York Region

LONG TERM

Water Conservation Strategy

MARCH UPDATED 2016

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

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Preface

The 2016 Long Term Water Conservation Strategy Update provides an update to the original 2011 Long Term Water Conservation Strategy. These strategies enhance and extend the Region's commitment to leading water conservation programming, water resource protection, energy conservation and greenhouse gas reduction.

LONG TERM WATER CONSERVATION STRATEGY UPDATE

1.0 EXECUTIVE SUMMARY

In 2011, York Region developed its Long Term Water Conservation Strategy (Strategy). Building on more than a decade of progressive water conservation programming, the strategy provided a framework and overarching guidance for continuing sustainable water management in the Region to 2051.

The Strategy was one of the conditions of approval of the Ministry of the Environment and Climate Change (Ministry) for expanding sewage flow capacity and for an intra-basin transfer of drinking water from Lake Ontario to the communities of Aurora, Newmarket and East Gwillimbury. Annual reporting and updating of the Strategy on a five-year timeframe was an additional requirement set out by the Ministry. This 2016 Long Term Water Conservation Strategy Update is the first update of the original strategy that was submitted in 2011. It provides an assessment of the successes and challenges of the initial five years, the new direction for water management, water conservation programming at the Region and the specific measures and tactics to be developed and implemented from 2016 through 2020.

1.1 Background And Context

Centrally located in the Greater Toronto Area (GTA), York Region is one of the fastest growing regions in Canada. The Region is the only municipality in the GTA without direct access to Lake Ontario for its drinking water supply and, therefore, secures its water from water supply agreements with the City of Toronto and Peel Region (90%), as well as from Lake Simcoe and groundwater sources (10%). The population of the Region is currently just over 1.1 million and is projected to increase to about 1.8 million by 2041[1]. Without conservation, demand for drinking water and wastewater treatment will increase significantly as the population grows.

1.2 The Regional Water System

York Region is an "Upper Tier" municipality that wholesales water to its nine local municipalities: the Towns of Aurora, East Gwillimbury, Georgina, Newmarket, Richmond Hill, Whitchurch-Stouffville, the Township of King and the Cities of Markham and Vaughan. The local municipalities are responsible for their own distribution networks and end-user customer water billing.

1.2.1 Water Conservation and Sustainable Growth

Water conservation will continue to be integral to sustainable growth in the Region. As per the Ontario government's direction under the Places to Grow legislation, York Region adopted an Official Plan that directs how the Region will grow and how that growth will be distributed to 2031. The focus of the York Region Official Plan (YROP – 2010) is on sustainable growth and creating healthy, livable communities and a

[1] "Amendment 2 To The Growth Plan For The Greater Golden Horseshoe" *https://www.placestogrow.ca/index.php?option=com_content&task=view&id=398&Itemid=14*

resilient natural environment. Water conservation and source water protection are integral to sustainably meeting the demands of a growing population.

1.2.2 Current and Historical Water Conservation Programming

Since implementing York Region's 1998 Long Term Water Supply Master Plan, water conservation planning has been integral to the Region's drinking water supply strategy. York Region has been ahead of the curve in water conservation programming. Over the past 18 years an estimated 26.2 million litres (ML) per day has been saved as a result of York's Water for Tomorrow program. In 2011, York Region developed its first Long Term Water Conservation Strategy. The strategy expanded on existing Regional plans, strategies and programs, and set the stage for innovative and jurisdiction-leading water conservation programming for the next 40 years. Prior to the 2011 Strategy, the Region focused much of its water conservation efforts on Demand Side Management – reducing demands through the use of water efficient technologies at the consumer or demand end of the supply system. Rebates for water saving toilets, fixtures, appliances and equipment were offered to residents and businesses in York Region. As a result of the Regional rebates, 106,000 water efficient showerheads were installed, 95,000 inefficient toilets were replaced and 245,000 toilet flappers were replaced with water-saving early-closing flappers. Significant water savings were achieved as a result of the high uptake of these rebates by water customers. Following Ministry approval of the 2011 Strategy, the Region completed an analysis of rebate programs and other Demand Side Management initiatives. The marketplace has adopted the latest provincial Building Code by moving toward water efficient fixtures and appliances. This shift in the marketplace meant that Regional rebates could be phased-out with little impact on water conservation.

The first five years of the Strategy (2011 to 2015) involved analyzing Regional water conservation programs, developing new tactics and measures to drive further savings, implementing planning based on Best In Class practices, reviewing the cost-effectiveness of individual measures, and testing new measures through pilot and demonstration projects. Figure 1 provides a summary of key actions by phase.

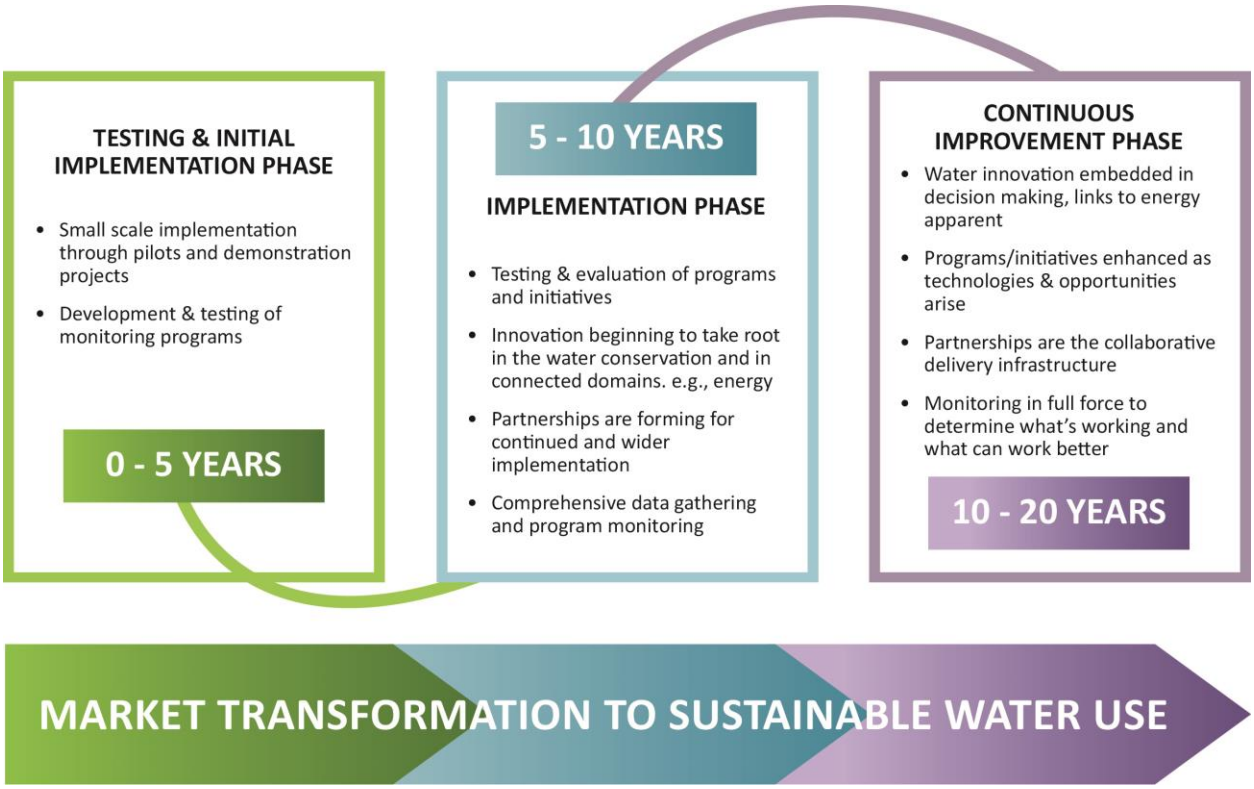

Figure 1 – Summary of Key Actions by Phase Commencing in 2011

In 2012 the Region embarked on a new direction for water conservation programming; phasing out rebates and implementing targeted, marketplace-based programs. This new direction focused Regional resources on high water users in the residential and the industrial, commercial and institutional (ICI) sectors and strategically engaged the marketplace, including the retail and service sectors and community organizations that deal directly with water customers – to cost effectively target water conservation programming. Retailers and service providers, such as landscape design and installation contractors, plumbers or automatic irrigation system contractors have regular and direct access to water using customers and, as market research studies have shown[2], are trusted sources of products and services. Community groups operate on a daily basis in neighbourhoods throughout the Region and regularly engage residents on issues of importance in their communities. Working in partnership with service providers and community organizations expands the scope and reach of Regional programs, serves as an economic stimulus for local businesses and reduces long-term costs to Regional taxpayers for water conservation programming.

[2] Halton (2007), TRCA (2008), City of Mississauga (2009), City of Toronto (2010), City of Kitchener (2015), City of Guelph (2015)

1.2.3 One Water: The Path to Sustainable Water Services

Over the past few years the Region has adopted a "One Water" approach to water management. This approach builds on past successes and provides an adaptive platform to respond to change and evolving conditions. With dynamic and evolving markets, increasing weather variability, emerging technology, population growth and changing demographics, new development with intensification in the corridors of southern York Region municipalities and greenfield growth in the more northern municipalities are all future trends that must be addressed through this approach. A summary of the key attributes of "One Water" is provided in Table 1.

