York Region

LONG TERM Water Conservation Strategy

MARCH 31, 2011

AURORA · East Gwillimbury · Town of Georgina · King · Markham · Newmarket · Richmond Hill · Vaughan · Town of Whitchurch-Stouffville

York Region has an opportunity to mobilize its energies to become the water innovator of Canada.

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List of Acronyms

AWE	Alliance for Water Efficiency
AWWA	American Water Works Association
CSA	Canadian Standards Association
DMAs	District Metered Areas
DSM	Demand Side Management
EI	Ecological Integrity
GTA	Greater Toronto Area
ICI	Industrial, Commercial and Institutional
IEA	Individual Environmental Assessment
IWA	International Water Association
LEED	Leaders in Energy and Environmental Design
LID	Low Impact Development
LSRCA	Lake Simcoe and Region Conservation Authority
LT	Lower Tier Municipality
LTWCS	Long Term Water Conservation Strategy
MLD	Million Litres Per Day
MOE	Ministry of the Environment
NGOs	Non-Government Organizations
ROI	Return on investment
SEC	South East Collector
SHIP	Sustainable Home Incentive Program
TRCA	Toronto Region Conservation Authority
USGBC	United States Green Building Council
UT	Upper Tier Municipality
WFT	Water For Tomorrow
WTPs	Water Treatment Plants
YCWF	York Children’s Water Festival
YDSS	York Durham Sewage System

Long Term Water
Conservation Strategy
At a Glance

22.4 million

Through *Water for Tomorrow*, York Region has saved an estimated 22.4 million litres of drinking water per day, which translates to a total water savings sufficient to supply a community of about 88,000 people.

Over 175

Over 175 leading water conservation programs, policies and initiatives covering hard infrastructure through pricing, outreach and education were reviewed for the best-in-class research.

No New Water

The aspirational target scenario of no new water by 2051 used a back-casting methodology by assuming total water used across all sectors in 2051 is equivalent to that used in 2011.

2051

The Long Term Water Conservation Strategy enhances and extends, to 2051, the Region's commitment to innovative water conservation and efficiency programming, water resource protection, energy conservation and greenhouse gas reduction.

1.0 Executive Summary

York Region has more than a decade of conservation and efficiency programming, which to date saves more than 22-million litres of water each day.

LONG TERM Water Conservation Strategy

Through the Water Efficiency Master Plan Update (2007), York Region developed a plan for water conservation to 2016. The Long Term Water Conservation Strategy (LTWCS) builds on the results and success of previous plans by providing overarching guidance for Regional water conservation and efficiency programming for the next 40 years.

York Region submitted proposals to the MOE for both the expansion of sewage flow capacity in the Southeast Collector Trunk Sewer Individual Environmental Assessment and for an Intra-basin Transfer of drinking water from Lake Ontario to the communities of Aurora, Newmarket and East Gwillimbury. One of the conditions of approval for these undertakings is the development of a 40-year Long Term Water Conservation Strategy. The completion and submission of this strategy to the Ministry of the Environment on March 31, 2011 builds on York Region's commitment to sustainable development and long term water conservation and efficiency programs and practices.

1.1 Introduction

York Region is centrally located in the Greater Toronto Area (GTA), directly north of the City of Toronto, in Ontario, Canada. York Region covers 1,756 square kilometres (678 square miles) and is comprised of nine local municipalities. It is the only Region in the GTA without direct access to Lake Ontario.

Currently, the Region's drinking water supply comes from multiple sources: Lake Simcoe located in the northern portion of the Region, ground water sources, and Lake Ontario via water supply agreements with both the City of Toronto and the Region of Peel to offset demand on groundwater and to meet the needs of water customers in the southern municipalities.

Water Efficiency Planning and Programming

York Region is one of the fastest growing Regions in Canada with a current population of over 1 million people. The population is projected to increase by approximately 500,000 by 2031 and by approximately 800,000 by 2051. Without concerted efforts in water conservation programming, demand on water supply and wastewater treatment systems is expected to increase in accordance with population growth. In 1997 York Region embarked on a Long Term Water Supply Master Plan and since its implementation in 1998, water conservation and efficiency has been an integral part of York Region's long-term drinking water supply strategy.

Through ***Water for Tomorrow***, York Region has saved an estimated 22.4 million litres of drinking water per day, which translates to a total water savings sufficient to supply a community of about 88,000 people.

Water Conservation and efficiency has been and continues to be an intergral part of York Region's long term drinking water supply strategy.

The Water Efficiency Master Plan Update was completed in 2007 and set the stage for a 10-year conservation and efficiency plan for York Region. (A copy of the Plan is included in Appendix 1). The Plan established the strategic direction for water efficiency and also supports York Region's Sustainability Strategy. In developing the Master Plan Update, an extensive list of water conservation and efficiency measures, based on local and North American programs, were evaluated and a short list of recommended measures were identified and have been implemented since that time through Water for Tomorrow, the Region's successful water efficiency and conservation program.

The measures fall into the following four main categories:

i. Residential programs – initiatives targeting single and multi-family dwellings and addressing indoor water use with fixture and appliance incentive programs and water audits; and addressing outdoor water use, through landscape audits and water efficient lawn and garden care information and guidance.

ii. Industrial, Commercial and Institutional (ICI) programs – initiatives aimed at ICI building owner/managers, proprietors of laundromats and commercial kitchens and large volume industrial clients. The Region provides rebates for water efficient fixtures, equipment and in the case of industrial clients, water audits including a capacity buy-back incentive to replace inefficient processes with water efficient ones.

iii. Distribution Leakage Detection – an International Water Association water audit and water balance of the municipal and regional distribution system was undertaken and a pro-active leak detection and repair program was initiated.

iv. Education Program – water conservation and efficiency outreach and education initiatives including workshops, web site, displays, DVDs, informational resources, partnerships with garden centre retailers and marketing incentives for water efficient plant material targeting residents. Curriculum resources including an interactive web site, York Children's Water Festival and a calendar contest have been developed to help educate and engage students.

Water for Tomorrow
Your water. Your community. Your choice.

1.1.1 Project Purpose

Development, completion and submission of the LTWCS to the Ministry of the Environment on March 31, 2011 is required to fulfill Conditions of Approval for both the Southeast Collector Trunk Sewer for additional sewer flow capacity and the Intra-basin Transfer initiative to supply drinking water from Lake Ontario to the communities of Aurora, Newmarket and East Gwillimbury.

The LTWCS includes the following:

- Preparation, review and analysis of best-in-class water conservation and efficiency programs, initiatives, strategies and tactics adopted by other jurisdictions throughout the world.
- Consultation with lower-tier municipalities, the Southeast Collector Advisory Committee, the public, relevant government agencies and the Central Regional Office of the MOE.
- Completion of peer review of the strategy compared to the best-in-class tactics and strategies used by other jurisdictions
- Implementation of the water conservation and efficiency strategy.
- Submission of monitoring and reports annually on progress in implementing the strategy.
- Undertake a review and update of the strategy at a minimum once every 5 years until the MOE Central Region Director indicates that it is no longer required.

The Long Term Water Conservation Strategy enhances and extends to 2051 the Region's commitment to innovative water conservation and efficiency programming, water resource protection, energy conservation and greenhouse gas reduction.

The provincial requirements for the strategy and other conditions of approval are consistent with the Region's water conservation goals and expand on the *Water Efficiency Master Plan Update* and York Region's Sustainability Strategy.

1.2 Vision And Objectives

With consideration to the conditions of approval set out by the MOE, a new approach that moves beyond traditional water management planning for the development of the LTWCS is being taken. Typically, increasing supply and Demand-side Management (DSM) – freeing up existing supply through the use of water efficient technologies at the consumer or demand-end of the supply system – are employed to accommodate growth.

The strategic decision to take a new approach led to the use of "Soft Path" to establish a long term vision for water conservation and efficiency in the Region. The Soft Path approach involved engaging stakeholders throughout the Region to develop a vision for a water future. The collective vision of "No New Water" evolved from public engagement and consultations. The definition of no new water reflects the aspirational goal for 2051. Even with water conservation, the demand for water will continue to increase over the decades due to approved increases in population and employment. By 2021 it is anticipated that the threshold of increasing demand may be reached and the continued implementation of progressive water conservation and efficiency programming coupled with new water saving technologies, regulations, practices and processes will result in a continuous reduction in per capita water use.

To achieve the vision of "No New Water", the LTWCS will require:

- Implementation of Regional incentive programs
- Provincial support through Ontario Building Code and/or legislative changes to allow the use of high efficiency fixtures in all new developments
- Adoption of reused water (i.e. rainwater, stormwater, grey water) as a water source for all outdoor and other non-potable uses beginning in 2021.

Numerically speaking, per capita water could decline to 150 litres per day from its current level of 252 litres per day. There are many aspects of the aspirational goal of "No New Water" that are currently beyond Regional jurisdiction. Achieving this vision will involve all sectors and facets of Regional life, from how individual residents use water at home and at work to building new water efficient communities and ICI developments.

The ambitious vision of the LTWCS is consistent with the sustainability and water conservation objectives of York Region, which are set out in the Region's Water Efficiency Master Plan Update (2007), Sustainability Strategy (2007), and Regional Official Plan (2009), and those articulated by stakeholders throughout the consultation process.

The objectives for the LTWCS are summarized as follows:

- Be a municipal leader in water conservation and efficiency.
- Maximize sustainability of the water supply through the application of best-in-class technology and practices.
- Minimize energy consumption and reduce York Region's carbon footprint.
- Maximize the use of energy efficient technologies, processes and practices.
- Minimize the financial costs to York Region water customers
- Maximize partnerships with local municipalities and utilities for the cost-effective delivery of York Region's water conservation and efficiency programs
- Maximize the reliability of the water supply system
- Minimize the risk of water service disruptions
- Maximize system flexibility to respond to change
- Ensure York Region's drinking water supply meets all existing and future regional, provincial and federal public health and drinking water quality standards
- The Regional non-potable water supply meets future standards and is of acceptable quality for intended non-potable uses.
- Align York Region's strategic goals as set out in the Regional Master Plan and York Region's Sustainability Strategy
- Actively engage with public, youth and other regional stakeholders to find effective means of conserving and protecting the water supply.
- Deliver effective focused water conservation education programs for youth, residents and ICI sector.
- Develop marketing and outreach resources and initiatives to engage the diverse cultures living and working within York Region.

1.3 Project Approach

A multi-disciplinary and integrated approach was employed to develop the LTWCS. Project management was the responsibility of Regional staff with guidance and support provided by local municipal staff. A project Advisory Panel of conservation and efficiency experts was established to guide the development of the LTWCS and provide input and feedback throughout the process (See Section 4.1.1 of the main report for a detailed description of the Advisory Panel). Additional guidance and feedback were provided by MOE staff and the Southeast Collector Advisory Committee. External consultant specialists provided research and support to Regional project staff (see Section 4.1.2 of the main report for a description of the LTWCS Project Team).

1.3.1 Soft Path

The Soft Path approach informed the strategy development process. Four guiding principles of the Soft Path approach include:

1. All water is considered a service provider and therefore other means of providing those services (i.e., transportation of waste, irrigation, heating and cooling), should be considered
2. Match water quality with quality of need, such as non-potable water for irrigation
3. Ecological integrity of water sources and their ecosystems incorporated up front in the planning process
4. Identify a long-term vision for a water future and back-cast to determine the programs and processes needed to attain the vision

The Soft Path approach is founded on the assumption of ecological limits. It is designed to recognize the limits of water resources. In other words, withdrawing increasingly more and more water to meet growing demand presents risks to the community water supply and to local ecosystems. By tapping into the wasted water within the existing system and matching the water supply source with the quality of water required to perform the service, the Soft Path approach ensures the sustainability of the water supply system.

The application of Soft Path is unprecedented in a large, two-tier municipality with nine autonomous municipalities such as York Region.

1.4 Project Methodology

A four-phased process was employed to develop the LTWCS: Phase 1, Project Design and Organization; Phase 2, Review and Research; Phase 3, Public Engagement and Consultation; and Phase 4, Analysis and Strategy Development. Phase 2 and 3 ran concurrently with the findings from each phase informing the other (A detailed discussion of the project methodology is provided in Section 4.2 of the main report).

1.4.1 Best in Class

A review of best-in-class water conservation and efficiency programs and practices from jurisdictions around the world was undertaken in Phase 2. A preliminary scan of external water conservation reports and programs, contact with sector experts and a review of internal Regional studies and reports was undertaken to identify leading jurisdictions for the best-in-class review. Over 175 leading water conservation programs, policies and initiatives covering hard infrastructure through pricing, and outreach and education were reviewed for the best-in-class research. A detailed discussion of the findings from the best-in-class review is provided in Section 5.0 and a copy of the Best-in-class Report in included in Appendix 5.

1.4.2 Public Engagement and Consultation

Concurrently with the Review and Research phase was engagement and consultation with a wide range of stakeholders throughout the Region. Stakeholder engagement was critical in developing a vision for the LTWCS. Findings from the best-in-class review were shared with stakeholders, providing an opportunity to collectively explore innovative ways and means of achieving the vision. Stakeholders identified key themes for the duration of the LTWCS and identified "time zones" for their development and implementation. The key themes for each identified time zone to emerge from the public engagement and consultation process is summarized below.

All aspects of the LTWCS, from the vision for a water future for York Region through the assessment and vetting of program components, were informed by findings from the public engagement and consultation process (A complete discussion of the process is included in Section 4.3 of the main report).

Stakeholders identified key themes for the duration of the LTWCS and identified "time zones" for their development and implementation.

1.4.3 Scenarios

Once the long term vision of "No New Water" and aspirational water saving targets were identified through public consultation and engagement, scenarios – an exploration of ways and means to realize the vision – were developed. In developing the scenarios an analysis of water consumption by municipalities and an assessment of potential water savings achievable across all sectors was undertaken.

Three scenarios summarized below considered conservation program uptake rates and potential reductions in indoor and outdoor water use as a result of new regulations, new technology, pricing and other drivers both regionally and provincially. Through this Soft Path process, the scenarios explore possible water savings from regionally developed incentive programs to more complex regulatory and infrastructure related initiatives.

The aspirational target scenario of no new water by 2051 used a back-casting methodology by assuming total water used across all sectors in 2051 is equivalent to that used in 2011. Any potential scenario, including no new water, cannot be a straight line from 2011 to 2051. Programs and practices take time to develop and reach potential, particularly where policy, regulations, and infrastructure are concerned; therefore, there will be an increase in actual total consumption before a decrease back to 2011 levels

The three scenarios developed are summarized as follows and are presented in Table 1 – Water Use Scenarios.

York Region Jurisdiction – Incentive Programs: This scenario assumes 10% uptake of new development incentive-based programs from the Region achieving 150 litres per capita per day (lpcd), indoor use. Total residential outdoor water use is reduced by 2.5% every 5 years through incentive and education programs and other financial drivers such as conservation-oriented pricing.

Provincial Programs and Support – Incentive Programs + Legislative Changes: All of the above incentive and education programs plus provincial updates to the building code and/or plumbing code to include water efficient fixtures to bring indoor water use to 175 lpcd beginning in 2016 and 150 lpcd beginning in 2021 and/or legislation giving municipalities the authority to enforce building standards above and beyond the Ontario Building and Plumbing Code.

No new Water – Incentive Programs + Legislative Changes + Water Re-use: Includes all of the programs and initiatives identified in the previous scenarios with the addition of significant water reuse and/or alternative sources for use in fixtures and processes that do not require potable water such as outdoor irrigation, industrial process water, toilet flushing, etc. commencing in 2021. This scenario

aspires to achieve 150 lpcd unit rate average for all residents, new and existing development and includes indoor and outdoor potable water use. In conjunction, ICI total water consumption would be reduced from the Water and Wastewater Master Plan anticipated 216.6 million litres per day (MLD) to 131.8 MLD by matching water quality with quality of need.

The scenarios and their potential impact on water use over the 40 year timeframe of the LTWCS are discussed in detail in Section 4.4.6.

	Residential water use (litres per person)			
	2011	2021	2031	2051
York Region Jurisdiction • Incentive Programs	252	235	230	224
Plus Provincial Programs and Support • Incentive programs and legislative changes		233	225	214
"No New Water" • Incentive programs, legislative changes and adopting water re-use or alternative sources for all outdoor and other non-potable uses		233	206	150

Water Use Scenarios

1.5 Research Findings & Assessment

The findings from the best-in-class review are the basis for the program components that comprise the LTWCS. The best-in-class programs and practices from leading jurisdictions were assessed for their relevance and applicability to York Region prior to inclusion in this strategy.

The program components from the best-in-class review were organized into the following categories:

Governance & Administration – research showed that leading jurisdictions in water conservation and efficiency utilize multi-stakeholder, multi-disciplinary committees to provide advice, guidance and feedback on programs from concept and design through implementation and monitoring. Representation on such committees often include local residents, academic experts from colleges and universities, builders/developers, ICI facility managers and operators, landscape irrigation specialist and landscape designers/contractors, plumbers, water auditors, process engineers, and water and water industry professionals.

Another management tool employed by leading water conservation jurisdictions is program tracking and reporting. Many best-in-class jurisdictions use an annual scorecard approach to track and assess water savings and the return on investment (ROI). Water saving targets and key performance indicators are developed and used to track the success of any given conservation and efficiency initiative.

Policies and By-laws – In leading jurisdictions, particularly those where water shortages are a reality, policy and regulatory initiatives to drive conservation actions down the water supply chain are commonplace. National, provincial/state and local level polices and regulations identified through the best-in-class research addressed all facets of water conservation and efficiency from pricing and economic instruments to building and technology performance standards. Regulations are used in combination with incentive and education based initiatives providing a mix of carrots and sticks.

Rebates and Other Financial Instruments – Financial incentives, such as tax credits and rebates for water conservation fixtures, equipment and devices and/or penalties for excessive water use or wastage are utilized by best-in-class jurisdictions. It should be noted that such financial instruments are not stand-alone drivers for conservation but rather are part of a larger suite of initiatives used by municipalities or water utilities.

New Development – As research showed, the greatest opportunity for water conservation and efficiency resides with new development. Practices such as dual plumbing for grey water recycling, installations of cisterns and rain water harvesting systems, landscape design for zero or minimal irrigation, etc., are more viable for new development. It is important to note however, that responsibility for planning and development approval for new construction resides with the nine local municipalities, not with the Region.

Conservation-Oriented Pricing – Best-in-class jurisdictions employ some form of conservation-oriented pricing which is attaching an economic value to a unit of potable water at a level that encourages water conservation on the part of the consumer. There are three forms of conservation-oriented pricing:

- fixed rate where the value is set at a point to encourage conservation (some form of discount to low income customers is often provided)
- seasonal tiered block rate where a seasonal rate or surcharge is applied during the warm weather months to discourage excessive water use for irrigation and other outdoor purposes. The goal is to reduce summer peak demand which can result in greater than 50% increase in water use and strain on the water supply system.
- tiered block rate involves the application of a tiered or increasing block rate concurrent with a customer's water use. Those customers who use the least amount of water pay the lowest unit rate while those using the most water pay a premium or the highest per unit cost for the water.

Pilot and Demonstration Projects – Pilot and demonstration projects are standard business practice for all potentially large scale undertakings. Leading jurisdictions used pilot projects to test new technology, rebates and other financial incentives, policies and by-laws, pricing models, etc. In addition, demonstration projects aimed at residents and ICI clients were used by many municipalities to showcase the benefits of a given water conservation practice or technology.

Regional-Municipal System – The best-in-class review examined the practices in three main stages of a system life cycle; planning, design and construction, and operation. Leading jurisdictions harmonize water quality objectives with water conservation and they do so by:

- closely scheduling infrastructure construction with the service demand to avoid oversized mains with underserved population;
- having a robust water quality program including co-ordinated sampling and conservation-based automated flushing program;
- employing pressure control and flow monitoring such as district metered areas within a leak detection program; and,
- assessing the condition and implementing an asset management program for water main replacement to prioritize repair and replacement of leak- or break-prone mains.

1.5.1 Screening and Evaluation

Best-in-class potential program components were identified for each of the categories identified above. In order to identify those program components to be included in the LTWCS, screening and evaluation criteria specific to York Region were developed to qualitatively analyse options. Screening or "knock-out" criteria culled the list of potential program components. Those components which passed the screening process were then assessed and ranked based on evaluation criteria (A detailed discussion of the screening and evaluation criteria and approach is included in Section 5.8).

1.6 Program Components

The screening and evaluation of potential LTWCS program components resulted in a go-forward list of projects, practices and initiatives to be evaluated and/or implemented between 2011 and 2021. It is considered impractical at this stage to suggest potential program components beyond the 10-year horizon since beyond this timeframe it is reasonable to assume that there will be policy and legislative changes, new technology and process and/or climate and other related ecological and water resource changes that will impact the LTWCS and the program components to be considered for implementation.

The strategy includes a qualitative analysis of program components that pass requirements pertaining to health, climate suitability, Regional strategic alignment and are within the control of the Region or are achievable through strategic partnerships with lower tier municipalities or other stakeholders. Full qualitative and quantitative vetting of program components, including cost-benefit analyses, return on investment (ROI) assessments, technology evaluations, market surveys and analyses, and pricing options/models assessments will be initiated in 2011 and 2012.

A summary of the LTWCS program components to be implemented over the next decade is summarized in Table 2. To reiterate, these components were drawn from the best-in-class global review and from existing York Region water conservation and efficiency initiatives and are consistent with the findings from the consultation process.

Summary of Program Components by Category

GOVERNANCE & ADMINISTRATION	Measurement and reporting framework
	Regional-municipal Advisory Group
	Implementation Plans
	Multi-stakeholder Advisory Group
	Incorporate LTWCS into infrastructure Master Plan
POLICIES & BY-LAWS	Conservation and low impact development for new development by-law
	Conservation plans for facilities/complexes
	Plumbing retrofit on resale by-law
	Drought response by-law
	Process water reuse by-law
	Update summer conservation by-law
	Water efficiency fixtures and appliances for new development and renovation by-law
	Irrigation system sensor by-law
	Individual unit water metering for multi unit complexes
REBATES & OTHER FINANCIAL INSTRUMENTS	Free water audits and capacity buy-back for businesses
	Incentive for hot water recirculation systems in homes
	Subsidized residential landscape design service
	Front-loading clothes washer installations in Laundromats
	Multi-unit metering subsidy
	Coupon discounts for xeriscape plants
	HET Toilet rebate
	Develop new rebates and incentives and/or modify existing ones
	Subsidized WaterSense toilet installations in multi-family dwellings
	Water efficient fixture rebate
	Water efficient residential furnace humidifier
	Low income incentive program
	Pre-rinse spray valve for commercial kitchens
	Subsidized rain barrels
NEW DEVELOPMENT	Implementation of East Gwillimbury program
	Integrate WaterSense when updating SHIP
	Develop conservation and reuse guidelines
	Integrate WaterSense into LEED programs
	Modify LEED for high rise to increase uptake
	Detailed monitoring for new development
	Modify SHIP to increase uptake and monitor
	Expedited approvals process for green building with local municipalities
	Study to quantify water use for main flushing and disinfecting
	Water reuse projects
	Water efficient landscapes
	Aquifer recharge through community-level water reuse

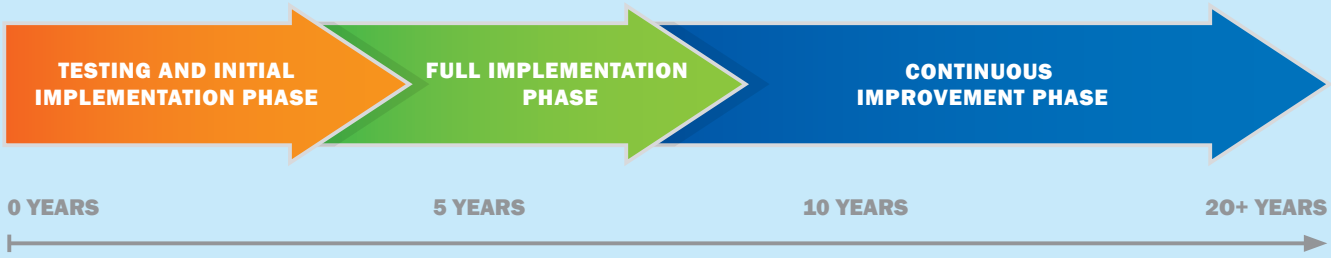
PRICING	Full cost conservation-oriented pricing
MARKETING OUTREACH & EDUCATION	Community-level great 'unlawning' challenge
	Regional marketing, outreach and education strategy
	Water efficient landscape workshops
	Free individual landscape assessments
	Water efficiency outreach program for new Canadians
	Children's Water Festival
	Sector specific water efficiency seminars and workshops
	Water efficiency outreach program for low income housing
	Grade 7 water efficiency curriculum for schools
	Develop curriculum unit on "embedded water"
	Region water efficiency calendar contest for Grade 7 students
PILOT PROJECTS	Expedited approvals for green building in partnership with local municipalities
	Capture and demonstrate results from upgrades at public facilities
	Water reuse projects
	Water efficient landscapes
	Water efficient irrigation
	Dual plumbing in new public buildings
	Quantifying water use for main flushing and disinfecting
	Aquifer recharge through community-level water reuse
REGIONAL-MUNICIPAL SYSTEM	District meter areas
	Flow and pressure control
	Leak detection program
	Design and construction methods – water efficiency and water quality
	Design leakage rates
	Flushing and disinfection
	Disinfection design practices
	Water system and storage flow (circulation) design
	System flushing and swabbing
	Process control at water treatment plants

1.7 Implementation Schedule

The implementation of the LTWCS program components is based on a 10-year timeline in recognition that beyond this timeline unforeseeable changes to federal and provincial policy and regulations, climatic conditions (and resulting alterations in weather patterns, water resources, water availability), area watersheds and ecosystems, and residential and ICI development and technology will occur. The implementation of the LTWCS is divided into three primary phases (see Table 3 below).

A timeline for the implementation of detailed implementation plans, cost benefit and return on investment is summarized in Table 4.

Summary of Key Actions by Phase



TESTING AND INITIAL IMPLEMENTATION PHASE

- Continuation of current programs
- Development & testing of monitoring programs
- Based on best in class development of guidelines for commercial & industrial, residential development programs, implementation plans, cost/benefit analysis
- Implementation through pilots & demonstration projects
- Continued consultation and creation of partnerships
- Creation of marketing, outreach and education plan and phased implementation
- Implement efficiency standards for new developments

FULL IMPLEMENTATION PHASE

- Testing & evaluation of programs and initiatives
- Implement conservation pricing
- Develop water reuse policies for ICI
- Partnerships for wider implementation
- Comprehensive data gathering and program monitoring
- Monitor for new technology and practices and test through pilot projects
- Continued implementation of marketing, outreach and education plan

CONTINUOUS IMPROVEMENT PHASE

- Water innovation embedded in residential and ICI through reuse, efficiency and conservation initiatives
- Programs/initiatives are enhanced as technologies & opportunities arise
- Partnerships are the collaborative delivery mechanism
- Monitoring in full force to determine what's working and what can work better

Timeline of Detailed Implementation Planning

PROGRAM COMPONENTS	NEW PROGRAMS	2011	2012	2013	2014	2015
New Developments	Develop plan to increase uptake of SHIP and LEED programs	START				
	Develop detailed monitoring program	START				
	Implement detailed monitoring					
	Create commercial industrial conservation and efficiency guideline	START				
	Pilot and demonstration projects					
Governance, Policies and Administration	Multi Stakeholder Advisory Group					
	Evaluate conservation based Pricing				START	
	Evaluate plumbing retrofits on resale homes			START		
	Develop annual measurement and reporting framework	START				
	Provincial Advocacy to encourage water efficiency					
	Incorporate results of LTWCS into infrastructure master plans			START		
Regional-Municipal System	Leak reduction					
	Develop process and implement monitoring and evaluation of water consumption	START				
	Guideline for retrofits of municipally owned buildings	START				
	Pilot and demonstration projects					
Financial Incentives	Capacity buy-back for industrial commercial institutional	START				
	Clothes washer installations for industrial commercial institutional	START				
	Evaluate low income incentive program				START	
	Evaluate multi unit meter subsidy			START		
Outdoor Water Use	Evaluate water efficient landscape design and assessment programs		START			
	Evaluate water conservation bylaw		START			
	Pilot Projects					

1.8 Opportunities And Constraints

In the review of best-in-class jurisdictions in water conservation and efficiency, opportunities and constraints for York Region's LTWCS were identified and may be summarized as follows:

1.8.1 Opportunities

Many of the leading jurisdictions in water conservation and efficiency are located in areas where water availability for most of the year, and year in and year out, is a reality. As a result, there are national and/or provincial/state policies, programs and regulations in place which support water conservation programming.

- **Established Water Conservation and Efficiency Programming** – York Region's 10-plus year record of water conservation and efficiency is consistent with other leading jurisdictions which have an established pattern of conservation-oriented water management. Consequently, the LTWCS is not a starting point, but rather, effectively builds on the success of existing Regional programs and processes.
- **Wholesaler Influence** – As a result of its wholesaler status, the Region can to a degree use policies and pricing to influence or motivate conservation and efficiency programming and practices at the local municipal level. In leading jurisdictions where there is a wholesale supplier and municipal/utility provider structure, pricing and contractual arrangements are used to drive conservation down to the consumer.
- **Partnerships** – Best-in-class jurisdictions, without exception, use partnerships and joint ventures with their municipal/utility clients and with other stakeholders to develop and deliver more impactful and cost-efficient water conservation and efficiency programs. York Region is well positioned to utilize existing partnership to deliver programs and to foster new partnerships. Strong connections with key stakeholders were made through the LTWCS public engagement and consultation process and there is a significant opportunity for the Region to cultivate these relationships into productive partnerships.

1.8.2 Constraints

The best-in-class review also highlighted possible barriers or constraints to achieving targeted water savings through the LTWCS. In some instances, the Region has the authority or the capacity to overcome or mitigate the constraint, in other instances; it is beyond the control and/or influence of the Region itself.

- **Supporting Provincial Legislation and Regulations** – All best-in-class programs and practices by leading jurisdictions were backed by supporting state/provincial and/or national policies, programs and regulations. Leading countries in water conservation such as Australia, Spain, America, Germany and England have state and/or national requirements for water conservation and in some jurisdictions, such as California, actual reduction targets are set for all regions. This approach ensures a level playing field, creates a favourable market for water conservation products and services, and provides municipalities or water utilities with the tools they need to make water efficiency and conservation a reality.
- Ontario Plumbing and Building Code – Of particular reference as a major obstacle to enforcing water efficient building standards is provincial Plumbing and Building Code. Section 35 of the Act stipulates that the Act and the code supersede all municipal by-laws and in the event that the "…Act or the building code and a municipal by-law (includes upper-tier municipalities) treat the same subject-matter in different ways with respect to standards… [the] Act or the building code prevails and the by-law is inoperative to the extent that it differs from [the] Act or the building code for the use of a building."
- Climate – Many leading jurisdictions in water conservation and efficiency are located in areas with arid or semi arid climates where water availability issues are a reality throughout the year and winter freezing is not a consideration. Certain initiatives, such as centralized grey water systems for irrigation, are not necessarily viable in York Region. Such systems are used in areas where there is year-round irrigation. In York Region, the season is about 3 to 4 months with high outdoor water demand for only about 2 of those months. This reality limits the ROI of such systems for York Region.
- Regional-Municipal Structure – As an upper tier municipality comprised of nine local municipalities, the Region has limited authority in many areas pertaining to water conservation and efficiency. The local municipalities or their utility representatives are responsible for direct communications with customers and water billing; collection of customer water use data, planning and development approvals and the municipal portion of the water distribution system.

