

TOWN OF EAST GWILLIMBURY – WATER AND WASTEWATER CONSERVATION STRATEGY

George Zukovs¹, Wayne Hunt²

1. XCG Consultants Ltd, Oakville Ontario, Canada
georgez@xcg.com
2. Town of East Gwillimbury Ontario, Canada

ABSTRACT

The Town of East Gwillimbury, Ontario is located in the north western portion of York Region; one of the fastest growing areas in Canada. East Gwillimbury's population is expected to experience a nearly five-fold increase between now and 2031. The next ten years to 2018 is a critical period. The community must generate sufficient growth momentum while ensuring that growth is managed effectively leading to a sustainable community. The paper presents East Gwillimbury's comprehensive Water and Wastewater Conservation Strategy that is central to the sustainability goal. The strategy was developed in partnership with York Region, landowners and the development community.

INTRODUCTION

The Town of East Gwillimbury, Ontario shown in Figure 1 is located in the north western portion of York Region; one of the fastest growing areas in Canada. East Gwillimbury's population is expected to experience an almost five-fold increase from the current level of just under 22,000 to almost 90,000 between now and 2031. By 2051, the Town's population is expected to reach 150,000. Employment growth is anticipated to follow a similar upward trend. The next ten years, to 2018, is a critical period for East Gwillimbury. The community needs to generate sufficient growth momentum to start implementation of vital community infrastructure. At the same time, East Gwillimbury wishes to ensure that growth is managed effectively leading to a sustainable community. Water and wastewater capacity are especially vital in that York Region can provide only a finite allocation of capacities within this timeframe. To effectively manage the anticipated growth and to further demonstrate its leadership in developing a sustainable community, East Gwillimbury in partnership with York Region, landowners and the development community undertook the development of a comprehensive water efficiency strategy. The purpose of the strategy was to develop a plan for reducing water use in new residential and institutional/commercial/industrial (ICI) growth. The water efficient new growth would support the Town's core principle of

sustainable development while at the same time providing greater development opportunities.

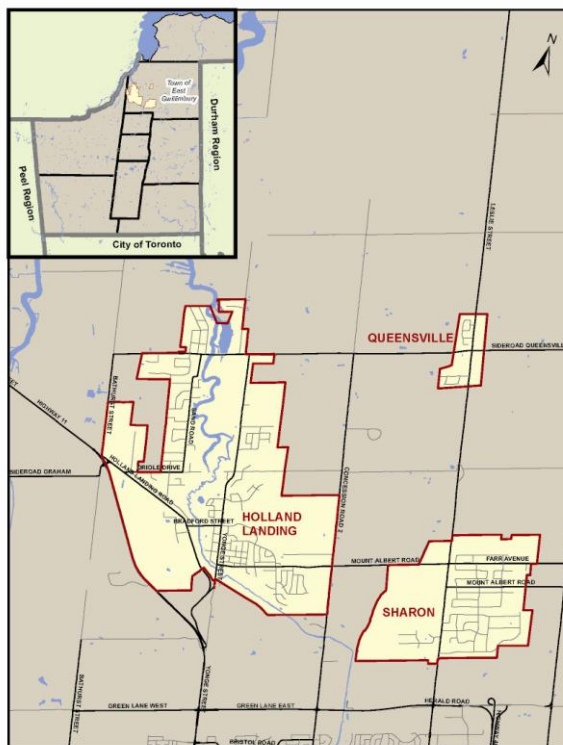


Figure 1: Town of East Gwillimbury

BACKGROUND

The Town of East Gwillimbury, an area municipality within the Regional Municipality of York, is located in south central Ontario. It is a mix of land uses including fully serviced urban areas, partially-serviced suburban areas, rural hamlets, estate residential subdivisions and rural agricultural land.

The urban areas and villages of East Gwillimbury are Green Lane Corridor, Holland Landing, Mount Albert, Queensville, River Drive Park, and Sharon. The residential population of East Gwillimbury is almost 22,000 and the employment population is 5,900.

Since 2005, East Gwillimbury has relied on its strategic plan to guide the future direction of the Town. The strategic plan is based on five pillars, namely:

1. Protecting and Enhancing the Environment;
2. Providing and Advocating for Quality Programs and Services to the Community;
3. Investing in Municipal Infrastructure;
4. Managing Growth to Ensure a Sustainable Community; and,
5. Supporting a Municipal Organization Focused on Excellence.