"One Water" is a holistic approach that considers the cross-functional nature of water management, including water conservation. Via "One Water", the Region is building on over 15 years of previous efforts to ensure water management programming is complementary and responsive to change.

Table 1 – Key Attributes of the "One Water" Approach

ATTRIBUTE	DESCRIPTION
Collaboration	With a wide variety of stakeholders and engagement with the community
Integration	Of the entire water cycle with planning and other services
Economics and Finance	That recognize the true cost of water and price it accordingly
Green Infrastructure	That works with and mimics nature
Closed Loop Systems	That enhance nutrient and energy recovery and are flexible to allow for innovation and adaptation
Built Environment	That supplements the function of the natural environment
Enabling Environment	That fosters innovative institutional and management arrangements

1.2.4 Regional Guidance

Guidance for sustainable growth in the Region is embedded in York's Vision 2051 strategy, the 2015-2019 Strategic Plan, the Regional Official Plan (2010) and the Water and Wastewater Master Plan (2016). A summary of this Regional guidance is provided in Table 2.

Table 2 – Regional Guidance for Future Growth and Infrastructure

GUIDANCE	DESCRIPTION
Vision 2051	• Vision 2051 is a blueprint for York Region's future. • A Regional Council and community initiative that articulates an integrated pathway to achieve a desired collective future. • Advances sustainability efforts, fosters health and well-being of our residents, and liveability of our communities.
2015-2019 Strategic Plan	• Operationalizes Vision 2051. • Aligns with the Regional Council four-year term. • Sets out a road map for Regional priorities over the five years. • Identifies areas requiring critical focus, including the need to protect and sustain the natural and built environment and reduce ecological impact.
Regional Official Plan (2010)	• Describes plans to accommodate future growth and development while meeting the needs of existing residents and businesses in the Region. • Sets out directions and policies that guide economic, environmental and community planning decisions. • Identifies several policies directly related to water conservation, specifically to: o develop a long-term, innovative strategy for water conservation; o reduce the amount of water used in the Region's construction projects; o investigate innovative wastewater treatment technologies and approaches including greywater reuse, naturalized wastewater treatment, and water recycling in residential, commercial, institutional and industrial uses; and, o pursue, with local municipalities and conservation authorities, implementation of water conservation initiatives, such as water reuse systems, rainwater harvesting and innovative storm water management.
Water and Wastewater Master Plan (2016)	• A strategy for providing water and wastewater services to York Region residents and businesses. The last Master Plan Update was completed in 2009. • Ensures services are provided in a sustainable and safe manner and in compliance with appropriate legislation and regulations while protecting the environment. • The plan is currently being updated and will provide guidance for water and wastewater services to the year 2041.

Regional guidance provides a framework for water conservation planning, including the Strategy (2011), Peak Demand Reduction Implementation Plan (2011), Average Annual Day Demand Reduction Plan (2012), and the current update of the Strategy (2016).

1.2.5 Provincial Guidance

The primary provincial guidance for water conservation in Ontario is the *Water Opportunities Act*, *2010*. The Act implemented changes related to water conservation in a number of existing acts. For example, the *Water Opportunities Act* amended the *Building Code Act, 1992* to include consideration of water conservation in the Minister of Municipal Affairs and Housing's review of the Ontario Building Code. In addition, the Act includes amendments to the *Capital Investment Plan Act*, *1993*, *Green Energy Act*, *2009* and *the Ontario Water Resources Act*. This Act is intended to foster innovative water management technologies,

services and practices, create opportunities for economic development and clean-technology jobs in Ontario, and conserve and sustain water resources for present and future generations.

Provincial guidance specific to development of the 2011 Strategy and this 2016 Strategy Update is through conditions of approval from the Ministry of the Environment and Climate Change. Through an individual environmental assessment under the *Environmental Assessment Act* (EA Act) the Region proposed twinning of the Southeast Collector Trunk Sewer (SEC) for additional sewer flow capacity. A condition of the Minister's 2010 approval for the Southeast Collector was preparing and implementing a long-term water conservation strategy. Around the same time, the Region also worked with the MOECC and the Ministry of Natural Resources and Forestry to submit a request for an increased intra-basin transfer of water under the 1985 Great Lakes Charter Prior Notice and Consultation Process. In 2010 the Ministries provided notice this process had been completed successfully for the Region's intra-basin transfer of up to 105 MLD of Lake Ontario-based water. This transfer volume was secured to support long term growth in Aurora, Newmarket and East Gwillimbury, located within the Lake Huron watershed. The Ministries' notice letter included water conservation strategy requirements, similar to those imposed under the Southeast Collector approval. Under these conditions, the preparation and implementation of a long-term water conservation strategy must include the following:

- global Best In Class review of leading jurisdictions in water conservation;
- consultation with public, stakeholders, local municipalities, the Ministry, conservation authorities and other relevant public committees and agencies;
- expert peer review of the strategy;
- implementation monitoring and annual reporting on progress; and
- completion of a review and update of the strategy every five years.

1.2.6 The Value of Water Savings

Benefits of water savings are many. Deferral of capital projects to service growth and reduction of operational costs provide financial benefits. Water conservation enables growth to occur in an environmentally sustainable manner. A summary of the benefits is provided in Table 3.

The Regional Water and Wastewater Financial Sustainability Plan, endorsed by Regional Council in October 2015, provides for water rate increases to achieve full-cost recovery pricing by 2021 based on detailed analysis of water demands, population growth, maintaining existing assets, day-to-day operations, and building reserves for future asset rehabilitation and replacement.

The Financial Sustainability Plan supports water conservation through raising public awareness of the cost and value of water.

Table 3 – Savings and Benefits of Water Conservation

CATEGORY	DESCRIPTION
Capital Works Savings	• Financial savings related to deferring, downsizing, or eliminating the need to expand capital works projects (e.g., water treatment capacity) is one of the largest savings related to reducing system water demands (infrastretching). • York Region is financially responsible for its share of the costs of any plant expansions in Toronto and Peel Region to supply the Region with drinking water. By reducing demands, the Region meet the water needs of its nine municipal customers while minimizing the need to expand water treatment facilities in Toronto or Peel Region beyond what is currently committed under existing agreements.
Operational Savings	• Energy and chemicals are used to produce potable water; energy is used to pump and distribute water to customers; energy is used to pump wastewater; and energy and chemicals are needed to treat wastewater. • Reducing water demands results in reduced energy and chemical requirements.
Environmental Benefits	• Some of the many environmental benefits of water conservation are: o reduction in energy, chemical requirements, and greenhouse gas emissions, o protection of water quality in natural environment, and o maintenance of water quantity in aquifers, lakes, and rivers
Societal Benefits	• Water saved represents new supply that can be dedicated to other users. • Deferring or reducing infrastructure needs results in less construction and disruption in the community. • Market-based programming provides an economic stimulus. • Water reuse, system optimization, new water conservation technology and processes, low impact development (LID) and other such initiatives help create economic development opportunities and more sustainable communities.

1.3 Vision

The 2011 Strategy has led to creation of a future aspirational vision of "No New Water" until 2051 that included two separate targets:

- Reduce average annual day *residential water demands* to 150 LCD by 2051
- Use no more water in the Region in 2051 than was used in 2011 despite the expected growth in population

1.3.1 Objectives

While many objectives in the 2011 Strategy remain relevant today, new conditions and circumstances have evolved since the development of the 2011 Strategy. For example:

- Advancements in technology: Virtually all new plumbing products are being developed to meet the water efficiency certification requirements of WaterSense® and ENERGY STAR - as such, it is becoming increasingly difficult to purchase inefficient toilet and clothes washer models, thus eliminating the need for and benefit associated with offering rebates towards the purchase of these products.

- Increasing variability in weather: Climate change is expected to increase the likelihood and intensity of extreme and variable weather such as droughts and flooding events.

- Changing water demands: Because of the improvements in the efficiency of plumbing products (primarily toilets and clothes washers) as well as a growing public awareness of the importance of using our natural resources more efficiently, water demands in most communities in North America are declining on an annual basis.

To reflect current conditions, new objectives were added to guide development of the 2016 Strategy Update. Figure 2 provides a summary of the 2011 Strategy objectives and additional objectives for this Strategy Update.

ORIGINAL OBJECTIVES 2011 STRATEGY

1. Be a municipal leader in water conservation and efficiency.
2. Maximize sustainability of water supply through applying best in class technology and practices.
3. Minimize energy consumption and reduce the Region's carbon footprint.
4. Maximize use of energy efficient technologies, processes and practices.
5. Minimize financial costs to York Region water customers.
6. Maximize partnerships with local municipalities and utilities for cost-effective delivery of Region's water conservation and efficiency programs.
7. Maximize reliability of water supply system.
8. Minimize risk of water service disruptions.
9. Maximize system flexibility to respond to change.
10. Ensure Region's drinking water supply meets all existing and future regional, provincial and federal public health and drinking water quality standards.
11. Ensure the Region meets any future provincial standards for water reuse for non-potable or potable purposes.
12. Align with York Region strategic goals as set out in the Regional Official Plan and the Water and Wastewater Master Plan.
13. Deliver effective water conservation and protection outreach and education programs to York Region residents, students and the business community.
14. Develop and deliver multicultural water conservation and protection programming and resources to effectively engage the Region's diverse demographics.

