Typically, the monitoring sites accorded the higher grades are located in the more rural and northern portions of TRCA's jurisdiction, which have large patches of intact habitat and suffer fewer disturbances from traffic or urban development.

PROGRESS

- Of the 1,112 native plant and animal species found in TRCA's jurisdiction, 700 (63 per cent) have been identified as Species of Regional Conservation Concern due to their small numbers and poor distribution across TRCA's jurisdiction.
- The Government of Ontario has designated 19 species of plants, mammals, birds, reptiles and amphibians found in TRCA's jurisdiction as Species at Risk[3] in danger of elimination.
- Approximately 10 per cent of the native local species of plants and six per cent of the birds, amphibians, reptiles and mammals have been eliminated from the region.

3 Species at Risk: a species that is identified as at risk by the provincial or federal government.

- The range for frogs has shrunk by more than 80 per cent and they have disappeared almost entirely from the urban core of TRCA's jurisdiction, indicating degraded habitat conditions.
- Within the urban zone, no frogs were present in nine of the 22 monitoring sites, and an additional four sites had only one species.
- Today, introduced non-native plants make up 45 per cent of all the flora species found in TRCA's jurisdiction. Invasive plants and animals can out-compete and displace many native species for resources and transform large areas into monocultures.

LEADERSHIP

- Provincial and federal agencies continue to work on biodiversity and invasive species strategies. For example, MNR is working on recovery planning for Species at Risk in Ontario.
- Municipalities are using TRCA's Terrestrial Natural Heritage Systems Strategy (TNHSS) to identify and protect natural heritage systems within their Official Plans and policies.
- TRCA is implementing its TNHSS through land securement, inventory surveys, stewardship, and restoration. Currently, detailed inventories are available for about 60 per cent of the natural cover in TRCA's jurisdiction.
- TRCA continues to undertake invasive plant management on TRCA-owned properties.
- The City of Toronto has produced a series of biodiversity guidebooks that describe the wealth of biodiversity within the city and highlight threats and potential mitigation options.
- The Ontario Road Ecology Group at the Toronto Zoo raises awareness about road and ecological issues to help guide conservation and restoration of habitats and to move wildlife safely through the landscape, especially where Species at Risk are known to exist.
- TRCA provides outdoor education programming to over 116,000 students annually that contributes to the knowledge and understanding of natural systems and the importance of biodiversity.

TARGETS

2016: No further loss of terrestrial plants and animals (maintain current abundance). Complete reforestation and wetland habitat restoration on approximately 750 hectares across TRCA's jurisdiction, and manage non-native invasive species to achieve long-term target.

Long-term: Terrestrial plants and animals achieved moderate to high abundance of Species of Regional Conservation Concern.

OPPORTUNITIES

- Finalize and implement TRCA's *Species and Communities Recovery Project* to enhance biodiversity of terrestrial plants and animals.
- Restore forest and wetland habitats and increase the amount of natural cover on 750 hectares at an estimated cost of $8.5 million. All landowners need to participate.
- Plan and implement safe wildlife corridors along provincial and municipal roads to reduce habitat fragmentation and mass mortality as animals move between habitats.
- Implement backyard habitats on private property using nesting structures, natural vegetation, food plots and migration corridors.
- Monitor the terrestrial natural heritage system using TRCA's regional long-term monitoring plots to detect changes in species composition, distribution and abundance.
- Increase public awareness on terrestrial biodiversity and management actions through stewardship and outdoor educational programs.

Natural Cover

Quantity		Quality	
PROGRESS	CURRENT CONDITION vs. TARGET	PROGRESS	CURRENT CONDITION vs. TARGET
↔	B	↘	B

Progress: **Small to no change for habitat quantity; worse for habitat quality.**
Grade: **Minor to significant action is required. Forest, wetland and meadow cover must increase to sustain the existing distribution and populations of Species of Regional Conservation. An investment of over $565 million (2010) is required.**