- Soft Path – Although it was chosen because of its innovative engagement process and holistic approach to water management, Soft Path is untested in a large upper tier Region with nine independent, local municipalities. In addition, there are two potential constraints associated with Soft Path. Firstly, scientific knowledge of water ecosystem needs is a new and evolving science and the scope of water sources to be taken into consideration is vast. Secondly, full cost accounting does not currently take into consideration the value of conserved water in terms of wastewater treatment, water source protection, etc., therefore there is an inherent bias toward conventional solutions.
- **Access to Water Use Data** – the local municipalities or their water utility providers are responsible for the collection of customer water use data. From a Regional perspective, two significant constraints exist. Firstly, it is often very difficult to secure the needed water use data and secondly, there is limited consistency in the data that is collected and supplied to the Region making analysis and comparisons difficult at best.
- **Planning and Development Approvals** – Local municipalities have primary responsibility for the review and approval of new construction. Best-in-class jurisdictions use incentives, such as expedited approvals and increased density allocations and disincentives such as increased development fees or surcharges to drive green building and the use of water conservation products and practices. In order to implement such leading initiatives, the Region will require the active participation of the local municipalities.
- **Water System** – Currently there is a lack of quantifiable data on water usage for construction and operation purposes and a lack of detailed condition and performance data on water mains. In conjunction, there is a significant cost associated with maintaining existing high risk water mains and there are competing demands to maintain water quality in the face of diminished water demand.

1.9 RECOMMENDATIONS

The recommendations in the Long Term Water Conservation Strategy came out of the best-in-class review and the assessment of the opportunities and constraints for water conservation and efficiency in York Region.

- **Provincial Legislation and Regulations** – For the province and its regional and local municipalities to truly be leaders in water conservation and efficiency it is imperative that the legislative and regulatory framework to support such programming be in place.
- The Ontario Building and Plumbing Code should be modified to require water efficient appliances and fixtures
- The sale of 13-litre toilets should be banned
- Standardized water use data collection, reporting and billing should be a requirement for all municipalities and utility providers
- Public reporting of water use and water savings data should be required.
- **Regional-Municipal Co-operation** – In order to address the complexities associated with a two-tier municipal structure it is recommended that the:
  - Region seek the endorsement of the LTWCS by the local municipal councils;
  - Water and Wastewater Steering Committee comprised of Regional and local municipal staff help direct and facilitate co-ordination and co-operation between relevant regional and municipal departments for the delivery of the strategy; and,
  - MOE provides a clear statement to local municipalities and their utility providers to furnish water use data in a format to be specified by the Region.

Soft Path – In order to address the potential constraints associated with the Soft Path approach it is recommended that implementation planning for the LTWCS program components employ Soft Path accounting practices and that there is on-going monitoring and updating of the methodology as required.

Water System – To address the constraints associated with the Regional-Municipal water supply system, it is recommended that the Region utilize the Regional-Municipal Water and Wastewater Steering Committee to facilitate co-ordination of planning, leakage detection, asset management, flushing programs and other system related matters.

1.9.1 Annual Monitoring and Reporting

York Region has established monitoring and reporting protocols and has undertaken on-going monitoring of its Water for Tomorrow conservation initiatives. Under the LTWCS, the Region will build on the existing monitoring program and employ additional metering, measuring and reporting mechanisms. Annual progress reports will be submitted to the MOE for their review and public reporting of water use savings and associated activities will also be carried out on an annual basis.

1.9.2 Updating the Long Term Water Conservation Strategy

The LTWCS will be implemented over a 40-year timeframe, therefore regular updating of the strategy will undertaken every five years to ensure it remains current and reflects any changes in provincial policies, programs and regulations; water using technologies and processes; climate; water resources and ecosystem health; building practices; and water pricing and associated accounting practices.

1.10 CONCLUSION

York Region has a proven record of water conservation and efficiency programs spanning more than a decade. This strategy expands on existing Regional plans, strategies and programs and sets the stage for innovative and jurisdiction-leading water conservation and efficiency programming for the next 40 years.

A peer review of the LTWCS by water conservation experts and program managers from leading jurisdictions across Canada and the United States has been undertaken. The comments and feedback received from the peer reviewers has been incorporated. The final, peer reviewed strategy will be submitted to the Ministry of the Environment for review and approval.

Roll out of the strategy will begin with the development of detailed implementation plans, including full cost-benefit analysis, ROI assessments, technology evaluations and resource assessments for the identified program components.

2.0 Background and Context

The Regional Municipality of York is centrally located in the Greater Toronto Area (GTA), directly north of the City of Toronto. York Region is one of the fastest growing areas in Canada with a current population of over 1 million. By 2031, the population is projected to increase by approximately 500,000 and by 2051, the population is projected to increase by approximately 800,000.

York Region is considered an "Upper Tier" (UT) municipality and is comprised of nine local or "Lower Tier" (LT) municipalities. As an UT municipality, the Region is responsible for water supply, production, treatment, storage, and trunk distribution. York Region is the wholesale supplier of drinking water to the LT municipalities, which are the retail suppliers of water to the consumer and are responsible for their own distribution networks. All water billing is the individual responsibility of the nine local municipalities.

York Region is the only GTA municipality without direct access to Lake Ontario for its water supply. Currently, the Region obtains its water from Lake Simcoe and ground water sources via its system of production wells. The Region also purchases water from the City of Toronto and the Region of Peel to offset demand on ground water sources and to meet the needs of water customers in the southern LT municipalities. Rural areas use ground water accessed through private wells. The Region operates and maintains:

- Two (2) water treatment plants
- 22 water pumping stations
- 43 storage facilities (elevated tanks and reservoirs)
- 39 production wells
- 310 kilometres of transmission mains

The Regional Municipality of York is made up of a confederation of nine municipalities and provides services to over 1 million residents, 29,000 businesses and 495,000 employees. York Region has a two-tier government structure, with services provided by the Region and local area municipal governments which include Georgina, East Gwillimbury, Newmarket, Aurora, Whitchurch-Stouffville, Richmond Hill, Markham, King and Vaughan.

Figure 1 below provides a map showing the water supply distribution in York Region.

York Region is also responsible for the collection, conveyance and treatment of wastewater.

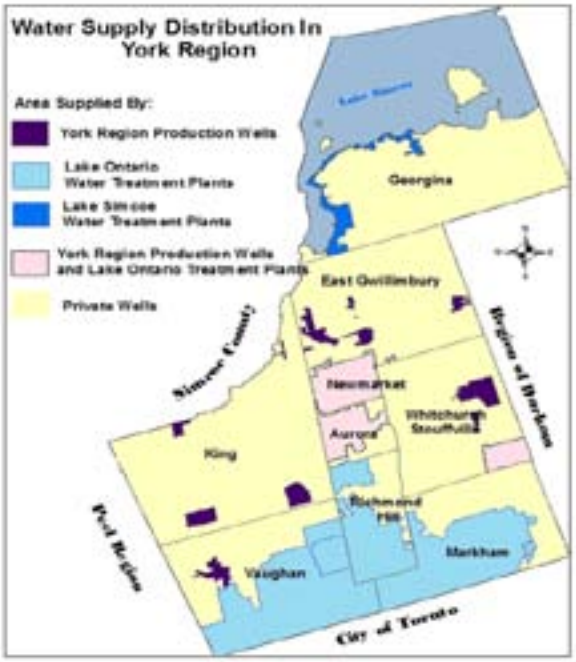


Figure 1 – Map of York Region Water Supply

As per Provincial direction through the Places to Grow legislation, York Region has adopted a Regional Official Plan which directs how the Region will grow until 2031 and how that growth will be distributed with a focus on sustainability principles. Water supply and wastewater treatment are significant Regional growth considerations. Integrating water infrastructure planning with water conservation and efficiency programming is critical to meeting growth based increases in water demands while ensuring a sustainable water supply and ultimately, a long term reduction in water use across all sectors in York Region.

The primary growth areas are the Designated Greenfield Areas, Urban Growth Centres, Regional Corridors and New Community Areas. It is anticipated that a large portion of growth in the earlier timeframes of the Long Term Water Conservation Strategy (first 5 to 10 years) will occur in the Greenfield Areas in grade-related form with an increasing amount of growth in the Urban Growth Centres and Regional Corridors in the form of high-rise development.

Water supply and wastewater treatment are significant Regional growth considerations.

The majority of the growth over the 2031 Planning horizon will occur within the existing built-up area or within Designated Greenfield Areas. These areas are already designated as Urban or Town and Village in the Regional Official Plan. About 12% of growth will occur in our New Community Areas where more stringent sustainable development policies can be applied as local Secondary Plans have yet to be adopted for these areas and are subject to the New Community policies of the Region's new Official Plan. Figure 2 – York Region Growth Areas shows the forecast growth throughout York Region by Municipality and by housing type (i.e. single family homes and apartments).

Growth areas provide one opportunity to seek better building and community design that provides for water conservation, while the existing areas that over 1 million people call home have an even greater opportunity to conserve water through programs outlined in this strategy that build on the existing Water for Tomorrow initiatives. Implementation of development related initiatives must be completed in partnership with the nine local municipalities as planning approvals is a two-tiered system as is water and wastewater infrastructure.

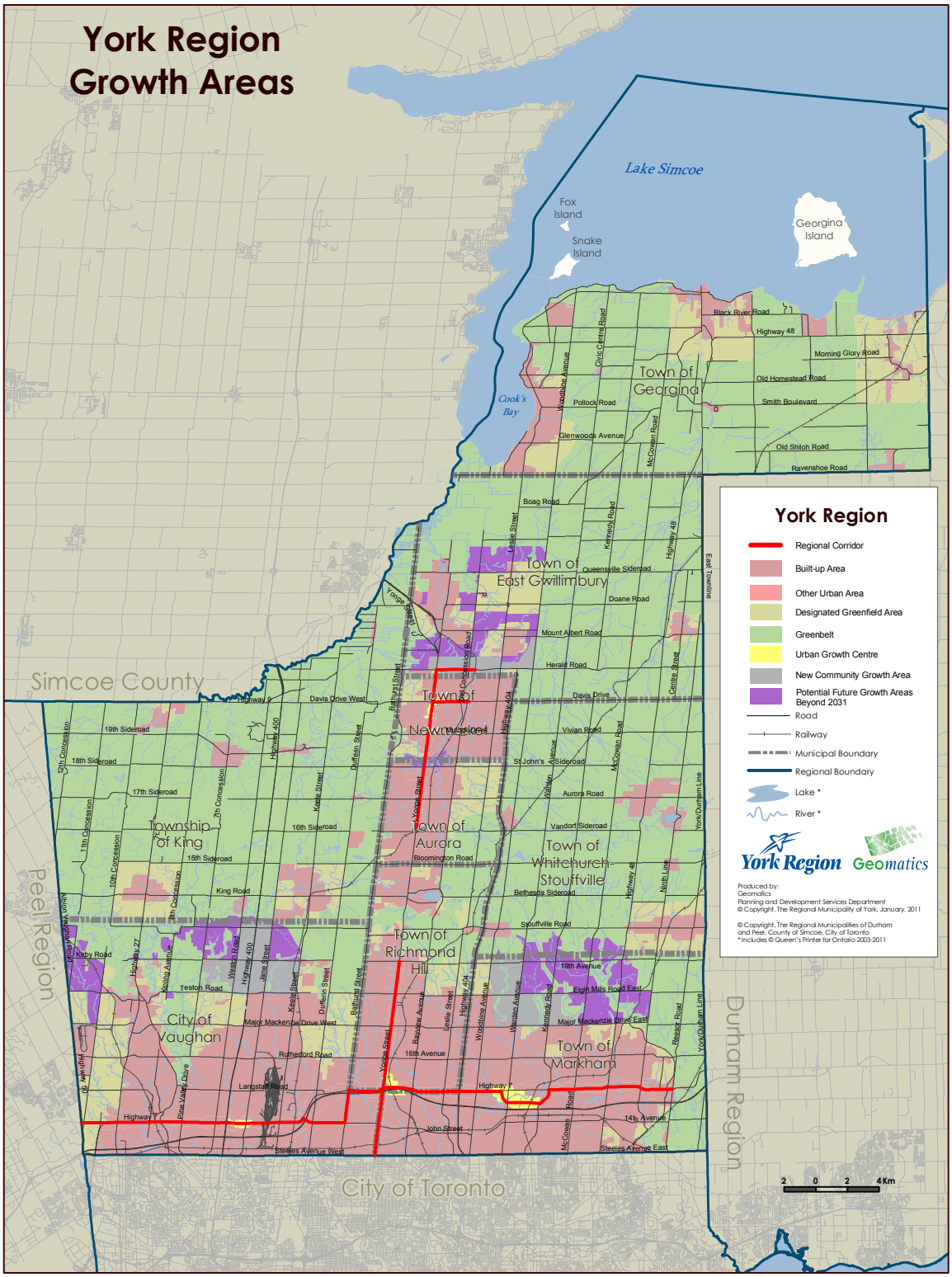


Figure 2 – York Region Growth Areas

Even with water conservation, the demand for water will continue to increase over the next 40 years due to approved increases in population and employment. The LTWCS acknowledges the limits of water resources. Withdrawing more and more water to meet growing demand presents risks to the community water supply and to local ecosystems. Tapping into the wasted water within the existing system and matching the water supply source with the quality of water required to perform the service, will enable the Region to meet growth related increases in water demand with no additional water takings. This will ensure the sustainability of the Region's water supply system and long term water savings across all sectors.

Forecast Growth for York Region 2006-2031

	HOUSING UNITS	GROWTH	POPULATION	GROWTH
2006	275,545	-	931,900	-
2011	325,666	50,121	1,071,100	139,200
2016	375,462	49,796	1,200,100	129,000
2021	424,573	49,111	1,313,800	113,700
2026	468,783	44,211	1,412,100	98,300
2031	506,804	38,021	1,500,000	87,900

Allocation of Housing Unit Growth in York Region 2006-2031

	GROUND-RELATED UNITS	APARTMENT UNITS	TOTAL	SHARE
Within Built-Boundary	32,985	73,785	106,770	46%
Designated Greenfield Areas	91,444	5,788	97,232	42%
New Communities	24,529	2,726	27,255	12%
Total	148,958	82,299	231,257	100%

York Region Population Forecast by Local Municipality

	2006	2011	2016	2021	2026	2031
Aurora	49,700	57,300	63,700	68,100	69,600	70,200
East Gwillimbury	22,000	26,300	34,700	48,100	66,300	86,500
Georgina	44,600	48,700	52,800	57,900	63,900	70,300
King	20,300	23,400	27,000	29,900	32,500	34,900
Markham	273,000	303,500	337,800	370,300	398,300	421,600
Newmarket	77,600	84,000	88,700	91,900	94,500	97,100
Richmond Hill	169,800	195,000	216,900	231,400	239,100	242,200
Vaughan	249,300	294,200	329,100	360,400	388,800	416,600
Whitchurch-Stouffville	25,500	38,700	49,400	55,800	59,100	60,600
York Region	931,900	1,071,100	1,200,100	1,313,800	1,412,100	1,500,000

2.1 Water Conservation and Efficiency

In 1996, York Region embarked on a Long Term Water Project Master Plan Study. The objective of the study was to develop a comprehensive long term strategy to serve the Region's water supply needs to 2031. Regional Council adopted the Long Term Water Project Master Plan in December 1996 that included the implementation of Region-wide water efficiency measures. Figure 3 provides a timeline of water efficiency initiatives beginning in 1996 and extending into the future to illustrate planned initiatives.

Since 1998, water conservation and efficiency has been an integral part of York Region's long-term drinking water supply strategy. The Water for Tomorrow (WFT) program operated by the Region is saving an estimated 22.4 million litres of drinking water per average day. This translates into a total water savings sufficient to supply drinking water to about 88,000 York Region residents. The WFT program has also contributed to the Regional objective to reduce greenhouse gases. As a result of York's water conservation and efficiency programs and initiatives, there is an annual reduction of over 3,809 tonnes of carbon particulates and 14,375 tonnes of carbon dioxide.

As a result of York's water conservation and efficiency programs and initiatives, there is an annual reduction of over 3,809 tonnes of carbon particulates and 14,375 tonnes of carbon dioxide.

Water for Tomorrow has delivered the following programs:

- Annually conducting 1,000 free personalized lawn and garden visits to assess gardens and offering advice on creating a beautiful and water efficient landscape.
- Offering up to 15 free water efficient garden design workshops in the spring of each year.
- Providing useful information and tips on how to use less water in the home.
- Partnering with garden centres, community groups and schools to provide water efficient demonstration gardens.
- Offering rebate incentives for water efficient fixtures for residents and businesses.
- Offering heavily-discounted rain barrels for sale each spring.
- Providing student education in the form of a Grade 7 curriculum for teachers and workbooks for students.
- Providing both business and industry with an opportunity for free water efficiency audits and financial incentives for switching to more water efficient practices.
- Offering free pre-rinse spray valves for commercial kitchens.
- Undertaking on-going system leak detection and repair.

Figure 3 – Water Efficiency Initiatives in York Region Timeline

2.1.1 Water Efficiency Master Plan Update

In 2007, York Region developed a Water Efficiency Master Plan Update providing a 10-year water conservation and efficiency plan for the Region (A copy of the Master Plan is included in Appendix 2). The Master Plan Update set the strategic direction for water efficiency and supports York Region's Sustainability Strategy. The development of the Master Plan Update involved screening an extensive list of water efficiency measures based on local and North American programs. Through the screening process, a short list of recommended measures was identified and over the past two years, York Region has implemented many of these measures which may be described as follows:

- **Residential Program** – The program offers all residents of single and multi-family high-rise dwellings incentives for installing water efficient measures inside and outside the home. These incentives are provided through rebates for the purchase of new water efficient toilets, clothes washers, central humidifiers, and rain barrels. York Region also provides water efficient landscape visits to assist residents with reducing outdoor water use for irrigation.
- **Industrial, Commercial and Institutional (ICI) Program** – This program is aimed at ICI facility/building managers, laundromat owners, commercial kitchens and large volume industrial clients. The program provides rebates towards the purchase of new water efficient toilets and clothes washers; installation of low flow pre-rinse spray valves, free of charge to commercial kitchens in the Region; and water audits, free of charge to large volume industrial clients including a capacity buy-back incentive to replace inefficient processes with water efficient ones.
- **Distribution Leakage Detection Program** - As part of the Water Efficiency Master Plan Update an International Water Association (IWA) Water Audit and Water Balance was completed. This audit identified potential leakage throughout the municipal and regional distribution system and the Region began a pro-active leak detection and repair program.
- **Education Program** – The program recognizes the importance of education as a tool in changing water use behaviour over the long term. Water for Tomorrow updated the successful youth education program including; the York Children's Water Festival, grade 7 curricular program, poster drawing/calendar contest, and website.

The program also includes literature such as booklets, leaflets and flyers, bi-annual water efficiency bulletins distributed with water bills, display booths at home shows, fairs and other community events, displays at Regional Administration Centre and area municipality civic centres, presentations at service clubs, community and youth groups, water efficient display gardens, water efficient gardening seminars and workshops, material supporting the Water Efficient Landscape Home Visits such as DVDs, fact sheets, plant lists and the Water for Tomorrow website. The first year of the program would include developing new graphics and designs for the education materials.

2.2 Project Purpose

In 2011, the Region is estimated to provide just over 400 million litres per average day (MLD) to the local municipalities for distribution to their water customers. Without progressive conservation programming, this amount would be expected to increase proportionally with growth in population to about 645 MLD by 2051. Attendant with this growth in population will be an increase in wastewater flows requiring additional sanitary sewer flow and treatment capacity.

To meet the projected growth in demand for wastewater management and water treatment and supply, York Region has implemented initiatives to secure additional sanitary sewer flow capacity and to an Intra-Basin transfer of water from Lake Ontario to the York Region's water system in order to meet the need for drinking water in the Towns of Aurora, Newmarket and East Gwillimbury that are located in the Lake Huron watershed. The development of a Long Term Water Conservation Strategy is a condition of approval for both initiatives.

2.2.1 Provincial Approvals

A key component of sewage management in the Region is the jointly operated York Durham Sewage System (YDSS) that is owned and operated by York Region and Durham Region. The YDSS is made up of several separate components that operate to provide sewage servicing to the majority of York Region. An integral component of the YDSS is the existing Southeast Collector (SEC) Trunk Sewer. An "Individual Environmental Assessment" (IEA) has been completed by York Region and Durham Region to address the projected increase in sewage flows resulting from approved growth and the need to augment the capacity of the SEC Trunk Sewer.

The Province has approved the IEA for this increased capacity and as part of the approval process imposed specific conditions that must be met in order to proceed with the implementation of this initiative. Some of these conditions affect the Region's water conservation plans and programs. Conditions of approval as set out by the Province that are related to water conservation and efficiency are as follows:

- Prepare a Long Term Water Conservation Strategy (LTWCS) including targets and timelines for achieving targets, as well as strategies, tactics, programs and initiatives to be used, including the cost to implement.
- Prepare a review and analysis of "Best-in-Class" water conservation and efficiency programs, initiatives, strategies and tactics adopted by other jurisdictions and throughout the world.
- Consult with LT municipalities, the Southeast Collector Trunk Sewer Advisory Committee, the public, relevant government agencies and the Central Regional Office of the Ministry of the Environment (MOE).

- Carry out the LTWCS
- Secure a peer review of the LTWCS compared to the Best-in -Class tactics and strategies used by other jurisdictions.
- Monitor and report annually on progress in implementing the LTWCS.
- Post a copy of the LTWCS and the annual reports on the project website
- Undertake a review and update the LTWCS at a minimum once every 5 years until the MOE Central Region Director indicates that updates are no longer required.

As discussed, approved population growth will also result in increased drinking water demand. York Region is committed to water conservation as a means of offsetting demand and freeing up additional supply from the existing system. That said, new supply is required. Consequently, the Region undertook an initiative to increase the intra-basin transfer of drinking water from the Lake Ontario watershed to the towns of Aurora, Newmarket and East Gwillimbury that are located in the Lake Simcoe watershed. In concert with the requirements for water conservation planning and programming under the approved IEA for the Southeast Collector Trunk Sewer, the Province has also included similar requirements as part of the conditions of approval for the Region's intra-basin water transfer of drinking water.

Water conservation goals are set out in the Regional Official Plan and with its endorsement by Council and approval by the Province; there is a commitment to implement innovative water conservation and efficiency programming well into the future.

2.2.2 Provincial Requirements and Regional Initiatives

The provincial requirement for a LTWCS and other related initiatives is consistent with the Region's water conservation goals, expands on existing programs and sets out a process for achieving water conservation and efficiency over the next 40 years. In the current Regional Official Plan (2010), there is a significant focus on sustainable development. Water conservation goals are set out in the Regional Official Plan and with its endorsement by Council and approval by the Province; there is a commitment to implement innovative water conservation and efficiency programming well into the future. The LTWCS translates this commitment into actionable, innovative water conservation and efficiency programming and water resource protection to 2051.

Photo courtesy of Claire Malcolmson

3.0 Vision and Objectives

With consideration given to the conditions for approval set out by the Province, a decision was made to move beyond a traditional approach to municipal water supply and management for the Long Term Water Conservation Strategy.

To accommodate approved growth, municipalities typically have focused on increasing water takings (new supply) coupled with Demand-Side Management (DSM), which involves freeing up existing water supply through the use of water efficient technologies at the consumer or demand-end of the supply system. In addition to the traditional approach of DSM there was a strategic decision to take a new approach to develop a vision for the Strategy based on stakeholder input through the Soft Path approach.

3.1 Developing the Vision

Moving beyond the traditional method of water management led to the "Soft Path" approach to establishing a long term vision for water conservation and efficiency in the Region. A Soft Path approach draws on the ideas and feedback of stakeholders to develop a vision for the future and through a process of back-casting; mechanisms and approaches to realizing the vision are vetted and a strategy developed (see Sections 4.1.3 and 4.4 for a complete discussion of the Soft Path approach). Through consultation with a broad range of regional stakeholders, a vision was formulated. The vision is a complex set of ideas for water management and a "water future" for York Region. The "collective" vision for the LTWCS is to move toward "no new water". This vision speaks to stakeholders' view that over the course of the LTWCS, achieving sufficient reduction in per capita water use through regulations, outreach and education, new technology, financial mechanisms and matching the water source with the quality of need (i.e., non-potable water for irrigation and some industrial processes) will ultimately result in no new water takings despite growth in the Region. Achieving this vision will involve all sectors and facets of regional life, from how individual residents approach water use at home and at work, to building new water efficient communities and industrial, commercial and institutional (ICI) developments.

The vision is a complex set of ideas for water management and a "water future" for York Region. The "collective" vision for the LTWCS is to move toward "no new water".

The ambitious LTWCS vision is consistent with the sustainability and water efficiency objectives of York Region, which are spelled out in key regional documents such as the Water Efficiency Master Plan Update (2007), the Sustainability Strategy (2007), the Water and Wastewater Infrastructure Master Plan (2009) and the Regional Official Plan (2010). The LTWCS is informed by the seven major sustainability goals for the Region as illustrated in Figure 4 below.

Figure 4 – York Region Sustainability Goals

3.2 Strategy Objectives

The objectives for the LTWCS, as indicated below, reflect the vision formulated through numerous consultations and the strategic goals set out in Regional Official Plans:

- Be a municipal leader in water conservation and efficiency.
- Maximize sustainability of the water supply through the application of Best-in Class technology and practices.
- Minimize energy consumption and reduce the Region's carbon footprint.
- Maximize the use of energy efficient technologies, processes and practices.
- Minimize the financial costs to York Region's water customers.
- Maximize partnerships with local municipalities and utilities for the cost-effective delivery of the Region's water conservation and efficiency programs.
- Maximize the reliability of the water supply system.
- Minimize the risk of water service disruptions.
- Maximize system flexibility in order to respond to change.
- Ensure the Region's drinking water supply meets all applicable existing and future regional, provincial and federal public health and drinking water quality standards.

- The Regional non-potable water supply meets future standards and is of acceptable quality for intended non-potable uses.
- Alignment with York Region strategic goals as set out in the Regional Master Plan and the York Region Sustainability Strategy.
- Actively engage with the public, youth and other regional stakeholders to find effective means of conserving and protecting the water supply.
- Deliver effective youth-, resident- and ICI-focused water conservation outreach and education programs.
- Develop marketing and outreach resources and initiatives to engage the diversity of cultures living and working in the Region.

The vision and objectives for the LTWCS are consistent with the objectives of the new provincial Water Opportunities and Water Conservation Act (November 23, 2010). The Act is intended to:

- Make Ontario a North American leader in developing and selling water technologies and services through the creation of the Water Technology Acceleration Project (WaterTAP) - a technology hub bringing together industry, academics and government to develop the sector and promote it abroad.
- Encourage Ontarians to use water more efficiently by creating and implementing innovative approaches to conservation.
- Strengthen sustainable municipal water planning by helping identify and plan for long term infrastructure needs.

3.3 Merging Goals and Objectives

The regulations to be developed and implemented under the Water Opportunities and Water Conservation Act, 2010 may provide additional opportunities for new or expanded Regional water conservation and efficiency programs, initiatives and partnerships.

Ultimately, the vision and related objectives for the LTWCS draw on the goals of the Sustainability Strategy to ensure that water conservation and efficiency planning addresses the broader ecological, economic and community-based needs of the Region as illustrated in Figure 5 below.

Figure 5 – Long Term Water Conservation Strategy Embedded in Sustainability

4.0 Project Approach

With consideration for the conditions of approval set out by the Province for the SEC Trunk Sewer and the Intra-basin Transfer initiatives, York Region staff from the Environmental Services Department undertook to design and implement a process to develop an innovative and jurisdiction-leading Long Term Water Conservation Strategy.

Given the breadth and scope of the project, it was decided early in the design stage that a multi-disciplinary and integrated approach to the process would be required. Throughout the strategy development and implementation, on-going research and market assessment ensures an iterative process which is essential for continuous improvement.

Regional staff evaluated options for project management and delivery that would bring together the diverse expertise necessary to develop a multi-faceted 40-year water conservation strategy.

4.1 Project Description

The project involved pulling together numerous and varied components into a cohesive strategy. For this reason, Regional staff evaluated options for project management and delivery that would bring together the diverse expertise necessary to develop a multi-faceted 40-year water conservation strategy. The following sub-sections discuss the project structure and methodology. Project management was the responsibility of York Region staff, but guidance was formally provided by a project Advisory Panel and, as well, through regular meetings with MOE Approvals staff with the advice of the SEC Advisory Committee.

Research (undertaken to develop a Best-in-Class review and report of leading water conservation programs and initiatives across the globe), the development of scenarios to achieve the LTWCS vision, and the evaluation and screening of program components (drawn from the Best-in-Class research) was undertaken by a multi-disciplinary Project Team comprised of Regional staff and external consultants.

4.1.1 Project Advisory Panel

A project Advisory Panel comprised of experts in the fields of water conservation and municipal water management has been established to help guide the development of the LTWCS and provide input and feedback throughout the process (see Figure 6 – Project Organization Chart). Representatives on the Panel are from the Alliance for Water Efficiency, Walter and Duncan Gordon Foundation (a leading organization in water policy and water management programming), POLIS Project (an academic-based organization with expertise in the Soft Path approach and water conservation policy development), the MOE, and the Federation of Canadian Municipalities (FCM). The Advisory Panel meets on a bi-monthly basis where issues and elements of the LTWCS are discussed and explored. The Advisory Panel has helped to shape the process for developing the LTWCS and provided ideas and feedback throughout.

4.1.2 Project Team

The Project Team, comprised of Regional staff and external consultants (see Figure 6), was created to work on each of the project elements including the Soft Path approach, research, public engagement and consultation, water conservation planning scenarios, and all other components of the strategy. The Project Team was led by a senior staff person from the Region's Environmental Services Department with guidance and support provided by other Regional departments for those elements of the strategy applicable to their specialization. For example, guidance and input on green building approaches and options was provided by the Planning Department while the Finance Department provided input and support on full-cost conservation-oriented pricing. Augmenting the staff team are five external consulting firms that have expertise in infrastructure and system design and optimization; public engagement and consultation; Soft Path and scenario development; and conservation programming and strategic planning (Figure 6).