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ADDITIONAL OBJECTIVES

1. Enhance integrated water management planning under the Region's "One Water " approach.
2. Integrate water and energy conservation to mitigate climate change impacts.
3. Enhance and expand data analytics, and improve Data Quality Assurance and Quality Control (QA/QC) process.
4. Enhance water conservation tracking and reporting framework.
5. Strengthen and establish strategic partnerships, committees and working groups to foster innovative ideas in water conservation.
6. Increase water efficiency in new developments/buildings.
7. Increase focus on water reuse.

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2016 STRATEGY UPDATE

Figure 2 – 2011 and 2016 Long Term Water Conservation Strategies

1.3.2 Research for the Long Term Water Conservation Strategy Update (2016 to 2020)

The 2016 Strategy Update commences with a Best In Class research on water conservation and efficiency. Best In Class research involved a global review of practices of leading jurisdictions in water conservation. New directions and trends were identified for overall water management and for water conservation in particular.

Best In Class research focused on those measures and approaches suitable for use in York Region, specifically adaptable to the Region's climate and water sources, and its two-tier municipal structure. Two significant changes from the 2011 Strategy informed Best In Class research for the 2016 Strategy Update, specifically:

1. The Region's "One Water" perspective was applied, expanding the scope of the Best In Class research to consider efficiency on a system-wide and function-wide basis. One Water enables an integrated analysis across water management portfolios.
2. A research focus was placed on practices that strategically target high water users and that have the potential to leverage resources via market-based programming to cost-effectively embed water conservation in the marketplace.

1.3.3 Consultative Research

Consistent with the One Water approach, interviews were conducted with senior management and program staff representing multiple disciplines/divisions in both the Region and the nine local municipalities. Also, the Region consulted with members of the Region's multi-stakeholder Water Conservation Advisory Committee including representatives from various sectors such as residential, industrial, commercial, institutional, Conservation Authorities, and Ministry.

Interviews explored Regional and local municipal staff experience over the first five years of implementation of the 2011 Strategy. Insights into past, present and future challenges and opportunities related to water management, growth and development, infrastructure planning, financing, etc., were secured through the interviews. Throughout development of this Strategy Update, meetings with Advisory Committee members were held to secure input, feedback and guidance on the direction forward.

1.3.4 Evaluating Water Conservation Measures

Screening and evaluation criteria specific to York Region were developed to assess and rank viable measures for inclusion in the 2016 Strategy Update.

Detailed implementation plans with full cost-benefit analysis are required for many of the measures that passed the screening process prior to determining their inclusion in Regional water conservation programming.

1.4 Updating The Long Term Water Conservation Strategy

The Ministry requires the Strategy to be reviewed and updated every five years. This Strategy Update also integrates with the 2016 updates of the *Water and Wastewater Master Plan* and the *Inflow and Infiltration Reduction Strategy*.

1.4.1 2011 Strategy Implementation and Lessons Learned

The years 2011 through 2015 were focused on testing and implementation of the initial Strategy. During this timeframe some impactful changes occurred which have influenced Regional water conservation programming and informed evaluation of potential measures for inclusion in the 2016 Strategy Update. These changes are as follows:

- The U.S. Environmental Protection Agency's WaterSense® and ENERGY STAR programs have significantly improved the efficiency of residential plumbing fixtures and appliances over the last decade. These improvements have resulted in an unparalleled decline in indoor residential per capita demands; this decline is expected to continue for several more years.
- The quality of water supply and water demand data has improved significantly since development of the 2011 Strategy.
- The value of broad-based water conservation programming has declined due to changes in the marketplace. Changes include federal and Regional requirements for water efficient toilets, fixtures and appliances. The reduction in lot sizes of single-family homes results in lower water use for irrigation. Also, growth in high rise condominiums results in lower discretionary outdoor water use in the residential and manufacturing sectors.
- Continued emphasis by the Region and local municipalities to operate their water supply and wastewater systems on a full-cost recovery basis.

These changes led to a shift from some previous water conservation programs and adjusting others during the first five years of the 2011 Strategy. Below is a summary of the programs and projects implemented over the testing and implementation phase (years 0 through 5) of the original strategy.

- Data Quality Assurance and Quality Control (QA-QC): The Region focused resources on securing quality water demand and water system data. Many of the local municipalities put significant effort into capturing customer water billing data and providing quality, usable data to the Region. Analytics capabilities at the Region improved in concert with collection of quality data.
- The Region conducted a cost-benefit assessment of its residential rebate programs in light of marketplace changes to more water efficient fixtures and appliances. As a result of this assessment and the recognition that the greatest impact from the rebate programs had been achieved, residential rebates were phased out in 2013.
- With over a decade of water conservation programming in place, the Region has already captured significant savings. It was recognized that the earlier savings came more readily than future savings would. Implementation planning undertaken in 2011 and 2012 set the stage for targeted water conservation programming aimed at high water users in Industrial, Commercial, and Institutional (ICI) and residential sectors.

- In combination with targeted programming focused on high water users, the Region moved toward a market-based approach to program delivery. A market-based approach uses joint ventures with key community organizations and relevant services providers – landscape contractors, garden retailers, and automatic irrigation system contractors – and strategic incentives to cost effectively influence the water use of end users.

- The Region designed and implemented two pilot projects to study market-based programming:

  - In the community of Kleinburg, the Region is delivering a 3 – 4 year peak water reduction pilot project in concert with the community, area garden centres, local landscape designers and contractors. The pilot project, called Fusion Gardening®, is designed to secure uptake of water efficient and sustainable landscapes through service industry participation, training of landscape designers and contractors and targeted marketing.

  - The peak water demand in any year is generally the result of excessive irrigation demands occurring during an extended period of hot and dry weather. Peak day water demands can be 150 percent or more of the average winter day demand. Water supply facilities are designed to meet peak demands – demands that only occur for a few days each year – and landscape irrigation is a significant component of peak water demand. By moving the landscaping industry towards Fusion Gardening, i.e., landscapes that require little or no supplemental irrigation, significant reductions in peak water demand could be realized.

  - A Fusion Gardening® pilot project being implemented in Kleinburg involves benchmarking, monitoring and evaluating peak water use in single-family homes to determine if cost-effective water savings can be achieved. Preliminary indications show that Fusion Gardening® can reduce irrigation demands and can increase on-site infiltration of stormwater thereby reducing runoff. Stormwater runoff is a major source of flooding and contaminant loadings – debris, oil and grit, antifreeze, fertilizers and other contaminants – to surface waters. The Kleinburg pilot project will run for 3 to 4 years and will inform if a market-based approach to sustainable landscaping will reduce peak water demand, increase on-site infiltration and reduce contaminant loadings to surface waters.

  - York Region, in partnership with the Peel Region and Landscape Ontario, developed the Water Smart Irrigation Professional (WSIP) program. The program is comprised of contractor training and certification to optimize in-ground automatic irrigation systems. York Region provides contractors with an incentive to identify, assess and upgrade inefficient systems to save water. Through market transformation, this program has potential to save significant amounts of water on a long term basis currently wasted by inefficient residential in-ground automatic irrigation systems and to

provide cost savings to customers. The long term benefits will outweigh the short term cost in providing incentives. A pilot project completed in Peel Region using this method identified average savings of 10,000 litres per day per acre of irrigated turf. Monitoring and evaluation of the program through local municipal water consumption data is on-going to ensure water savings are realized and sustained.

- The Capacity Buyback (CBB) program involves completing water conservation audits of ICI facilities and identifying opportunities for water savings. A rebate based on water savings achieved when a facility implements recommended measures is provided as an incentive. This will help offset the cost of equipment and process changes needed to reduce water consumption. This program continued to be a significant water conservation program during the past five years as it targets the high water users in the Region. Recent developments to the CBB program included establishing strategic partnerships to provide greater access to potential ICI facilities and the opportunity to leverage shared resources and marketing. For example, York Region is exploring partnership opportunities with the Toronto and Region Conservation Authority to collaborate in identifying water and energy saving opportunities within ICI sectors.

- One of the other recommendations of the Strategy was to develop a full-cost recovery conservation-based water pricing model. An in-depth analysis of conservation-based rate structures was undertaken as was extensive consultation with the local municipalities to discuss implications of a Regional rate structure change on their retail rate structure and system of billing. The analysis and consultation informed the decision to achieve full cost recovery and continue with a volumetric rate – supporting the principle that users pay for the water they use.

- The Region developed and implemented a multi-level public campaign to demonstrate the 'value of water' and to establish acceptance and understanding of full-cost pricing.

- Regional-municipal committees play an important role in water conservation programming and in the directional shift to "One Water":

  - The York-Area Municipal Liaison Committee is comprised of senior management, meets quarterly and its priority objective is to increase co-operation and collaboration between the Region and local municipalities.

  - The Water and Wastewater Steering Committee is a sub-committee of the Municipal Liaison Committee with a focus on water and wastewater programs.

- Outreach and education continued to be a major focus of water conservation programming in the Region. The Region has been supporting the Children's Water Festival for over ten years, engaging more than 5,000 students annually from across the Region. Curriculum-based education initiatives, special events, Fusion Gardening® demonstration projects and community outreach projects were the

foundation of the Region's outreach and education programming.