GRADING CRITERIA FOR NATURAL COVER

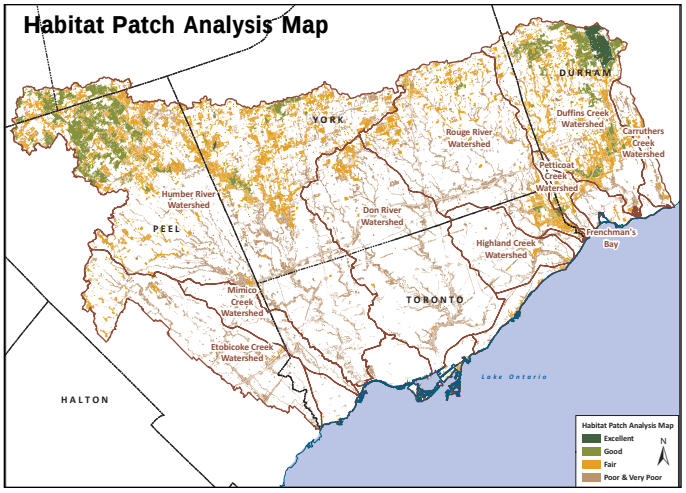
Grade	Quantity of Cover	Quality of Cover (size, shape, distribution and adjacent uses)
A	>30%	Good to excellent—supports species and communities of Species of Regional Conservation Concern. Above minimum threshold, less risk.
B	**20% – 29%**	**Fair—supports species and communities of Species of Regional Conservation Concern but close to threshold and subject to risk.**
C	10% – 19%	Poor—will only support species that are adapted to urban conditions.
D	<10%	Very poor—will only support the most common species and communities.

The quality, quantity and distribution of natural cover is intricately linked to the natural hydrologic cycle, air quality, the mitigation of climate change, levels of biodiversity and the quality of life for residents and visitors. However, despite ongoing efforts to protect our natural heritage, there have been alarming reductions in the quality of vegetation communities and species populations.

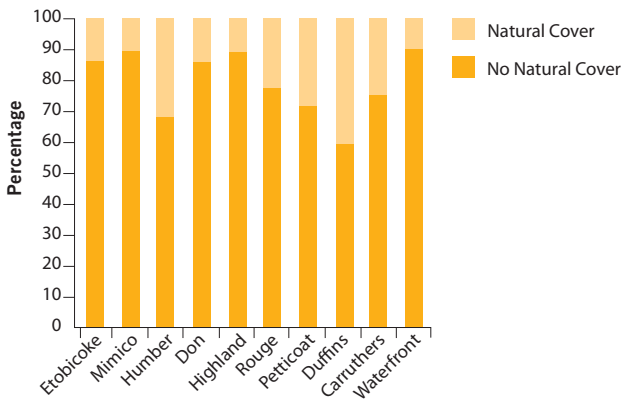
The quantity of natural cover is based on the percentage of land with forest, meadow, wetland and beach bluff habitat. The quality of natural cover is an average total score from a habitat patch analysis that considers patch size, shape, distribution and adjacent uses. Extensive modelling has shown that TRCA's jurisdiction needs to have at least 30 per cent natural cover to sustain the existing distribution and populations of Species of Regional Conservation Concern. And when it comes to natural cover, size matters. The larger the habitat patch, the greater the diversity of native species.

Given historic development trends, preventing further loss of habitat quantity would be a success story. Improving the quality of the cover, on the other hand, is far more difficult. It depends on increasing the size, shape and distribution of the habitat type and minimizing the negative influences adjacent to the natural habitat.

Habitat Patch Analysis Map



Total Natural Cover in each Watershed
(Based on 2007/2008 Data)



PROGRESS

- The total per cent of natural cover has held steady at 25 since 1999. About eight per cent of the natural cover today is classified as meadow and 17 per cent classified as forest and wetland.
- The amount of natural cover classified as excellent to fair habitat declined in the same period, while the amount of natural cover classified as poor to very poor increased across TRCA's jurisdiction.
- The Duffins Creek watershed has the highest per cent of natural cover with 40 per cent, while the Mimico and Highland Creek watersheds have only 11 per cent each.
- From 2002 through 2008, the amount of land designated as urban and urbanizing increased by almost 7,500 hectares, equivalent to about three per cent of TRCA's jurisdiction. This would equate to a new municipality about three-quarters the size of Richmond Hill.
- The continued expansion of the urban zone northwards has been stopped by the *Oak Ridges Moraine Conservation Plan* and the *Greenbelt Plan.*

LEADERSHIP

- The Government of Ontario is working to protect natural cover through provincial level planning frameworks, such as the *Provincial Policy Statement*, *Oak Ridges Moraine Conservation Plan* and *Greenbelt Plan*.
- The Government of Ontario's *Natural Heritage Reference Manual* (2010), part of the *Provincial Policy Statement*, has a strong focus on natural heritage systems planning, including not only lands that have been restored but also areas of land that have the potential to be restored.
- TRCA's TNHSS provides the extensive data, scientific models, mapping and guidance needed for TRCA staff, partner municipalities and community groups to achieve natural heritage protection objectives. The TNHSS is implemented through a variety of methods, including land acquisition and stewardship.
- A number of municipalities, including the Regions of Peel and York, Town of Markham and Cities of Toronto and Vaughan, are taking a natural heritage systems approach in their revised Official Plans using the guidance and recommendations of the TNHSS and the watershed plans as the basis for such work.