Figure 6 – Project Organization Chart

4.1.3 Soft Path Approach

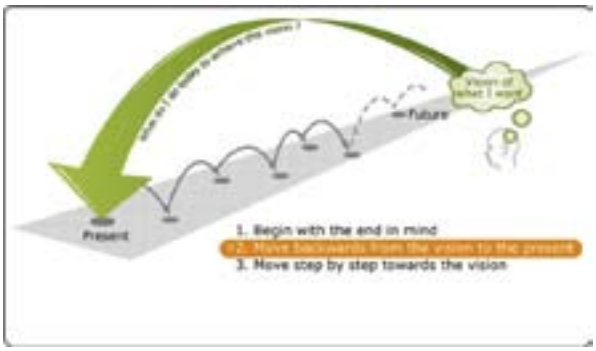
As discussed, the Soft Path approach informed the strategy development process. In greater detail, Soft Path is an alternative to the Demand Side Management (DSM) approach used in the past. DSM develops policies and programs in the short-term, on a cost-benefit of water efficiency basis and relies on gains through consumer education and the application of water efficiency technology. In other words, a DSM approach is most synonymous with infrastructure-focused or "hard" solutions.

Soft Path considers a desired future state of water use 40 to 50 years hence. Future population growth, ecological sustainability and the sources of water are all taken into consideration in developing the vision. Back-casting from the future desired vision then enables the development of a path or paths forward in order to

realize the identified vision. This approach has shown the potential for potable water savings of 30-50%.

The "Soft Path" approach to water management has its origins in Soft Energy Path from the 1970's – a response to the energy crisis. Led by Friends of the Earth, Water Soft Path has been developing over the past 10 years or so, with advancements by groups such as the POLIS Project. The core principles that were developed by these leaders are the basis on which any Soft Path process is founded and are excerpted from "The Soft Path for Water In a Nut"[1]. These principles form the Soft Path lens:

1. **Treat water as a service rather than an end in itself.** Iingenuity allows for the consideration of other means of providing services currently provided by water (i.e. transportation of waste, heating, cooling, irrigation, cleaning, etc.).
2. **Match the quality of water delivered to that needed by the end-use.** The majority of water used in homes, businesses and industries is currently of potable quality, yet for many uses this level of water quality is not necessary. For such uses as landscape irrigation, industrial process water, toilet flushing, etc., alternatives to potable water could potentially be substituted.
3. **Make ecological sustainability a fundamental criterion** and their ecosystems up front in the planning process and not as an afterthought. While this aspect of Soft Path is likely the most challenging to quantify, it is arguably the most important principle in terms of ensuring ecological sustainability. Continuing to increase demands on water systems is not sustainable over the long term.



4. **Plan from the future back to the present.** Identifying a long-term vision for a community's water future and then back-casting to determine the programs and policies needed to attain that vision. Community engagement at the front end of the process is vital to a Soft Path process. Unlike other public consultation processes, the public is not asked to respond to a predetermined vision, they are integral to the development of the vision.

The Soft Path approach is grounded in the knowledge that ecological limits exist. It is designed to recognize the limits of water resources. Withdrawing increasingly more and more water to meet growing demand presents risks to both the community water supply and to local ecosystems. By tapping into the waste water within the existing system and matching the water supply source with the quality of water required to perform the service, the Soft Path approach ensures the sustainability of the water supply system.

While challenges are always present with every pioneering effort, the opportunities for growth and sharing experiences are many.

The application of Soft Path is in its early stages and the use of processes anchored in the principles above is growing. The application of the Soft Path approach in a large, two-tier municipality such as York Region, with its nine autonomous local municipalities, is without precedent. While challenges are always present with every pioneering effort, the opportunities for growth and sharing experiences are many. Other examples of where and how Soft Path has been applied can be found through Friends of the Earth (www.foecanada.ca) and The POLIS Project (www.poliswaterproject.org).

[1]Oliver M. Brandes and Davis B. Brook 2005 The Soft Path for Water in a Nutshell Friends of the Earth Canada and the POLIS Project on Ecological Governance

4.2 Project Methodology

The development of the LTWCS is divided into four phases and rooted in the Soft Path approach. Phase 1 encompasses the *Project Design and Organization*. Phase 2 - *Review and Research* and Phase 3 - *Public Engagement and Consultation* - ran concurrently, with the findings from each informing the other. This iterative process ensured the development of a vision for the near- and long-term future of water conservation and management in the Region. During these phases, potential programs and approaches to realizing the vision were identified. Phase 4 - *Analysis and Strategy Development* - involved the assessment and selection of preferred program components for the LTWCS. To reiterate, through the development of the strategy; new research findings; input from stakeholder consultations; and guidance and feedback from the Advisory Panel, the SEC Advisory Committee, the MOE, other Regional and Municipal department personnel and peer reviewers ensured an iterative approach to the strategy development. Figure 7 illustrates the process employed by the Region to develop this strategy.

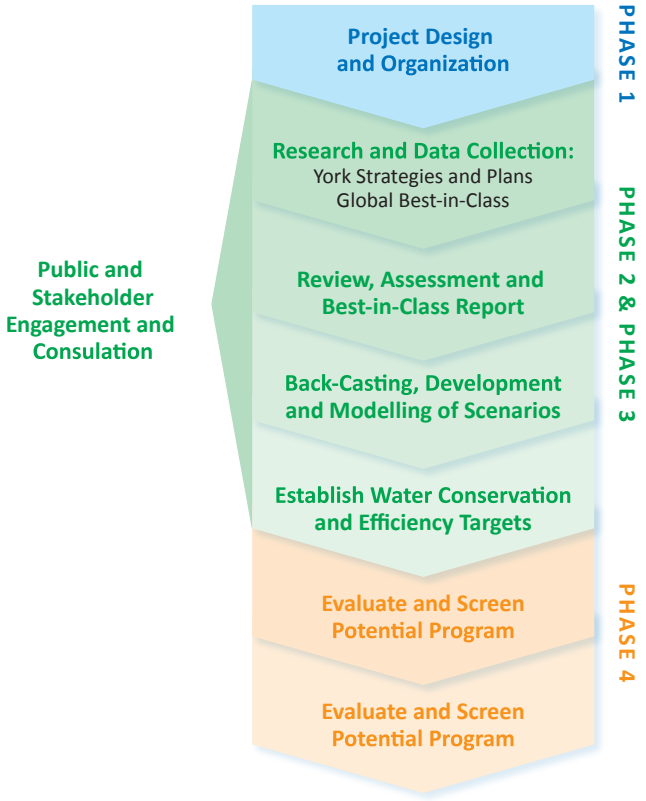


Figure 7 – LTWCS Development Process

4.2.1 Phase 1 – Project Design and Organization

Phase 1 involved designing the process to develop the LTWCS. Particular attention was paid to designing an iterative process with emphasis on public and stakeholder engagement and consultation. The design of the process allowed for early public involvement in the development of the vision, and continued participation and input as information from the research became available and potential scenarios and program components were developed.

The design of the process also allowed for the on-going input, review and feedback of the project Advisory Panel and regular updates, with opportunities for feedback, to the SEC Committee. The relatively short timeline and the need to carry out secondary research on Best-in-Class water conservation and efficiency programs and initiatives from around the world were other factors considered in designing the process for developing the LTWCS.

4.2.2 Phase 2 – Review and Research

A facilitated project planning session with York Region project personnel and external consultant specialists was held at the beginning of Phase 2 to identify research priorities for the Best-in-Class review, a preferred approach to the research, and assign responsibilities for project deliverables. From the meeting, research categories were identified, including task assignments for each. The following are the research categories were developed:

- Programs, practices and guidelines
- Water reuse
- Governance, policy and regulations

- Conservation pricing and other economic instruments
- New development
- Municipal infrastructure – planning, design and construction and operation

The second principal outcome of the project planning session was a go-forward process for the Best-in-Class research and public consultation and engagement. Regional staff directed the research carried out by the Project Team, which involved a review of all relevant York Region reports and a preliminary scan of external water conservation programs and reports to identify leading jurisdictions in water conservation from across the globe. Project Team members subsequently began extensive exploration of the Best-in-Class in water conservation for their respective research categories. The information garnered from this research was summarized in report format with Best-in-Class case studies applicable to York Region discussed in detail. Over 175 leading water conservation programs, policies and initiatives covering hard infrastructure, through pricing, and outreach and education were identified and reviewed through the Best-in-Class research. Key findings from the Best-in-Class research are discussed in greater detail in Section 5.0 of this strategy

As previously indicated, Phase 2 ran concurrently with Phase 3 (Public Engagement and Consultation). Information collected through the Best-in-Class research was provided to the social innovation specialist and integrated into the Public Engagement and Consultation process. As well, the Project Team was regularly updated on the outcomes of the consultation sessions. The consultation process continued to develop the vision for the LTWCS by providing another filter for identifying the case studies most applicable to York Region and the expectations of residents and other stakeholders.

4.2.3 Phase 3 – Public Engagement and Consultation

Key components in the development of the LTWCS were the engagement of stakeholders to discuss their ideas for the future state of water use in York Region and to identify a collective vision that captured these ideas. The nature of stakeholder engagement was seen as critical in developing the vision for the LTWCS and sowing the seeds of a much wider and deeper social movement with respect to water in which York Region can take the lead. The Public Engagement and Consultation process is discussed in greater detail in Section 4.3 of this strategy.

Examples from the Best-in-Class water conservation research were shared with stakeholders providing an opportunity to explore innovative ways of achieving the vision for the LTWCS. This approach to consultation allowed for an interactive investigation and discussion of a range of water conservation programs and initiatives from municipal policies and regulations to individual actions by residents and businesses alike.

4.2.4 Phase 4 – Analysis and Strategy Development

Large amounts of data were collected through both the Review and Research and the Public Engagement and Consultation phases of the project. Phase 4 involved the analysis of this data and the development of the LTWCS. The goal of the analysis was to develop a list of potential water conservation and efficiency options that would ultimately form the basis of the LTWCS. The first step in this process developed evaluation and screening criteria to analyse the scope of options identified through the Best-in-Class research. Legal and administrative, technical, financial, water system and other criteria were developed by which to evaluate and screen potential options for inclusion in the overall water conservation and efficiency program set out in this strategy.

4.3 Engagement and Consultation

In developing the engagement and consultation process, early research identified the need to add objectives to the LTWCS that reflect the Soft Path approach. The additional objectives to rebrand water using a holistic view and to shift the social narrative by identifying water as an agent of change were added to all public engagement and consultation material.

4.3.1 Water and Wastewater Steering Committee

To successfully develop such a comprehensive Strategy to meet the Minister's Conditions, the Region formed the Water and Wastewater Steering Committee. The Committee comprised of staff representatives from each of the nine local municipalities and York Region and has been meeting on a regular basis since April 2010. The Steering Committee is responsible for reporting back to their respective organizations and Councils. The Region and Municipalities agreed that this collaboration would be a key factor in the progress and endorsement of the Strategy document.

The Steering Committee will continue to meet and address opportunities on a regular basis. Working groups will be formed beginning in 2011 to address specific implementation plans at the Regional and local municipal level. The Regional and Municipal Steering Committee and working groups are committed to working together over the coming years in a collaborative manner to ensure the Strategy is implemented, maintained and enhanced over time.

4.3.2 Water Liaison Committee Workshop

On August 10, 2010 a workshop was held with local municipal staff representatives of the Water Liaison Committee.

The following topics were discussed at the workshop:

- Project overview including conditions of approval, introduction to project team and process of creating the Long Term Water Conservation Strategy.
- Result of best-in-class review including municipal programs, policy and regulation, infrastructure design and alternative sources of water.
- Public consultation.
- Soft Path approach to the development of the strategy.

A series of questions were posed to the committee members and focused discussions were held in small groups in response. The summary of the workshop outcomes is provided in Appendix 3.

4.3.3 Southeast Collector Advisory Committee (SeCAC) Review

The Southeast Collector Advisory Committee (SeCAC) was formalized in April 2010. The Committee is comprised of members of the local community, Regional staff, and staff from external agencies. The role of SeCAC is to provide meaningful input, comments and suggestions on topics related to the construction, commissioning and operation of the Southeast Collector in relation to the relevant Conditions of Approval issued by the Minister.

On October 14, 2010, a presentation to SeCAC was delivered that described the Best-in-Class review results and how the results would be used in the development of this Strategy. A subsequent meeting was held on December 9, 2010 to present the contents of the draft Strategy. Copies of the draft strategy were provided to the SeCAC committee members subsequent to this meeting. A third meeting on January 13, 2011 was held to present the targets, timelines and performance measures.

Table 1 summarizes the schedule of meetings with the SeCAC used in the development of the Strategy.

Table 1 – SeCAC Schedule of Meetings

MEETING TOPIC	DATE
Presentation of Best-in-Class review results	October 14, 2010
Presentation of draft Strategy contents	December 9, 2010
Presentation and distribution of targets, timelines, programs and tactics	January 13, 2011

4.3.4 Public Engagement and Consultation Approach and Process

Research used to develop the approach for stakeholder engagement for the LTWCS identified the following:

- There is 'Plan Fatigue' – there have been numerous plans developed at Regional and municipal levels which include public consultation and there was a possibility that the LTWCS engagement would be met with a "not another plan" response from the public.
- The public is becoming satiated with 'Environmental' and 'Sustainability' messaging.
- The current context for water is outdated yet engrained.
- The current awareness and education initiatives are not effective in shifting individuals' relationship to water, and therefore their behaviour
- There is a large gap between desired behaviours and engrained beliefs.

When explored further, it was found that the current Canadian view of water is as a commodity, a resource to be saved, and viewed as a limitless resource. This Canadian myth or context and its ensuing mindset presented significant challenges in looking forward 40 years. These conditions confirmed the need to explore the concept of social innovation and the best practices in this emerging field. This exploration revealed the following:

- Social innovations are defined as new ideas (products, services and models) that simultaneously meet social needs and create new social relationships or collaborations. In other words, they are **innovations that are both good for society *and* enhance society's capacity to act**.
- Given that most **creative action** happens between sectors, social innovation works best when people are connected from across the sectors in meaningful ways.
- Social Innovation is distinct both in its **outcomes** and in its **relationships**. It brings new forms of co-operation and collaboration and creates a change in the relationships of power.
- Social innovation creates a change in **how people think and see**.

One of the most significant findings from the research into social innovation best practices was the focus on ***establishing a new public*** through a series of triggers, inspirations, and blending ideas from multiple sources. This new public is not a passive consumer but an active player – a producer in their own right. By taking this approach, York Region would be able to tackle the deeper issues of the mindset shift and value of water, while identifying a path forward to protect, preserve and use water.

Having explored social innovation approaches and methodologies, objectives were developed to guide stakeholder engagement. The following objectives elevated the conversations to the larger context of the role of water in a changing economy and society, and contributed to the outcomes from this engagement.

- Change the Canadian myth regarding water.
- Involve citizens in uncovering the new narrative and generating innovative ideas.
- Transform the social context – street level innovations and engagement.
- Develop a powerful brand that tells a new story for water.
- Develop a framework for a multi-year process of social innovation.

Description

The design of the public engagement and consultation process involved developing of a range of pathways for people to explore the future possibilities of water in York Region, as well as provide their thoughts and ideas. There were both 'passive' type of engagement processes such as the Special Report on Water and Youth Films that provided a range of perspectives to explore, as well as 'active' engagements such as public events, Water Cafés and Water Future Scenario Planning sessions.

Figure 8 below depicts the range of public engagement activities created for the Long Term Water Conservation Strategy.*

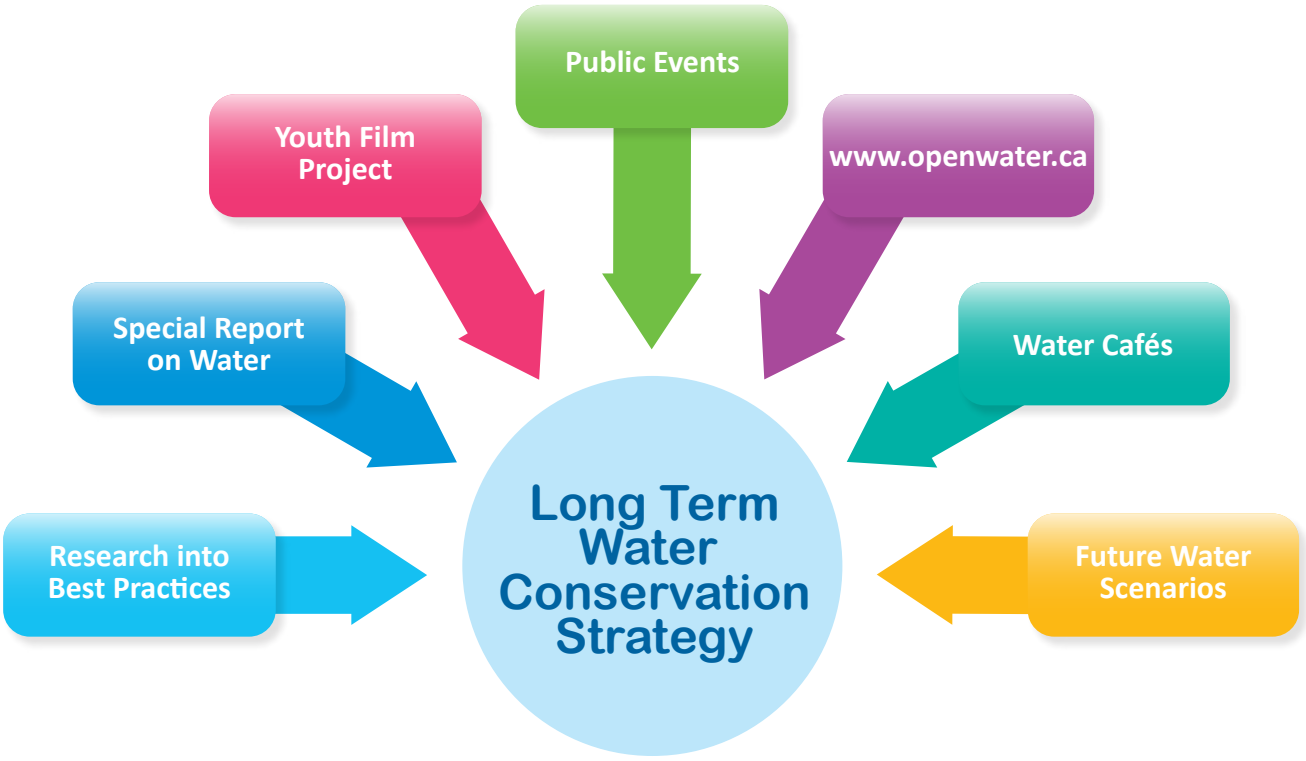


Figure 8 – Public Consultation and Engagement Activities

Research into Best Practices

The 'Best-in-Class Review' that was conducted as part of the LTWCS gathered leading concepts for water conservation and efficiency from across North America and around the world covered the following areas:

- Policies and Incentives
- Conservation-Oriented Pricing
- Programs for New Developments
- Industrial, Commercial and Institutional Efficiency Programs and Grants
- Municipal infrastructure Planning, Design and Operation

These practices were integrated into the Public Engagement process in a number of ways:

- Selected 'Best-in-Class practices were shared in the Context video created for the public engagement entitled Same Deep Water.
- Best-in-Class practices were discussed at the Water Cafés and Water Future Scenario Planning sessions, supported by a hand out.
- The actions for the scenario planning created by the public that reflected the Best-in-Class practices were identified as such.

The provision of these examples was very helpful in demonstrating what was possible, in very practical and concrete ways, which in turn contributed to richer dialogue and outcomes.

Our Water Future

This newspaper insert contains stories from a group of passionate Canadians providing their perspectives, examples, advice and views about this new world of water. All are specialists in water, in their own right. Some pieces are conceptual, some personal and some highly practical.

Special Report on Water

The Special Report on Water is an upbeat, magazine style insert to the Globe and Mail and local Regional newspapers. It will be circulated throughout the Greater Toronto Area on completion of the Long Term Water Conservation Strategy in March 2011. Its goals are:

- To stimulate new thinking and have a fresh look at water in a way that provokes and ignites a different stream of thought with respect to the future of water in York Region.
- To identify York Region within the Great Lakes and Province and highlight opportunities that demonstration how York Region can be a leader and be part of something bigger than just the municipality.

Youth Film Project

Another initiative of the public engagement and consultation was the youth film project. The intent was to create a series of films, combining a youth's perspective about the future of water with the experience of a seasoned filmmaker. The films, summarized below, are tools which will be used over the coming years to help implement the LTWCS and further mobilize this 'new public' that are instrumental in setting the stage for an exciting and comprehensive water future. All films can be viewed at www.openwater.ca

- **Wake Up To Water**
  This is a documentary of the journey to create the Vision and Action Framework and the emergence of a 'new public' who stepped up to create a new direction for water in York Region. This film will also profile the events, the reactions, the feelings and thoughts evoked by this public engagement.
- **A Day in the Water Life**
  This is a graphics supported documentary of how much water a senior manager in York Region consumes, and causes to be consumed in one day. This is an upbeat look at physical and hidden water use and may be the first time many people consider the idea of a water footprint.
- **The Spring House**
  The film celebrates water through cultural heritage. It also showcases how diverse organizations can come together to save a forgotten structure from the past to create a new future.

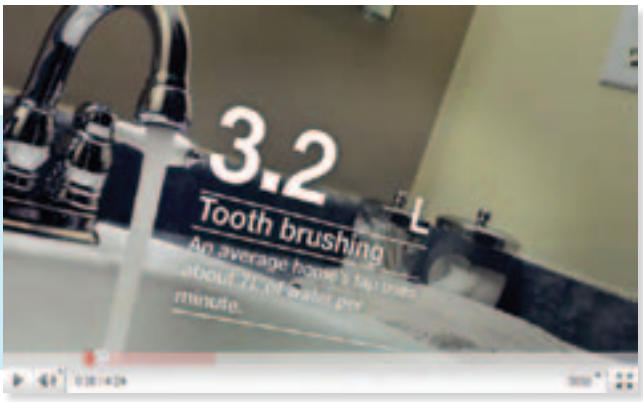
A Day in the Water Life
The Regional Municipality of York follows one man's water use on an average day, with great graphics to explain where it all comes from. To view the four and a half minute video visit www.openwater.ca

Public Events

As part of the general promotion of the public engagement for the LTWCS, booths were set up at a series of fall events, including:

- September 25:
  Georgina, ON – Harvest Festival
- September 26:
  Markham, ON – Apple Festival
- October 3:
  Richmond Hill, ON – Taste of the Hill
- October 9 to 11:
  Unionville, ON – Unionville Oktoberfest
- October 9 to 11:
  Woodbridge, ON – Woodbridge Fall Fair

Each event featured live painting with water themes, which attracted children to paint their impressions of water. The artwork provided the opportunity to engage and learn from children as they have a love and appreciation for natural change. The events were supported by postcards about the project and were captured by videographers and photographers. A 'gallery' of the paintings and a brief backgrounder is included in Appendix 5.



Open Water Website

All of the public engagement and consultation activities are supported by an interactive website; www.openwater.ca . The site captures reactions, ideas, feedback and perceptions, as well as documents outcomes of the public engagement process. This website houses a discussion board and insights into the public participation process in the form of video and photographs. The outcomes from public engagement, the best-in-class review and the Strategy documents are posted on the website for comment and ongoing dialogue.

The Water Cafés

The public events provided key learning for the more in-depth public engagement. It was confirmed that if one merely poses open questions about how people feel about water or their thoughts about the future of water, the conversation is very monochrome and deals with water in the taps and toilets. In order to help people tap into a broader conversation about the future of water, a new context needed to be provided, along with different questions that probed areas like 'how do you want to live?' in the future. Asking these philosophical, belief–based questions set the stage to zero in on individuals ideal water future and to explore specific water-related issues. The conversational setting of "Water Café" was employed to facilitate the deeper exploration of water issues. The general objectives of the cafés were as follows:

- To generate ideas using design or creativity methods to deepen the probe and widen the menu of options available for consideration for the future of water.
- To inspire new visions, perspectives, contexts, patterns and possibilities for the future of water.

Specific objectives were developed for each of the four Water Cafés which were held in different locations throughout the Region. Those objectives are summarized as follows:

- Explore how people will live and work in York Region in 2051 as a context for future water use, governance, infrastructure and innovation.
- Explore best practices in water use, pricing, governance, management, infrastructure, reuse, and new developments from around the world that could guide York Region in developing the LTWCS.
- Identify Regional successes that can springboard the Region into the future.
- Probe further on the current attitudes towards the value of water and water use now, and the nature of the shift required to support a different water future.
- Explore how new water strategies could bring key York Region 2026 visions to life.
- Bring the outcomes of these explorations and probes into a series of emerging visions that will represent the desired water future for these stakeholders.

Table 2 – Water Cafes – Public Engagement and Consultation

WATER CAFÉ	DATE	LOCATION	FOCUS
Celebrating Water	September 25, 2010	Regional Administration Building, Newmarket	A cross cultural experience of water, and what our indigenous and cultural groups envision as a new role for water in helping to create a vibrant York Region.
The Blue Region	September 28, 2010	McMichael Art Gallery, Kleinberg	Envisioning a future for water by exploring the realm of living and working in the next 40 years. The future holds exciting possibilities for water – its use, its infrastructure and a new water economy in the Region that can connect worldwide.
Superbia!	October 5, 2010	Markham Theatre Rehearsal Hall, Markham	Explored how a new water future could inspire redesigning suburbia in simple yet powerful ways. Innovation in water use, infrastructure, technologies, design and the emerging water economy hold great opportunities for creating neighbourhoods that provide true community rather than merely housing and replace long commutes with local economic development.
Refreshing Future Plans	October 6, 2010	Eaton Hall, King	Explored how the world's best practices for water conservation and efficiency and the exciting new innovative possibilities can refresh and inform the key visions that have been developed for other planning initiatives.

The Water Café format provided a broader context and tapped into the perspectives of a range of individuals. This approach enabled an exploration of stakeholder ideas and views of the future of water in a complex region. The Water Cafés:

- enabled diverse groups people with diverse ideas to come up with new ideas,
- went below the surface of regular thinking to find new insights and,
- created a community of common intent – and it was a fun way to think and feel.

The design of the Cafés also helped participants tap into and share their innate wisdom and experience to provide creative answers to the challenges inherent in the issues facing the future of water in York Region. Outlined in Table 2 below are the date, location and focus of each of the four Water Cafés.

The Water Cafés were highly interactive sessions. Each of the Cafés was introduced with samples, new approaches and perspectives to stimulate fresh thinking – such as the idea of 'Affluenza, 'Superbia, and new emerging indicators of wealth. Small groups of people then examined thought provoking questions that linked water to such things as the future of education, health and business in York Region, the future of suburban neighbourhoods, the connection between water and culture, the role of culture in inspiring innovation, and the opportunities to embed York Region's water future in a range of planning strategies. Through these lively discussions, the participants identified common themes of action, unique ideas and emerging visions.

The Water Cafés provided participants with a blank canvas and the opportunity to share their thoughts and ideas on what they felt was important in shaping the future of water in their communities.

Water Future Scenario Planning

The last stage of public engagement was to sort through the actions/ideas and develop scenarios for key timeframes between the present and the next 40 years. These scenario planning sessions focused on providing public input into:

- Creating time linked scenarios for the LTWCS
- Determining the opportunities and challenges for the various scenarios

The Scenario Planning Sessions were opened with an overview of the work to date along with sharing the pillars of the session – the emerging Vision, Goals, and Success Criteria. The potential Ideas and Actions were clustered into four categories: Individuals in Action, Business in Action, Communities in Action, and Partnerships in Action. Each action was written on a card, with a water drop icon on those that were based on research of best-in-class practices. A menu of all the potential actions was also posted. Participants were asked to choose the action cards that they could personally support and then drop them in one of four timeframe buckets:

1. 0 to 5 years
2. 5 to 10 years
3. 10 – 20 years
4. 20 years and beyond

Teams were then formed for each of the timeframes to sort through the cards, group and categorize them, and then analyze and interpret the card themes for their team's assigned timeframe. The teams then presented their 'bucket strategy' through which a 40-year water strategy emerged. Stakeholders' allocation of potential actions to timeframes was considered in the development of scenarios for the LTWCS.

The list of attendees for both the Water Cafes and the Scenario Planning Sessions is provided in Appendix 4.

4.3.5 Results of Public Engagement

The results obtained from public engagement and consultation informed the development of the 40-year LTWCS and can be summarized under the following six categories:

1. Vision
2. Principles
3. Goals
4. Action (40-year plan)
5. Success Criteria

It is important to reiterate that these thoughts and ideas came from a range of stakeholders who were given the opportunity, through a series of diverse public engagement sessions, to sketch their thoughts about York Region's LTWCS on a blank canvas.

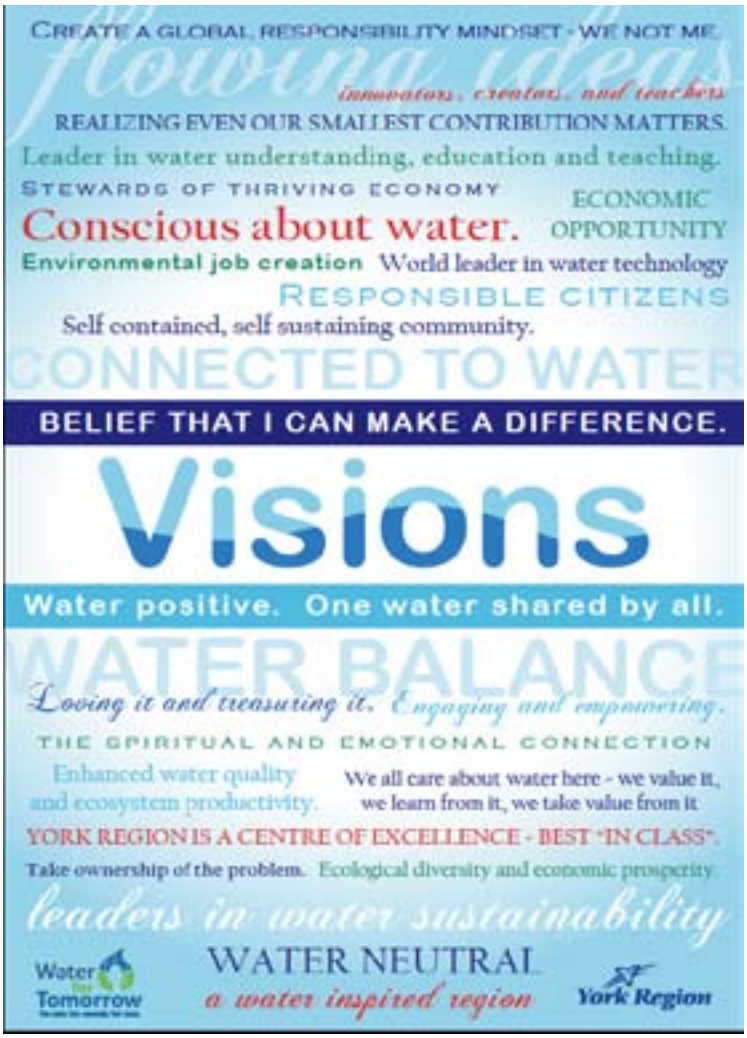
The Vision, Principles, Set of Goals and Action strategies developed by the public for the coming 40 years are both holistic and comprehensive.

1. The Vision

The Vision that emerged through this process began with a series of key phrases displayed in Figure 9 on the next page. On the right is the Vision statement that encapsulates the intent of these phrases. This Vision statement is in turn exemplified through four 'code words' which are further explained in Table 3 – Vision 'Code' Categories.