1.5 Updated Measures And Programs

Best In Class research of leading jurisdictions in water conservation and strategic consultative research informed the selection of potential options for inclusion in the 2016 Strategy Update. Opportunities for new programming and measures were examined through the "One Water" lens. This meant Best In Class practices and measures that provided, or could be adapted to provide, integrated, system-wide strategies for water conservation were given priority. In addition, the decision was also made to give particular attention to market-based options given the new emphasis on measures and programs which cost-effectively generate long-term, sustained water savings and embed water conservation in the marketplace. Table 4 provides a summary of measures selected for inclusion in the 2016 Strategy Update.

Table 4 – 2016 Strategy Update Water Conservation Measures

2016 STRATEGY WATER CONSERVATION PROGRAMS AND MEASURES
PROGRAM MANAGEMENT
1. Water Conservation Advisory Committee (WCAC) • While the WCAC will continue to play similar role in the Region's Water Conservation programming as in the past, initiation of a new term and focus will begin in 2016. • Expanded representation to include local municipalities and business associations on the committee will be evaluated over 2016-2017. • The goal of expanded representation on WCAC is to align the membership with the Region's commitment to One Water and the identification and realization of conservation opportunities system-wide.
2. Tracking and Reporting Framework • Expand on the existing Key Performance Indicator (KPI) mechanism currently in use in the Region to track and report water conservation KPIs on an annual basis. • A water conservation (or One Water) reporting framework could be updated on a regular basis to keep pace with Best In Class practices. • A format for a report to provide a summary of water conservation programming KPIs will be developed in 2016 with initial testing in 2017. • As programming evolves and changes, so too do performance indicators that are tracked, measured and reported without losing year over year comparability.
3. One Water Infrastructure Optimization • The Region works closely with local municipalities via the Regional-Municipal Steering Committee to ensure greater coordination in the operation of the water systems. • With the goal of continuous improvement and recognition that through system optimization, opportunities for greater water conservation, energy savings and capture, water reuse, reduction of Inflow & Infiltration, etc., can be realized; the Region will investigate over the course of 2016 opportunities for optimization including establishing of an Infrastructure Optimization Steering Committee under the auspices of One Water. • Enhanced resiliency in light of climate change and potential increases in extreme and variable weather, changing market demands, significant planned growth and related new construction/re-development, evolving technologies, full-cost recovery, etc. These speak to the importance of a continued emphasis on efficiency and greater co-operation and co-ordination of planning, operation and management of the Regional-municipal water systems.
4. Expanded Analytics • As part of the Region's commitment to continuous improvement, greater integration of data capture and analytics across key divisions to maximize water system efficiency and ensure a continued and growing focus on a One Water approach to planning and decision-making is a key objective over the next five years.

Note: Existing Programs | New Programs | New Pilot Programs

2016 STRATEGY WATER CONSERVATION PROGRAMS AND MEASURES
• Continued work with local municipalities to enhance and coordinate water billing data collection for improved integrated decision-making in areas of importance – reducing water loss through leakage, preventing excessive flushing, reducing Inflow and Infiltration, monitoring demand trends, measuring and assessing program performance, planning for growth, optimizing operations protocols, etc. – will remain a priority for the Region in the near and longer terms.
5. One Water Innovation
• With rapid advances in physical and information technology and infrastructure, significant challenges and opportunities exist to bring the two together. • A One Water Innovation Group could work to identify, explore, test and develop new processes, equipment, and technologies related to water management. • The Innovation Group could bring together leading business, academic, and public sector expertise to create innovative solutions and expansion of the Regional Innovation Group to include key external stakeholders via an innovation incubator or innovation hub. This could significantly expand the scope and capacity for One Water innovation in the Region. • Incubators and innovation hubs in leading jurisdictions such as Chicago, Philadelphia, and San Jose stimulate the local economy, support innovation, develop local capabilities and expertise, and generate public sector-private sector-academic joint ventures. • The One Water Innovation Group would be responsible for identifying opportunities for innovation across the Regional and local municipal systems. • Linkages with the province's WaterTAP initiative, the Ontario Water Centre, the York University campus in Markham, the LSRCA and TRCA Living City Campus and the Sustainable Technologies Evaluation Program [STEP], and the Canadian Water Network could be made through a One Water Innovation Incubator.
6. Water Reuse Plan
• In the final quarter of 2015, the Region formed an internal team to develop a cross-functional water reuse plan. • Water reuse is part of the Region's long-term strategy for achieving its ambitious target of 150 litres per capita per day (LCD) over the next 35 years. • Under the Region's One Water program, research into leading water reuse technologies and practices, and the identification and exploration of potential water reuse opportunities across the Regional and local municipal systems will culminate in development of a water reuse plan. • This work commenced in 2015 and will continue over the next several years of the Strategy Update. • Region's Upper York Sewage Solution (UYSS) Individual Environmental Assessment (IEA) has proposed opportunities for water reuse to be undertaken as part of the cross-function water reuse plan development. • Substantial water reuse will be required to meet the Region's aspirational target of "No New Water" by 2051. Currently there is no provincial guidance for large scale water reuse. In order to develop large scale water reuse opportunities, the Region will work closely with the Ministry on regulatory and programming guidance.

Note: Existing Programs New Programs New Pilot Programs

2016 STRATEGY WATER CONSERVATION PROGRAMS AND MEASURES

7. Integrated Master Planning

- Integration of One Water and the Strategy Update in the master planning process is integral to maintaining continuity and ensuring full consideration of water conservation in all future infrastructure plans and projects.
- Over the past decade the Region has taken significant steps to integrate water conservation into infrastructure planning; this approach will continue with greater focus on system-level water efficiency and water reuse in the master planning process.

POLICY AND REGULATION

1. Building Code Standard for Water Efficiency Upgrades in New Construction

- The Region will investigate the potential to require water efficiency upgrades, specifically 4.0 litre toilets, on-demand hot water recirculation systems, increased top-soil depth and quality, and fusion landscaping in new construction - or to include these measures under the Sustainable Incentive Program (SIP) in 2016-2018.

2. Water Efficiency and Water Reuse Standards for all Regional Buildings

- Region to develop requirements for all new and redevelopment projects of Regional buildings to require 4.0 litre or less toilets, water efficient fixtures, fusion landscaping, and water reuse where viable and feasible.
- The Region will develop water conservation requirements and supporting guidance for all new and redevelopment projects of Region-owned buildings.

3. Requirement for all Facilities with In-ground Irrigation Systems to be Optimized

- Over the 2020-2021 period, the Region will investigate a requirement for ICI facilities with in-ground automatic irrigation systems to install smart (weather-based) controllers to reduce water wastage.

4. Water System Design Criteria Advisory Group

- The Region will investigate opportunities to bring key stakeholders from local municipalities, other GTA or Ontario municipalities and/or associations (American Water Works Association, Federation of Canadian Municipalities, Association of Municipalities of Ontario, Canadian Water Network, etc.) and relevant provincial ministries together. This advisory group will discuss design guidelines for water supply systems, including fire flow requirements, and to explore the efficacy of potential changes to the guidelines for enhanced efficiency, cost-effective operation and quality maintenance, and capital cost reduction.
- The key deliverable from this collaborative work is developing a recommendation for updating design criteria for water supply systems.

REBATES AND OTHER FINANCIAL INCENTIVES

1. Capacity Buyback (CBB) Program

The Region continues to implement its Capacity Buyback program to ICI customers. The program offers financial incentives to ICI customers based on average daily water savings achieved.

Note: Existing Programs | New Programs | New Pilot Programs

2016 STRATEGY WATER CONSERVATION PROGRAMS AND MEASURES

INFRASTRUCTURE

1. District Metered Areas (DMAs)

- The Region continues to offer support to local municipalities in implementing District Metered Areas to reduce system leakage.
- Localized DMA methodology involves comparing the theoretical demand of an isolated area of the system to the measured actual demand; a high actual demand compared to the theoretical demand can indicate leakage.
- The Region will determine the value of bringing the DMA program under the One Water Optimization Working Group.

2. Stand-Alone System Water Conservation Plan and Program

- The Region, in consultation with local municipalities in service areas supported by stand-alone systems such as Kleinburg where serviced population is generally less than 10,000 and peak demand is high, will develop targeted water conservation programming to reduce water demands in these communities.
- The plan will be developed over the next two years.

3. Risk-based Asset Management for Pipe Replacement

- The Region will enhance its risk-based pipe replacement program through adopting advanced condition assessment technology, improving data collection, partnering with other municipalities and educational institutions to research pipe deterioration curves, investing in pressure monitoring and developing a transient model to identify areas of vulnerability.
- A complex assessment risk methodology is used to identify pipes that are statistically more likely to fail, pipe clusters with higher than average or acceptable levels of failure (break) rates are targeted first for replacement, while deferring replacement of pipes in clusters with low failure rates.
- Risk-based pipe replacement reduces the likelihood of pipe failures and resulting water loss, reduces utility liability, and optimizes repair and replacement costs.

4. Pressure Management

- The Region has investigated the use of pressure reduction/management to reduce leakage in system pipes. Pressure management in the water supply system is achieved via the use of pressure-reducing valves and is generally done during low demand periods, usually overnight.
- As part of its One Water system-wide efficiency assessment, the Region will investigate the potential change in system pressure due to system expansion to minimize system pressures that may increase leakage. This investigation will be undertaken in the next three years.