The strategic plan identifies the Town's core purpose: to provide quality cost-effective services and to lead the community in the planning and delivery of a sustainable future. Key among the goals that the Town has set is a commitment to develop strategies to ensure that East Gwillimbury is a model community for environmental stewardship.

The present residential and employment populations are not all serviced by municipal water and/or wastewater systems: approximately 75% of East Gwillimbury's residents and 65% of East Gwillimbury's employment population is currently served by municipal water systems. In terms of municipal wastewater servicing, 36% of the current residential population and almost 53% of the current employment population are served.

Desired Growth To 2018

The Town of East Gwillimbury through its Growth Management Plan has determined the optimal level of growth in the next ten year period to 2018. By 2018, East Gwillimbury's desired residential population increase is a total of 7,500 residential units. Assuming an average of 3.11 persons per unit (ppu) results in an increase of 23,325 persons. During the same period, the Town would like the employment population to increase by 11,250 positions. The employment population target is based on a desire to maintain an appropriate community work-live balance thus ensuring a sustainable community.

The residential population forecast for 2018 is planned to be accommodated principally in Queensville, which will receive about half of the expected growth, followed by Holland Landing with approximately one third, and 15% going to Sharon.

Present Regional Servicing Allocation

Water and wastewater servicing in the Town of East Gwillimbury is a multi-jurisdictional undertaking, based on the two-tier municipal governance structure. The Town is responsible for local water distribution and wastewater collection, while York Region is responsible for source water and water treatment and wastewater treatment and disposal. Consequently, there is a

need for the Town and the Region to coordinate water and wastewater servicing to adequately accommodate future growth. To do this, the Region has made a determination about how much of its water and wastewater system capacities can be allocated to East Gwillimbury.

In the short term, between now and 2018, York Region has determined that development of 5,465 new residential units in East Gwillimbury can be accommodated by the Region's water and wastewater systems. According to York Region, the rationale for this allocation of new residential units is based on the limited capacity of the drinking water and wastewater systems. The assumptions used by York Region to determine the allocation of 5,465 new residential units are presented in Table 1. The water rates used by the Region are inclusive of losses and the Harmon peaking factor was used to determine peak dry weather wastewater flows.

Table 1: Assumptions Used to Determine York Servicing Allocation

Measure	Value
Residential water consumption rate	229 litres per capita per day
Residential wastewater production rate	229 litres per capita per day
Employment water use	198 litres per capita per day
Employment wastewater generation	198 litres per capita per day
Peak inflow and infiltration	0.26 litres per second per hectare
Peak population wastewater rate	Harmon's Peaking Factor ¹
Persons per unit (ppu)	3.11
Ratio of residential population to employment population	2.7:1
Notes:	
1. Harmon's Peaking Factor = $1 + 14/(4+P^{0.5})$ where P is the population in thousands	

Based on York Region's planning assumptions, the 5,465 new residential units translate to an additional 16,996 residents and 6,270 jobs, accommodated by an increase in service area of 412 (241 residential + 171 employment) hectares.

Table 2 presents the equivalent "water footprint" for both water and wastewater corresponding to the York Region allocation.

Table 2: "Water Footprint" for York Region Allocation

Footprint Measure	Value
Existing total average daily water consumption	2,935 m ³ /day
Increase in water demand residential	3,892 m ³ /day
Increase in water demand employment	1,241 m ³ /day
Total 2018 average water demand	8,068 m³/day
Existing total wastewater peak flow ¹	57 L/s
Increase in wastewater peak rate residential	185.7 L/s
Increase in wastewater peak rate employment	89.7 L/s
Total 2018 wastewater peak rate	332.4 L/s
Notes:	
1. Estimated using average day wastewater flow, Harmon's Peaking Factor and assuming an inflow and infiltration rate of 0.26 L/ha/s	

The Region's allocation falls short of the Town's planned growth to 2018 by 2,035 residential units (equivalent to 6,329 persons at an average ppu of 3.11) and an employment population of 4,980 persons. In order for the Town to bridge the gap between its Growth Management Plan targets and the Regional allocation, the Town and Region together with local landowners groups and developers prepared a strategy based on a number of co-operative conservation programs. The goal was to increase the serviced populations to the Town's 2018 targets while at the same time remaining within the Region's "water footprint".