This Vision 'Code' will undergo further refinement, however the intent is to use these words and what they stand for, as a form of measurement or screen for determining whether or not future actions and strategies will be undertaken.

This Vision sends a distinct signal about the holistic and powerful role that the public feels the LTWCS could have. Like water itself, the strategy and the manner in which it is implemented should influence the ecological, social, cultural, economic, scientific, and recreational future of York Region.



Water

Reviving the way we live.

Invest
Inspire
Respect
Adapt

Figure 9 – Long Term Water Conservation Strategy Vision

Table 3 – Vision 'Code' Categories

INVEST	INSPIRE	RESPECT	ADAPT
• In new industry • In new technologies • In our future • In preserving water for future generations	• Responsible government • Responsible citizens • Responsible businesses • Innovation and creativity	• The natural world • Places you play • Cultural ways • Ideas • Learning and education • Legislation	• To climate change • To changing environment • To new ideas • Minds

2. The Principles

Three key principles were identified by the public that should be used to guide the development and implementation of the LTWCS. These principles are important because they provide the broader context of how the public views the LTWCS. In essence, these principles suggest that since humans are mainly composed of water, the strategy can influence all facets of our lives. Therefore a guiding water ethic should be developed. Possible examples include:

- Let our water ethics guide our decisions and interactions from the drip in the tap to the huge stretch of community and everything in between.
- Water is a transmitter – it sends waves of messages that guide us in how we live.
- We are water – everything is connected and water unites us all.

3. The Goals

Goals provide specific descriptions regarding how the Vision would be realized. The goal areas again demonstrate the comprehensive nature of how the public viewed the LTWCS, Water Preservation and Use, Governance, Culture, Economic, and Development. The following summarizes the specific objectives under each goal area.

Water Preservation and Use

- Water would be preserved for use and enjoyment of future generations, both human and non-human.
- Preserve our valuable fresh water resource through sensible and efficient practices.
- Ensure an adequate supply of fresh potable water
- Reduce water use significantly
- Develop and meet attainable targets to improve water quality.

Governance

- Recognize one water – work towards a watershed context for management.

Culture

- Break down cultural and ethnic backgrounds to develop a better understanding of water use.
- Educate the public about the sacredness of water from an Indigenous perspective.

Economic

- Create a Region-wide economy that stimulates and retains employment, new jobs and brings back "old" ways of thinking about community.

Development

- Growth is limited to the capacity of the watershed. Urban growth stabilizes and is truly sustainable.

These goals provide a backdrop to the specific actions that are articulated in the following section.

4. The 40 Year Action Plan

The Vision, Principles and Goals provide the foundation for a wide range of actions that the public identified as needing to be undertaken through partnership with a broad range of stakeholders. This section outlines actions based on the following categories: **Action Zones**; **Time Zones** and **Success Criteria** for the implementation of the strategy.

Action Zones

In order to realize the Vision and Goals the public shaped for the LTWCS, they identified that action was required in the zones outlined in the graphic below. These Action Zones are ones which are needed for strategy development, implementation and extending to 20 years and beyond.

The detailed public engagement outcomes are provided in Appendix 6 and represent the strategy as shaped by the public and what they believe must take place by a collaborative range of partners.

One of the significant findings of this public engagement was the compelling role that was seen for 'education'. The term 'redefined' is used to signify that the public were not referring to conventional education, but rather one that will include demonstration and pilot projects, community-based initiatives, school-based strategies, and other

approaches that foster a cultural transformation. Redefined education therefore sits at the centre as it is the theme that will run through all of the Action Zones illustrated in Figure 10 below.

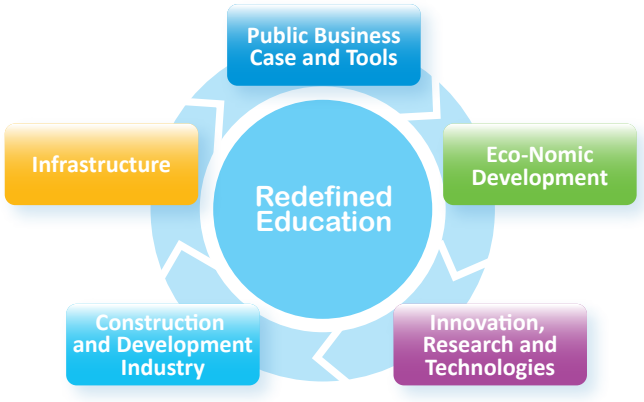


Figure 10 – Action Zones

These Action Zones are shown in a circle as they are highly interrelated and therefore action taken in one zone will likely influence the others. Appendix 5 contains detailed charts of the public outcomes identified for each time zone. An outline to aid in understanding the essence of each Action Zone is set out below.

The Public Business Case and Tools

The nature of this action zone is to communicate the essence of the LTWCS, i.e., the reasons for the strategy, the expected benefits, the options being considered and the key steps that are being taken. This zone provides the tools including new perspectives such as Soft Path and the water footprint, incentives, water use tools, and water conservation programs. This zone monitors the uptake and evolution of the business case, which will change over the years. Tools will also evolve over the course of the strategy.

Eco-Nomic Development

This action zone focuses on the shift from the conventional economy to one which fosters a thriving and sustainable green, blue and localized economy. This zone sparks and fuels new economic development that places a different value on water and views water as a valuable vehicle of sustainable economic activity. Helping current businesses transition to this new economic environment as well as attract, retain and grow new blue and green companies and technologies to the Region is all part of this zone.

Innovation, Research and Technologies

As the title depicts, this action zone contains the key ingredients for a 21st Century strategy. What makes this zone unique is the manner in which these ingredients will be conducted. Research includes establishing a global water centre/institute that utilizes core water philosophies and practices from around the world to bring about economic, social, and environmental innovation. Research also involves ongoing community based innovative research that utilizes pilot and demonstration projects as a means of action. Innovation is also stimulated by exploring the collision of diverse trends such as climate change and demographics, as well as the desire to develop new forms of measurement.

Construction and Development Industry

The focus of this action zone is to motivate and support the construction and development industry to design and build sustainable landscapes and neighbourhoods. Encouraging green construction and incorporating 'blue' standards will be a core part of this zone. Piloting and implementing projects such as water re-use in subdivisions and small communities, as well as self sustaining water solutions are all part of this zone.

Infrastructure

The Infrastructure zone is probably the least understood and least accessible by public participants yet it deserves its own category due to the importance infrastructure plays in the future of water in York Region. Identifying and implementing a conservation-based approach when operating, maintaining and renewing infrastructure is at the heart of this zone.

Redefined Education

As the backbone or foundation of all of the action zones, Redefined Education focuses on engaging people about water, within the context of a much larger societal and economic transformation. This zone must also encourage people to get excited about the water inspired change. While some of the tools and programs will be practical ways to conserve water and reduce water use indoors and out, other tools and programs designed for the strategy will be embedded with multi-cultural and intergenerational perspectives. These ingredients will provide the ongoing sustainability and uniqueness that will contribute to the deeper cultural transformation.

Time Zones

There are four key time zones identified for the LTWCS:

- 0 to 5 years,
- 5 to 10 years
- 10 to 20 years
- 20 years and beyond

The public identified key themes for the first three time zones which are described in the following graphic. The first five years is the testing and building phase; 5 to 10 year period is about full scale implementation, with the following 10 year period evolving the actions though continuous improvement and ongoing innovation as depicted in Figure 11 below. The description of the 20 year and beyond period is a type of vision for what will be achieved in 20 years from which the next 20 years of work can springboard. Again, Redefined Education is the backbone of the Time Zones.

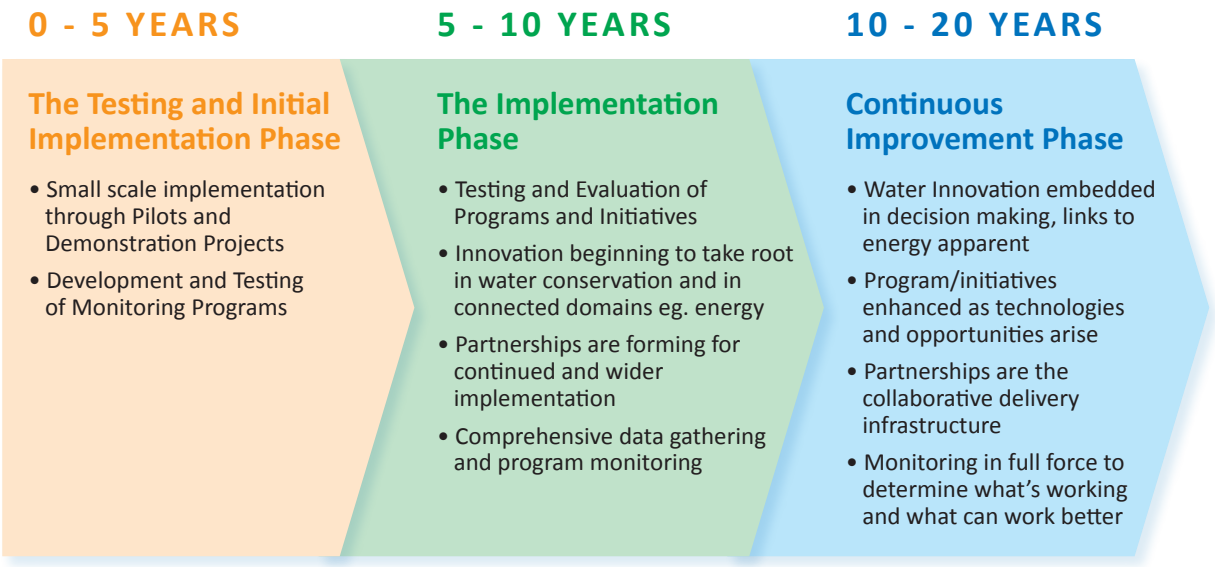


Figure 11 – Time Zones

20 Years and Beyond

In 20 years the following would ideally be embedded in the way individuals think and act:

- A new economic structure with indicators that reflect healthy people, planet and economy.
- Decisions and standards are based on integrated trends in demographics, climate, employment and economic development.
- Clear indicators of a cultural shift that is anchored in the appreciation for the full value of water and our fresh water assets.
- A global water institute that leads that way for the next 20 years.
- Green and blue construction is common with engrained green business standards and practices.
- Eco-education embedded is in all aspects of the curriculum which has lead to a totally revitalized educational system.
- Green and blue industry excels in water focused technology and trained trades professionals.

Success Criteria

The last finding pertains to Success Criteria that are described in Figure 12 below. This set of performance indicators signal the uniqueness of this strategy in powerful ways. Rather than pointing the finger at government to say "you make the policy", the success criteria for the public focuses instead on a "what I can do policy" and instead of using a conventional future-casting lens, this strategy calls for a family focus – a far more human perspective.

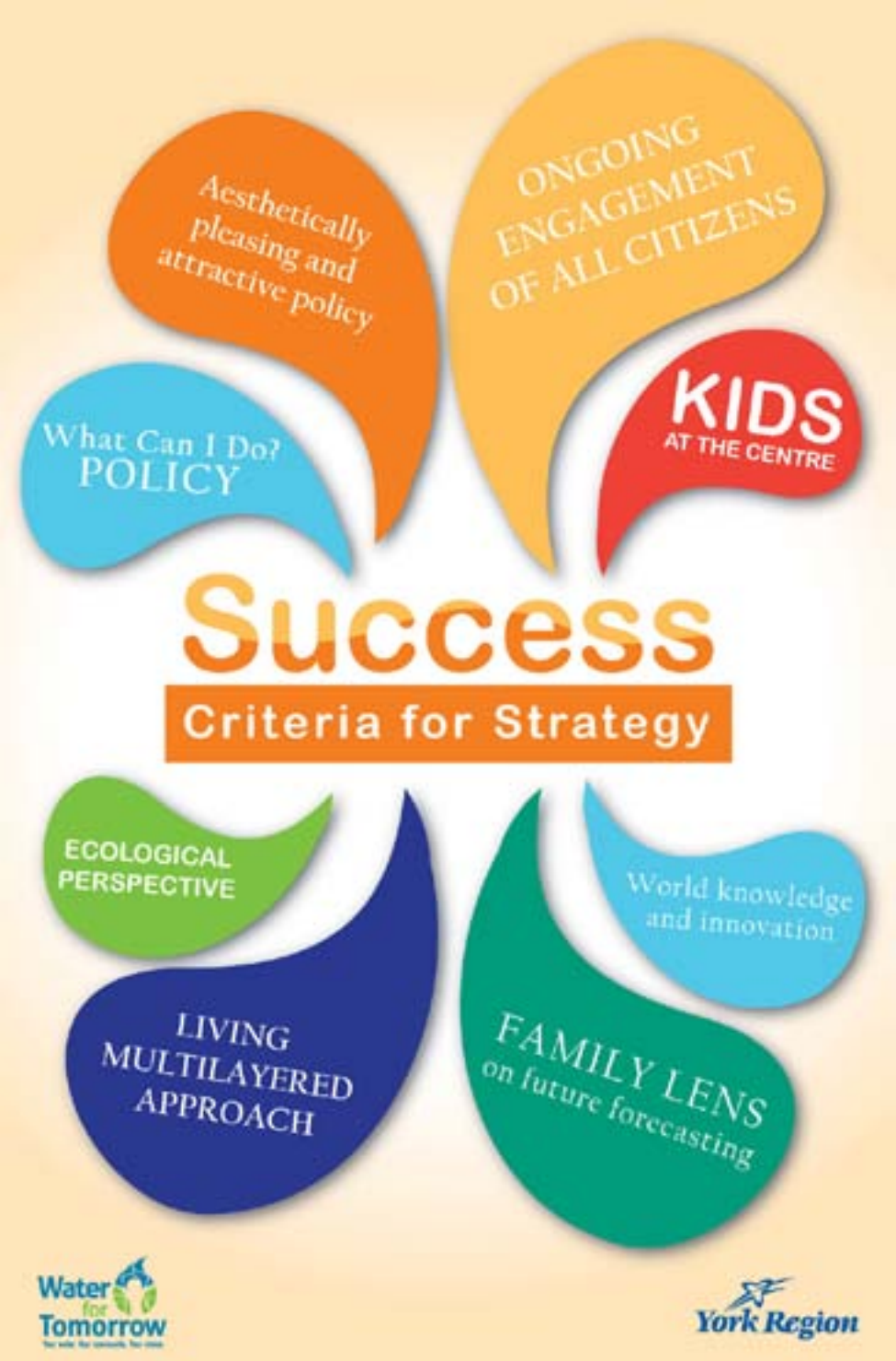


Figure 12 – Success Criteria
The results of public engagement for the LTWCS are what the 'new public' comprised of diverse stakeholders, believes the 40 year strategy should look like.

4.4 Soft Path

York Region is anticipating significant growth in both residential and employment sectors in the coming years. By 2031 residential growth is expected to increase by 50% above 2006 levels to reach a total population of 1.5 million and as high as 80%, 1.8 million people, by 2051. Soft Path was chosen as a method to help guide and filter the long term water management options that will be needed and identified in this strategy.

4.4.1 Putting the Principles into Practice

As discussed in Section 4.1.3, four principles distinguish the Soft Path approach from demand side management; the principles are discussed in more detail below.

Treat water as a service rather than an end in itself

Identifying the services water provides can allow for creativity and ingenuity when developing alternative servicing methods. As outlined in "The Soft Path for Water in a Nutshell" the basis of Soft Path is to not view the final product water delivers such as toilet flushing, watering residential landscapes and irrigating crops, but instead consider the final desired services of sanitation, attractive yards and agricultural production. This change in thinking will allow for more creativity in developing alternative methods and programs for achieving the same service using less or no treated drinking water. A simple example is to create attractive yards by using different landscaping techniques that do not require water at all.

As the program components of this strategy are developed the services water traditionally provide will be considered to generate creative methods of reaching the ultimate goal of using less potable water.

Potable water is not required to irrigate lawns and gardens nor is it required for industrial cooling.

Match the quality of water delivered to that needed by the end-use

Potable water is not required to irrigate lawns and gardens nor is it required for toilet flushing or industrial cooling. Matching water quality with quality of need means that grey water or harvested rain water can be used for those functions where potable water is not needed. This in turn can free up existing potable water supplies for more appropriate purposes, such as a drinking water supply for new developments.

Using Regional demand data and estimates of residential water use calculated for the Water and Wastewater Master Plan Update (2009), water uses were separated into potable and non-potable categories. This provided broad figures which could be evaluated for reuse alternatives such as rainwater harvesting, stormwater reuse, grey water, etc. Most implementation strategies related to these options, beyond demonstration, will need to be evaluated at the local municipal level; however, the scale of potential for savings is identified in this strategy.

Another analysis that was undertaken was to quantify the level of summer use within each of the municipalities and to translate that into a unit rate. Monthly water demand volumes for each community were examined. As anticipated, demand increased beyond the average in the months of May to September inclusive. The average demand was calculated for the remaining seven months and the volumes "above average" were tallied for the summer months. That total "above average" volume is considered to be summer use. The majority of this demand is expected to represent outdoor watering, however water for pools, outdoor cleaning etc. are also included in this total. The summer volume was translated to a summer use unit rate and an annual unit rate and these figures were used to determine the outdoor component of the residential unit rate. There was not sufficient data available to the Region to determine the outdoor water use break down by sector.

Make ecological sustainability a fundamental criterion

A core Soft Path principle that differentiates this approach from demand side management is a requirement to embed ecological integrity in decision making. Ecological integrity is defined as the ability of an ecological system to support and maintain a community of organisms that has a species composition, diversity and functional organization comparable to those of natural habitats within a region" (Parrish et al. 2003). Although understanding of ecology integrity has increased particularly over the past 20 years, few quantitative studies are available today to guide decision-making in the Great Lakes Basin. The ultimate question in terms of truly fulfilling the principal of ecology integrity, is answering the following question: ***How much natural water, in measureable units, do the ecosystems that support our water sources need to function as healthy, self-sustaining entities?*** Water quantity and quality are so interconnected that water quality is also necessarily an important consideration for ecological integrity.

However, assessing ecological integrity in a quantitative sense is highly complex and the science is still unfolding. There are many existing and ongoing studies that will help elucidate the question of ecological integrity of York Region's water sources.

In the absence of science, embedding ecological integrity into decision requires a precautionary approach be taken. Continuing to expand water takings and discharging wastewater from centralized sources 100 or 200 years from now is fundamentally unsustainable. Soft Path planning offers a new approach that shifts away from using large quantities of highly treated drinking water for services where it is not necessary and instead focuses on identifying alternative, water sensitive solutions to secure the water needed.

Plan from the future back to the present – Long term vision

Public engagement and consultation is fundamental to a Soft Path process. The public and community stakeholders form the vision by articulating what they would like to see over the time period being considered and then scenarios for achieving the vision are developed. The public engagement process carried out in York Region was the first of its kind to stem from a Soft Path approach. Not only did the vision come directly from the public engagement process, but many of the actions and identified time-frames for those actions also came directly from the engagement process.

The public engagement and consultation process identified four main themes were used to guide development of Soft Path numeric scenarios, specifically:

1. A clear mandate for York Region to demonstrate leadership in different areas of water management including water use, water-related industries and water culture;
2. New development should be used to showcase water efficiency and conservation;
3. Alternatives for potable water need to be demonstrated and used to educate and promote options;
4. By 2031 the public desires that our "blue" policies, practices and activities are second-nature and represent common practice.

Ecological integrity is defined as "the ability of an ecological system to support and maintain a community of organisms that has a species composition, diversity and functional organization comparable to those of natural habitats within a region"

4.4.2 Water Demand Analysis

In order to develop the scenarios, an analysis of water demand by municipalities and an assessment of potential water savings achievable across all sectors were undertaken. The application of Soft Path in York Region, in terms of generating numeric scenarios, was modified to accommodate the two tier nature of the municipal government structure. This means that the Region, with regard to the autonomous nature of its local municipalities, is somewhat limited in the kind of data that can currently be obtained, particularly given the time constraints to complete the Long Term Water Conservation Strategy. For example, total monthly demand data was available for each local municipality calculated from the Regional supply and boundary meters; however, water demand for individual accounts is not available nor a summary breakdown by sector i.e. residential versus industrial, commercial and institutional demand data. The breakdown of the Region's water demand in general terms are identified in the 2009 Water and Wastewater Infrastructure Master Plan Unit Rate Report with an approximate split of 67% residential and 33% employment based on historical average demand data and land uses, this total includes non-revenue water. This breakdown of water demand was used to determine the daily demand for residential users and industrial, commercial and institutional uses including non-revenue water. In terms of quantifying the volume of savings that could be realized, for example through alternative cooling methods, detailed water use data will be needed prior to the implementation of any conservation programs in the ICI sector.

The Water and Wastewater Infrastructure Master Plan (2009) unit rates for water demand by each local municipality were applied to future growth projections to determine the standard against which savings could be evaluated. These unit demand rates incorporate the savings to be realized from the 2007 Water Efficiency Master Plan Update of 23.8 MLD by 2018. Future attributed savings will be above and beyond this amount and the amount of 20.3 MLD attributed to the Water for Tomorrow program from 1998-2006.

4.4.4 Scenarios

The next stage in the Soft Path process was the development of detailed scenarios which reflect the long term vision and aspirational targets identified through public consultation and engagement. The suite of scenarios will reflect the spectrum of water savings possibilities from the regionally developed, mature incentive programs to more complex, regulatory supported programs. Three scenarios exploring different ways and means of achieving water saving targets were developed. The third scenario, which reflects the Soft Path approach, considered water saving mechanisms necessary to achieve the No New Water vision.

The three scenarios reflect the spectrum of water savings possibilities from the regionally developed, mature incentive programs to more complex, regulatory supported programs.

The vision of "No New Water" by 2051 translates to total potable water use across the sectors in 2051 equivalent to the total potable water use in 2011. Three scenarios were developed and analysed to determine potential water savings through various programs, policies and legislative changes.

The three future scenarios (2051) were developed as follows:

York Region Jurisdiction – Incentive Programs

This scenario assumes 10% uptake each year of new development incentive based programs such as SHIP achieving 150 lpcd indoor use, total residential outdoor water use is reduced by 2.5% every 5 years through incentive based and education programs, water efficient fixture rebates and retrofits available for homes and businesses, education programs, and other financial drivers (e.g. conservation-oriented pricing). Once outdoor water use is reduced below a certain level behaviour and attitude change towards desired landscapes and/or irrigation system policies will be required.

Provincial Programs and Support – Incentive Programs + Legislative Changes

All of the above incentive and education based programs plus Provincial updates to the building code and/or plumbing code to include water efficient fixtures to bring indoor water use to 175 lpcd starting in 2016 and 150 lpcd starting in 2021 and/or policy/legislation allowing municipalities to enforce building standards above and beyond Building and Plumbing Code. This also includes policy and/or legislation allowing municipalities to require other non-standard appliances to be included with the sale of new houses (eg washing machines) or Provincial or Federal legislation allowing the sale of WaterSense and Energy Star fixtures and appliances only.

No New Water – Incentive Programs + Legislative Changes + Water Re-use

All of the above incentive and education programs, Provincial Programs and support plus starting in 2021 significant water re-use and/or alternative sources for use in fixtures and processes which do not require potable water such as toilet flushing, irrigation and industrial process for new development, additional incentive and retrofit programs, additional updates to the Building and Plumbing Codes for advanced water efficient technologies, changes to water system design standards (e.g. watermain sizing reflecting lower water demand, etc). This scenario aspires to achieve 150 lpcd unit rate average for all residents, new development and existing, and includes indoor and outdoor potable water use by 2051. This scenario seeks to reduce the ICI total water demand from the Water and Wastewater Master Plan (2009) anticipated 216.6 MLD in 2051 to 131.8 MLD through matching water quality with need.

Residential water demand unit rates and water savings for both residential and ICI sectors generated through the three scenarios are provided in Table 4 below.

Table 4 – Water Savings Scenarios

	2011	2021		2031		2051	
	Residential Water Use Unit Rate	Residential Water Use Unit Rate	Water Saved	Residential Water Use Unit Rate	Water Saved	Residential Water Use Unit Rate	Water Saved
Scenario 1 *York Region Jurisdiction* Incentive Programs	252 lpcd	235 lpcd	6.6 MLD	230 lpcd	15.7 MLD	224 lpcd	32.4 MLD
Scenario 2 *Provincial Programs and Support* Incentive Programs + Legislative Changes		233 lpcd	8.6 MLD	225 lpcd	23.3 MLD	214 lpcd	49.1 MLD
Scenario 3 *No New Water* Incentive Programs + Legislative Changes + Water Re-use				206 lpcd	73.3 MLD	150 lpcd	244.3 MLD

Figure 13 below illustrates the scenario for the vision of no new water by 2051. A back-casting methodology was employed and assumed total water used across all sectors in 2051 as equivalent to that used in 2011. A horizontal line of water demand with time would represent an ability to reduce demand at the same rate of population growth. Given the high growth rates in York Region and some of the policy barriers that exist (described in Section 8.2), achieving No New Water may be difficult in the short-term Programs and practices take time to develop and reach potential, particularly where policy, regulations, and infrastructure are concerned; therefore, there is a projected increase in actual total demand before a decrease back to 2011 levels. As provincial policies and market forces change over time, York Region will continue to monitor these predicted unit rates with the intention to minimize increases in total water demand in keeping with the principles of the Soft Path.

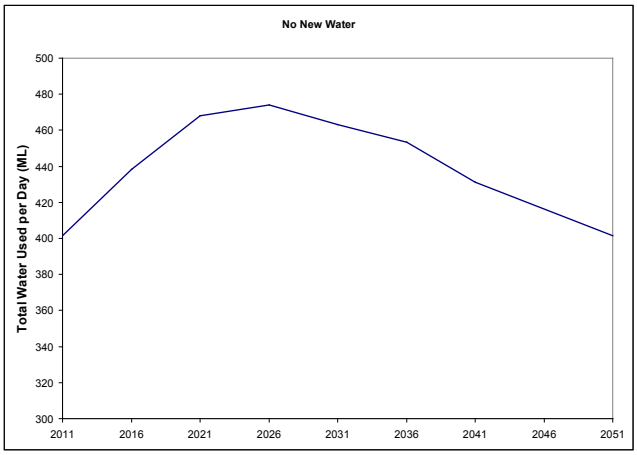


Figure 13 – Total Water Use - "No New Water"

The Region will proceed with the vision of "No New Water" by 2051 starting with the incentive based programs currently within the jurisdiction of York Region. Evaluation of detailed billing data within the first year of the program will be key to determining more accurate demand by the various sectors as well as seasonal changes in all sectors due to outdoor water use to develop more accurate saving estimates and a detailed monitoring and reporting plan.

Revised flows have been calculated for the intra-basin transfer of drinking water from Lake Ontario to the communities of Aurora, Newmarket and East Gwillimbury and are presented in Appendix 9.

Considerations for Scenarios

Water Use in New Homes

It is generally accepted in North America that 150 lpcd is an achievable indoor unit rate for new houses with water efficient fixtures and installed appliances that are currently available on the market. York Region can encourage the installation of efficient fixtures and appliances through incentive based programs aimed at the development and building sector such as the Region's Sustainable Home Incentive Program (SHIP) or other similar incentive based programs. The expected participation in an incentive program is based on experiences with other "green" building programs in North America is 10% each year. Provincial changes to the Building Code or Plumbing Code could make efficient fixtures mandatory in all new construction and renovations or a Provincial policy that would give municipalities the authority to make mandatory and enforceable requirements over and above the Building Code could allow for 100% uptake programs such as SHIP. It is expected that the Ontario Building Code will begin to adopt efficient fixtures as the standard over the next 10 years and the Region estimates that houses "built to code" could achieve a unit rate of 150 lpcd by 2021. More on this is discussed in Constraints and Opportunities, Section 8.0.

Water Use in Existing Homes

In 2009 Polis Project completed a report "H2Ontario: A Blueprint for a Comprehensive Water Conservation Strategy" in anticipation a Provincial Water Conservation and Efficiency Strategy for the Province of Ontario[2]. In this report an aspirational target of 150 lpcd was established as unit rate target for individual residents in Ontario (total indoor and outdoor use). The report states that "Getting to an urban residential water use of 150 litres per capita per day (LCD) in a generation is attainable providing appropriate actions are taken now".

It should be noted that achieving a target of 150 lpcd for existing homes requires different actions than the target of 150 lpcd indoor unit rate for new development that was discussed previously. Achieving a target of 150 lpcd will require retrofits of existing homes with water efficient fixtures and appliances as well as shift in people's water use behaviour. This is a long term aspirational target that made up part of in the "No New Water" scenario.

Outdoor Water Use

Outdoor water use in the Region is estimated to be in the range of 8 – 15% depending on the municipality, with the southern more urban municipalities having typically higher outdoor water use and the northern more rural municipalities with much lower outdoor use. A detailed analysis of billing data needs to be completed by York Region in partnership with the local municipalities to create a better understanding of the outdoor water use by sector in the summer months. Incentive and education based outdoor water reduction programs have an estimated effect of reducing outdoor water use by a total of 2.5% over 5 years. Water re-use and alternative sources for outdoor water use and an overall shift in mind set regarding landscapes and irrigation would have the most significant impacts on reducing outdoor water use for new development in the future.

Water Use in the ICI Sectors

Water use for the ICI sectors includes domestic use (toilets, faucets etc.), outdoor use (irrigation) and process use. Domestic and outdoor use can be addressed through similar programs as the residential sector including building code and other policy or legislative changes. Reducing water used in industrial processes is currently addressed through the Region's free Water Audits and Capacity Buy-Back program. These savings are included in the Water and Wastewater Master Plan projections up to 2018. Further savings could be achieved through this program beyond 2018; however, new ICI facilities using water efficient guidelines will likely be more effective at saving water than capital retrofits after construction. Water re-use, alternative sources and/or alternative methods for processes that do not need potable water, for example cooling and even toilet flushing, would yield significant savings in the ICI sectors. York Region currently estimates that 33% of all water consumed in the Region is used by the ICI sectors, the Water and Wastewater Infrastructure Master Plan (2009) assumes that ICI and residential water demand will continue to grow at the same proportion to 2051, indicating that the type of industry isn't expected to change significantly in York Region. Currently industry in York Region is described as mainly dry, however, a detailed analysis needs will need to be completed by York Region in partnership with the local municipalities on water billing data to evaluate actual water use by the ICI sectors in each of the municipalities in York Region. Due to the 2–tier nature of the municipality York Region does not currently have access to water billing data to complete this analysis. More on this is discussed in the Constraints and Opportunities section 8.

More detailed breakdown of water use, demand rates and water saved by municipality can be found in Appendix 8.

[2]Carol Mass 2009 H2Ontario A Blueprint for a Comprehensive Water Conservation Strategy Version 2.0 The POLIS Project on Ecological Governance

It is expected that the Ontario Building Code will begin to adopt efficient fixtures as the standard over the next 10 years and the Region estimates that houses "built to code" could achieve a unit rate of 150 lpcd by 2021.