Note: Existing Programs | New Programs | New Pilot Programs

2016 STRATEGY WATER CONSERVATION PROGRAMS AND MEASURES

5. Water Energy Nexus

- The Region is currently evaluating energy recovery and operational optimization opportunities within the Regional water system.
- This work will continue throughout the planning horizon of the 2016 Strategy, securing energy capture where viable and cost effective.
- System-wide water conservation work will provide energy savings concurrent with water savings.

PILOT PROJECTS AND RESEARCH STUDIES

1. Development-scale water reuse (greywater) and/or rainwater harvesting

- The Region will work with local municipalities and the local builder/developer industry to identify opportunities for development-scale water reuse or rainwater harvesting projects for non-potable purposes. Opportunities such as toilet flushing and irrigation in new residential developments and building-scale water reuse or rainwater harvesting for non-potable purposes such as toilet flushing, boiler systems, and irrigation for commercial and residential development/redevelopment projects.
- Water reuse involves capturing of greywater (water from showers and sometimes laundry), on-site treatment, storage and subsequent reuse for non-potable purposes.
- Pilot project opportunities will be identified during 2016-2017 with the goal of implementation in 2018 – 2020.
- The goal of the pilot project is to assess the costs, potential savings and constraints of development-scale water reuse or rainwater harvesting for non-potable purposes.

2. Water Banking

- The Region will investigate the potential and value of water banking (aquifer recharge).
- Water harvesting and/or reuse will be considered as potential sources of supply for aquifer recharge.
- Given high water levels in some of the Regional wells, a determination as to the need, feasibility, efficacy and value of water banking is required.
- The study of the potential of water banking to the long term sustainability of Regional aquifers will be carried out over 2019 – 2021 of the Strategy Update.

3. Mains Flushing Public Outreach Campaign

- The Region will investigate the potential of co-ordinating water main flushing activities with a spring-time “fill your pools/water features and irrigate new plantings” public outreach and engagement campaign.
- In areas where significant flushing is required to maintain water quality, the potential and viability of redirecting flush water to fill pools, hot tubs and ornamental water features and for irrigation of new plantings at a peak demand time for these activities (generally the 2nd and 3rd weekends of May), will be evaluated in 2018-2019.

Note: Existing Programs | New Programs | New Pilot Programs

2016 STRATEGY WATER CONSERVATION PROGRAMS AND MEASURES

MARKET BASED PROGRAMS

1. Market-based Programming

- The Region will continue to pursue market-based programming to drive water conservation transformation in the marketplace.
- Market-based measures identified in the Peak Reduction and Average Annual Day Demand Implementation Plans developed in 2012 will continue through the pilot study phase and, where appropriate (based upon results from pilot studies), will be implemented Region-wide over the 2016-2020 period.

2. Water Smart Irrigation Professional (WSIP) Program

- A market-based program involving a 3-way collaboration of York Region, Peel Region and Landscape Ontario.
- Involves training and certification of irrigation contractors who then qualify for an incentive to optimize the efficiency of existing automatic irrigation systems.
- The potential average water saving for Industrial, Commercial, and Institutional facilities is in the range of 10,000 litres per day per acre of irrigated turf. WSIP is potentially a significant program for reducing peak demand and for tackling high outdoor water use.

3. Fusion Gardening® Program

- A market-based program using landscape design/install and maintenance service providers.
- Involves training and certification of landscape designers/installers and landscape maintenance contractors in fusion gardening/landscaping.
- In 2015 the Region began implementing a pilot project in Kleinburg, a community with a significant percentage of high peak season residential water users.
- Fusion landscapes are water efficient and incorporate LID/green infrastructure features such as rain gardens, bioswales, increased vegetative cover (including tree canopy cover), dry river beds, and soak-away pits.
- Fusion landscapes require little or no supplemental irrigation once established, mitigate stormwater runoff and contaminant loadings to source waters, help reduce flooding, and enhance vegetative cover.
- The Fusion Gardening® pilot program will continue in 2016 – 2018 and will be evaluated to determine if the program will be implemented Region-wide beginning in 2019.

EDUCATION AND OUTREACH

1. "Water Is" Campaign

- "Water Is" campaign rolled out in the fall of 2013.
- First phase of campaign created an emotional connection between residents and water and included multi-pronged communication tactics including ads (newspaper, bus shelter, and movie theatre), social media, event attendance, photo contest, posters, etc.
- The second phase of campaign is more informational – showcasing hidden infrastructure and how York Region keeps drinking water safe and clean and included videos, posters, social media, Water Hero campaign, advertorials.
- The "Water Is" program raises awareness about the importance of water. Making the

Note: Existing Programs | New Programs | New Pilot Programs

2016 STRATEGY WATER CONSERVATION PROGRAMS AND MEASURES

connection between the value of water and the need to conserve is a key component of the Region's water conservation outreach program.

2. Children's Water Festival

- Grade 4 students across York Region learn about water conservation through interactive, curriculum-linked activities.
- The Children's Water Festival is a five-day signature event that helps approximately 5,000 students understand how important a clean and plentiful water supply is. Children learn respect for a healthy environment and make a commitment to use natural resources wisely. The festival has been held for over ten years for schools in York Region where each teacher registers his/her own class separately.
- The York Children's Water Festival is a major component of York Region's *Water for Tomorrow* program and is a partnership between York Region and the Toronto Region Conservation Authority.

3. Student Education Initiatives

- York Region offers a number of educational water conservation programs for elementary schools.
- Teachers and students are encouraged to participate in events and activities linked to the Ontario curriculum.
- The Region developed a new elementary-level, in-class presentation to demonstrate where water comes from and the systems that move it, and the safety and reliability of the Region's supply. The presentation features hands-on activities and engaging discussion about how water is needed and used.
- The Region offers a calendar showing Grade 7 student drawings reflecting the students' views on water conservation, protection and responsibility.
- Student drawings are first judged at each school and then submitted to York Region for final judging.
- The 12 winning art pieces are printed in the Water for Tomorrow student calendar which is available online. Each winning artist is personally recognized for his/her contribution at his/her school.

INNOVATION

1. Water Reuse Pilot – development and implementation

- Water reuse is part of the Region's long term strategy for achieving its ambitious targets. The Region's Upper York Sewage Solution Project has proposed exploring opportunities for water uses.
- The Region will be piloting a project to utilize water reuse for irrigation purposes from a Regional Water Resource Recovery Facility from 2016- 2019.

Note: Existing Programs | New Programs | New Pilot Programs

1.6 Updated Water Saving Targets And Timelines

The 2011 Strategy envisions a residential water consumption rate of 150 litres per capita per day (LCD) by 2051. While per capita residential water demands have declined over the last decade or so because of the impact of Regional programs, an improvement in the efficiency of key water using fixtures and appliances (e.g., toilets, clothes washers, showerheads), and a growing awareness of the importance of using our natural resources wisely, further savings are required if the Region is to reach its targets.

Table 5 summarizes the projected water savings and consumption rates that can be achieved over time under three scenarios.

Scenario 1 represents consumption rates that can be achieved through Region's water conservation programs only. Scenario 2 represents consumption rates that can be achieved through the Region's water conservation programs plus additional water savings from provincial legislation such as mandating water efficient fixtures in new homes through the new Plumbing Code (effective January 2014). Scenario 3 represents a 2051 target consumption rate of 150 LCD. It requires implementation of water reuse and provincial guidance on water reuse applications.

Through implementation of the 2016 Strategy Update over the next five years, coupled with additional savings from new building code, the Region is on track to achieve the 2021 target consumption rate of 190 LCD. Piloting water reuse project in the next five years is essential to prepare for implementing water reuse measures from 2021 to 2051, in order to achieve the 2051 water consumption target of 150 LCD.

The 2016 Strategy Update recommends the Region form a team to develop a water reuse plan, including providing support and input to the implementation of water reuse in the proposed Upper York Water Reclamation Centre, and working with the Province on policy and regulatory changes to permit large scale water reuse.

The 2011 Strategy also envisions a "No New Water" goal by 2051. It is expected that achievement of this goal requires large scale water reuse. Currently there is no provincial guidance for large scale water reuse. In order to develop large scale water reuse opportunities, the Region will work closely with the Ministry on regulatory and programming guidance.

Table 5 – Residential Water Consumption Targets and Timelines

WATER SAVINGS SCENARIOS	2014	2021	2031	2041	2051
	Residential Consumption Rate (LCD)				
Scenario 1 Regional Incentive Programs	200	192	185	179	173
Scenario 2 Regional Incentive Programs + Existing Provincial Programs and Legislation		190	183	176	170
Scenario 3 Regional Incentive Programs + Existing Provincial Programs and Legislation + Water Reuse and Provincial Guidance and Legislative Changes			180	165	150

1.7 Conclusion

The 2016 Strategy aligns with the Region's One Water approach to water management and takes a market-based approach to program implementation to leverage resources from other agencies and to maximize the Region's return on investment.