YORK REGION CO-OPERATIVE CONSERVATION PROGRAMS

Water for Tomorrow

Water for Tomorrow is a water efficiency program jointly delivered by York Region and its area municipalities including East Gwillimbury. The original objective of this program was to reduce the demand for water in existing residential, institutional, commercial and industrial development by more than 19 million litres per day, a target that has been surpassed: *Water for Tomorrow* is currently saving 20.3 million litres of water per day, which is enough water to supply a community of approximately 77,000 people. The *Water for Tomorrow* program was updated in April 2007 through a Water Efficiency Master Plan Update Report. The program has been presently extended for another 10 year period at a budget of approximately \$4 to \$5 million per year.

The Water for Tomorrow program comprises a combination of outreach, rebates, installation of water saving devices, and by-laws. The program promotes less summer outdoor water use by encouraging water efficient garden and landscaping. The program also includes a leak detection program and public/elementary school education program.

From the perspective of East Gwillimbury, the ongoing Water for Tomorrow program will afford residents with existing water services the opportunity to further reduce their demand and therefore offset some of the future demand from the desired residential and employment growth to 2018.

Sustainable Development through LEED (Leadership in Energy and Environmental Design) Highrise Program

York Region's "Sustainable Development Through LEED" program is designed to encourage more sustainable high density development within Regional Centres and Corridors. It provides allocation incentives for multi-unit residential developments with a minimum height of four storeys.

York Region Council in June 2007 adopted a policy to provide a 20-35% increase in servicing allocation for development proposals meeting the following criteria:

- Significant water conservation is achieved,
- Location is served by local rapid transit or other major regional transit,
- Site is within a Regional Centre or Regional Corridor, or Local Centre,
- Building meets Regional guidelines including supporting an overall, long-term density target of 2.5 Floor Space Index,
- Three stream waste reduction is incorporated into the building, and
- A minimum LEED™ Silver certification is achieved

From the perspective of East Gwillimbury this program will have some benefit for the Green Lane development area (in proximity to GO Station) where about 750 units of 6 storey + developments are planned.

Sustainable Home Incentive Program ~ SHIP

York Region developed the Sustainable Home Incentive Program (SHIP) to encourage more sustainable ground related development. For the purposes of the SHIP program, grade related development has been defined to include single detached residential, semi-detached residential development, town homes, and low-rise multi-unit

residential development with a maximum height of three-storleys.

The SHIP program is undertaken by the Region in partnership with the area municipalities, with the goal of providing additional servicing allocation as an incentive. Developers of grade related residential developments meeting specific criteria and including sustainability requirements can qualify for a reduction in the amount of water and wastewater servicing allocation required for their developments. In addition, developers of grade related residential developments who meet an advanced set of criteria could qualify for an additional allocation reduction.

In order to realize the intended benefits, the SHIP Program looks for improvements in a broad range home design and construction components. In order to make a “servicing allocation” incentive available, developers must demonstrate that water conservation will be achieved through the construction of new homes beyond what can be achieved via existing Ontario Building Code requirements. The program relies on third party rating systems to ensure that sustainable construction is practiced. From a water savings perspective, the program has two incentive levels as shown in Table 3.

Inflow and Infiltration Reduction and Prevention

York Region and the area municipalities have embarked on a large-scale, multi-year program for inflow and infiltration (I/I) reduction and prevention. The overall goal of the program is to reduce peak wet weather inflow and infiltration to wastewater collection systems and ultimately to wastewater treatment facilities. In conjunction with the flow monitoring component of the inflow and infiltration reduction and prevention program, the Region has developed proposed new construction and development commissioning standards best practices aimed at reducing the amount of inflow and infiltration entering both existing and future wastewater systems.

From the standpoint of East Gwillimbury, it is expected that the inflow infiltration reduction program will yield benefits in the Holland Landing area through existing wastewater peak flow reduction. The magnitude of the benefits will be known once the program is further developed through additional monitoring, inspection and cost-effective inflow infiltration correction. The inflow infiltration prevention program will be an important component of future sanitary servicing in East Gwillimbury.