4.5 Best-in-Class Review

As discussed, one of the conditions of approval for the SEC Trunk Sewer IEA initiative and the intra-basin initiative requires "...a review of the Best-in-Class in water conservation and efficiency programs, initiatives, strategies and tactics adopted by other jurisdictions". To meet this requirement, and to identify viable and innovative program components for the LTWCS, the project team researched water conservation and efficiency initiatives across the globe.

Two principle objectives guided the Best-in-Class research, they are as follows:

1. Identify and collect information on Best-in-Class, proven and innovative water conservation and efficiency initiatives world-wide for each of research areas; and
2. Identify those Best-in-Class water conservation and efficiency initiatives most suited for implementation in York Region.

Internet research and an extensive literature review were undertaken for the Best-in-Class research. The combined expertise of the project team and the Advisory Committee provided research direction on the leading jurisdictions in water conservation and efficiency. Building on these initial references, research into Best-in-Class practices and programs focused on the following areas:

Water Conservation and Efficiency

- General Water Conservation
- Water Efficiency
- Water Reuse
- Governance
- Policy and Regulation
- Conservation-oriented Pricing
- Rebates and incentives
- New Development

Municipal Infrastructure Guidelines

- Water System Planning
- Fire Protection Systems
- Flow Measurement System Planning
- Design and Construction of Water Mains and Structures
- Distribution Control Design
- Water Quality Control
- System Operations and Monitoring
- Practices in York Region Municipalities

In addition to internet research, technical reports, journals, case studies, policy and regulatory documents, annual reports, long-term strategies, implementation plans and guidelines pertaining to water conservation and efficiency initiatives in jurisdictions around the world were reviewed and where appropriate, catalogued. A comprehensive list of water conservation practices and programs, including brief abstracts, references and contact information, was compiled. Innovative initiatives proven to reduce water use, and implementable or potentially implementable in the Region in the near or longer term, were examined in detail. Where additional information or insights were needed, primary research in the form of phone interviews with key informants in the select jurisdictions was conducted. Research findings, including detailed case studies, were presented in the Best-in-Class Report (copy included in Appendix 1).

Monitoring of conservation and efficiency programmes and practices in other jurisdiction and liaison with sector experts will be on-going, ensuring that new initiatives, technologies and processes are identified and assessed for applicability in York Region.

Peer reviewers identified several jurisdictional initiatives potentially applicable in York Region. These additional best-in-class programs will be reviewed, in addition to any other new viable programs identified, during implementation planning. Best –in-class programs and initiatives will continue to evolve and will be reviewed during program planning and during the five-year update of the Long Term Water Conservation Strategy.

4.6 Conservation-Oriented Water Pricing Analysis

Conservation-oriented water pricing is a rate structure adopted by a water service provider where the costs of providing services are recovered. Individual customers are metered and pay for the volume of water they use, and the price signal is sufficient to affect individual decisions and encourage efficiency. Augmenting research on conservation-oriented water pricing was a parallel analysis of water price elasticity's for York Region.

The analysis included a preliminary assessment of how conservation-oriented pricing could affect future water demand across York Region and what this might mean for residents. The analytical methodology utilized relied on the economic concept of demand elasticity, which is a tool for measuring the responsiveness of a function to changes in parameters in a relative way. Specifically, it refers to the ratio of the percent change in one variable to the percent change in another variable. For example, the responsiveness of the quantity of water demanded by a community to a change in its pricing.

The analysis further examined how annual aggregate water use might respond to future changes in major demand drivers beyond water pricing, including sewage and electricity prices, average income, population, level of business activity and climate. This was analyzed over a 40-year period from 2010 to 2050. The rationale behind this examination was to better understand the role played by specific drivers so that Regional staff and those responsible for water services with local municipalities and utilities will be in a better position to advise on potential measures, policies and programs to promote water conservation.

Four scenarios were modelled using different assumption about water price increases, as well as influence of past climate trends and electricity prices. A range of assumptions about price 'elasticity' were used to calculate the rate of growth for water demand. While the results of the study are preliminary and indicative only, the general finding is that by pursuing a steady course of price reform over the next 40 years, York Region and its local municipalities could significantly influence water demand. A copy of the study is provided in appendix 10. The findings from the elasticity modelling and analysis and from the pricing research conducted for the Best-in-Class research are further discussed in Sections 5.5 and 6.5.

4.7 Peer Review of Strategy

A peer review of the LTWCS by water conservation experts and program managers from leading jurisdictions across Canada and the United States (Alliance for Water Efficiency, Seattle Public Utilities, San Antonio Water System, East Bay MUD, Aquacraft and Region of Durham) was undertaken and comments and suggestions provided by the reviewers have been incorporated in the strategy.

Comments and suggestions from peer reviewers were summarized by the Alliance for Water Efficiency and received by York Region in February 2011. These comments were reviewed and considered in preparation of the final Strategy document. A copy of the peer review comments are provided in Appendix 7.

5.0 Key Research Findings and Assessment

The findings set out in the Best-in-Class Report are the foundation of the Long Term Water Conservation Strategy. Program and practice case studies in the Best-in-Class Report were further assessed for their relevance and applicability to York Region prior to inclusion in this strategy.

It is important to reiterate that this strategy provides over-arching guidance for long-term water conservation programming in the Region and that detailed implementation plans, including full cost-benefit analysis, ROI assessments, analysis of avoided and/or deferred costs, etc., will be developed for many of the individual program components prior to their execution.

Key findings from the Best-in-Class review, an assessment of the programs and practices identified through the review, and a discussion of the resulting LTWCS program components are covered in Section 6.0. The program components have been organized into the following categories: Governance and Administration, Policies and Bylaws; Rebates and Other Financial Instruments; New Development; conservation-based Pricing; Pilot Projects; and the Regional-Municipal System.

5.1 Key Findings – Governance and Administration

Research for this portion of the study explored the governance models jurisdictions were using to facilitate water conservation. Research showed that organizational structure and function dictate how a water utility or municipal works department is managed, not water conservation. Regardless, jurisdictions that are leaders in water conservation and efficiency employ governance mechanisms for program oversight, administrative guidance and community and stakeholder participation.

5.1.1 Multi-Stakeholder Advisory Committees

Committees comprised of community stakeholders representing a multitude of sectors and disciplines, provide input and feedback on residential and ICI programs from design through to implementation. Representatives on these multi-stakeholder committees often include local residents, academic experts from post-secondary institutions, builders/developers, ICI facility managers and operators, landscape irrigation specialists, landscape designers/

contractors, plumbers, water auditors, process engineers, and water management and water industry professionals.

Multi-stakeholder committees enable water utilities/ municipalities to draw on the expertise within their jurisdictions and to work directly with those individuals, businesses and organizations that are either on the receiving end of the conservation programs and practices, or are involved on the delivery side. Long term conservation planning, regulatory initiatives, marketing and education, water pricing and financial incentives and other water conservation programs and practices are, in whole or in part, within the purview of these committees. The advantages of establishing multi-stakeholder advisory groups or task forces and securing their on-going participation early are as follows:

- Securing innovative ideas from end users and/or specialists
- Identification of potential opportunities and constraints in advance of program implementation
- Developing relationships with the broader community to facilitate outreach and build support for conservation initiatives.

5.1.2 Program Tracking and Reporting

Another management tool utilised by leading water conservation jurisdictions involves program tracking and reporting. Water saving targets, in combination with key performance indicators, are developed and used to track the success of any given conservation initiative. This annual scorecard approach to tracking and assessing water savings and the return on investment (ROI) enables program mangers to evaluate the effectiveness of any given initiative and make modification where necessary.

A tracking metric based on demand data and end-user feedback will be developed for each program. Tracking will allow for continuous monitoring and the data will be utilized for annual assessments and reporting.

5.2 Key Findings – Policies and Bylaws

Policies and in particular, regulatory initiatives to drive conservation actions down the water supply chain are commonplace in areas were water availability is an issue. National, provincial/state and local level policies and regulations identified through the Best-in-Class research were found to address all facets of water conservation such as the following:

- Conservation pricing and economic instruments
- Infrastructure design and operation
- Use of non-potable water systems grey water and rainwater
- Long range water management and conservation planning (20 to 40 year plans)
- Requirements for water audits and conservation retrofits
- Requirements for water conservation measures for new development projects
- Irrigation and landscape design requirements
- Technology performance standards
- Plumbing and building code requirements for water saving equipment, fixtures and devices Transfer of property or resale retrofit requirements
- Public participation and consultation
- Legal prohibition of water wastage

It is important to note that the presence of strong national and provincial/state conservation policies and legislation resulted in progressive conservation planning and programming at the municipal/utility level. This issue is discussed in greater detail in Section 8.0

Most jurisdictions that impose regulations to compel conservation practices also employ a suite of other conservation-based programs and practices. Regulations are used in combination with:

- outreach and education;
- marketing, joint ventures and partnerships;
- training and certification programs (for water related trades and professional services);
- conservation pricing and other financial instruments (tax incentives, cash rebates and discounts, etc.);
- leak detection programs; and,
- alternative infrastructure (e.g. grey water systems, rain water harvesting) and other such initiatives.

This integrated approach to conservation ensures a good mix of carrots and sticks to drive conservation practices in the near and long term. This latter point is significant in areas were water availability is an issue and variability of supply is a reality. Long term planning and security of supply require a level of predictability that regulations or by-laws and other 'hard' initiatives provide.

5.3 Key Findings – Rebates and Other Financial Instruments

Research indicated that financial incentives, such as tax credits and rebates for the installation of efficient fixtures, equipment and devices and financial penalties for excessive water use or wastage prove effective in securing greater uptake in all of the sectors. That said, due to the relatively low cost to purchase water as compared with other resources and services (e.g. the annual cost of a cell phone, cable television, internet services, home heating, vehicle fuel and electricity) pricing and financial incentives or disincentives are not stand alone drivers for conservation. Rather, they are part of a larger suite of instruments used by municipalities and water utilities.

5.4 Key Findings – New Development

Achieving water use efficiency in new residential and ICI development is more viable and cost-effective than in existing developments. Progressive practices such as double plumbing for grey water recycling and the installation of cisterns and rainwater harvesting systems, landscape designing for minimal irrigation requirements, installation of hot water re-circulating systems and other water saving measures are readily achievable for new development. However, it is important to note that York Region is an upper tier municipality and it is the local lower tier municipalities that have responsibility for planning and development approval for new construction and enforcing the requirements of the Ontario Building Code.

Planning for population growth and new residential and ICI development is a significant consideration for long term infrastructure planning for many jurisdictions, including York Region. Research clearly showed that water providers and experts in water conservation view new construction as the greatest prospect for innovative and progressive water conservation design and development.

Two approaches to achieving water use efficiency in new development are common amongst leading water conservation jurisdictions. The first approach involves the use of green building programs wherein the municipality implements construction requirements or incentives for sustainable building. The second approach involves establishing mandatory water efficiency requirements for new residential and or institutional/commercial developments. Green building programs are broader in scope and although they address water efficiency they also cover energy conservation, pollution prevention, carbon dioxide (CO2) reduction, stormwater management and other green building components. Municipal planning departments are typically responsible for administering green building programs while, in general, water efficiency programs for new developments are most often managed by the equivalent of a works or water services department.

The greatest potential for long-term water conservation and source protection, as well as environmentally sustainable development in a municipality, is through the adoption of green building programs with mandatory requirements for water efficiency. Currently, these programs not only address water use efficiency but in addition, the energy-water nexus. The problem to date has been the focus on energy conservation and greenhouse gas reduction over water efficiency. This constraint is being addressed by establishing specific water efficiency requirements for green building approvals. Currently, several leading municipalities have green building requirements and incentives delivered through their planning and development departments and water efficiency regulations for new developments instituted by the works departments or the water utility.

Green building systems provide a rating for each type of green building initiative, for example, low-flow toilets, green roofs or energy efficient windows. The rating system is weighted such that those initiatives that achieve greater savings or provide more environmental protection or benefit are given a higher score. Municipalities that have implemented green building programs usually require or incentivize a certain level or score to be achieved. For example, the United States Green Building Council (USGBC) sets a scoring system with top scoring projects achieving platinum status and on a declining score scale; platinum, gold, silver or certification status. In turn, municipalities have stipulated or incentivized one or more levels of the USGBC Leaders in Energy and Environmental Design (LEED) certification. Seattle, Washington for instance has a green building expedited approvals process and as a result, currently has the greatest number of LEED silver buildings in North America. Integrating specific and mandatory water conservation and efficiency requirements to these rating systems is the key to achieving desired water savings.

In California, a large number of municipalities have "Build-it-Green" requirements and incentive programs. Build-it-Green is similar to LEED and includes a rating system for a range of green measures for new development. The problem to date with these rating systems is that energy savings are heavily weighted over water savings and there is some concern about specific fixtures, such as sensor-operated faucets, being included in the rating system as their water saving merits are in question.

5.5 Key Findings – Conservation-Oriented Pricing

Conservation-oriented pricing is attaching an economic value to a unit of potable water at a level that encourages water conservation on the part of the customer.

There are three types of water conservation pricing.

- Fixed rate
- Seasonal tiered block rate
- Tiered block rate

In all cases, the objective is to set the unit cost of water high enough s to encourage customers to use less water.

There is a good deal of debate as to what price model is most effective in securing water use reduction and some experts contend that for the large volume residential water users (typically upper-middle and upper income families), water does not cost enough to encourage water conservation.

Those jurisdictions that are considered progressive in water efficiency use either a water budget-based seasonal rate structure or increasing block rate structure. A season rate or surcharge is applied during the warm weather months with the goal of discouraging excessive water use for irrigation and other outdoor uses. A more common approach amongst leading jurisdictions in the application of a tiered or increasing block rate based on a customer's water use. There are examples of 2-, 3- and 5-tier rate

structures. Those customers who use the least amount of water pay the lowest per unit cost while those using the most pay a premium or the highest per unit cost for the water.

Water budgets are used by water utilities and municipal works departments to establish a formal definition of the quantity of water that would be required by an efficient level of water use. According to the Alliance for Water Efficiency (AWE), exactly what constitutes an "efficient level " of water use (particularly as it relates to outdoor irrigation) is often a community decision and must be based upon public expectations as well as water supply realities.

Various models are used to establish indoor and outdoor water budgets but it suffices to say, water budget-based rates are block rates that are "defined by using one or more customer characteristic". Characteristics include such things as number of persons per household, area of landscape, or the evapotranspiration rate of the landscape.

As described by the AWE, water budget-based rate structures can be thought of as an increasing block rate structure where the block definition derives from a water budget that defines an efficient level of water use for each customer.

According to the AWE, data collected from jurisdictions that have implemented water budget-based rate structures show there are both advantages and disadvantages to such pricing schemes. One advantage is that such rate structures are considered a more equitable means of sharing limited water supplies while still allowing for a degree of customer choice. In conjunction, utilities by the very nature of the customized aspect of water budget-based rate structures "...have developed closer working relationships with their customers..." As technology improves, the ability to manage multi-tiered conservation-based rate structures is more easily accomplished.

One disadvantage is that water budget-based rate structures have potentially higher associated implementation costs. The billing system is more complex and often must be modified to accommodate the level of customer water use and billing data that is required.

The best practice for water rate structures includes full life cycle costing. This is comprised of maintenance, rehabilitation and replacement of existing infrastructure. The American Water Works Association (AWWA) has estimated that large portions of many water infrastructure systems will have to be replaced over the next 30 years. Deferring maintenance on older infrastructure contributes to water losses and ultimately higher costs.

The Conservation-Oriented Pricing Analysis provided in appendix 10 provides a number of recommendations including adopting conservation-oriented price structure as one of many water conservation tools recommended in the Long Term Water Conservation Strategy. The study also recommends working with the local municipalities and engaging various stakeholders including the public to investigate different pricing structures and how they would affect demand in York Region.

5.6 Key Findings – Pilot and Demonstration Projects

Pilot and demonstration projects are standard business practice for any potentially large scale undertaking. Pilot projects will enable York Region to test the viability of a given program component, such as a priority approvals process (in conjunction with local municipalities) for green building construction or new water efficient technology for flushing and disinfecting water mains. Pilot testing also allows for the collection of relevant data such as water and energy use, greenhouse gas production and/or stormwater generation.

Demonstration projects provide an opportunity to showcase the benefits of taking a new approach to water use. Whether it is reaching the public with a new way of landscaping their property or a company with technology to reduce or eliminate the use of potable water for industrial processes. Such projects provide a financially viable means of reaching a target market. By demonstrating alternative water saving technologies, programs and practices, the intended audience witnesses firsthand the benefits of the new approach. Where appropriate, such as water-energy retrofits for the ICI sector, monitoring and data collection for the purpose of information sharing is an integral part of the demonstration project.

5.7 Key Findings – Regional-Municipal System

The Best-in-Class review for municipal infrastructure guidelines examined the practices in three main stages of an asset life cycle; planning; design and construction; and operation of water infrastructure. The underlining objective was to determine the best available planning, strategies, technologies, maintenance procedures, and options for water conservation by researching and contacting water utilities and organizations around the world.

The major goal of providing, operating and maintaining water infrastructure is foremost the achievement and preservation of water quality. The goal of water conservation is somewhat counter to the goal of preserving water quality, as one of the principle means of achieving and maintaining water quality is the use of water to test, flush and clean the water infrastructure. To harmonize water quality objectives with water conservation the main considerations are to:

- Closely schedule infrastructure construction with the service demand to avoid oversized mains.
- Have a robust water quality program including co-ordinated sampling and automated flushing programs.
- Employ pressure control and flow monitoring such as district metered areas within a leak detection program.
- Assess the condition and implement an asset management program for water main replacement to prioritize repair and replacement of leak or break prone mains.
- Develop system design guidelines for water conservation.

A utility team that understands their water system and the water conservation obstacles it faces including the geographic area, population trends, weather trends, existing infrastructure, and the local industries, is best positioned to implement operations and maintenance procedures to effectively meet quality and conservation goals.

5.8 Assessment of Key Findings

Screening and Evaluation criteria specific to York Region were developed for the assessment of viable Best-in-Class programs and practices for inclusion in the LTWCS. Culling the extensive list of water conservation program components to build an innovative and viable strategy was the objective in developing the screening and evaluation criteria. A range of considerations were taken into account in order to screen and evaluate program components. The purpose of the screening criteria is to filter out program components while evaluation criteria are used to rate components and identify timelines and other considerations for implementation.

The qualitative analysis allow for an assessment of potential program components against requirements related to health, climate suitability, Regional strategic alignment and that are within the control of the Region or achievable through partnerships with local municipalities or other stakeholders.

5.8.1 Screening of Potential Program Components

Mandatory criteria were used to screen potential program components identified through the Best-in-Class global review. Application of this screening or "knock-out" criteria culled the list of potential program components developed through the Best-in-Class research. Those components that passed the screening process were then evaluated. The following is a summary of the screening criteria:

Environmental Screening Criteria

- Maximize sustainability of the water supply through the application of Best-in-Class technology and practices.

Water System Screening Criteria

- Maximize the reliability of the water supply system
- Proven effective in cold weather climates
- Potential to generate sufficient water savings as to contribute to the long term vision of no new water.

Health and Safety Screening Criteria

- The Regional potable water supply meets all existing and future regional, provincial and federal public health and drinking water quality standards
- The Regional non-potable water supply meets future standards and is of acceptable quality for intended non-potable uses.

Legal and Administrative Screening Criteria

- Alignment with York Region's strategic goals

5.8.2 Evaluation of Program Components

Numerous water conservation program components passed through the screening process. These were then assessed using evaluation criteria. To assess and rank those components for inclusion in the LTWCS, an evaluation matrix was developed. This enabled the ranking of program components based on the evaluation criteria. In conjunction, the evaluation criteria also helped identify the timeframe for implementation (between 2011 and 2021) and the potential for pilot testing or demonstrations. The following is a summary of the evaluation criteria:

Environmental Evaluation Criteria

- Minimize energy consumption and reduce the Region's carbon footprint.
- Maximize the use of energy efficient technologies, processes and practices.

Resource Evaluation Criteria

- Minimize the financial costs to York Region water customers
- Maximize partnerships with local municipalities and utilities for the cost-effective delivery of the Region's water conservation and efficiency programs

Water System Evaluation Criteria

- Minimize the risk of water service disruptions
- Maximize system flexibility to respond to change

Other Evaluation Criteria

- Demonstration potential
- Future applicability
- Regional economic stimulant
- Technical, environmental, and social innovation

Legal and Administrative Screening Criteria

- Implementable with supporting regulations in place

Each parameter was scored from one (1) to five (5) to represent fit or achievement of the criteria outlined in the parameter. The scoring was qualitative, based on the expertise and opinion of specialists and engineering personnel. The overall results are more valuable as a means of qualitatively ranking the opportunities within the practice areas as opposed to a quantitative value on the scale; i.e. those that score higher are more likely to offer a better opportunity or value to the Region than those that score lower. Table 5 provides an explanation of the qualitative grading approach.

Table 5 – Qualitative Scoring Description

RATING	GRADE
1	The practice does not contribute to the criteria
2	The practice contributes very little to meeting the criteria
3	Good alignment to meet the criteria.
4	Significant alignment and strong consideration to achieving the goal or concept of the criteria
5	Full value or alignment is expected

Based on research of the identified components, discussions with relevant water utility and municipal staff, water industry experts, specialists in conservation technologies and/or practices, and system design specialist in North America and around the world; scores were assigned to each practice area and are shown in Table 6 – Evaluation Matrix.

Following the grading of each of the components for a total score out of a possible 25, the program components were then ranked highest to lowest score as shown in Table 7 – Evaluation Rank. This last step helps identify those components that have the potential for the highest return of investment. For many of the indentified program components, detailed implementation plans with full cost benefit analysis are required.

The first step in implementation planning will be a comprehensive assessment of the new water conservation and efficiency components set out in this strategy. This qualitative and quantitative assessment will include an evaluation of potential water savings, cost-benefit analysis, an assessment of avoided and/or deferred costs, market viability, etc. All program components will have to meet a minimum ROI factor which will be established using the soft path methodology.

		Environ-mental	Resource	Water System	Legal and Admin-istrative	Other	Total
Program Category	Program Component	(1-5)	(1-5)	(1-5)	(1-5)	(1-5)	/25
Governance and Administration	Multi-stakeholder Advisory Group	3	4	3	5	4	**19**
	Implementation plans	3	5	4	5	4	**21**
	Measurement and reporting framework	4	4	4	5	5	**22**
	Region-municipal Advisory Group	3	5	4	5	4	**21**
	Incorporate LTWCS into infrastructure Master Plan	3	4	4	5	3	**19**
Policies And By-Laws	Update summer conserve by-law	3	3	4	5	3	**18**
	Drought response by-law	3	3	5	5	3	**19**
	Plumbing retrofit on resale by-law SF	4	3	4	4	4	**19**
	Water efficient fixtures and appliances for new dev./reno by-law SF/MF	4	3	4	3	4	**18**
	Conservation and LID for new dev. by-law SF	4	4	5	3	5	**21**
	Individual unit water metering MF	4	3	3	3	4	**17**
	Conserv plans for facilities/complexes ICI	4	3	3	5	5	**21**
	Conserv pricing or rate rebate ICI	4	3	3	3	4	**17**
	Irrigation system sensor by-law ICI	4	3	3	4	4	**18**
	Process water reuse by-law ICI	4	4	3	4	4	**19**
Rebates And Other Financial Instruments	Het Toilet rebate SF/MF	3	2	3	5	5	**18**
	Efficient furnace humidifier rebate SF/MF	3	2	3	5	3	**16**
	Coupon discounts for xeriscape plants SF/MF	3	5	2	5	3	**18**
	Subsidized rain barrels SF/MF	2	2	2	5	2	**13**
	Modify and/or develop rebates/ incentives SF/MF	3	2	3	5	3	**17**
	Subsidized landscape design service SF/MF	4	2	2	5	4	**18**
	Incentive for hot water recirc. systems SF	4	2	3	5	4	**19**
	Subsidized WaterSense toilet installations MF	3	2	3	5	4	**17**
	Front-loading clothes washer installations MF	4	3	2	5	4	**18**
	Low income incentive program MF	3	2	2	5	3	**16**
	Unit metering subsidy or incentive MF	4	2	3	5	4	**18**
	Free water audits and capacity buy-back ICI	4	3	4	5	4	**20**
	Efficient fixture rebate ICI	4	2	3	5	3	**17**
	Pre-rinse spray valve for commercial kitchens ICI	4	2	2	5	3	**16**

		Environ-mental	Resource	Water System	Legal and Admin-istrative	Other	Total
Program Category	Program Component	(1-5)	(1-5)	(1-5)	(1-5)	(1-5)	/25
New Development	Implementation of East Gwillimbury program SF	3	4	3	5	4	**19**
	Detailed monitoring for new developments SF	3	5	4	5	4	**21**
	Modify SHIP to increase uptake and monitor SF	4	4	4	5	5	**22**
	Integrate WaterSense when updating SHIP SF	3	5	4	5	4	**21**
	Modify LEED for high rise to increase uptake MF	3	4	4	5	3	**19**
	Integrate WaterSense into LEED MF	4	3	4	4	5	**20**
	Develop conservation and reuse guidelines ICI	4	4	4	5	4	**21**
Pricing	Full cost conservation-oriented pricing structure SF/MF	4	4	4	4	4	**20**
	Full cost conservation-oriented pricing structure ICI	4	4	4	4	4	**20**
Pilot Projects	Expedited approvals for green building with local municipality SF/MF	5	4	4	3	5	**21**
	Water efficient furnace humidifier rebate SF/MF	3	3	2	5	5	**16**
	Water efficient landscapes SF/MF	3	4	3	5	4	**19**
	Range of water reuse projects SF/MF	3	3	4	4	5	**19**
	Water efficient irrigation MF/ICI	2	3	3	5	4	**17**
	Capture results from upgrades at Regional and Municipal facilities ICI	2	3	3	5	4	**17**
	Demo of upgrades at Regional & Municipal facilities ICI	2	3	2	5	5	**17**
	Expedited approvals for green building with local municipality ICI	5	4	3	4	5	**21**
	Reuse projects ICI	3	3	4	4	5	**19**
	Study to quantify water use for main flushing & disinfecting R/M	5	4	3	4	5	**21**
	Community-level water reuse projects	5	2	5	3	5	**20**
	Aquifer recharge through community-level water reuse R/M	4	3	4	4	5	**20**
	Dual plumbing in new public building	5	3	4	2	5	**19**

		Environ-mental	Resource	Water System	Legal and Admin-istrative	Other	Total
Program Category	Program Component	(1-5)	(1-5)	(1-5)	(1-5)	(1-5)	/25
Marketing Outreach & Education	Regional marketing, outreach and education strategy	3	4	2	5	5	**19**
	Water efficient landscape workshops	3	4	3	5	4	**19**
	Free individual landscape assessments SF	3	3	4	5	4	**19**
	Sector specific water efficiency seminars and workshops ICI	3	3	3	5	4	**18**
	Water efficiency outreach program for new Canadians	3	4	3	5	4	**19**
	Community-level great 'unlawning challenge'	4	4	4	5	4	**21**
	Water efficiency outreach program for low income housing MF	3	4	3	5	3	**18**
	Grade 7 water efficiency curriculum for schools	3	5	2	5	3	**18**
	Region water efficiency calendar contest for Grade 7 students	2	5	2	5	3	**17**
	Children's Water Festival	3	5	2	5	4	**19**
	Develop curriculum unit on "embedded water"	3	4	2	5	4	**18**

		Environ-mental	Resource	Water System	Legal and Admin-istrative	Other	Total
Practice Area	Program Component	(1-5)	(1-5)	(1-5)	(1-5)	(1-5)	/25
Water system planning	Land Use Density*						**18**
	Dual Water Systems	4	2	2	2	3	**12**
Fire Protection Systems	Municipal Water Storage and Flow Requirements	5	4	3	2	2	**16**
	Fire Suppression Systems*						**20**
Flow Measurement System Planning	District Meter Areas	5	5	5	4	5	**24**
	Customer Metering	4	4	2	4	4	**18**
Design and Construction of Water Mains and Structures	Design leakage rates	5	4	4	4	4	**21**
	Construction Methods	5	3	5	4	5	**22**
	Flushing and Disinfection	5	4	3	4	5	**21**
Distribution Control Design	Flow and Pressure Control	5	5	5	4	5	**24**
	Water System Flow Circulation	4	3	3	3	3	**16**
	Water Storage Flow (Circulation) Design	4	3	3	3	3	**16**
	System Isolation Valves	2	3	4	2	3	**14**
	Overflow Design for Water Storage	3	2	2	3	4	**14**
Water Quality Control	Disinfection Design Practices	3	4	4	2	3	**16**
System Operations	Water Quality Management	5	5	4	4	4	**22**
	System Flushing and Swabbing	5	3	4	4	5	**21**
	Process Control at Treatment Plants	4	4	4	4	4	**20**
System Monitoring	Leak Detection Program	5	4	5	5	4	**23**

Program Category	Program Component	Score	Rank
Governance & Administration	Measurement and reporting framework	22	1
	Regional-municipal Advisory Group	21	2
	Implementation Plans	21	2
	Multi-stakeholder Advisory Group	19	3
	Incorporate LTWCS into infrastructure Master Plan	19	3
Policies & By-Laws	Conservation and LID for new development by-law	21	1
	Conservation plans for facilities/complexes	21	1
	Plumbing retrofit on resale by-law SF	19	1
	Drought response by-law	19	2
	Process water reuse by-law ICI	19	2
	Update summer conservation by-law	18	3
	Water efficiency fixtures and appliances for new development and renovation by-law SF/MF	18	3
	Irrigation system sensor by-law	18	3
	Individual unit water metering for multi unit complexes MF	17	4
Rebates & Other Financial Instruments	Free water audits and capacity buy-back ICI	20	1
	Incentive for hot water recirculation systems SF	19	2
	Subsidized landscape design service SF/MF	18	3
	Front-loading clothes washer installations MF	18	3
	Unit metering subsidy MF	18	3
	Coupon discounts for xeriscape plants SF/MF	18	3
	HET Toilet rebate SF/MF	18	3
	Develop new rebates and incentives and/or modify existing ones SF/MF	17	4
	Subsidized WaterSense toilet installations MF	17	4
	Water efficient fixture rebate ICI	17	4
	Water efficient furnace humidifier SF/MF	16	5
	Low income incentive program	16	5
	Pre-rinse spray valve for commercial kitchens ICI	16	5
	Subsidized rain barrels	13	6

Program Category	Program Component	Score	Rank
New Development	Implementation of East Gwillimbury program SF	21	**1**
	Integrate WaterSense when updating SHIP SF	21	**1**
	Develop conservation and reuse guidelines	21	**1**
	Integrate WaterSense into LEED MF	20	**2**
	Modify LEED for high rise to increase uptake	20	**2**
	Detailed monitoring for new development SF	19	**3**
	Modify SHIP to increase uptake and monitor SF	19	**3**
	In co-operation with local municipalities an expedited approvals process for green building SF/MF	21	**1**
	Study to quantify water use for main flushing and disinfecting R/M	21	**1**
	In co-operation with local municipalities an expedited approvals process for green building	21	**1**
	Community-level water reuse projects	20	**2**
	Aquifer recharge through community-level water reuse	20	**2**
	Water efficient landscapes SF/MF	19	**3**
	Range of water reuse projects SF/MF	19	**3**
	Range of water reuse projects ICI	19	**3**
Pricing	Full cost conservation-oriented pricing SF/MF	20	**1**
	Full cost conservation-oriented pricing ICI	20	**1**
Marketing Outreach & Education	Community-level great 'unlawning' challenge	21	**1**
	Regional marketing, outreach and education strategy	19	**2**
	Water efficient landscape workshops	19	**2**
	Free individual landscape assessments SF	19	**2**
	Water efficiency outreach program for new Canadians	19	**2**
	Children's Water Festival	19	**2**
	Sector specific water efficiency seminars and workshops ICI	18	**3**
	Water efficiency outreach program for low income housing MF	18	**3**
	Grade 7 water efficiency curriculum for schools	18	**3**
	Develop curriculum unit on "embedded water"	18	**3**
	Region water efficiency calendar contest for Grade 7 students	17	**4**

Program Category	Program Component	Score	Rank
Pilot Projects	In partnership with one or two local municipalities, expedited approvals for green building SF/MF	21	**1**
	Quantifying water use for main flushing and disinfecting R/M	21	1
	In partnership with one or two local municipalities, expedited approvals for green building ICI	21	1
	Community-level water reuse projects R/M	20	2
	Aquifer recharge through community-level water reuse R/M	20	2
	Water efficient landscapes SF/MF	19	3
	Water reuse projects SF/MF	19	3
	Water Reuse projects ICI	19`	3
	Dual plumbing in new public buildings R/M	19	3
	Water efficient irrigation	17	4
	Capture and demonstrate results from upgrades at public facilities R/M	17	4
Flow Measurement System Planning	District meter areas	24	1
Distribution Control Design	Flow and pressure control	24	1
System Monitoring	Leak detection program	23	2
Design & Construction Of Water Mains & Structures	Construction methods	22	3
Systems Operations	Water quality management	22	3
Water Mains & Structures	Design leakage rates	21	4
	Design & Construction Of	21	4
System Operations	System flushing and swabbing	21	5
	Process control at water treatment plants	20	5
Flow Measurement System Planning	Customer Metering	18	6
Fire Protection Systems	Municipal water storage and flow requirements	16	7
Distribution Control Design	Water system flow circulation	16	7
	Fire Protection Systems	16	7
Water Quality Control	Disinfection design practices	16	7
Distribution Control Design	System isolation valves	14	8
	Water Quality Control	14	8
Water System Planning	Dual water systems	13	9

6.0 Program Components

The screening and evaluation of potential Long Term Water Conservation Strategy program components resulted in a go-forward list of projects, practices and initiatives to be evaluated and/or implemented between 2011 and 2021.