TARGETS

2016: Restore or reforest 750 hectares of wetland and forest areas identified in the targeted TNHSS which will improve the quantity and quality of natural cover.

Long-term: Increase natural cover of TRCA's jurisdiction to 30 per cent. That would mean restoring an additional 28,000 hectares, of which 80 per cent would be forests, 10 per cent meadow and 10 per cent open wetland. Increase quality of natural cover from fair to good. New development will need to exceed 30 per cent natural cover.

OPPORTUNITIES

- Incorporate protection and enhancement of natural cover into government and conservation authority policies to ensure the sustainability of natural cover and the functions and services it provides.
- Acquire 1,000 hectares of greenspace in TRCA's jurisdiction by 2016. Municipal and TRCA greenspace acquisition programs are in place for guidance.
- Allocate approximately $565 million among all partners to reach the long-term target of 30 per cent natural cover or more in TRCA's jurisdiction. This does not include site restoration plans, maintenance and monitoring expenses.
- Finalize priorities and begin implementation of TRCA's *Species and Communities Recovery Project* to help improve the quality of natural cover.
- Protect and enhance natural cover by engaging businesses, citizens and local community groups in habitat restoration activities.

BIODIVERSITY
PRIORITY OPPORTUNITIES[4]

- Adopt the four R's for guiding policy to conserve biodiversity. RETAIN all existing natural areas; RESTORE, on a priority basis, habitats that have been degraded; REPLACE habitats that have been lost, where ecologically and economically feasible; and RECOVER habitats for Species at Risk.

- Develop and maintain natural heritage system strategies that are seamlessly integrated with watershed management plans. Ensure the provision for core habitats, corridors and all representative ecosystem types within the GTA.

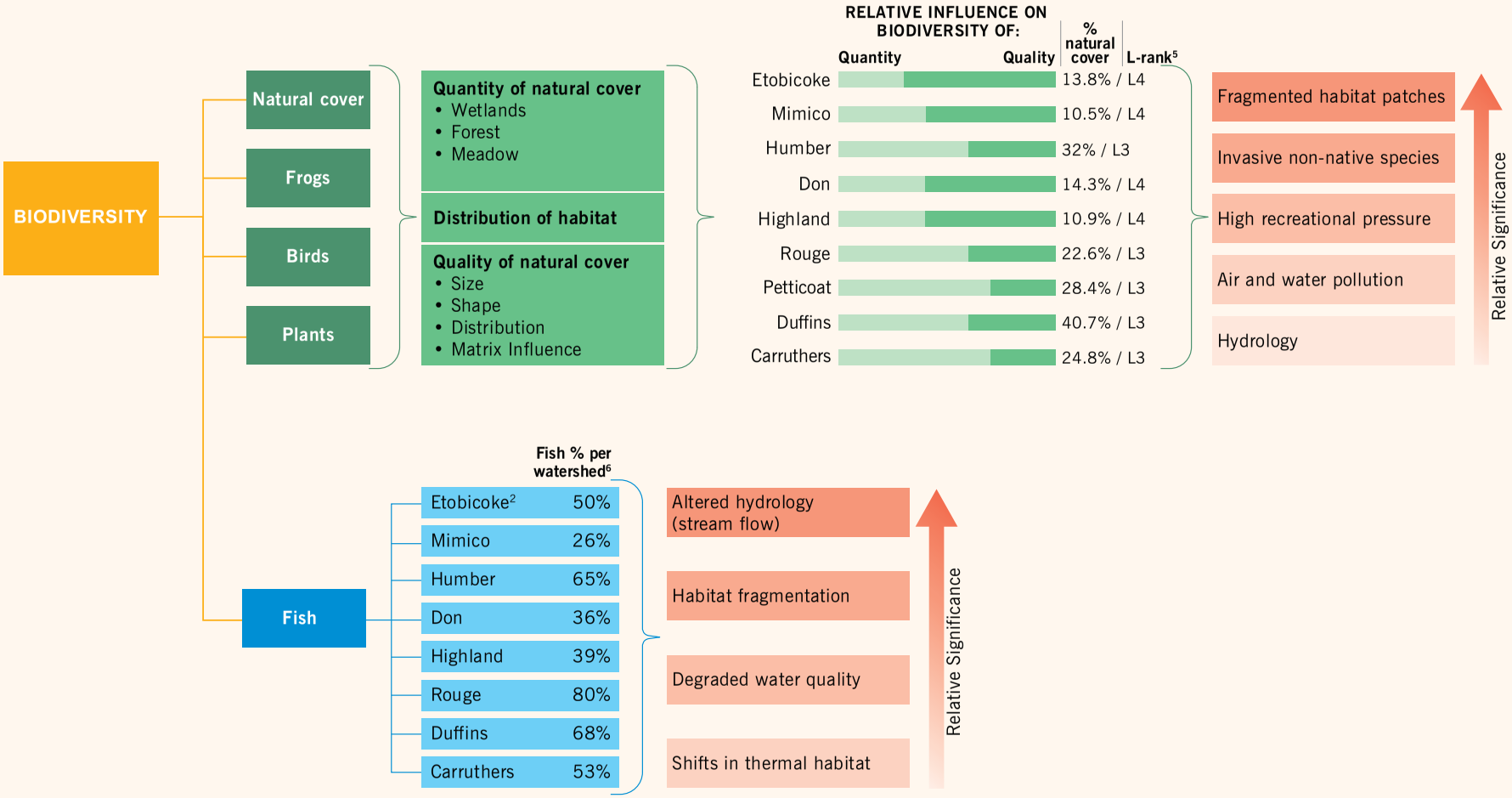
- Approve natural heritage system strategies through official planning processes. These should exceed the requirements set out by the *Natural Heritage Reference Manual* of the *Provincial Policy Statement* and be monitored and enforced, so that new urban areas achieve higher biodiversity than is found in the existing urbanized areas.