WATER EFFICIENT DEVELOPMENT IMPLEMENTATION PLAN

The East Gwillimbury Water Conservation Group, consisting of Town staff, staff of York Region and representatives of the development community as well as expert consultants, collaborated over a period in 2008 and 2009 to develop a specific water conservation and inflow infiltration reduction/prevention program for East Gwillimbury. The East Gwillimbury program produced a sequence of steps to be undertaken by various parties that would culminate in the desired increases in the 2018 residential and employment allocation.

Increased Water Allocation

Based on the consultations and the original York Region allocations the following presents the required savings to achieve the increased allocation:

Residential

- Indoor water savings target– 68 Lcpd
- Water efficient unit rate for new residential housing – **161 Lcpd**

Employment

- Employment water savings prorated from residential – 59 Lcpd
- Water efficient unit rate for new employment – **139 Lcpd**

The increased allocation focused on defining the water demand assuming that corresponding reductions in wastewater generated would result. The additional allocation release plan does however contain provisions to address inflow infiltration reduction and prevention. The target water savings were developed specifically for East Gwillimbury based on a hybrid of SHIP Levels 1 and 2.

On the basis of the above, the total increase in allocation with new development will be an additional residential allocation of 2,077 units (this reflects a 10% reduction in additional units retained as a margin of safety) when combined with the 5,465 already allocated gives 7,542 units or slightly in excess of the Town’s desired growth target; and, an additional employment allocation of 2,416 employees (this also reflects a 10% reduction in additional employees retained as a margin of safety) when combined with 6,270 employees already allocated gives 8,686 new employees or 2,564 new employees less than the Town’s original target. Depending on the actual water savings achieved as well as other factors such as reductions in demand from existing development and the number of at home

employment positions the employment may be able to be increased.

The new additional allocation will be released in a staged manner. Table 4 presents the residential allocation release amount and requirements for the four step process.

In order to avoid delays associated with Step 2 monitoring and release the Town will secure a "retrofit to existing homes program" in advance of the Step 2 monitoring. Under these circumstances the Region has agreed to release the Step 2 in advance. The full "retrofit program" would only be implemented if the conservation targets were not met on the new units. Developers will post securities estimated as \$2,500 per home to secure the "retrofit" program. If the monitoring program proves that the new units only partially meet the conservation target, then the "retrofit" program will be implemented to make up the shortfall for the conservation target. It should be noted that negotiations are underway to accelerate the allocation process indicated in Table 4. If the negotiations are successful, the release of units would occur over a two rather than a four year period. Table 5 presents the East Gwillimbury program components and timing.

ACKNOWLEDGEMENTS

This study is one of the many ways that East Gwillimbury demonstrates its leadership role in the on-going development and management of a sustainable community.

The author wishes to thank Town of East Gwillimbury staff, staff of York Region as well as the members of the East Gwillimbury Water Conservation Group for their guidance and input throughout the study.

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- Town of East Gwillimbury (2008). *Official Plan Review Update*. Presented by D. Given. May, 2008. Available on-line at: <http://www.eastgwillimbury.ca/Assets/Town+Hall/Branches/Development+and+Legal+Services/OP+Review/MGP+May+5+Pres.pdf>
- Town of East Gwillimbury (2009). *Water and Wastewater Master Plan Final Report*. Prepared by Genivar Ontario Inc. April, 2009.

Table 3: SHIP Program Incentive Levels

Certification	Mandatory Features	Estimated Savings
Incentive Level 1 – 10%		
Energy Star GreenHouse or LEED Certified or Equivalent Certification Program	<ul style="list-style-type: none"> High efficiency toilet (HET) 4.1 litres Bathroom taps max flow 5.6 Lpm Shower head max flow 7.6 Lpm Dishwasher - Energy Star Clothes washer - Energy Star Hot water recirculation system 	50 Lcpd
Incentive Level 2 – 20%		
LEED Silver or Equivalent Certification Program	<ul style="list-style-type: none"> HET max flush 4.1 litres Bathroom taps max flow 5.6 Lpm Showerhead max flow 6.6 Lpm Dishwasher - Energy Star Clothes Washer – Energy Star with MEF\geq2.0 and WF$<$5.5 Hot water recirculation system Water efficient whole home humidifier 6 inches of top soil 90% drought tolerant species and 80+ sod Irrigation system using non potable water source Rainwater harvesting 75 % roof area Grey water collection from 3 sources 	80 Lpcd