It is important to note that it is considered impractical at this stage to suggest potential program components beyond the 10-year horizon. Beyond such a timeframe it is reasonable to assume that there will be policy and legislative changes, new technology and processes, and/or climate and other related ecological and water resource changes that will impact the LTWCS and the program components to be considered for implementation.

The following is a brief description of the LTWCS program components to be implemented over the next ten years to meet the long term vision. As previously discussed, these components were drawn from the Best-in-Class global review and from existing York Region water conservation and efficiency initiatives and are categorised as Governance and Administration, Policies and Bylaws; Rebates and Other Financial Instruments; New Development; Conservation-based Pricing; Pilot Projects; and the Regional-Municipal System.

6.1 Governance and Administration

The establishment of committees to provide input and guidance on the development and implementation of water conservation initiatives; administrative tools to track progress and ensure on-going adaptation as required; and a conservation-based, full cost recovery pricing structure are the key components in the governance and administration of the LTWCS.

6.1.1 Multi-stakeholder Advisory Group

Most leading jurisdictions in water conservation and efficiency have multi-stakeholder committees with representation across water using sectors, experts in water management and those responsible for the provision of water and wastewater services.

York Region has currently in place an expert Advisory Panel for the LTWCS comprised of industry experts in the area of water conservation and efficiency from municipalities, academia, non-government organizations (NGOs) and the MOE. This group has provided guidance and feedback to York Region staff and the Project Team on the development of the LTWCS.

Building on the existing Advisory Panel structure and function, and adjusting the representation accordingly will enable the establishment of a multi-stakeholder Advisory Group to provide guidance and feedback throughout the implementation of the strategy. Representation on the Advisory Group will include, but not be limited to the following:

- Residents (1 to 2 representatives)
- Industry (1 representative)
- Institutional – hospitals, school boards, etc. (1 to 2 representatives)
- Commercial – retail and office complexes (1 representative)
- Builders/developers (1 representative)
- Local municipalities (1 to 2 representatives)
- Water conservation expert (1 representative)
- Community – community and/or multi cultural organization, etc. (2 representatives)
- Environmental organization (1 representative)
- York Region staff (1 to 2 representatives)
- MOE (1 representative)

The Advisory Group will advise on strategies and approaches provide sector-specific insights and ideas, serve as program ambassadors to the larger Regional community, and help to identify champions in their respective sectors. It is expected that for year one (2011) the Advisory Group would be required to meet in person or via teleconference or online conference, on a monthly basis. Once implementation plans for program components are complete and execution is underway, the meeting schedule will be adjusted as required.

6.1.2 Regional-Municipal Steering Committee

Throughout the development of the LTWCS local municipal staff have been involved through participation in the Water and Wastewater Steering Committee. This group of senior local municipal and York Region staff have set the direction and provided guidance to ensure the success of the LTWCS. This group will continue to support the implementation of the strategy through various working groups with representation from the nine local municipalities and York Region to:

- develop full cost conservation-oriented wholesale and retail pricing structures;
- determine a pilot study project for an expedited approvals process for green building construction;
- identify water reuse and new technology applications for public sector buildings;
- ensure co-ordination with sustainability and Master Planning processes and approaches;
- identify opportunities in the nine local municipalities for other water conservation and efficiency initiatives; and
- maintain open communication and ensure the long-term, on-going support of the local municipalities

The active participation and support of the nine local municipalities is critical to the success of the LTWCS. Without such on-going support it will not be possible to implement several strategy components. As previously discussed, it is the local municipalities or their utility providers that are responsible for water billing and customer service. Any water conservation and efficiency programs dealing with the end user must involve the active co-operation of the local municipalities.

Consideration will be given to including local utility representation as representatives in working groups of the Steering Committee. In several instances, it is the local electrical utility that is responsible for water billing and the collection of water use data. York Region requires the participation of the utility in any outreach initiative involving the water billing system and in the collection of water use data for benchmarking, cost-benefit analysis, ROI calculations, and monitoring and tracking.

6.1.3 Implementation Planning

Implementation plans, including detailed cost-benefit analyses, will be developed for many of the new LTWCS program components prior to launching. Whether full cost conservation-oriented pricing, a by-law for plumbing retrofit on resale, unit metering for multi-unit complexes or numerous other initiatives, a complete assessment, design and implementation process for each is needed to ensure effective delivery and acceptable ROI. For those program components requiring the active co-operation and participation of local municipalities and, where applicable, their utility partners, implementation planning will require the early and continued involvement of municipal and/or utility representatives. Implementation plans will apply to all relevant LTWCS program components until the year 2021.

6.1.4 Water Conservation Measurement and Reporting Framework

York Region has articulated water conservation and efficiency objectives as part of the LTWCS and sustainability planning processes. These objectives will form the foundation of a water conservation measurement and reporting framework. The Region's performance will be measured against established water conservation indicators or quantitative objectives. The measurement and reporting framework will be designed to be in-line with international best practices and will draw on successful reporting structures from leading jurisdictions in water conservation such as Sydney, Australia . Such an approach involves reporting on Regional performance measured against water conservation and efficiency indicators. A scorecard will utilize LTWCS goals and objectives and employ a triple bottom line analysis – as set out in the Region's Sustainability Strategy – which measures progress against economic, social and environmental indicators.

6.1.5 Integrate the LTWCS and Infrastructure Master Planning

Integrating the strategy with Infrastructure Master Planning is integral to maintaining continuity and ensuring full consideration of water conservation and efficiency in all future infrastructure plans and projects. Over the past decade, the Region has taken significant steps to integrate water conservation into the operational and capital sides of infrastructure planning. This approach will continue under the LTWCS and will be an integral part of the Region's overall water and wastewater infrastructure planning process.

6.2 Policies and By-laws

Policies and by-laws are 'hard' components of the LTWCS and provide a formal mechanism to securing water use reductions over the short and long terms. Such legal initiatives are targeted and specific in nature and give the Region tools to drive conservation practices amongst end users if and when required. Existing water conservation-related policies and by-laws will be revisited and re-assessed to determine if changes are necessary. At the same time, potential new water conservation policies and by-laws, identified through the Best-in-Class research and subsequently screened and evaluated, will be fully assessed and vetted for possible implementation.

6.2.1 Summer Water Conservation By-law

York Region currently has a Summer Water Conservation By-law which has been adopted, with slight variations, by the nine local municipalities. All Regional municipalities stipulate that residents whose house address end in an odd number may water outdoors only on odd numbered days of the month while those whose house address ends in an even number may water outdoors only on even numbered days of the month. All municipalities allow newly planted trees and shrubs to be watered for a 24 hour period after planting but the times in which irrigation can be done vary amongst individual municipalities.

The existing by-law will be evaluated against the LTWCS objectives and the efficacy of the individual municipal by-laws to date in achieving summer water use conservation during drought periods will be assessed. Modifications and further harmonization to ensure greater water savings when required will be taken into consideration in the evaluations.

6.2.2 Plumbing Retrofit on Resale By-law

In order to drive indoor water conservation in existing buildings, the efficacy of implementing a Plumbing Retrofit on Resale by-law will be evaluated. Using the Best-in-Class research, several leading jurisdictions, such as the City of San Diego, California , have by-laws or ordinances in place that require all buildings, prior to a change in property ownership, to be certified as having water conserving plumbing fixtures in place. The by-law would apply to all residential, commercial and industrial water customers and would require the installation of high efficiency toilets, water efficient showerheads and faucets and other water saving devices or fixtures as determined necessary.

The property owner/seller would be responsible for ensuring the property is in compliance prior to the close of sale. Based on similar by-laws or ordinances in other jurisdictions, the onus is on the seller to pay a filing fee and submit a "Water Conservation Certificate" confirming completion of the retrofit. The seller is given several months to complete the retrofit and subsequently to file the certificate.

In the absence of provincial legislation banning the sale of 13 litre toilets and other water wasting fixtures, the Plumbing Retrofit on Resale by-law is a potential mechanism to drive uptake of water efficient fixtures in existing building stock in York Region as long as it does not conflict with or supplant provincial legislation such as the Ontario Building Code.

6.2.3 Water Efficient Fixtures for New Development By-law

Regional LTWCS staff will evaluate a potential by-law to require the installation of water efficient fixtures and appliances in all new developments. As identified through the Best-in-Class research, this approach to securing water efficient fixture and appliance installations in new developments is used effectively by many leading water conservation jurisdictions. By requiring all residential, commercial and institutional buildings to have water efficient toilets, faucets, washing machines, dishwashers, and

other water using fixtures and appliances as deemed appropriate, the by-law(s) will help stimulate the local market and ensure maximum indoor water efficiency is achieved.

The efficacy and viability of such a by-law for the residential sector, both single-family and multi-family residences, and for the ICI sectors will be evaluated in year one (2011) of the LTWCS and will be done in consultation with the Regional-Municipal Working Group. The individual municipalities are responsible for new building approvals in their respective jurisdictions and therefore will have to adopt the by-law as long as it does not conflict with or supplant provincial legislation such as the Ontario Building Code.

6.2.4 Water Conserving and Low Impact Development (LID) Landscaping for New Development By-law

Currently there are no water conservation requirements for landscaping in new developments. Regional staff will investigate the value of a by-law setting out specific landscaping requirements for new residential and ICI developments. The by-law could potentially restrict lawn area and/or impermeable surfaces, specify the use of native and/or water efficient plants, require the installation of rain gardens and soak-away pits, and other such landscaping related requirements/restrictions.

As noted, the local municipalities have jurisdiction in York Region over new development and therefore will be actively engaged through the Regional-Municipal Working Group in the evaluation of the water conserving and LID landscaping by-law.

6.2.5 Unit Metering for Multi-Family Residences

Regional staff will investigate approaches and options to encourage or compel individual unit metering in multi-family residential complexes. Research has shown that water use declines in homes with individual water meters, where occupants pay for the water they use. In order to encourage water saving behaviour and practices amongst occupants of multi-unit residences, Regional staff will evaluate policy and regulatory approaches to drive the use of individual unit metering in multi-unit residences. This evaluation will be done in partnership with local municipalities.

6.2.6 Water Conservation Plans for New Industrial, Commercial and Institutional Developments

Best-in-Class research identified an approach used by many leading jurisdictions requiring the development and submission of conservation plans by ICI facility owners/operators for any new construction projects. These plans targeted not only water conservation, but also energy conservation and stormwater management. In leading jurisdictions, owners/operators of ICI facilities are required to evaluate options for reducing water use, energy consumption and stormwater runoff and submit a plan to the municipal or jurisdictional authority for review and approval. Approval of the plan is a condition of approval for construction of the ICI facility or complex.

6.2.7 Water Efficient Irrigation Systems for Industrial, Commercial and Institutional Facilities By-law

Regional staff will investigate the viability and efficacy of a by-law requiring the use of soil sensor- and rain sensor based irrigation systems by ICI facilities. Soil sensors detect the moisture level in the soil and only engage when soil moisture levels fall below a preset threshold. Rain sensors automatically shut-off irrigation systems during rain events. These water efficient irrigation systems have proven very effective in reducing water use for irrigation. In those jurisdictions which have requirements for water efficient irrigation systems, most also require that only certified irrigation contractors trained in the installation, programming and upkeep of water efficient irrigation systems and certified by the jurisdiction may install and service them. Regional staff will also investigate options for training and certifying irrigation system contractors.

6.3 Rebates and Other Financial Instruments

Financial incentives in the form of a range of rebates targeting residential and ICI water users have been implemented by York Region. Under the LTWCS, Regional staff will evaluate the current effectiveness of existing rebates and make any changes as indicated by the evaluation. In conjunction, new financial inducements such as a rebate or incentive for individual unit metering will be evaluated.

6.3.1 High Efficiency Toilet Rebate

York Region through its Water for Tomorrow program currently provides single-family home owners and multi-unit building owners in York Region with a $75 rebate on the purchase of a WaterSense™ certified toilet. A list of eligible toilets is provided to residents and building owners on-line or by contacting the Region; only those toilets on the list qualify for the rebate.

In one year of operation approximately 19,000 toilet rebates were provided to residents and as of December 31, 2010 over 35,000 WaterSense toilets have been purchased by single-family homeowners in York Region. The program has been highly successful and will continue under the LTWCS.

6.3.2 Efficient Furnace Humidifier Rebate

Again, through the Water for Tomorrow program, the Region provides rebates to residents for furnace-mounted humidifiers. The Region offers $30 and $70 rebates, respectively for furnace-mounted humidifiers that send 10 to 50 litres of water to the drain per day and those humidifiers that send less than 10 litres of water to the drain per day. York Region investigated various models of furnace-mounted humidifiers available on the market and tested and approved certain models based on performance criteria. Only such approved models qualify for the rebate. The water efficient furnace humidifier rebate will continue as part of the LTWCS.

6.3.3 Retail Discount Coupons for Water Efficient Plants

As part of the Water for Tomorrow landscape assessment service, York Region has offered coupons for savings on water efficient plants redeemable at participating garden centres. Promotional coupon discounts are recommended to continue to be offered under the LTWCS and in conjunction with the landscape assessment service, discussed in detail in Section 6.7.3.

6.3.4 Subsidized Rain Barrels

Through special events, the Region has offered rain barrels at a subsidized price to residents. In May 2010 the event sold out with 4,000 rain barrels sold by noon. To date, 11,500 rain barrels have been purchased by York Region residents since the initiative started in 2008. Although the water savings from rain barrels has been debated, it is important to note that beyond their use as an alternative source of irrigation water, rain barrels provide a constant visual reminder to residents to conserve water use outdoors and to make use of captured rain water. The success of the rain barrel events demonstrate that they are an important outreach and education tool and will continue as part of the LTWCS for the near future.

6.3.5 Incentives for Low Income Housing

As part of implementation planning, Regional staff will investigate the efficacy of establishing a water efficiency incentive program for low income housing. It will be first necessary to secure water use data for low income residences to determine the potential savings. If the benefit to cost ratio is acceptable, market research to determine the type and amount of the incentive necessary to secure uptake will be undertaken. It is the position of York Region that all residents should have access to its programs and that incentive programs can be an effective means of retrofitting existing buildings with water saving fixtures and appliances.

6.3.6 Subsidized Landscape Design Service

Regional LTWCS staff will evaluate the potential of York Region, in conjunction with area garden centre retailers, to offer subsidized water efficient landscape design services. Currently, the Region provides a landscape assessment service to residents which achieves maximum uptake each year. The landscape design service would expand the existing program to include landscape plans developed by designers at area garden centres. Residents would be provided with landscape design plans customized to their property. They could then use these design plans to modify or redo their landscapes. The entire focus of the program would be to reduce lawn area, the use of high water ornamentals and the percentage of impermeable surfaces.

6.3.7 Passive Hot Water Recirculation System Incentive

A review and evaluation of an incentive program for hot water recirculation systems for single-family residences will be undertaken early in the implementation of the LTWCS. The water savings to be realized through the use of recirculation systems will be assessed and a full cost benefit analysis conducted.

6.3.8 Water Efficient Clothes Washer Rebate

York Region currently provides rebates to multi-unit residence building owners who provide communal laundry facilities for residents. The Region provides a $100 rebate on the purchase and installation of an Energy Star™ qualified front loading washing machine. A list of eligible washers is provided to building owners. Only those washers on the list qualify for the rebate. This program will continue under the LTWCS.

6.3.9 ICI Water Audits and Capacity Buy-Back

The Region currently provides water-use audits to identify water-saving opportunities free-of-charge to ICI owners and property managers. Upon completion of the water audit, Region staff provide a comprehensive report of water saving options and tactics implementable at the facility. Approved applicants are then eligible to receive a one-time financial incentive of $0.30 per litre of water saved per average day, or 50 per cent of the total capital cost of the retrofit up to a maximum of $50,000, following the implementation of the capital retrofits identified in the audit.

York Region will continue to offer this program as part of the LTWCS and will monitor the uptake and impact of the program on water use.

6.3.10 Water Efficient Fixture Rebate for Industrial, Commercial and Institutional Facilities

York Region through its Water for Tomorrow program currently provides rebates to ICI facility owners on the purchase and installation of water efficient fixtures. The Region provides a $75 rebate for WaterSense™ labeled high-efficiency gravity-fed toilets, a $140 rebate for water efficient commercial valve flush (flushometer) toilets, and a $100 rebate for Energy Star™ qualified front loading washing machines. Lists of eligible washers and toilets are provided to facility owners. Only those toilets and washers on the list qualify for the rebate. This program will continue under the LTWCS.

6.3.11 Pre-rinse Spray Valves for Commercial Kitchens

In 2009, York Region in partnership with Enbridge Gas Distribution began offering to commercial kitchens, free-of-charge including installation, pre-rinse spray valves. The spray valve and installation have approximately a $150 value. This program will continue as part of the LTWCS and will be monitored for uptake and water savings.

6.4 New Development

New development represents perhaps the best opportunity for designing and building for water efficiency and conservation in York Region. Double plumbing for grey water recycling, installation of cisterns and rainwater harvesting systems, landscape designing for minimal irrigation requirements, installation of hot water re-circulating systems and other water saving measures are more viable for new development. For existing development, such measures can be cost prohibitive with limited ROI unless a major renovation is planned. With this in mind, and based on the findings from the Best-in-Class research, which clearly showed the greatest water savings could be achieved with new construction, program components focused on new development form an integral part of the LTWCS.

6.4.1. Implementation of the East Gwillimbury Sustainable Development Program

York Region and the Town of East Gwillimbury have produced and will be delivering a Water Conservation Program. In addition a detailed implementation guideline has been prepared with the East Gwillimbury developers. These guidelines will allow developers the opportunity to obtain additional servicing allocations by satisfying various sustainability requirements including:

- Water conservation measures
- Energy conservation measures
- Improved indoor air quality
- Renewable energy
- Resource management
- Enhanced homeowner education

The East Gwillimbury Water Conservation Program has substantive water conservation and waste water reduction components and will form part of the Region's LTWCS. This initiative sets the stage for similar joint ventures with the remaining eight local municipalities and provides a model for achieving sustainable development across the Region. The program will be monitored and evaluated over a two year period commencing after first home occupancies.

6.4.2 Integrate WaterSense Labelled Appliance Standards into the Sustainable Home Incentive Program

In the first year (2011) of the LTWCS, York Region will integrate WaterSense labelled appliance requirements into SHIP. SHIP evolved from York Region's Sustainability Strategy and provides additional servicing allocation as incentive to encourage more sustainable housing development. The benefits of SHIP include using key resources such as water, energy, materials and land much more efficiently. To qualify for the SHIP incentive, builders must include a homeowner education component to ensure occupants understand the benefits of a SHIP home including improved air quality, resource conservation, greenhouse gas reduction, and ultimately, improved home performance that cumulatively promotes healthy communities.

Best-in-Class research supports this approach to integrate WaterSense Standards into SHIP. Although there are other water rating systems, such as the Australian WELS system and the Consortium for Energy , overall WaterSense sets a higher standard to follow. In addition the WaterSense Standard is likely to be adopted by the Canadian federal government. WaterSense specifications are widely accepted and integrated into certification programs such as the USGBC LEED certification. WaterSense specifications are set 20% above the current standard providing significant and feasible water savings. The main limitation to WaterSense is the focus on residential and commercial water efficiency, with limited application to institutions and industries.

By integrating WaterSense into SHIP for residential development York Region will incent uptake of water efficiency and other environmentally sustainable design and building practices by new home builders.

6.4.3 Integrate WaterSense Labelled Appliance Standards into LEED for High-rise Developments

In 2007, Regional Council endorsed the Sustainable Development through LEED program. This program allows proponents of high density residential (high-rise) development proposals meeting specific eligibility criteria and incorporating various sustainability objectives, to qualify for water and wastewater Servicing Allocation Credits equivalent to servicing allocation of 20%, 35% or 40% of the total residential units within the proposed development.

In the first year (2011) of the LTWCS, requirements for WaterSense labelled appliances will be integrated into the LEED for high-rise program thereby securing increased water savings in new high density residential developments.

6.4.4 Evaluation of SHIP and LEED Incentive Programs

Regional staff will monitor and evaluate the SHIP and LEED incentive programs for uptake and identify approaches to increase participation rates. Both programs have significant potential to stimulate sustainable development in the single- and multi-family residential markets. In addition to increased allocations, Regional staff will explore other potential incentives to stimulate greater uptake. See Section 6.6.1 for a discussion of an expedited approvals process for green building construction to be pilot tested early in the implementation of the LTWCS.

6.4.5 Conservation Guideline for Industrial, Commercial and Institutional Sectors

Regional staff in consultation with the Advisory Group will develop a guideline for water conservation and efficiency technology, programs and practices for commercial and industrial facilities and complexes. This guideline, established in policy, will provide a consistent set of guidelines – Best-in-Class options for achieving water use efficiency, including grey water and rain water harvesting systems, new water-energy conserving processes and/or equipment, other such means of reducing water and energy use, target objectives, resource information, standards and other technical information which can be used by facility owners/operators.

6.5 Full-cost Recovery Conservation-Oriented Pricing

Regional staff and project personnel will evaluate models and options for full-cost recovery conservation-oriented pricing. This evaluation process will be done in close partnership with the Regional-Municipal Working Group and relevant staff at the local municipalities.

As discussed, in conjunction to the Best-in-Class research on conservation-oriented pricing, expert analysis of a potential model or models specific to York Region was undertaken. The analysis included a preliminary assessment of how conservation-oriented pricing could affect future water demand across York Region and what this might mean for residents.

Building on the research and analysis, Regional and local municipal staff will conduct an evaluation of such a conservation-oriented pricing scheme. The research and analysis will take into account full cost recovery for all existing and planned capital, operating and program components, as well as direct input from the local municipalities, consultation with water users, and an assessment of the most equitable approach to water pricing. The ultimate goal of this research is to develop a Region-wide full-cost recovery conservation-oriented pricing structure.

6.6 Pilot Projects

Pilot projects are industry standard for designing and evaluating initiatives prior to full-scale implementation. Given the range of new, untested initiatives to conserve water and improve water use efficiency in all sectors, the Region will be undertaking several pilot projects on a concurrent basis commencing with the first wave in 2011/12 and the second wave in 2016/17.

6.6.1 Expedited Approvals Process for Green Building

In consultation with the Regional-Municipal Steering Committee and relevant planning staff at the local municipalities, Regional LTWCS staff will identify and develop a partnership with one or two local municipalities to test an expedited approvals process for green building.

Planning for population growth and new residential and ICI development is a significant consideration for long term infrastructure planning in York Region. Best-in-Class research clearly showed that water providers and experts and organizations in water conservation view new construction as representing the greatest opportunity for innovation and progressive water conservation design and development. Green building programs with requirements and/or incentives for sustainable construction are considered more progressive and are being utilized by leading municipalities around the globe. Green building requirements and/or incentives take a broader approach which targets a range of environmental measures covering energy, water, stormwater, biodiversity, and carbon sequestration. Green building programs are operated through planning and development departments at the local municipalities.

Once a Regional-Municipal partnership agreement has been achieved, project personnel will monitor, track and evaluate the expedited approval of one or more green developments. This approach will enable an analysis of all facets of the process and the development of a template for use by all nine local municipalities.

6.6.2 Residential Water Efficient Landscaping

Outdoor water use increases by more than 50% in the summer months and much of this increase is attributable to landscape irrigation. Working in partnership with residential builders/developers and owners/property managers of multi-unit residential development, Regional staff will identify opportunities to construct water efficient, LID landscapes and implement full monitoring and assessment of water use, maintenance, and stormwater runoff. Eliminating the need for additional irrigation on residential landscapes is potentially more cost effective than providing an alternative, non-potable water source. Grey water and rain water harvesting systems have a reasonable ROI in jurisdictions where water availability is an issue and the climate necessitates irrigation for the better part of the year. In York Region the summer irrigation season is two to three months in total and therefore the viability of centralized or community grey water or rain water harvesting systems is questionable and must be studied in detail.

6.6.3 Water Efficient Irrigation Systems for ICI facilities

Regional staff will undertake a pilot study to determine the water savings achievable by the installation of soil sensor- and rain sensor-based irrigation systems at ICI facilities. Soil sensors detect the moisture level in the soil and only engage when soil moisture levels fall below a pre-set threshold. Rain sensors automatically shut-off irrigation systems during rain events. These water efficient irrigation systems have proven very effective in reducing water used for irrigation in many leading jurisdiction around the globe. What is unclear is the value of such systems in York Region where the irrigation season is short and there is significant rainfall. The results of the pilot study of water efficient irrigations systems will help to determine the viability of a by-law requiring their installation in new developments.

6.6.4 Rainwater Harvesting

Rainwater has been used to replace potable water in irrigation and garden watering applications, as well as indoor use for toilet flushing. One type of approach found through the Best-in-Class review was the application of roof-top cisterns on multi-story buildings .

Regional staff will identify pilot opportunities to study the viability of rainwater harvesting applications for multi-unit residential buildings and institutional and commercial facilities.

6.6.5 Groundwater Recharge through Water Reuse

One of the applications of reused or "reclaimed" water is groundwater augmentation. This practice has been successfully applied in jurisdictions such as Florida and California . A successful application in York Region would augment already limited groundwater resources in the north and could divert discharge to surface waters thereby improving water quality. While there are many benefits that could be achieved by groundwater recharge, it is largely without precedent in Ontario and could face significant barriers to implementation. Regional staff will undertake a pilot project to determine the viability of aquifer recharge through community-level water reuse with a decentralized system.

6.6.6 Dual-plumbing for New Public Buildings

Dual-piping systems are common in many of the leading water-conserving jurisdictions high-lighted in the Best-in-Class review. Canada now has a Canadian Standards Association (CSA standard (B128.1/B128.4) and guidelines by Health Canada for water reuse in toilets and urinals .

Regional staff will identify a pilot project opportunity for dual plumbing and the use of grey water for toilet and urinal flushing. In conjunction with testing the viability of such systems in new buildings, the pilot project will present an opportunity to showcase such systems and provide valuable data on water savings and the effectiveness of dual plumbing for grey water use.

6.6.7 Quantification of Water Use for Main Flushing

Water main flushing and disinfecting is standard practice to keep lines clear and prevent contamination. The practice understandably uses significant amounts of potable water. With this fact in mind, Regional staff will evaluate a potential pilot to quantify the use of water for main flushing and disinfecting and to identify procedures to reduce water use during this process.

6.7 Marketing, Outreach and Education

The Public Engagement and Consultation for the LTWCS set out to provide stakeholders with the opportunities to actually help shape the Strategy through a social innovation framework. The secondary objective was to begin the process to rebrand water, shift the social narrative and mobilize the context of water as an agent of change. These were very bold objectives, and yet the 'new public' that emerged through the public engagement process, comprised of a diverse mixture of stakeholders, rose to the challenge.

The public outcomes for the LTWCS speak to a holistic and partnership-based approach that these stakeholders would like to see employed as the strategy is rolled out. The nature of leadership they would like to see from York Region is one that involves a soft infrastructure that would support, connect and facilitate the strategy implementation, rather than York Region carrying out the actions themselves.

York Region, through its Water for Tomorrow program, has implemented marketing, outreach and education initiatives over the past decade. Many of these successful initiatives will continue under the LTWCS, but as the findings from the Public Engagement and Consultation process indicate, there are significant opportunities to expand the scope and nature of community engagement and support the broader York Region public in helping to implement the LTWCS. The first step in this process is to draw on the findings from the public consultation to develop a Marketing, Outreach and Education Plan.

6.7.1 Marketing, Outreach and Education Plan

Concurrent with the development of implementation plans for many of the LTWCS program components, Regional staff and project personnel will utilize the findings from the consultation and engagement process and other Regional market research studies, and review existing initiatives to develop a ten-year Marketing, Outreach and Education Plan. The plan will identify programs and practices to move beyond public engagement to securing community involvement in the delivery of the strategy itself. Much of the content of the Plan will come from the findings of the Public Engagement and Consultation process, ensuring that the innovative "made in York Region" ideas and recommendations are realized.

6.7.2 Water Efficiency Workshops

Under the Water for Tomorrow program, the Region provides workshops on a range of water efficiency topics. Water efficient landscaping workshops are offered in conjunction with area garden centres and cover such topics as designing a home landscape to water wise container gardening. The workshops have proven to be an effective mechanism for reaching residents.

In 2010, workshops for plumbers, irrigation contractors, and multi-unit and ICI facility owners began. The workshops introduce these stakeholders to the Region's programs and provide them with the information they need to participate. The workshops will continue under the LTWCS and will be evaluated as part of the research and review for the Marketing, Outreach and Education Plan.