- Invest in urban forest protection and, more importantly, in urban forest renewal of public greenspaces, while encouraging through incentives, the naturalization of private lands with genetically appropriate native plants matched to local site conditions.

- Support broad biodiversity education and awareness programs to reach businesses, educational institutions and the public.

4 Greening Greater Toronto: Taskforce Working Group 3—Biodiversity Context (Draft 2010).

BIODIVERSITY DRIVER TREE - Contributors to the GTA's plants and animals



5 Natural Cover and L-rank per watershed based on 2007-08 orthophoto interpretation. L-rank is the measure of the available cover quality (L1 excellent to L5 very poor).
6 Fish percentage per watershed calculated based on average of observed to expected native species richness ratio for each regional monitoring site sampled between 2001-2009.
Arrows show the relative significance of pressures effecting aquatic and terrestrial biodiversity in TRCA's jurisdiction.

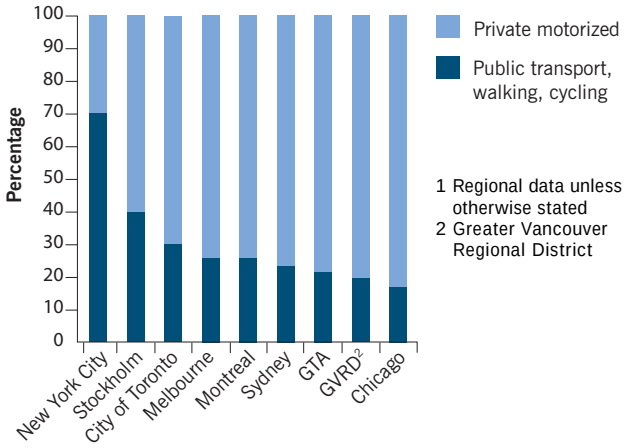
DEEP DIVE

TRANSPORTATION AND ENVIRONMENTAL HEALTH[1]

Prepared by ***Andrew Bevan,***
Executive Director, Sustainable Prosperity

The Greater Toronto and Hamilton Area (GTHA) is more dependent on the car than most other comparable city regions. This over-dependence is both an enabler and product of sprawl, and the lack of efficient alternative forms of transportation has significant environmental and economic impacts.

Public /Private Transit Mix, 2007[1]
2007 Transportation Modal Split (%)



Emissions from transportation have substantial negative effects on air quality. Despite improvements driven by a decrease in energy consumption and a change in the grid mix, a steady increase in vehicle kilometres travelled has offset some of these gains.