Table 4: Release of Increased Allocation

Step	Residential Units Released ²	Employment Population Released ³	Requirements For Release
1	546	635	<ul style="list-style-type: none"> Establish third party certification and inspection process Develop new sanitary sewer construction and commissioning standards for new developments to reduce potential inflow infiltration
2	546	635	<ul style="list-style-type: none"> One year of monitoring and proven target savings Develop inflow infiltration reduction strategy addressing existing areas of high inflow infiltration Enforcement of summer water conservation bylaw
3	546	635	<ul style="list-style-type: none"> Two years of monitoring and proven target savings
4	439	511	<ul style="list-style-type: none"> Three years of monitoring and proven target savings
Total	2077 ¹	2,416 ^{1,4}	

Notes:

- Ten percent of units will be held back until all conditions are met.
- If target savings in additional residential and employment uses are not demonstrated then the developer receiving the additional allocation must implement equivalent savings on existing homes employment institutions.
- Employment population release prorated from residential release and is based upon maximum additional water demand from employment equivalent to 139 Lpcd
- Employment release contingent on mandated water efficiency measures in new employment related construction; Official Plan and zoning by-law requiring hot water recirculation systems for employment uses; and, the Region and Town partnering to increase the level of water audits and retrofits in existing employment uses under the *Water For Tomorrow* program

Table 5: East Gwillimbury Sustainable Community – Program Components

	Program Component	Description	Expected Deliverable	Timeline for Completion
1.	Standard Summer Water Conservation By-law	<ul style="list-style-type: none"> EG Commitment to implement York Region's Standard Summer Water Conservation By-law to restrict lawn and garden watering. 	<ul style="list-style-type: none"> EG to work with York Region to up-date/adopt revised by-law. 	<ul style="list-style-type: none"> 2010
2.	Inflow/Infiltration Reduction Program	<ul style="list-style-type: none"> EG to actively participate in York Region's I/I reduction program Design and Commissioning Standards for new development. 	<ul style="list-style-type: none"> EG to complete Sanitary Sewer Evaluation Study EG to prepare and complete a remediation plan to resolve I/I issues within the community of Holland Landing EG to develop Design and Commissioning Standards for new development 	<ul style="list-style-type: none"> Q1 2010 Q4 2012 Q4 2009
3.	Third Party Certification and Verification Program or – the LEED® Canada for Homes Certification process.	<ul style="list-style-type: none"> Establishment of a third party certification process that addresses all the technical requirements identified in the LEED Canada for Home program Residential Retrofitting Program 	<ul style="list-style-type: none"> Development of a detailed program outlining the technical studies, documentation, inspections and specify inspection team required to ensure new developments meet the requirements of the Sustainable Home Incentive Program Development of a detailed residential retrofitting program to be utilized if monitoring 	<ul style="list-style-type: none"> Q4 2009 Q4 2009
4.	ICI Flow Reduction and Water Conservation Measures	<ul style="list-style-type: none"> Daily flow target for ICI to be established (including flushing and unaccounted for water use) Draft ICI Water Conservation Policies 	<ul style="list-style-type: none"> EG to implement Heavy Water User Restrictions that include a daily flow target EG to require Water Conservation Reports for any new ICI development EG to draft ICI Water Conservation Policies based on the recommendations of the XCG report. Adoption and implementation of the ICI Water Conservation Policies 	<ul style="list-style-type: none"> Q4 2009 Q4 2009 Q4 2009 Q4 2010

Table 6: East Gwillimbury Sustainable Community – Program Components (cont'd.)

	Program Component	Description	Expected Deliverable	Timeline for Completion
5.	Monitoring Program	<ul style="list-style-type: none"> Develop monitoring program Residential retrofitting Program 	<ul style="list-style-type: none"> Program that monitors reduction in water use and I-I flows occur as a result of this program Development of a detailed residential retrofitting program to be utilized if ongoing monitoring demonstrates that required water savings are not being achieved 	<ul style="list-style-type: none"> Q4 2009 Q4 2009