While the Region appears to be on track to reach its "150 LCD" residential water demand target by 2051, the second target of "No New Water" would be more challenging as it will require system-wide, large scale water reuse. The Region will continue to explore options to achieve its aspirational long term goal of "No New Water" as envisioned in the 2011 Strategy, in consultation with the Ministry.

With development and implementation of the 2016 Strategy Update, York Region maintains its position as one of the leading Canadian jurisdictions in water conservation.

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 1.1 million. By 2041, the population is projected to increase to approximately 1.79 million (Table 6).

Table 6 – Projected population, Single Family (SF) and Multi Family (MF)

YEAR	POPULATION	SINGLE FAMILY POP	MULTI FAMILY POP
2011	1,000,000	850,000	150,000
2016	1,176,066	999,656	176,410
2021	1,298,853	1,104,025	194,828
2026	1,421,640	1,208,394	213,246
2031	1,544,426	1,312,762	231,664
2036	1,667,213	1,417,131	250,082
2041	1,790,000	1,521,500	268,500

2.1 The Regional Water System

York Region is considered an "Upper Tier" municipality and is comprised of nine local municipalities. As an upper tier 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 nine local municipalities and the local municipalities are the retail suppliers of water to their customers. The nine local municipalities are responsible for their own distribution networks and all customer water billing.

York Region has no direct access to Lake Ontario for its water supply. Currently, the Region purchases about 90 percent of its water supply from the City of Toronto and Peel Region via long-term water supply agreements, with the rest obtained from Lake Simcoe and ground water sources through a system of production wells.

Because the Region has multiple sources of water, (see Figure 3) the true cost of water supply varies across the Region, as do the properties of the water (e.g., the hardness of well water is typically greater than that of surface-based water). However, to be equitable, the Region charges all local municipalities a single rate for water purchases regardless of the source of water or the season.

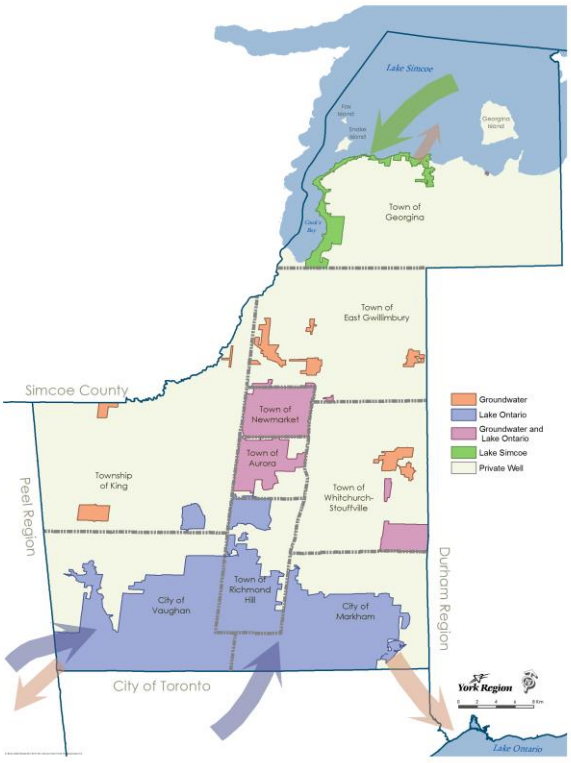

Figure 3 – Water Supply Sources in York Region

The Region operates and maintains:

- 3 water treatment plants
- 22 water pumping stations
- 44 storage facilities (elevated tanks and reservoirs)
- 40 groundwater production wells
- 344 kilometres of transmission mains

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

2.2 Water conservation and Sustainable Growth

As per Provincial direction through the Places to Grow legislation, York Region has adopted an Official Plan that directs how the Region will grow until 2031 and how that growth will be distributed throughout the Region with a focus on sustainability principles. Water supply and wastewater collection are significant Regional growth considerations. Integrating water infrastructure planning with water conservation programming is critical to meeting potential increases in water demands due to population growth 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 over the next decade or so 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.

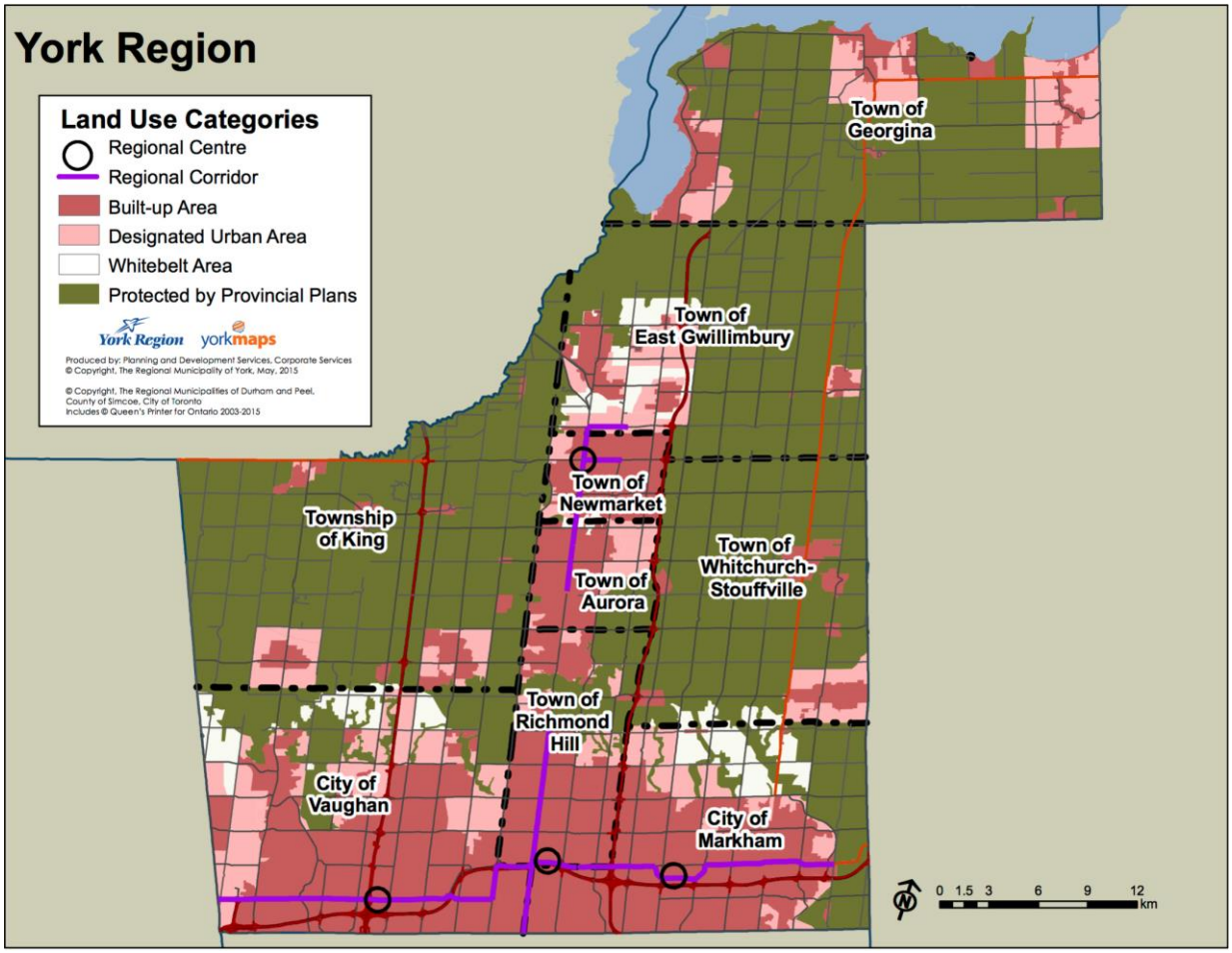

Figure 4 – York Region Land Use Categories

While growth areas provide an ideal opportunity to design efficiency into new buildings, the sheer number of existing customers in York Region means that a significant effort must also be made to reduce the per capita demands of these customers. 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.

Because of the significant growth expected within the Region, Regional water demands will continue to increase over time unless a significant level of water savings is achieved. Currently, 100 percent of the water produced and distributed by the Region is potable even though very little of this water is actually consumed. Reducing the amount of water wasted within the system and adopting water reuse strategies should enable the Region to meet growth related increases in water demand with minimal increase of water supply – thus helping to ensure the sustainability of the Region's water supply system and long-term water savings across all sectors.

2.3 Current and Historical Water Conservation Programming in the Region

In 1997, 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. This Master Plan identified the need to implement Region-wide water conservation measures.

Since 1998, water conservation planning has been an integral part of York Region's long-term drinking water supply strategy. Between 1998 and 2014 water saved in the Region is estimated at 26.2 million litres per day (MLD). Much of this water savings was directly related to the Region's *Water for Tomorrow* (WFT) program. Additional savings were the result of the recent North American-wide improvements to the efficiency of plumbing fixtures and appliances, such as toilets, clothes washers, showerheads, and faucet aerators. Lower water demands also mean lower levels of greenhouse gas emissions. It is estimated that the discharge of over 4,455 tonnes of carbon particulates and 16,814 tonnes of carbon dioxide was avoided between 1998 and 2014 because of reduced water demands.