Since 2005, the GTA gasoline and diesel sales have decreased, likely as a result of economic conditions, higher fuel prices and improved vehicle fuel efficiencies. Over the same period, total passenger (gasoline-powered) vehicle kilometres travelled is estimated to have increased by about two per cent, or one billion kilometres, increasing traffic congestion and the associated environmental impacts. Using diesel sales to estimate commercial (diesel) vehicle kilometres shows an 11 per cent decline, or 850 million kilometres, presumably as a result of economic conditions. This is likely a temporary reduction that will rebound with the recovering economy.

As our population and economy grows, the GTHA must act to reduce congestion on our roads and highways, and to prevent future growth in the emissions from the transportation sector. More fuel-efficient vehicles, increased use of alternative fuels and electric vehicles can help achieve this, along with a fully implemented regional transportation plan.

This puts the GTHA at a crossroads. One branch leads to a transformed transportation system with faster and more widespread transit service. Much of this system would be on rail, and roads would be designed and operated to serve the movement of people and goods more efficiently and safely, by bus, truck, foot and bicycle, as well as by single-occupant cars. There would be real-time information to assist travellers on their way, and an integrated and more convenient fare and revenue-collection system. This would result in more sustainable development patterns that would encourage shorter trips, greater use of public transit and active transportation through compact, mixed use mobility hubs and corridors. This improved system would reduce trips made in high emission vehicles and reduce trip lengths, with a corresponding reduction of environmental impacts.

The other branch leads to an unacceptable business as usual destination. This branch is characterized by insufficient ad hoc funding for transit and lacks most

1 This commentary draws substantially from "Time To Get Serious: Reliable Funding for GTHA Transit/Transportation Infrastructure"(July 2010), prepared by Neal Irwin (IBI Group) and Andrew Bevan (Sustainable Prosperity) for the CivicAction (formerly Toronto City Summit Alliance) Transportation and Other Infrastructure Working Group Discussion Paper http://sustainableprosperity.ca/article170

of the major changes needed to increase the traveller's modal options beyond the private automobile. The result will be increasingly futile attempts to provide essential increases in transportation capacity, speed and reliability through auto-dominated networks, land uses and policies.

A SERIOUS CHALLENGE

While major positive steps have been taken over the last few years, the real work of recovering from decades of underfunding transit and transportation infrastructure in the GTHA is just beginning. The provincial *Growth Plan for the Greater Toronto Golden Horsehoe* and Metrolinx's *Regional Transportation Plan (*RTP) provide the necessary framework for integrated land use and transit and transportation improvements. Implementation has begun, although some parts of the plan have been challenged and serious concerns about long-term funding remain. Full implementation of the RTP will have an important positive impact on the environmental health of our region, and the funding mechanisms need to be solidified to ensure this impact is realized.

BENEFITS FOR ALL

All travellers and residents in the GTHA will benefit from the major transit and transportation improvements of the RTP. They would also benefit from associated pricing incentives related to avoiding congested roads and times, driving low emission cars, and making greater use of transit, car-pooling and/or active transportation alternatives. If funding can be found to implement it, significant economic, environmental and social benefits will be provided by the RTP.

The promise of the value proposition of the RTP includes:

- increased access to a transport system that is affordable, effective, integrated and multi-modal;
- a seamless and coordinated balance of transportation choices, including transit, walking and cycling;
- the easing of congestion and commute times; and
- a reduction in transportation-related emissions of smog precursors and greenhouse gases.

PREFERRED FUNDING SOURCES AND MECHANISMS

Despite a significant provincial commitment, the RTP remains more than 75 per cent unfunded. The key challenge is a chronic lack of long-term, reliable funding sufficient for transit and transportation capital and operating requirements, without which the RTP's implementation is seriously at risk.

Other orders of government are providing partial funding for the RTP. Municipalities have also received revenue transfers in recent years, such as the provincial and federal gas tax transfers and the federal GST rebate. There is clearly a need for further revenue stream diversification to fill the funding gap if the RTP is to be put in place successfully.

As we look toward choosing preferred funding options, new instruments should have to pass two tests to have a chance at viability. First, new funding instruments must be fair, effective, efficient, transparent and accountable, as well as seen to be so. Second, these instruments, or at least some of them, need to do more than simply provide the quantum of funding required for the RTP. They also need to help moderate increasing congestion by beginning to reduce personal vehicle kilometres travelled, and possibly to achieve stable or reduced congestion levels in some corridors.