6.7.3 Landscape Assessments

The largest demands on the water supply system occur during the summer when outdoor uses increase significantly, particularly during dry spells when people are watering their lawns and gardens. Local municipalities have to build extra capacity to meet this peak summer demand although though it only occurs for a short duration. Even with extra capacity, it is sometimes necessary to issue temporary watering bans to relieve the strain on the supply system. In order to reduce outdoor water use for irrigation, the Region offers to residents free-of-charge water efficient landscape assessment. Residents schedule an assessment and trained Regional personnel engage directly with the homeowner about their landscape and ways and means of reducing its water demands. The resident is provided with resources including plant lists, design suggestions and discount coupons for water efficient plants available at participating garden centres. The landscape assessment service will continue under the LTWCS and will also be reviewed and evaluated as part of the Marketing, Outreach and Education Plan development.

6.7.4 Outreach through Local Groups

The Public Engagement and Consultation process revealed the need for greater engagement of local community groups, particularly those groups representing new Canadians, indigenous peoples and youth. A process and approach for engaging and securing the participation of local groups in the implementation of the LTWCS will be developed as part of the Marketing, Outreach and Education Plan.

6.7.5 School Curriculum on Water Efficiency

Early in the Water for Tomorrow program, the need to engage young people about the importance of water and the need to use water more efficiently was recognized by program staff. To that end, a curriculum module including a Teacher's Manual, Student Workbook, and a "made-in York Region" video on the water system was developed and is delivered to grade 7 and 8 students at schools across the Region. A French version of the curriculum package has been produced and distributed to french language schools in the Region. The final component of the curriculum initiative is an interactive webpage which ties all the elements together. In conjunction with the curriculum package, the Region hosts an annual water efficient calendar contest wherein students submit drawings about the importance of water and the need to conserve it. Each year, 12 or more drawings are selected and the calendar is made available to all York Region schools and residents.

6.7.6 Children's Water Festival

The York Children's Water Festival (YCWF) is a major component of York Region's Water for Tomorrow program and is a partnership between York Region and the Toronto and Region Conservation Authority (TRCA).

What started in 1999 as a three-day, 1,000 student event has grown into a five-day event drawing more than 5,000 students. The York Children's Water Festival team invites all Grade 4 York Region students to Bruce's Mill Conservation Area near Stouffville for the annual May event.

Through approximately 50 interactive curriculum-linked activities, students learn about water conservation, changing environmental attitudes, water and technology, water protection, water science and water stewardship - all in a hands-on, enjoyable way.

The mandate for the festival is to educate children on the value, importance, vulnerability and globalism of water. The objectives of the initiative are to develop awareness of the importance of a clean and plentiful water supply, foster a respect for a healthy environment and make a commitment to use natural resources wisely.

Local organizations also receive invitations to join the YCWF and lend their expertise and experience to the interactive displays. Over the years, there has been participation from MOE, the Lake Simcoe and Region Conservation Authority (LSRCA), TRCA, Oak Ridges Moraine Foundation and Earth Rangers.

The overwhelming success of the YCWF assures it continuance under the strategy. The Marketing, Outreach and Education Plan will explore potential options for expanding the role and influence of the York Children's Water Festival.

6.8 Municipal Infrastructure

The focus of Municipal Infrastructure components were grouped into three major phases of an asset lifecycle - planning, design and construction, and operation of water infrastructure.

6.8.1 Infrastructure Planning

The planning stage holds the foremost key to water conservation; it consists of modelling of growth and service level, operations and maintenance to forecast needs for long term horizons. There are a number of "leading edge" inputs to calculate future demands for services that can be considered in the planning and modelling of future demand. Planning considers future demands and influences such as climate change, alternative technologies, fire-flows, inflow/infiltration, water loss, alternative supply options like rain water tanks, reuse and demand management. These include:

- Land Use Density
- Water Rate Structure
- Dual Water Systems
- Municipal Water Storage and Flow Requirements
- Standards for Building Fire
- District Meter Areas
- Customer Metering

The following briefly highlights the technologies and strategies that have presented the most significant benefits for this phase.

Land-use Density: Conventional development has shifted toward the suburban lifestyle with large lots, low density, and dispersed communities. Underlying community development is the water infrastructure needed to support service. The more infrastructure there is, the more operational and maintenance issues that have to be dealt with. Compact, higher density development is more efficient from an infrastructure perspective.

Dual Water System: Dual water system infrastructure has very viable benefits in water conservation. They have been in place in areas of the world for over 50 years and some studies have shown fairly significant evidence of conservation in comparison to typical single distribution systems. Dual water systems provide potable, and reclaimed or alternative sources of water in separate piping systems to the end user. The purpose is to avoid using treated water for anything other than demand, and to use reclaimed/reused water to address other needs (such as toilet water or irrigation). Dual water systems require a legislative framework to be in place prior to being implemented at the engineering level. Additionally, water quality issues with oversized systems could be exaggerated with a dual water system in place.

District Metered Areas (DMAs): DMAs enable engineers and operators to effectively identify and measure leakage in the distribution system. Advanced Metering Infrastructure (AMI) can be used to detect leakage from individual users and networks. This includes sectioning districts for study, where a district is an area of the distribution system that is specifically defined (e.g. by the closure of valves) and in which the quantities of water entering and leaving the district are measured. Through the use of DMA systems the service provider can more accurately measure leakage in certain districts and identify priority areas for rehabilitation or replacement.

A component recommended for inclusion in the LTWCS is:

- A comprehensive leakage management and monitoring program is complemented by the use of DMAs. Implement a leakage monitoring and correction program for storage, transmission and distribution systems

6.8.2 Design and Construction

The design and construction stage is where the system and technologies are designed, selected, installed and commissioned. The design and construction process includes standards used to develop or acquire water infrastructure. Standards can include consideration of triple bottom line costs, operational performance history, statutory requirements, technological change and societal changes. This life cycle approach is inclusive of social, environmental and economic costs, in the selection of standard equipment or products. Included in this stage are:

- Design leakage rates
- Construction Methods
- Flushing and Disinfection
- Flow and Pressure Control
- Water System Flow Circulation
- Water Storage Flow (Circulation) Design
- System Isolation Valves
- Overflow Design for Water Storage
- Disinfection Design Practices

The following briefly highlights the technologies and strategies that have presented the most significant benefits for this phase.

Construction Methods: The effect of construction practices on asset life is conceptually well understood. The United States Environmental Protection Agency (USEPA) has identified the need for a 'start to finish' barriers for new pipeline construction and repair activities to minimize or prevent the potential for contamination or physical damage to pipelines. This is a matter of good sanitary practices and will also reduce flushing and disinfection requirements. Construction practices deemed effective to prevent contamination include the use of pipe end caps or wraps, storing pipes in secure dry areas, using pre-sanitized materials from manufacturers, and implementing specific flushing and disinfecting procedures. The use of metallic material (ductile iron and cast iron) was historically quite prevalent throughout North America with polyvinyl and reinforced concrete representing the bulk of pipelines currently specified in York Region. Cast iron and ductile iron distribution pipes are the most susceptible to corrosion and breakage and the historic use of this material did not include corrosion protection. Advanced protection programs for the existing mains include cathodic protection and condition assessment to identify required repair and replacement prior to leakage and breaks.

Flushing and Disinfection: Throughout the world, most standards for installation reference and follow procedures involving flushing and disinfection by super-chlorination followed by disposal of the super-chlorinated water. Flushing rates when specified are based on achieving a minimum flushing velocity or that flushing is to continue until such time as a specified turbidity value has been achieved (typically 1 NTU or background when connecting to existing mains). Measurement of the water used in this process is not typically done.

Flow and Pressure Control: Very few water utilities worldwide are implementing proper pressure control. Flow and pressure control is typically considered only from the perspective of providing the minimum requirements and not exceeding the maximum guideline or regulatory values. Lower operating pressure reduces system leakage. Monitoring pressure and flow on a continuous basis and utilizing advanced pressure control devices can allow system operation at the lowest pressure possible at any given time while still allowing system response to unexpected demand such as fire flow.

Water demand during construction relates to flushing and disinfection prior to the mains being placed in service. The total volume of water used is related to the length and diameter of mains as well as the construction practices. Estimates of the total volume used in the construction of the Region's mains are shown below in Table 8 with the assumptions noted.

Table 8 – Estimates of Water Volume Used in Construction of Water Mains

PARAMETER	LOCAL MUNICIPALITY	REGION
Length of main km	2000	362
Average Diameter mm	200	750
Volume used for flushing %	20	20
Volume used for Disinfection %	100	100
Re-testing %	5	5
Estimated Volume Used (litres)	75,390,720	164,328,210

It is difficult to estimate the volume that could be saved through improved practise since use for this purpose is largely unmetered. However, implementing improvements would be relatively easy to do although it would require co-ordination among all the local municipalities.

Components recommended for inclusion in the LTWCS are:

- Evaluate corrosion protection for metallic water main and implement a protection program
- Implement a uniform best practice construction standard for water mains
- Implement new procedures to reduce water use during water main commissioning
- Replace aging and/or break prone water main
- Evaluate water main condition and develop a replacement program to replace aging and/or break prone sections
- Evaluate and quantify the use of water for mains flushing and disinfecting; identify candidate procedures to reduce water use during this process

6.8.3 Operations and Maintenance

Operators are responsible for the delivery of water quality complying with and typically exceeding regulatory requirements. Operational duties include: operating and monitoring the status of water treatment; water distribution/transmission including monitoring of flows and pressure; system status; and performing regular plant inspections.

Best practice programs for water systems include programs for identifying unaccounted for water, flushing and cross connections. The need and ability to isolate a water supply zone to effect repair and rehabilitation, flush adverse water from the system and clean water-mains is a reflection of system design and materials, age and condition, demand and operational strategy.

The following briefly highlights the technologies and strategies that have presented the most significant benefits for this phase.

System Flushing and Swabbing: Maintaining water quality or chlorine residual levels and setting parameters for water quality in relation to retention time will influence the amount of system flushing required. Flushing programs are often time-based (e.g. flush the system every spring and fall), or are based on velocity and turbidity. Detailed procedures regarding the optimal amount of time or volume of water necessary for proper flushing is not specifically outlined. Most of the local municipalities employ flushing to address water quality issues as they arise and in some cases have regular scheduled programs. Automated flushing devices have been shown to decrease the amount of water required for flushing while also reducing operating costs. While it may appear to be wasteful, flushing is an effective and essential way to keep drinking water safe, clean and pleasant tasting. This is a preventative maintenance program, and planned flushing may save more water than unplanned flushing later.

Process Control at Water Treatment Plants: Conventional water treatment processes may require excessive water use in comparison with advanced treatment technologies or may not have been optimized with respect to water use. Backwash water use, the process of reversing the flow of water through the filter media to remove the entrapped solids, has a significant need for high quality water. The backwash flow rate is usually 10 times higher than the filtration rate in order to expand, or fluidize, the media in order to release the entrapped solids. This process may use two to four percent of the treated water production to clean the filters.

Leak Detection Program: The detection and repair of water leaks is central to minimizing revenue loss due to underground water system leakage. Many service providers perform some type of leak detection on their water and wastewater infrastructure. The aim is to perform the detection, location, and repair of the leak in as little time as possible. Accurately measuring leakage in buried infrastructure is difficult; locating the leaks can be especially challenging. An important factor in a leak detection program is an accurate and detailed recording procedure, with records that can be easily analyzed during future examinations. DMAs, or 'sectorization,' allow a utility to effectively identify and measure leakage in the distribution system. Sectioning districts permits measurement of the quantities of water entering and leaving the district. Through the use of DMA systems the service provider can work to more accurately measure leakage in certain districts and identify priority areas for rehabilitation or replacement. A successful water utility will also include periodic pipe inspection, cleaning, lining, and other preventive maintenance procedures (condition assessment and management) in combination with leak detection programs.

Water use for flushing to maintain water quality or that lost due to breaks is not typically measured but may be estimated as part of leak detection studies. There are many factors that impact this usage such as the length, diameter, age and material of water mains as well as the operational practices in place. Estimates of the total volume used in York Region are shown in the Table 9 with the assumptions noted.

Table 9 – Estimates of Water Use for Main Flushing

PARAMETER	LOCAL MUNICIPALITY	REGION
Length of main km	2000	362
Average Diameter mm	200	750
Water Quality flushing %	25	0.5
Estimated Flushing Volume Used annually (litres)	15,706,400	684,701
No. of annual main breaks	300 (0.15 per km)	1
Distance between shut off valves m	300	1000
Duration of break before isolation minutes	30	60
Estimated Break Volume annually (litres)	10,350,015	1,411,173

It is difficult to estimate the volume that could be saved through improved practices since use for this purpose is largely unmetered. Since these are annual volumes, the cost and benefit of improvements warrants investigation.

Components recommended for inclusion in the LTWCS are:

- Match infrastructure construction with the build out of development to minimize the impact of lower initial water demand with the size of the infrastructure needed for future development. Evaluation of the permitting procedures for infrastructure build out to improve co-ordination of infrastructure with development
- Evaluate water storage maintenance practices and implement a routine cleaning program
- Develop working practices to coordinate water quality sampling programs between local municipal and Regional systems
- Conduct a performance assessment on the Region WTPs
- Upgrade York Region's WTPs with conservation design practices
- Co-ordinate leak detection activities, programs and DMA's between local municipal and Regional systems
- Implement a leakage monitoring and correction programs for storage, transmission and distribution systems
- Evaluate flushing programs, implement unidirectional flushing programs and install automated flushing devices

7.0 Implementation Schedule

The implementation of program components is based on a 10-year timeline. Changes to provincial legislation and regulations, climatic conditions (and resulting alterations of weather patterns, water resources and water availability and area watershed and ecosystems), residential and ICI development and technology are anticipated over the next decade.

Implementation of the LTWCS is divided into 3 primary phases: Program Start-up and Initial Implementation; Implementation, Assessments and Adjustments; and Completion. Specific actions will be undertaken in each of these phases, a summary of which is included in Table 10 below.

Table 10 – Summary of Actions by Phase

PHASE	TIME LINE (YEAR)	ACTIONS
Phase 1: Program Start-up*	2011-2016	• Finalize strategy and secure approvals • Continue York Region's current water conservation and efficiency actions • Identify data gaps and needs • Establish a process for interim and long-term data collection, management and analyses • Complete detailed cost-benefit analysis • Establish program monitoring and assessment process • Establish LTWC policy and regulatory framework • Develop LTWC implementation plan
Phase 2: Implementation, Assessment and Adjustments	2016 - 2051	• Continue relevant water conservation and efficiency actions from Phase 1 • Implement new water conservation and efficiency actions as set out in the Implementation Plan • Monitor implemented programs, collect data and analyze findings • Conduct 5-year interval "target" and "performance" assessments and make necessary program adjustments • Report and publish LTWC program results
Phase 3: Completion	2051	• Complete final target and performance assessment • Produce LTWC report and publish program results

The program component implementation schedule provides for two implementation stages: 2011 to 2016 and 2016 to 2051. The second stage assumes implementation in 2016. The LTWCS and all program components will be re-visited every five year to ensure that any external changes, such as new technologies or provincial regulations are considered. When and where appropriate, the strategy and resulting program components will be revised, terminated or new ones developed. If a major change should occur that impacts the delivery of the LTWCS, it will be assessed and adapted as necessary. The implementation schedule for the LTWCS program components is set out in Table 11.

Table 11 – Implementation Schedule for the LTWCS Program Components

PROGRAM CATEGORY	SECTOR	WATER CONSERVATION and EFFICIENCY PROGRAM		
		2011-2016	2016-2031	2031-2051
Governance	Program Wide	• Create a multi-stakeholder Advisory Group with sector experts and local ICI and resident representatives • Develop a detailed implementation plan for all program components to 2021 • Develop a water conservation and efficiency measurement and reporting framework – track progress with annual reporting to Advisory Group and public		
	Region – Local Municipalities	• Create a Working Group with 9 local municipalities and York Region to develop a full cost conservation-oriented pricing structure • Seek Regional and local endorsement of updated pricing structure • Incorporate outcomes of strategy into infrastructure master planning processes	• Create a Working Group with 9 local municipalities and York Region to develop water reuse policies and guidelines (employ a full-systems, sustainability planning process for new industrial parks, other ICI developments and where applicable, residential developments)	
Policies and By-Laws	Single-family residential	• Evaluate summer water conservation by-law components including drought response by-law • Evaluate potential of by-law for plumbing retrofit on resale • Evaluate potential of by-law for water efficiency fixtures and appliances requirement for new development and renovation	• Implement updated summer water conservation by-laws • Implement full cost conservation-oriented water pricing • Review, evaluate and update by-laws to reflect updated technology and practices as required • If viable, implement plumbing retrofit on resale plumbing by-law • If viable, implement water efficiency requirements for new development • Evaluate potential for water conservation and LID landscaping requirements for new development and implement if and where plausible	• Review, evaluate and update by-laws to reflect updated technology and practices as required • Review, evaluate and update pricing programs as required
	Multi-family residential	• Evaluate potential of by-law for water efficiency fixtures and appliances for new development • Develop opportunities for individual unit metering	• Implement full cost conservation-oriented water pricing • If viable, implement water efficiency requirements for new development and renovation • Evaluate potential for water conservation and LID landscaping requirements for new development and implement if and where plausible	• Review, evaluate and update by-laws to reflect updated technology and practices as required
	Commercial/Industrial	• Create guideline for conservation, efficiency and reuse • Evaluate potential by-law for water efficiency fixtures and appliances for new construction and renovation • Require facility/complex level water conservation and efficiency plans which integrate stormwater management as part of approvals process (use to track efficiency audit process)	• Develop conservation pricing or rate rebate program • If viable, implement water efficiency requirements for new construction and renovation • Evaluate by-law for soil and rain sensors for irrigation systems and implement if and where viable • Evaluate by-law for process water reuse requirements and implement if and where viable • Evaluate water conservation and LID requirements for new development and implement if and where viable	• Review, evaluate and update by-laws to reflect updated technology and practices as required

Table 11 – Implementation Schedule for the LTWCS Program Components (continued)

PROGRAM CATEGORY	SECTOR	WATER CONSERVATION and EFFICIENCY PROGRAM		
		2011-2016	2016-2031	2031-2051
Rebates and Incentives	Single-family residential	• HET toilet rebate program • Efficient furnace humidifier rebate • Discount coupons xeriscape plants • Subsidized rain barrels • Develop incentive program for low income housing • Integrate WaterSense standards into SHIP • Review and evaluate rebate program and modify or develop new rebates/incentives • Review and evaluate potential of subsidized landscape design services in conjunction with garden centre retailers • Review and evaluate potential of incentivizing hot water recirculation systems in conjunction with local municipalities and energy utilities	• Monitor and evaluate rebate program/ research new programs and modify or develop new rebates/incentives • If viable, implement free or low-cost residential landscape design service in conjunction with garden centre retailers • If viable, implement hot water re-circulation system incentive program	• Monitor and evaluate rebate program/ research new programs and modify or develop new rebates/incentives
	Multi-family residential	• HET toilet rebate (owner-occupant) • WaterSense subsidized toilet installations • Front-loading clothes washer installations • Develop incentive program for low income housing where applicable (owner-occupant) • Integrate WaterSense standards into LEED • Evaluate potential of individual unit meter installation subsidy or incentive for multi-unit apartment complexes	• Monitor and evaluate rebate program/ research new programs and modify or develop new rebates/incentives • If viable, implement subsidized meter installation program	• Monitor and evaluate rebate program/ research new programs and modify or develop new rebates/incentives
	Commercial/Industrial	• Free water audits and capacity buy-back • Water-efficient fixture rebate • Free pre-rinse spray valve to commercial kitchens • Review and evaluate rebate program/ research new programs and modify or develop new rebates/incentives	• Monitor and evaluate rebate program/ research new programs and modify or develop new rebates/incentives	• Monitor and evaluate rebate program/ research new programs and modify or develop new rebates/incentives
New Development	Single-family residential	• Implementation of East Gwillimbury Water Conservation program • Develop detailed monitoring program for new developments • Monitor and evaluate results of EG Water Conservation Program • Re-evaluate Sustainable Home Incentive Program (SHIP) components and incentives to increase uptake • Monitor uptake of SHIP • Seek Regional and local Municipal Council endorsement of SHIP incentives	• Continue to monitor uptake • Re-evaluate program components and incentives as required • Monitor and evaluate new developments (SHIP) to determine water usage over time	• Continue to monitor and evaluate SHIP program water use and uptake, and update as required
	Multi-family residential	• Monitor uptake of LEED for high rise program • Re-evaluate LEED for high rise program incentives to increase uptake • Seek Regional and local Municipal Council endorsements of LEED incentives	• Continue to monitor uptake • Re-evaluate program components and incentives when required • Monitor and evaluate new developments (LEED) to determine water usage over time	• Continue to monitor and evaluate LEED program water use, components and uptake, and update as required
	Commercial/industrial	• Create guideline for conservation, efficiency and reuse. • Seek Regional and local Municipal Council endorsement of principles and guidelines	• Implement guidelines • Evaluate results of pilot tests and implement region-wide program	

Table 11 – Implementation Schedule for the LTWCS Program Components (continued)

PROGRAM CATEGORY	SECTOR	WATER CONSERVATION and EFFICIENCY PROGRAM		
		2011-2016	2016-2031	2031-2051
Pricing	Residential	• Evaluate and develop full-cost recovery conservation oriented pricing structure with consideration to all existing and planned capital, operating and program components	• Implement full-cost recovery conservation-oriented pricing structure • Monitor new pricing structure and evaluate impact on water use • Make adjustments to pricing structure if and when required	• Implement full-cost recovery conservation-oriented pricing structure • Monitor new pricing structure and evaluate impact on water use • Make adjustments to pricing structure if and when required
	Commercial/Industrial	• Evaluate and develop full-cost recovery conservation oriented pricing structure with consideration to all existing and planned capital, operating and program components	• Implement full-cost recovery conservation-oriented pricing structure • Monitor new pricing structure and evaluate impact on water use • Make adjustments to pricing structure if and when required	• Implement full-cost recovery conservation-oriented pricing structure • Monitor new pricing structure and evaluate impact on water use • Make adjustments to pricing structure if and when required
Demonstration	Single-family residential	• Pilot residential demonstration garden/landscaping • Identify and create a partnership with one or two local	• Monitor and evaluate rebate program/ research new programs and modify or develop new rebates/incentives	• Monitor and evaluate rebate program/ research new programs and modify or develop new rebates/incentives
	Multi-family residential	• Pilot multi-unit demo garden/landscape or irrigation program • Identify and create a partnership with one or two local municipalities to pilot test an expedited approvals process for green construction. • Evaluate the viability of an expedited approval process in partnership with local municipalities	• Water reuse projects • Monitor for new technology and practices and evaluate for suitability for pilot study and/or demonstration in York Region	• Monitor for new technology and practices and evaluate for suitability for pilot study and/or demonstration in York Region
	Commercial/Industrial	• Pilot test guidelines (irrigation pilot) • Develop process to document water-energy results of regional and municipal facility upgrades and retrofits • Showcase results as business case for further implementation • Retrofit and showcase municipally held facilities with aim to secure support of broader ICI sector • Document water-energy outcomes of facility-level water/energy efficiency retrofits • Identify and create a partnership with one or two local municipalities to pilot test an expedited approvals process for green construction. • Evaluate the viability of an expedited approval process in partnership with local municipalities	• Rainwater reuse for indoor and outdoor via rooftop cisterns, subsurface tank (i.e. complexes with high roof surface areas) • Other water reuse demonstrations and pilot projects (e.g., stormwater reuse on sports fields) • Water efficiency and/or rain water harvesting in schools or other public facilities (use as both demo and outreach platform • Monitor for new technology and practices and evaluate for suitability for pilot study and/or demonstration in York Region	• Monitor for new technology and practices and evaluate for suitability for pilot study and/or demonstration in York Region
	Local Municipal and Regional Systems	• Evaluate potential pilot to quantify the use of water for mains flushing and disinfecting and identify procedures to reduce water use during this process	• If viable, Implement pilot to quantify the use of water for mains flushing and disinfecting and identify procedures to reduce water use during this process	
	Community	• Initiative and pilot the great ‘unlawning challenge’	• Develop community demo project as an educational tool (use public building) • Water re-use projects • Explore viability of aquifer recharge through community-level water reuse project with decentralized system • Explore viability of water reuse through dual plumbing in new public building projects	• Monitor for new technology and practices and evaluate for suitability for pilot study and/or demonstration in York Region
	Marketing, Outreach and Education Plan – tied to all sectors and the Long Term	• Develop a marketing, outreach and education strategy linked to all components in the Long Term Water Conservation Strategy including Soft Path and virtual water – summer water use, youth	• Continue phased implementation of components • Monitoring and evaluation program components to determine success and modify as required	• Continue phased implementation of components • Monitoring and evaluation of program components to determine success and modify as required

Table 11 – Implementation Schedule for the LTWCS Program Components (continued)

PROGRAM CATEGORY	SECTOR	WATER CONSERVATION and EFFICIENCY PROGRAM		
		2011-2016	2016-2031	2031-2051
Marketing Outreach and Education	Marketing, Outreach and Education Plan – tied to all sectors and the Long Term Water Conservation Implementation Plan	• Develop a marketing, outreach and education strategy linked to all components in the Long Term Water Conservation Strategy including Soft Path and virtual water – summer water use, youth education, professional development and training (i.e., trades), overall marketing and outreach for value of water, etc. • Begin phased implementation of priority components	• Continue phased implementation of components • Monitoring and evaluation program components to determine success and modify as required • Review Marketing, Outreach and Education Plan and update as required.	• Continue phased implementation of components • Monitoring and evaluation of program components to determine success and modify as required • Review Marketing, Outreach and Education Plan and update as required.
	Community	• Water efficient landscape workshops • Free individual Landscape Assessments • Water efficiency seminars and workshops • Outreach through local groups (e.g., new Canadians) • Water efficiency outreach program targeted at subsidized housing	• Evaluate success and continue workshops • Evaluate success of unlawning pilot and integrate with other summer programs if viable • Based on results of Marketing, Outreach and Education plan, develop and implement enhanced programs	
	Schools	• Grade 7 water efficiency curriculum • Water efficient calendar contest • Children's Water Festival • Use Soft Path to encourage culture shift in value of water • Development component of curriculum on embedded water	• Based on results of Marketing, Outreach and Education plan, develop and implement enhanced programs	
	Commercial/Industrial	• Enhanced partnerships with garden centres • Water efficiency seminars and workshops • Use Soft Path to demonstrate the business case for reducing potable water use	• Based on results of Marketing, Outreach and Education plan, develop and implement enhanced programs	
Region	Regional distribution system	• IWA Water Audits • Monitoring and leakage reduction • Evaluate water storage maintenance practices	• Regular IWA Water Audits • Continued monitoring and leakage reduction as required • Conduct a performance assessment of the Region WTP's	• Regular IWA Water Audits • Continued monitoring and leakage reduction as required • Update the Region WTP with conservation design practices
	Institutional - Region	• Develop guidelines for retrofits of public buildings • Implement retrofit projects (during planned capital improvements) • Develop guidelines for new region-owned buildings and facilities • Implement conservation guidelines	• Implement retrofit projects (during planned capital improvements) • Review and implement conservation guidelines	• Implement retrofit projects (during planned capital improvements) • Review and implement conservation guidelines
	Monitoring and Benchmarking	• Develop process for collecting billing data from 9 local municipalities • Develop detailed monitoring and evaluation program • Determine municipal water demand by sector	• Continual monitoring of water demand per capita by sector • Review and improve process	• Continual monitoring of water demand per capita by sector • Review and improve process
	Local Municipalities	• Develop guidelines for retrofits of public buildings • Develop guidelines for new municipally-owned buildings and facilities • Implement retrofit projects (during planned capital improvements) • Evaluate flushing programs, including uni-directional flushing programs and automated flushing devices	• Evaluate guidelines and update as required • Implement retrofit projects (during planned capital improvements) • Implement changes to flushing programs as required	• Evaluate guidelines and update as required • Implement retrofit projects (during planned capital improvements)
	Local Municipalities and Regional Systems	• Implement a uniform best practice construction standard for water mains • Evaluate and quantify the use of water for mains flushing and disinfecting; identify candidate procedures to reduce water use during this process (Assess as pilot opportunity) • Develop an infrastructure build-out review process to improve co-ordination with development • Develop working practices to coordinate water quality sampling programs between local municipal and Regional systems • Co-ordinate leak detection activities, programs and DMA's between local municipal and Regional systems • Evaluate water main condition and develop a replacement program to address aging and/or break-prone sections • Evaluate corrosion protection for metallic water main and implement a protection program	• Implement new procedures to reduce water use during water main commissioning • Replace aging and/or break-prone water main • Implement a corrosion protection program for metallic water main • Implement a leakage monitoring and correction program for storage, transmission and distribution systems	• Replace aging and/or break-prone water main

7.1 Conservation Efficiency Targets and Timelines

Employing the Soft Path approach to developing a water future vision for York Region required back-casting and establishing and testing water saving targets to realize the vision. As with any long-term water management planning, establishing viable targets that are feasible, quantifiable and generate progressive and sustained water savings is critical for success.

The Best-in-Class review identified a common methodology employed by leading water conservation jurisdictions for setting targets. This methodology begins with establishing a baseline and then evaluating potential water savings to be achieved by different measures to calculate a total water use reduction amounted expressed volumetrically over time. With the Soft Path approach, the same actions and assessments are required, but the process instead begins with an end point and then determines the best means to reach it.

The baseline is expressed in water use per capita per day and the base year for the LTWCS is 2011. A total system baseline has been established and has been divided into residential and ICI. Water savings required to meet the aspirational goal of 150 lpcd by 2051, have been calculated and are expressed in 5-year increments. In addition, new development and existing development, both residential and ICI, are treated separately and calculated as such. Current water conservation and efficiency measures to meet the desired targets have been identified and qualitatively screened and evaluated. Subsequently, a quantitative assessment of potential measures, including water saving calculations and a full cost-benefit analysis, will be undertaken as part of implementation planning. Other measures may be added or the timeline shortened for their implementation if the assessment indicates such actions are necessary to achieve water saving targets. On-going measurement and evaluation throughout the LTWCS will be undertaken and whenever necessary, program modifications or adjustments will be made to reach the desired water saving targets.

The Region will proceed with the aspirational goal of "No New Water" by 2051 starting with the incentive based programs currently within the jurisdiction of York Region. Evaluation of detailed billing data with the first year of the program will be key to determine more accurate consumption by the various sectors and seasonal changes in all sectors due to outdoor water use to develop more accurate saving estimates and a detailed monitoring and reporting plan. Table 12 shows the five year targets and timelines for York Region jurisdiction incentive programs.

- New program components include expected 10% expected uptake for most new development
- 2.5% reduction in outdoor water use every year
- Markham 100% uptake on all new high rise development
- East Gwillimbury 100% uptake on all new development

Table 12 - Scenario 1: Five Year Targets and Timelines - York Region Jurisdiction Incentive Programs

PHASE	2011	2016	2021	2026	2031
Residential unit rate (litres per person per day) new program components only	252	241	235	232	230
Water saved from new programs (million litres per day)		3.4	6.6	11.0	15.7
Water saved from existing programs (million litres per day)		10	10		
Additional possible savings with changes to Ontario Building Code in 2012 (million litres per day)		5.5	12.7	16.4	22.6

The affects of reaching the aspirational goal of 'no new water' are shown in Figure 14. The demand for water could decline over time even with an increasing population.