Up until 2011, York Region – like most other North American municipalities – focused much of their water conservation efforts on delivering broad-based /rebate-based measures. While the installation of efficient toilets and clothes washers have resulted in a significant reduction in per capita water demands since the early 2000s, with every efficient model installed, fewer and fewer inefficient fixtures remain. What's more, because of changes in the marketplace (see section 5.1.10) there are fewer inefficient plumbing fixtures and appliances being sold by retail outlets. For both of these reasons, fixture and appliance rebate programs have essentially "run their course".

There are also some inherent limitations with broad-based (non-targeted) programs, specifically:

- Variable uptake.
- Program participants are volunteers and, therefore, unlikely to be "water wasters".
- High water users may or may not be reached.
- Costly for the Region to deliver on a per capita basis.
- Require continuous and increasing investments with an ever-decreasing return in water savings.

Because of these limitations, the Region has shifted its focus in recent years to developing marketplace-based programs that specifically target high water users. These programs focus on removing barriers to customer participation and leveraging opportunities to internalize cost-effective water conservation to the degree that it becomes standard practice. Engaging the marketplace – the retail and service sectors that deal directly with customers – and developing strategic partnerships for the delivery of water conservation initiatives is not only more cost-effective but also extends the scope and reach of Regional programs.

The Region will continue to deliver its Capacity Buyback (CBB) program for industrial, commercial, and institutional (ICI) customers as part of its Strategy Update. Unlike many rebate programs where the level of rebate is fixed for

each type of fixture or appliance being replaced, a CBB program provides financial incentives to participating customers based on the volume of water savings they achieve – or, more accurately, on the average daily rate of water savings achieved. CBB programs are significantly more flexible than typical fixture rebate programs because payments are based on water savings versus the type of product that is installed. As such, ICI customers are free to consider all potential water conservation opportunities, including changes to equipment and processes, water reuse activities, indoor and outdoor water uses, etc., to achieve water savings.

In 2015 York Region began development of a Fusion Gardening pilot project in the community of Kleinburg in York Region. Fusion gardening is a new and innovative style of lawn and garden design that collectively brings the luxury and beauty of traditional gardens together with low-water-use, eco-friendly plants, and Low Impact Development (LID) practices. LID is the use of vegetative cover, rain gardens and permeable surfaces, such as mulches, gravel, interlocking paving, flagstone and slatted wooden decks to increase the infiltration of stormwater and reduce runoff. The end result is an on-trend, dynamic landscape that not only uses less water but is also beautiful and easy to maintain. The Region will continue to implement its Fusion Gardening® pilot project as part of the 2016 Strategy.

In 2013, York Region, Peel Region and Landscape Ontario developed the Water Smart Irrigation Professional (WSIP) program. This program provides qualified irrigation companies with specialized training and certification to deliver "Water Smart" irrigation system efficiency and maintenance services. This program benefits local irrigation contractors by providing enhanced water conservation training and new business opportunities, and benefits local customers by helping them reduce their irrigation demands without sacrificing the health and beauty of their landscape. Because this program focuses on customers with automatic irrigation systems, it is naturally tailored to typically high water users. The Region will continue to implement the WSIP program as part of their 2016 Strategy.

York Region continues to offer distribution system leak detection support to their local municipalities using the International Water Association and American Water Works Association (IWA/AWWA) best practice methods. Water audits conducted in each local municipality assess the level of non-revenue water and water loss (leakage) in each system. Once the audits are received they are reviewed by the Region and feedback is provided where necessary. The results are tracked and trend analysis is completed to see how the values compare annually. The AWWA defines the Infrastructure Leakage Index (ILI) as "a performance indicator quantifying how well a distribution system is managed (maintained, repaired, rehabilitated) for the control of real (leakage) losses at the current operating pressure". An ILI value of 1.0 is considered a "best managed" system. A target ILI value of between 1.0 and 3.0 has been established for the nine municipalities. The Region also collaborates with municipalities who have a high ILI to implement a leak detection program, where the cost benefit analysis proves it feasible.

2.4 One Water: The Path to Sustainable Water Services

In this era of change – dynamic and evolving markets, increasing weather variability and the

associated increase in the frequency and intensity of extreme events such as droughts and flooding, fast emerging technology, population growth and changing demographics, new development with intensification in the corridors of southern York Region municipalities and greenfield growth in the more northern municipalities – a responsive and resilient water system is critical.

"One Water" operationalizes the philosophy that there really only is "one" water on earth, with each molecule of this water being reused over and over thousands of times.

"One Water" is a holistic approach that considers the cross-functional nature of water management, including water conservation. Via "One Water", the Region is building on previous efforts to ensure water management programming is coordinated, innovative, complementary and responsive to change. How we grow as a Region impacts water use; evolution of the market to more efficient fixtures and appliances impacts water demand and influences future trends that in turn, impact capital planning. New water management technologies create opportunities for greater efficiencies on a system scale and make water reuse, energy capture and nutrient recovery viable. "One Water" fosters integration and enables the Region to capitalize on significant cross functional opportunities as illustrated in Figure 5.

Figure 5 – "One Water" Approach

The "One Water" approach facilitates integration of future trends, such as:

- Technology changes that enable the use of alternative sources for water supply; that can provide service on an individual customer basis; that integrate with energy management; that embrace the concept of "big data" and advanced analytics.
- Higher expectations for management and regulation; for public-private partnerships; for customer service; and for supply security.
- Increased awareness of sustainability requirements and the impact of climate change; of the need to manage water demands; of the need to reduce inflow & infiltration (external water entering sewer system pipes); of source water protection; and of the need to use renewable resources
- Acceptance that water is a valuable commodity unto itself and as an embedded commodity in other products.

Exploration of direct and indirect water reuse, energy recovery and nutrient extraction from Water Resource Recovery Facilities (formerly known as Wastewater Treatment Plants) are key components of the 2016 Strategy Update and the "One Water" approach.

2.5 Provincial Requirements and Regional Initiatives

2.5.1 Regional Official Plan (2010)

The Region's current (2010) Official Plan states that water conservation measures are essential components of York Region's long term water supply strategy. These measures help to meet new demand in a cost-effective manner. The savings resulting from water conservation measures assist in maximizing use of built capacity therefore deferring costly capital projects while not stressing current supply. The Official Plan identifies the objective: *To ensure adequate water resources for today's residents and future generations through conservation*.

The Official Plan also identifies six Council policies related to water management:

- To develop a long-term, innovative strategy for water conservation.
- To update and implement the York Region 10-year Water Conservation Master Plan to ensure long-term water conservation, cost savings, and public education.
- To investigate full cost pricing of water, in co-operation with local municipalities, to encourage water conservation facility system improvements.
- To pursue with local municipalities and conservation authorities the implementation of water conservation initiatives, such as water reuse systems, rainwater harvesting and innovative storm water management.
- To investigate innovative wastewater treatment technologies and approaches including greywater reuse, naturalized wastewater treatment, and water recycling in residential, commercial, institutional and industrial uses.
- To reduce the amount of water used in the Region's construction projects.

2.5.2 Official Plan Update and Water and Wastewater Master Plan (2016)

The Region is currently undertaking a Municipal Comprehensive Review (Official Plan Update) to address new growth forecasts to 2041 as set out in Amendment 2 to the Provincial Growth Plan for the Greater Golden Horseshoe. The Region is projected to grow to 1.8 million residents and 900,000 employees. In conjunction with the Municipal Comprehensive Review, the Region is also updating its Water and Wastewater Master Plan, anticipated for completion in the fall of 2016. The previous version of the Master Plan recommended the need to continue with, and enhance, the Region's water conservation efforts while at the same time strengthening efforts to reduce and prevent further inflow and infiltration to the wastewater collection system. This Master Plan Update will continue to incorporate water conservation results into water demand modelling. More importantly, this Master Plan Update incorporates the Long Term Water Conservation Strategy as an integral part of the preferred servicing alternative to support the Region's growth to 2041 and beyond.

2.5.3 Ministry of the Environment and Climate Change

The *Water Opportunities Act, 2010* identifies three primary purposes:

- To foster innovative water, wastewater and stormwater technologies, services and practices in the private and public sectors;
- To create opportunities for economic development and clean-technology jobs in Ontario; and
- To conserve and sustain water resources for present and future generations.

The Act also states that municipal service providers shall "prepare, approve and submit to the Minister a municipal water sustainability plan". The Region's updated Water Conservation Strategy meets this requirement.

2.6 Savings Related to Reduced Demands

York Region's water supply and water resource recovery systems are moving towards operation on a full-cost recovery basis, as are the nine local municipalities. By definition, full cost pricing is a pricing structure that fully recovers the total cost of providing the service.

The Regional Water and Wastewater Financial Sustainability Plan, endorsed by Regional Council in October 2015, provides for water rate increases based on detailed analysis of water demands, population growth, maintaining existing assets, day-to-day operations and the building of reserves for future asset rehabilitation and replacement to achieve full-cost recovery pricing by 2021.

The Region embraces "triple bottom line" accounting, i.e., where the environmental and social benefits are included along with economic benefits, therefore, the total savings to the Region (and, by extension, the local municipalities) can be significant.