For each of 12 selected funding sources, CivicAction's *Time to Get Serious* report summarized the yearly net revenue range, the assumed rates on which these revenue estimates are based, the significant policy advantages, and implementation issues and disadvantages to be considered. A number of the funding sources have the important policy advantage (in addition to yielding revenue) of providing direct pricing incentives for drivers to make more sustainable travel choices.

THE NEXT STEP

There is an urgent and well-identified need to fully implement the RTP in the GTHA so that we can all enjoy its environmental, economic and social benefits. Implementation requires that an investment strategy (including new revenue generating mechanisms and alternative funding sources) be put in place cooperatively by all three orders of governments—and supported by public opinion—to ensure the long term sustainability of both the GTHA and its regional transportation plan.

DEEP DIVE

INCREASING WASTE DIVERSION RATES

Prepared by ***Dr. Virginia Maclaren,***
Associate Professor and Chair Department of Geography and Program In Planning, University of Toronto.

The authority to take action on waste diversion in the GTA is shared between the municipalities and the province. Thus, any action plan that attempts to increase waste diversion will have to include a mix of provincial and municipal initiatives.

CONTAMINATED MATERIALS

Recycling rates in the GTA have been growing steadily. However, those rates do not show the amount of contaminated material that is left over after the recyclables are sorted out at a materials recovery facility. Contamination of paper, for example can be as high as 20 per cent. This material, which is sent to landfill for disposal, includes items that municipalities ask residents not to put in their blue boxes. Examples include:

- polylactide biodegradable plastics, which are considered a contaminant if mixed with other plastics during recycling because they are plant-based, not hydrocarbon-based;
- clear plastic clamshells, which are made of a type of plastic that cannot be recycled currently in most jurisdictions; and
- multi-material products, such as waxed cardboard.

What can be done to solve the problem of contaminants? First, municipalities can expand their communication programs to make residents more aware of what belongs in the blue box or recycling bin. Second, if the province encouraged or required consistency in the list of acceptable blue box materials, residents moving from one municipality to another would not have to learn new recycling rules. Third, new packaging that cannot be recycled at Ontario recovery facilities should not be allowed to enter the marketplace.

MULTI-UNIT RESIDENTIAL BUILDINGS

Why is it so difficult to achieve high diversion rates in multi-unit residential buildings (MuRBs)? There are many reasons:

Convenience – residents of MuRBs often have to take their recyclables and organics down to bins located on the ground floor, in the basement or even outside.

Mobility – apartment and condo dwellers are more frequent movers than residents of single family homes, and have to relearn the procedures for waste diversion every time they relocate.

Visibility – waste diversion is a 'hidden' activity in MuRBs in the sense that neighbours usually do not see other tenants putting recyclables or organics out for collection. This means that there is less social pressure to divert waste or to divert the correct materials.

Economics – unlike the residents of single family homes, residents of MuRBs cannot be charged individual user fees for disposal of their garbage because garbage is collected from the entire building, not individual units. Graduated user fees for collection of garbage have been shown to increase waste diversion significantly because residents can reduce their fees by recycling or composting more.

One size does not fit all – some MuRBs have chute rooms, others do not. Some have space for large recycling containers, others do not. Some are condominiums, others are not. And so on.

What can be done to overcome these barriers to diversion in MuRBs? To address the convenience problem, municipalities can require that developers of new MuRBs make waste diversion as convenient as garbage disposal.

Some cities, such as the City of Toronto, have started to do this but since the policy is for new developments only, it will take some time to have an impact. Toronto is also addressing the problem of economics by imposing a user fee for garbage collection services on MuRBs. In theory, the fees provide a motivation for owners and managers to make recycling and organics diversion more convenient for building residents, and to encourage participation through highly visible and ongoing education and promotion programs. This may mean putting recycling bins in the chute room (if there is space), installing tri-chute systems that have separate chutes for recyclables, garbage and organics, or even shutting down the chute system altogether so that disposing of garbage is no easier than recycling. They can increase convenience by providing all MuRB residents with free recyclable and organic waste containers or bags for their units. These also can serve as visible reminders of waste diversion programs.