To help ensure water savings targets are met York Region has allocated $43 million over the next ten years to water conservation and efficiency programming. Figure 15 illustrates the annual spending and associated water savings expected by program component.

Figure 14 - The Affects of Reaching the Aspirational Goal of "No New Water"

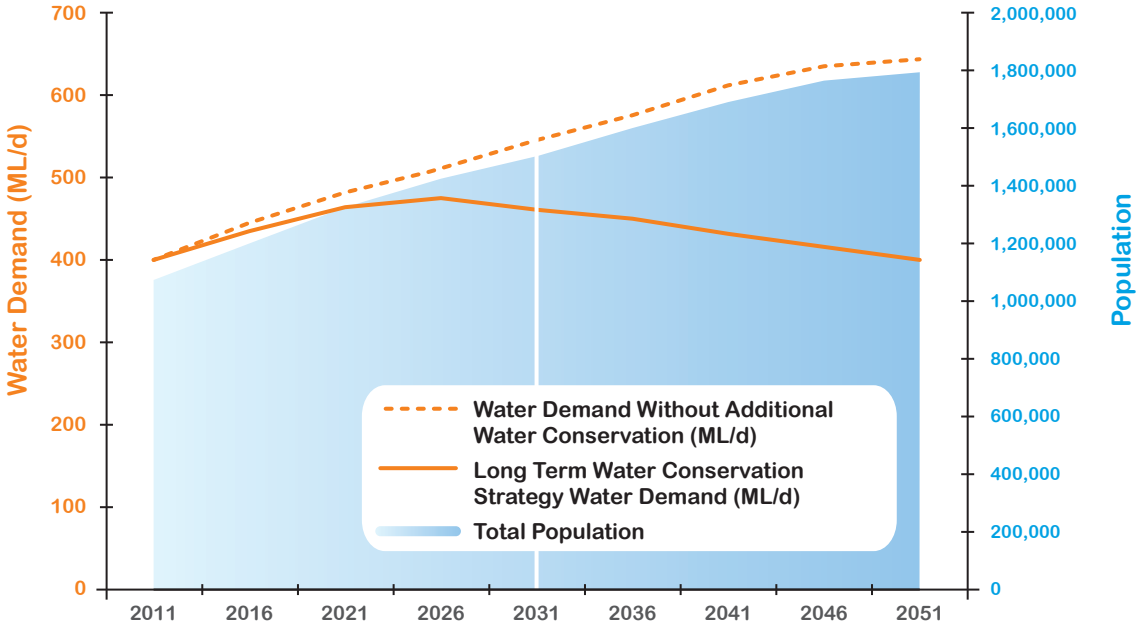


Figure 15 - Annual Spending and Associated Water Savings

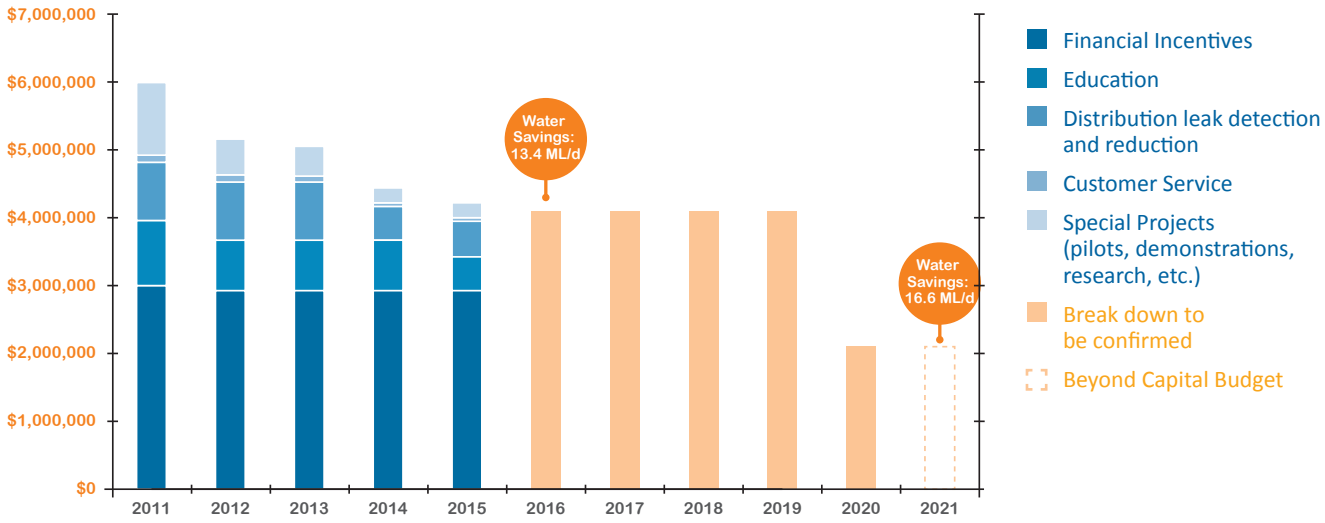


Table 13 - Scenario 1: Five Year Targets and Timelines - York Region Jurisdiction Incentive Programs

PROGRAM COMPONENTS	TACTICS	SECTOR	PROGRAMS AND TACTICS IDENTIFIED THROUGH PUBLIC CONSULTATION	2011	2012	2013	2014	2015
REBATES AND OTHER FINANCIAL INSTRUMENTS								
	Free water audits	ICI		10 facilities	10 facilities	10 facilities	10 facilities	10 facilities
	Implementation of capacity buy-back	ICI	✓	1.5 facilities	1.5 facilities	1.5 facilities	1.5 facilities	1.5 facilities
	Front-loading clothes washer installations	ICI	✓	120	120	120	120	120
	HET Toilet rebate	ICI		6,240	6,240	6,240	6,240	6,240
	Pre-rinse spray valve for commercial kitchens (program has reached market saturation)	ICI		30 comm. kitchens	30 comm. kitchens	30 comm. kitchens	30 comm. kitchens	30 comm. kitchens
	Water efficient furnace humidifier	Single family residential		1,000	1,000	1,000	1,000	1,000
	Incentive for hot water recirculation systems	Single family residential	✓			START		
	Front-loading clothes washer installations	Multi family residential	✓	150	150	150	150	150
	Evaluate unit metering subsidy	Multi family residential				START		
	Evaluate subsidized WaterSense toilet installations	Multi family residential	✓				START	
	WaterSense Toilet rebate	Single and multi family residential		12,000	12,000	12,000	12,000	12,000
	Evaluate low income incentive program	Single and multi family residential	✓				START	
	Water Efficiency Product and Program Seminars	all	✓	5	5	5	5	5
	Outreach to subsidized housing	Single and multi family residential	✓				Start full implementation	
evaluate against best in class	Plumbing retrofits on resale homes	Single and multi family residential	✓			START		

	Existing and Continuing Programs
	New Programs
	Pilot and Demonstration Projects

PROGRAM COMPONENTS	TACTICS	SECTOR	PROGRAMS AND TACTICS IDENTIFIED THROUGH PUBLIC CONSULTATION	2011	2012	2013	2014	2015
NEW DEVELOPMENT								
	Review suitability of development charge credits for participating developers	Single and multi family residential	✓	COMPLETE Q4				
evaluate against best in class	Develop plan to increase uptake of SHIP and LEED programs - evaluate incentives, barriers	Single and multi family residential	✓	START				
	Develop detailed monitoring program	Single and multi family residential	✓	START AND COMPLETE				
	Implement detailed monitoring program	Single and multi family residential	✓					
	Create commercial industrial conservation and efficiency guideline	ICI	✓	START				
	Expedited approvals process	Single and multi family residential	✓		START • confirm possible partnerships for pilot implementation • develop project plan with local municipal staff			
	Demonstration of rainwater harvesting and grey water in action (water reuse project)		✓			START		
	Implement commercial industrial guidelines	ICI	✓		START • develop project plan • confirm possible partnerships			
	Aquifer recharge through community level reuse							START
Efficient New Development Low Density Total (SHIP, East Gwillimbury or other)	Uptake - Commitment by developers to adopt standard	Single family residential	✓	5%	5%	5%	5%	5%
	Number of units constructed to standard	Single family residential	✓				X	X
Efficient New Development High Density (Sustainable Development through LEED or other)	Uptake - Commitment by developers to adopt standard	Multi family residential	✓	10%	10%	10%	10%	10%
	Measured - Number of units constructed to standard	Multi family residential	✓	X	X	X	X	X
GOVERNANCE AND ADMINISTRATION, POLICIES AND BYLAWS								
	Develop Multi-stakeholder advisory group and determine suitable meeting schedule and protocols	all	✓	Full implementation				
	Develop detailed implementation plans with full cost-benefit and ROI assessments	all	✓	START				
Evaluate against best in class	Develop measurement and reporting framework to meet annual reporting requirements	all	✓	START	Full implementation			
	Evaluate conservation based pricing	all	✓				START	
	Advocacy to encourage water efficiency and reuse in Provincial permit to take water and building code changes	all	✓	START				

- Existing and Continuing Programs
- New Programs
- Pilot and Demonstration Projects

PROGRAM COMPONENTS	TACTICS	SECTOR	PROGRAMS AND TACTICS IDENTIFIED THROUGH PUBLIC CONSULTATION	2011	2012	2013	2014	2015
REGIONAL-MUNICIPAL INFRASTRUCTURE								
	Leak Reduction - address results of IWA audits		✓		20 DMA's ILI <2"	20 DMA's ILI <2"	20 DMA's ILI <2"	20 DMA's ILI <2"
	IWA Audit ILI = Infrastructure Leakage Index - annual audits			START				
	Quantify water used in main flushing		✓			START		
	Incorporate outcomes into infrastructure master plans	all	✓			START		
REGIONAL-MUNICIPAL PROCESSES								
	Develop process for collecting water consumption data			START				
	Develop monitoring and evaluation program		✓	START				
	Implement monitoring and evaluation program		✓		Full implementation			
	Determine consumption by sector			START				
	Guidelines for retrofits of municipally owned buildings		✓	START				
	Dual plumbing in new public building						START	
	Retrofit and showcase municipal facilities		✓	START • create inventory of new and/ or retrofitted facilities • confirm possible partnerships	START • develop plan and public material with local municipal staff			
	Document water/energy savings outcomes		✓		START • develop plan and methodology with local municipal staff			

	Existing and Continuing Programs
	New Programs
	Pilot and Demonstration Projects

PROGRAM COMPONENTS	TACTICS	SECTOR	PROGRAMS AND TACTICS IDENTIFIED THROUGH PUBLIC CONSULTATION	2011	2012	2013	2014	2015
OUTDOOR WATER USE								
	Subsidized rain barrels	Single family residential		4,000	0	0	0	0
	Evaluate subsidized landscape design service	Single and multi family residential	✓			START		
	Pilot and Evaluate coupon discounts for water efficient plants	Single and multi family residential			START			
Evaluate the following against best in class	Summer water conservation bylaw	all	✓		START			
	Outdoor water use reduction pilot – target high water users & irrigation systems	ICI	✓	START • develop project plan with local municipal staff				
	Water efficient demonstration landscape on residential property in Richmond Hill (part of SNAP project)	Single family		START • project plan being developed with TRCA and Richmond Hill				
	Unlawning challenge	Single and multi family residential	✓		START • develop project plan • confirm possible partnerships	Implement in select neighbourhoods		
	Innovative ways to deal with water use in sports fields, splash pads		✓			START		
	Water Efficient Landscape Seminars	all		15	15	15	15	15
	Free Individual Landscape Assessments and Advice	Single and multi family residential		1,000	1,000	1,000	1,000	1,000
EDUCATION AND OUTREACH								
	10-year education and outreach strategy linked to all program components	All	✓	START				
	marketing strategies for each program component	All						
	Revised School Curriculum			** schools participate	** schools participate	** schools participate	** schools participate	** schools participate
	Children's Water Festival			5,000 students	5,000 students	5,000 students	5,000 students	5,000 students
	Implementation of priority education programs based on 10-year education and outreach strategy results	All	✓		START			
	Outreach through local groups	All	✓		Start full implementation			
	Water Efficiency outreach to new Canadians		✓		Start full implementation			
	Youth/community project that addresses local climate change issues		✓			START		
	Multi-cultural "Praise Water Week"		✓			START		

	Existing and Continuing Programs
	New Programs
	Pilot and Demonstration Projects

8.0 Constraints And Opportunities

The Best-in-Class review identified leading water conservation and efficiency programs and practices in jurisdictions around the globe. Most of these jurisdictions have much in common, from climatic conditions to policies and regulations.

In reviewing the mechanisms that enable Best-in-Class jurisdictions to lead in water conservation and efficiency, opportunities and constraints for York Region's LTWCS were identified and are discussed below.

8.1 Opportunities

Best-in-Class jurisdictions have been delivering water conservation and efficiency programming for decades and have acquired much knowledge in the process. Many of the leading jurisdictions are located in areas where water availability for most of the year – year in and year out – is a reality, therefore significant state/provincial and/or national/federal policies, regulations and programs are in place which support water conservation and efficiency. Consequently, the opportunities identified through the Best-in-Class review focus on those initiatives that fit with the climatic conditions of the Region, the regional-municipal organizational structure, and existing provincial and federal legislation and regulations.

8.1.1 Established Water Conservation and Efficiency Programming

Perhaps the most significant opportunity within York Region results from the water conservation and efficiency work completed over the past 10-plus years. Leading jurisdictions have an established pattern of conservation-oriented water management that in turn translated to water saving practices and behaviour on the part of their LT jurisdictions/water utilities and/or end users. The LTWCS strategy is not the starting point but rather, effectively builds on existing, successful conservation programming in the Region. This situation has three distinct advantages:

1. Many of the local municipalities in the Region are already on-board and supportive of initiatives to reduce water use and protect valuable water resources.
2. Water efficiency master planning has already been successfully undertaken, enabling the Region to both build on existing successful initiatives and leap frog much of the costly and time consuming learning process that is usually required when implementing a LTWCS.

3. Triple bottom-line and sustainability assessments are currently part of the project planning ethos in York Region, thereby reducing the need to implement a new project planning and management structure.

8.1.2 Wholesaler Influence

As a wholesaler, York Region can take a full-spectrum approach to water management and can utilize, to a degree, Regional policies and pricing to influence or motivate conservation and efficiency programming and practices by LT municipalities and in-turn, their consumers. In leading jurisdictions with a similar municipal/utility structure, the wholesaler used policy (with supporting ordinances/by-laws) and pricing, in conjunction with programming and relationship-building, to influence the water management practices of their customers.

8.1.3 Partnerships

Over the past decade and more, the Region has established partnerships with LT municipalities, retailers, manufacturers and community organizations to jointly deliver water conservation and efficiency initiatives. To a one, Best-in-Class jurisdictions developed partnerships and joint ventures with their municipal/utility clients and with a range of stakeholders at all levels, thereby ensuring more cost efficient, wider reaching and efficient programs. York Region can utilize existing partnerships to deliver new programs and foster new ones. Furthermore, there is a significant opportunity to draw on those connections made through the extensive public consultation and engagement process for the LTWCS to build new partnerships and secure the participation of these stakeholders in the delivery of the strategy.

8.1.4 Lower Price Increases

Successful implementation of the Long Term Water Conservation Strategy has the potential to keep water rate increases lower than would be necessary without progressive conservation and efficiency programming. Reduced demand for water results in lower revenues to municipalities. Lower demand also allows existing infrastructure to service a larger population than originally planned. This translates to lower capital costs up front in the building of new infrastructure and lower operating and maintenance costs throughout the life cycle of the infrastructure. These avoided and/or deferred costs translate to smaller rate increases than those that would occur with the more expensive option of infrastructure expansion.

8.2 Constraints

By identifying programs and practices of leading jurisdictions in water conservation and efficiency, the Best-in-Class review highlighted possible barriers or constraints to achieving potential water savings through the LTWCS. In some instances, the Region may undertake actions to overcome or mitigate the constraint, in other instances, the barrier or constraint is beyond the control and/or influence of the Region.

8.2.1 Supporting Provincial Legislation and Regulations

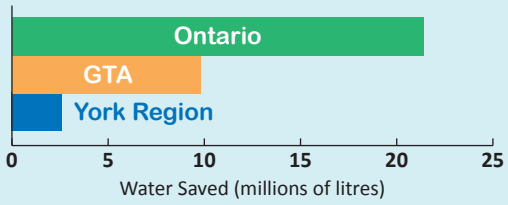
Without exception, leading jurisdictions in water conservation and efficiency had the backing of state/provincial and/or federal legislation and regulations. In many instances, such as leading regional jurisdictions in Australia, Spain, America, Germany and England, there are state and/or national requirements for water conservation and in some jurisdictions, such as California, actual reduction targets are set for all regions. This approach creates a level playing field and creates a water conservation-oriented market and mentality. In conjunction, state/provincial building codes require the use of water efficient fixtures, appliances and practices, again creating a level playing field and ensuring water efficiency is a fact in new construction and renovation. Not only do such regulations ensure the use of water saving practices and technology, they serve as a market driver for water efficient products and services. Purchasing a 13-litre toilet at the local hardware store is not an option in any leading jurisdiction identified through the Best-in-Class research.

8.2.2 Ontario Plumbing and Building Code

Enforcing water efficient building standards is the provincial Plumbing and Building Code. Section 35 of the Act stipulates that the Act and the code supersede all municipal by-laws and in the event that the "…Act or the building code and a municipal by-law (includes upper-tier municipalities) treat the same subject-matter in different ways with respect to standards… [the] Act or the building code prevails and the by-law is inoperative to the extent that it differs from [the] Act or the building code for the use of a building." Updating the Ontario Plumbing Code to align with Water Opportunities Act to drive water conservation in Ontario is needed to be successful.

If every new home was built with high efficiency toilets, the expected water savings every day could be:

- 21.4 million litres throughout Ontario
- 9.8 million litres in the Greater Toronto Area
- 2.6 million litres in York Region



8.2.3 Climate

Not so much a constraint as a reality, climatic conditions in York Region render certain water conservation measures cost prohibitive and significantly less effective than other approaches at this time. For example, many leading jurisdictions utilize regional grey water systems to provide irrigation water to their customers. In areas where water availability is limited and outdoor irrigation takes places for the better part of the year, dual systems to supply water for such purposes make logistical sense. In York Region, the warm season is only about 3 to 4 months and during this time, outdoor irrigation is for the most part limited to peak demand days when there is protracted hot, dry weather. Therefore, outdoor irrigation occurs for about a 2 month period. Constructing a regional grey water system with dual plumbing that is utilized for only 2 months each year but must be maintained for 12 months is at this point in time, not a viable water saving measure.

8.2.4 Regional-Municipal Structure

As previously discussed, York Region is an upper tier municipality comprised of nine local municipalities. As a UT municipality, the Region is a wholesale supplier of drinking water to the local municipalities, which are the retail delivery agents to the water customer. The local municipalities are responsible for their own distribution networks and are responsible for all water billing.

This Regional-Municipal structure and resulting division of responsibility for the water supply and treatment networks and water billing creates logistical and programming constraints. Any initiatives involving the municipal networks or targeting directly water customers must have the support and participation of each of the nine local municipalities. This structural fact means that implementation planning must consider the roles and responsibilities of local municipalities and the variations in their operations and approaches. For larger scale, new program components such as full cost recovery conservation-oriented pricing, or expedited approvals for water efficient, green construction; pilot projects, in partnership with one or two local municipalities, will be required to test the viability of such options, develop templates for use by the other local municipalities and demonstrate to the other municipalities the viability and efficacy of such approaches.

8.2.5 Soft Path and Larger Scale Implementation

Soft Path was chosen by York Region management and project personnel for its innovative engagement process and its holistic approach to water management. As with anything new and innovative, there are expected constraints or difficulties which must be addressed. There are three principal constraints to the use of Soft Path for the Region's LTWCS:

1. The Soft Path approach requires a transition from thinking in terms of conventional water management solutions to unconventional, ingenuity-based solutions.
2. The lack of scientific knowledge of how to quantify ecosystem water needs can impede the full application of water Soft Path principles.
3. Full cost accounting does not currently include the value of conserved water in terms of wastewater treatment, stormwater treatment, water source protection, etc, therefore an artificial bias for conventional solutions is created.

It is important to state that York Region, by employing the Soft Path approach on such a scale, is cutting new tracks. Therefore, implementation of the LTWCS will, in this regard, be without precedent and the process will be an iterative one and a learning opportunity for the Region and all stakeholders in water management.

8.2.6 Access to Water Use Data

Accessing water use data in a consistent, usable form from all nine local municipalities and in some instances, their utility providers (who have responsibility for water billing and therefore the collection of such data), is a real challenge for the Region and implementation planning and program monitoring and evaluation. Securing usable, consistent data is absolutely imperative for the effective execution and on-going monitoring of the LTWCS.

The Region has undertaken a lot of work to date to secure water use data in a consistent form from all nine municipalities and, where applicable, their utility provider. Their support and endorsement of the Regional LTWCS will be an imperative first step in ensuring their on-going and enhanced participation and co-operation.

8.2.7 Development Approvals

New development represents a significant opportunity for water conservation and efficiency. Leading jurisdictions employ a mix of carrots and sticks to secure the participation of builders/ developers in green building and water efficient design initiatives. Expedited approvals, reduced development charges and increased allotments are the key incentives used by Best-in-Class jurisdictions to drive water conservation and green building in new developments. Approval for new development rests with the LT municipality and therefore, the Region must secure their participation in such an initiative prior to implementation. Given the resource implications of an expedited approvals process, the Region will also have to provide some form of support to reduce or eliminate any potential burden on the municipality. It is for these reasons that where on-going participation of local municipalities is required, the Region will employ pilot projects to fully vet such initiatives and develop templates for use by the other local municipalities.

8.2.8 The Water System

There are several potential constraints associated with the Regional-Municipal water system that may be summarized as follows:

- Lack of quantifiable data on water usage for construction and operation purposes
- Lack of detailed condition and performance data on water mains
- Financial cost of maintaining existing high risk water mains
- Competing demands to maintain water quality in the face of diminished water demand.
- Infrastructure built for higher demand highlights the need for more efficient water quality programs such as uni-directional flushing and automated flushing.

9.0 Summary

The Region of York has a proven record of water conservation and efficiency programming spanning more than a decade.

Through its Water Efficiency Master Plan Update, the Region set the stage for long-term water conservation planning. The LTWCS builds and expands on the Master Plan, draws on the goals and objectives of the Region's Sustainability Strategy, and reflects the input of a broad range of stakeholders from across York Region. Approval of the LTWCS by the Minister of the Environment sets the stage for innovative conservation programming in the Region over the next 40 years.

Before this strategy submission of the Strategy to the Ministry of the Environment for review and approval, a panel of water management and conservation and efficiency experts has been assembled to conduct a peer review and provide their comments and input.

Once this feedback has been collected by Regional project staff, any changes and/or additions to the LTWCS will be completed.

Once the strategy meet the approval of the Minister of the Environment, ensuring its effective implementation is the next priority. In light of the constraints discussed previously, there are several key recommendations for the effective Implementation of this multi-faceted strategy.

9.1 Recommendations

The Recommendations discussed below stem from the assessment of opportunities and constraints for water conservation and efficiency planning and programming set out in the LTWCS.

9.1.1 Provincial Legislation and Regulations

As the Best-in-Class review clearly revealed, leading jurisdictions in water conservation and efficiency do so with the backing of supporting provincial/state and/or federal legislation and regulations. The absence of provincial water conservation requirements limits the extent of initiatives that the Region may undertake and the marketplace for water efficient products and services. The following recommendations apply to the province and have the support of the Region and water conservation and efficiency organizations and program personnel across Ontario:

- Modify the Ontario Building and Plumbing Code to require water efficient appliances and fixtures in all new home construction and renovation
- Ban the sale of 13-litre toilets
- Implement standardized water use data collection, reporting and billing criteria for all municipalities and utility providers.
- Implement public reporting of water use and water savings data

9.1.2 Regional-Municipal Co-operation

The two-tier structure of municipal government in York Region presents logistical and organizational issues for the implementation of the LTWCS. In order to secure the continued and on-going support and participation of the local municipalities for the implementation of the strategy, access to water use data and programs involving shared stakeholders (e.g., builders/developers), it is recommended that:

- the Region seeks endorsement of the LTWCS by the local municipalities;
- the Regional Municipal Advisory Group help direct and facilitate co-ordination and co-operation between relevant regional and municipal departments for the delivery of the strategy; and,
- the Ministry of the Environment provides a clear statement to local municipalities and, where applicable, the electrical utilities responsible for water billing and data collection, to provide water use data in a format to be specified by the Region

9.1.3 Soft Path

It is recommended that to facilitate the transition to a Soft Path Approach within a Regional and Municipal context, that:

- implementation planning employs the Soft Path accounting practices in the cost-benefit analysis; and,
- on-going monitoring and updating of both the Soft Path methodology and scientific knowledge of ecosystem water needs contiguous with the implementation of the LTWCS.

9.1.4 The Water System

To address the constraints associated with the Regional-Municipal water supply system it is recommended that the Region utilize the Regional-Municipal Working Group to facilitate co-ordination of activities including leveraging initiatives such as DMA's, leakage programs, corrosion protection, asset management, flushing programs and other appropriate practices.

9.2 Annual Monitoring and Reporting

York Region has established monitoring and reporting protocol and has undertaken on-going monitoring of its Water for Tomorrow conservation and efficiency initiatives. Under the LTWCS, the Region will build on the existing monitoring system and employ additional metering, measuring and reporting mechanisms. Annual progress reports will be submitted to the Ontario Ministry of the Environment for their review. In conjunction, public reporting of water use savings will be carried out on an annual basis. All reporting will be expressed both as system-wide volumetric savings and as per capita per day savings.

It is expected that the Region will establish a water conservation indicators and reporting framework within the first year of the LTWCS and will utilize this framework for all subsequent annual reports.

9.3 Updating the Long Term Water Conservation Strategy

Given the 40-year timeframe in which the LTWCS will be implemented, regular updating of the strategy to ensure it remains current and reflects any changes in:

- relevant provincial or federal legislation and regulations;
- water using technology and processes;
- climate;
- water resources;
- ecosystem health;
- building practices; and,
- water pricing and associated accounting practices

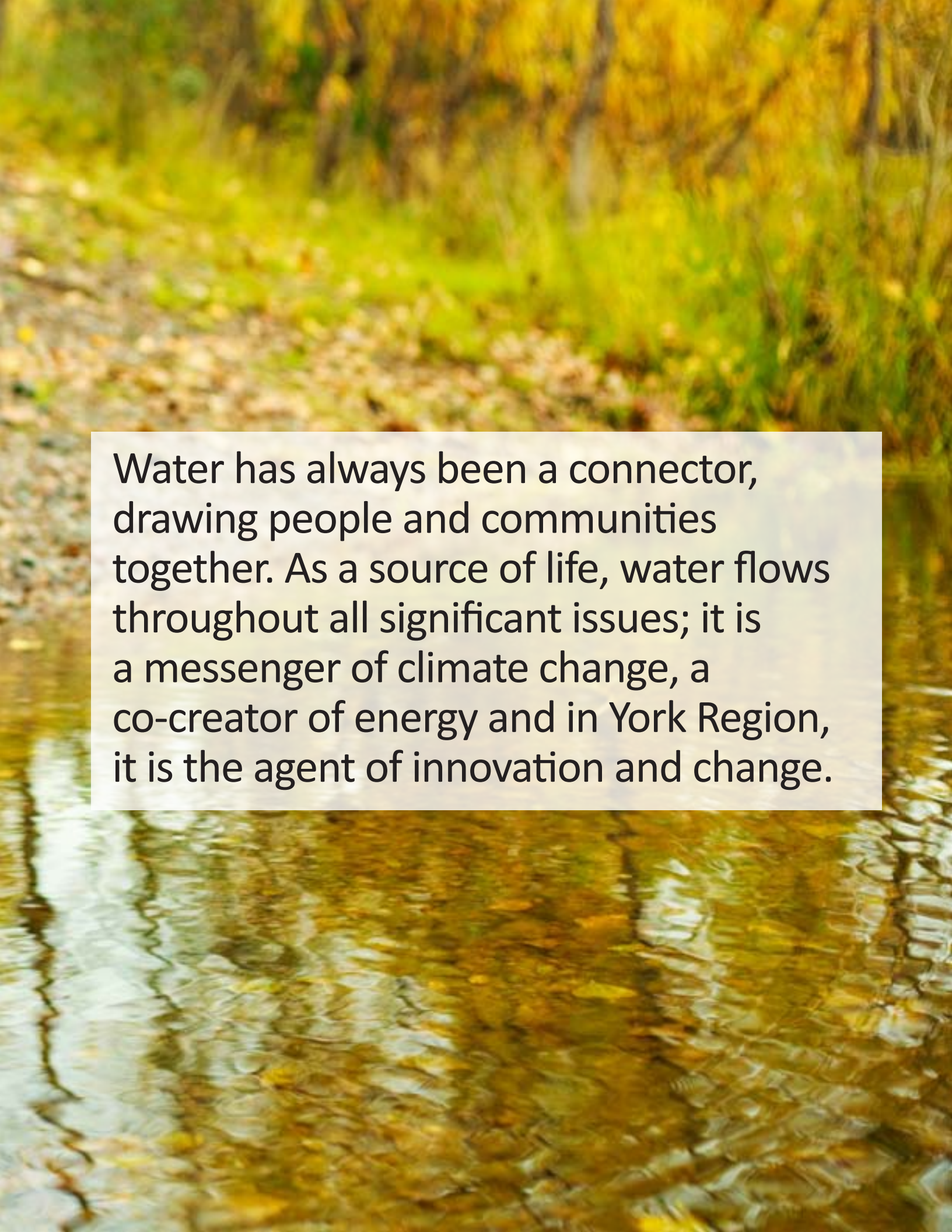
In addition to monitoring for changes as identified above that could impact the LTWCS, the Region will undertake an evaluation of the full water conservation and efficiency program every five years and modify as required to maximize the ROI and ensure all opportunities are capitalized upon at the earliest, feasible point.

10.0 Conclusion

The Long Term Water Conservation Strategy expands on existing Regional plans, strategies and programs and sets the stage for innovative and jurisdiction-leading water conservation and efficiency programming for the next 40 years.

A peer review of the LTWCS by water conservation experts and program managers from leading jurisdictions across Canada and the United States was undertaken and comments and suggestions provided by the reviewers have been incorporated in the strategy. A copy of the peer review comments is included in Appendix 8. The final, peer reviewed strategy will be submitted to the Ministry of the Environment for review and approval.

Roll out of the strategy will begin with the development of detailed implementation plans including full cost-benefit analysis, ROI assessments, analysis of avoided and/or deferred costs, a market assessment, etc., for the identified program components.



Water has always been a connector, drawing people and communities together. As a source of life, water flows throughout all significant issues; it is a messenger of climate change, a co-creator of energy and in York Region, it is the agent of innovation and change.

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