EXTENDED PRODUCER RESPONSIBILITY

In the last two years, Ontario has introduced several programs that incorporate extended producer responsibility and require manufacturers to take responsibility for managing the post-consumer waste generated by their products. Programs are now in place for used tires, waste electrical and electronic equipment and certain types of municipal hazardous waste, such as paints, solvents and antifreeze. None of these items belong in landfills. The challenge in the next few years will be to make residents more aware of these programs, make them much more convenient to use, and increase the number of locations where the products can be dropped off for recycling, reuse, treatment or proper disposal. Some municipalities in the GTA are already assessing or implementing collection systems that will provide the ultimate in convenience—namely door-to-door collection.

INDUSTRIAL, COMMERCIAL AND INSTITUTIONAL

The amounts and types of waste that are produced and diverted by the IC&I sector in Ontario are largely unknown. Most IC&I waste is collected by the private sector rather than by municipalities. Municipalities keep careful records of how much residential waste they collect and how much is sent for recycling, composting or energy recovery and this information is public. Although a few firms and institutions make waste diversion data available on their websites, this practice is rare across the sector. The waste diversion data for Ontario and the GTA, therefore, present only a partial picture of how well the province and municipalities are doing.

As a first step towards addressing this lack of data (and as suggested in the provincial review of the *Ontario Waste Diversion Act*, released in October 2009),[1] the province should broaden extended producer responsibility to include packaging and paper (i.e., blue box materials) in the IC&I sector and require that all future materials designated for diversion under the *Ontario Waste Diversion Act* include material discarded in the IC&I sector. A second step might see municipalities and/or the province focusing on education about diversion and developing a manual or website of case studies for the IC&I sector that highlight effective diversion practices. Other steps would include those opportunities for increasing IC&I waste diversion set out on pages 38 to 39 of this report card.

1 Ontario Ministry of Environment, "From Waste to Worth: The Role of Waste Diversion in the Green Economy. Minister's Report on the Waste Diversion Act 2002 Review," (October 2009).

DEEP DIVE

ECOSYSTEM SERVICES

Prepared by ***Deborah Martin-Downs,***
Director, Ecology Division,
Toronto and Region Conservation Authority

In a region where land values are rising and highest value uses are the order of the day, sometimes the preservation of greenspace cannot compete with taxes and jobs—or can it? In this analysis we explore the relatively new concept of ecosystem services and the benefits to the Greater Toronto Area.

A municipality's basic facilities such as roads and sewers are known as grey infrastructure. In recent years a new promising concept called green infrastructure has been promoted to make the region clean and safe. The Green Infrastructure Ontario Coalition defines green infrastructure as natural vegetation and vegetative technologies, including but not limited to: urban forests, natural areas, greenways, streams and riparian zones, meadows and agricultural lands; green roofs and green walls; parks, gardens and landscaped areas, community gardens, and other green open spaces; rain gardens, bio-swales, engineered wetlands and stormwater ponds. Green infrastructure also includes soil, in volumes and qualities adequate to sustain leafy green infrastructure and absorb water, as well as technologies like porous paving, cisterns and structural soils. In turn, this green infrastructure provides a variety of ecosystem services that should be safeguarded and enhanced as critical elements in city regions and healthy watersheds.

What is an ecosystem service? The term refers to the many benefits derived from the natural environment. Some might suggest that we can't afford nature in urban centres, that these wild places should be restricted to the rural landscape to be visited periodically. But as society becomes more aware of all the benefits that natural areas can provide it will become accepted that natural areas are critical to urban communities.

ECONOMIC BENEFITS

Research is showing us that there is a significant net benefit of natural infrastructure. Using the Ontario Ministry of Natural Resources' ecosystem services valuation model,[1] TRCA calculated the known annual value of the existing natural cover (not including street and backyard trees) in its jurisdiction. This natural infrastructure is a community asset with an annual value of over $1.2 billion dollars.[2]

Recently, the Ministry of the Environment commissioned a study of the benefits of applying the recommendations of the Rouge Watershed Plan[3] in the Greater Toronto Area for reduced nutrient loadings and improved near-shore health of the Great Lakes.[3] The recommendations were for the application of sustainable community attributes – in short, the application of green infrastructure to existing and proposed communities. The benefits were outstanding – present value net benefits ranged from $416 to $960 million with a mean of $687 million. When extrapolated to watersheds throughout the Golden Horseshoe, mean net present value benefits were estimated at over $10 billion. The benefits to water quality improvements, natural cover and recreation were the greatest. A similar exercise was undertaken for the Credit River watershed which found that the watershed delivers a constant flow of services to society of over $371 million per year.

1 Troy, A. and K. Bagstad, "Estimating Ecosystem Services in Southern Ontario." Prepared by Spatial Informatics Group for Ontario Ministry of Natural Resources (2009).
2 Toronto and Region Conservation Authority (TRCA), "Terrestrial Natural Heritage System Strategy."
3 Marbek, "Assessing the Economic Value of Protection the Great Lakes: Rouge River Case Study for Nutrient Reduction and Near-shore Health Protection" prepared for the Ministry of the Environment, Great Lakes Branch (2010).

MULTIPLE COST SAVINGS

Natural infrastructure is able to perform many services at the same time; therefore, investing in one type of natural infrastructure will help to deliver multiple services efficiently with less dollars. In the City of Mississauga and Town of Ajax, trees are estimated to reduce annual residential heating and cooling costs by approximately $1.2 million and $400,000 respectively.[4,5] Residential properties with mature trees are valued up to 15 per cent higher than comparable properties without trees.[6] Shade from large trees over city streets has been found to reduce grey infrastructure repair costs by approximately 58 per cent over 30 years.[7]

A NEED FOR CHANGE: HEALTH CARE COSTS

Health care is the most expensive service for all levels of government. Investing first in preventative measures, instead of reactively addressing the damage caused by poor environmental quality, will reduce health care costs. The provincial budget over four years was 0.3 per cent for environmental programs but ranged from 36 to 41 per cent for health care. Green infrastructure can reduce health care costs, for example, by contributing to improved air and water quality and to reduce exposure to ultraviolet rays.

Skin cancer, resulting from overexposure to ultraviolet radiation, is the most common cancer in Ontario, representing one third of all new cancer cases. The treatment costs are considerable due to the sheer number of cases. For melanoma, the most serious form of skin cancer, treatment options are few; hence prevention is critical. Reducing overall exposure to sunlight is the most important way to prevent skin cancer. The provision of natural and constructed shade and personal sun protection are important strategies for reducing exposure when outdoors.

Substantial increases in health damages can be expected in Ontario over the next 20 years if air quality does not improve. Economic damages for three example years are shown in the table below.

Example Years	Lost Productivity	Health Care Costs	Pain and Suffering	Loss of Life
2000	$374,342,400	$506,612,700	$536,546,600	$6,391,700,000
2015	$402,883,900	$571,089,400	$593,149,400	$8,279,400,000
2026	$466,508,500	$701,988,500	$718,341,300	$11,027,400,000

QUALITY OF LIFE AND WELLBEING

Nature is appreciated for its ability to add life to and soften hard built form. Natural infrastructure is being linked to mental and psychological health resulting in the reduction of Attention Deficit Disorder,[8] domestic violence,[9] speeding up of hospital recovery rates,[10] and improvements in school grades.[11] Apartment buildings with high levels of greenery had 48 per cent fewer property crimes and 56 per cent fewer violent crimes than buildings that had little or no vegetation.[9]

LOOKING AHEAD

If communities are to be livable over the long-term, there is an urgent need to ensure that natural infrastructure is strategically distributed across the landscape.

The following priority actions need to take place:

- make explicit links between ecosystem services, health benefits and reduced health care costs.
- continue ecosystem valuation work;
- develop conservation and planning policies that reflect ecosystem services values; and,
- evaluate the benefits of green infrastructure to grey infrastructure, through watershed planning.

4 Toronto and Region Conservation Authority (TRCA), "Town of Ajax Urban Forest Study: Technical Report" (2009).
5 Toronto and Region Conservation Authority (TRCA), " Peel Partnership Urban Forest Study: City of Mississauga Technical Report" (2011).
6 Theriault, M. Y. Kestens, and F. Des Rosiers, "The Impact of Mature Trees on House Values and on Residential Location Choices in Quebec City," in Rizzoli, A.E. and Jakeman, A.J. (eds.) *Integrated Assessment and Decision Support, Proceedings of the First Biennial Meeting of the International Environmental Modeling and Software Society*: Volume 2: 478-483 (2002).
7 MacPherson and Muchnick, (2005).
8 Taylor, Kuo, F.E., and W.C. Sullivan, "Coping with ADD: The Surprising Connection to Green Play Settings," Environment and Behaviour: Volume 33, No. 1.54-77 (2001).
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10 Ulrich, R. "View through window may influence recovery from surgery." Science: 224: 420-421 (1984).
11 "Children and Nature. A report on the movement to reconnect children to the natural world." http://www.childrenandnature.org/downloads/CNNMovement2009.pdf.

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