2.6.1 Capital Works Savings

Typically, the financial savings related to deferring, downsizing, or eliminating the need to expand capital works projects (e.g., water treatment capacity) is one of the largest savings related to reducing system water demands, and this is true in York Region. Savings are not limited to systems within York Region, but rather they encompass the entire water supply system. The Region obtains approximately 90% of its water through long-term agreements with Toronto and Peel Region. York Region is financially responsible for a share of the costs associated with treatment plant and transmission expansions in Toronto and Peel Region in relation to the portion of water supply assigned to York Region. By reducing water demands, the Region will be able to meet the water needs of its nine municipal customers while minimizing the need to further expand water treatment facilities and transmission system in Toronto or Peel Region beyond what is currently planned for in the agreements. As a result, there will also be a reduced need to transfer water obtained from Toronto and Peel across watershed boundaries than originally projected in 2010. It is estimated that the unit cost to expand the water treatment facilities in the GTA is approximately $0.89 per L/day of capacity. In other words, a water treatment plant expansion of 100 MLD would cost approximately $89 million. While no water treatment plant expansions are required to meet York's growing demands to 2041, the value of long-term savings could be significant.

2.6.2 Operational Savings

Energy and chemicals are used to produce potable water and treat wastewater. Energy is also used to pump and distribute water to customers and collect wastewater. Therefore, reducing water demands in the Region also results in reduced energy and chemical requirements.

Energy and chemical costs are two of the key variable cost components associated with providing water services – estimated as $91 per ML. For example, in 2011 (when the "No New Water" target was established) the Region's population was about 1.0 million persons and the gross per capita demand was 338 litres per capita per day (LCD) (338 LCD was calculated based on the 2011 total water supply of 123,261 ML divided by 365 days divided by 1 million population), equating to an annual demand of approximately 123,000 ML. If gross per capita demands remained at 338 LCD between 2011 and 2051, the Region would need to supply 234,000 ML in 2051 – far more than the 123,000 ML they supplied in 2011. In fact, the Region could reduce their total water supply volume by approximately 2.28 million Megalitres between 2011 – 2051 if they were able to maintain a water supply rate of 338 MLD (see Figure 6) – equating to about $207 million in chemical and energy costs. Note that population projections may change over time as new data becomes available and, as such, water savings targets may need to re-evaluated and updated occasionally to reflect the new forecasts.

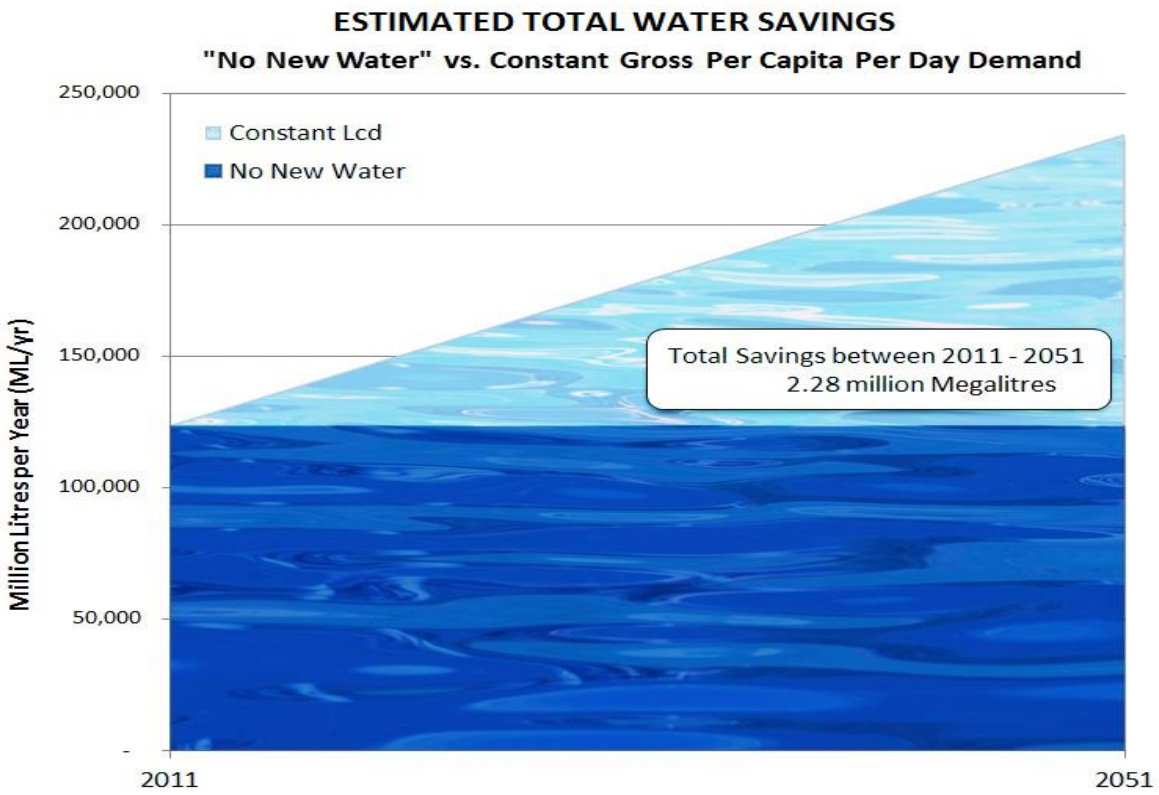

Figure 6 – Estimated Total Water Savings

2.6.3 Environmental Benefits

While there are many environmental benefits associated with water conservation, some of the primary benefits are:

1. reduces energy and chemical requirements,
2. reduces greenhouse gas emissions,
3. preserves water quality in natural environment, and
4. maintains water quantity in aquifers, lakes, and rivers

Conventional thinking of protecting nature for its own sake has largely failed to prevent the degradation of natural habitats because philosophical and scientific arguments rarely trump profits. By putting a value on ecosystem services – such as flood control, water filtration, carbon sequestration, and species habitat – it makes it easier to include environmental benefits in a triple bottom line evaluation.

While it is generally accepted that the natural environment is degraded when we take water from it, it is very difficult to assign an accurate value to ecosystem services. In fact, to date, only one study has attempted to quantify such a value. The 2006 California Urban Water Conservation Council (CUWCC) report, *Valuing the Environmental Benefits of Urban Water Conservation*[3], identifies an average ecosystem services value equivalent to approximately $0.04 per m^3 of water savings. Based on a total "No New Water" savings of about 2.28 million ML between 2011 and 2051, an environmental savings rate of $0.04 per m^3 equates to a total benefit to the Region and its customers of about $91 million.

[3] Project sponsored by United States Bureau of Reclamation and U.S. Environmental Protection Agency.

2.6.4 Societal Benefits

The two greatest social benefits associated with water conservation in York Region are:

1. Ensuring that high quality potable water is available and affordable to all Regional customers in a sustainable manner.

2. Allowing a greater number of customers to be serviced within the Region's current water budget.

Because some of the costs associated with providing water services vary (e.g., energy and chemical costs), reducing water demands will reduce operational costs and therefore, reduce the revenue needs of the municipality. As such, reducing demands helps keep water rate increases to a minimum and helps ensure that water remains affordable to all customers. Reducing water demands on a per capita basis will also enable a greater number of customers to be serviced with the same volume of water. In other words, saving water frees up existing supply to support new growth.

Like environmental savings, it is difficult to assign a dollar value to social benefits. Currently, there are no available references that identify a dollar value to the societal benefits associated with reducing water demands. While the societal benefits associated with lower water demands might be considered even more valuable than the associated environmental benefits, the same value of $0.04 per m^3 of water savings has been assumed for estimation purposes. As such, based on a total "No New Water" savings of about 2.28 million ML between 2011 and 2051, a societal savings rate of $0.04 per m^3 equates to a total benefit to the Region and its customers of about $91 million.

2.6.5 Water Rates

The Region charges each Local Municipality a uniform cost per cubic meter regardless of the volume of water purchased or time of year. Each of the local municipalities, in turn, is responsible to develop their own rate structure to bill their own customers.

Because the Region charges its municipal customers based on a uniform rate, the revenue generated by water sales varies from year to year based on local weather conditions, i.e., higher water sales during years with hot dry summers, and lower water sales during years with cool wet summers.

Because most of the Region's water supply and water resource recovery system costs are fixed, like many municipalities in Canada, the Region has had to implement major rate increases over the last several years to counteract significantly declining per capita water demands.

While a decline in per capita water demands was anticipated as part of the Region's water conservation efforts, the magnitude of the decline over the last decade or so has been far greater than expected – not just in York Region but across North America as market changes have resulted in the demands related to toilets and clothes washers (two of the largest residential water uses) to decline to less than half of what they were just a few years ago. The significant decline in per capita water demands meant that you could no longer project future water demands based on population increases. This caught many North American communities by surprise and, as a result, a significant percentage experienced revenue shortfalls and were forced to implement significant rate increases. Both Table 7 and Figure 7 illustrate the Region's water rates from 1996 till 2015. The increase in rates from year to year has been the most significant over the last six years.

Table 7 – Regional Water Rates 1996 - 2015

YEAR	WATER RATE, $/M^3	WASTEWATER RATE, $/M^3	TOTAL RATE, $/M^3	PERCENT INCREASE
1996	0.4334	0.3689	0.8023	-
1997	0.4134	0.3689	0.7823	-2%
1998	0.4134	0.3689	0.7823	0%
1999	0.4134	0.3689	0.7823	0%
2000	0.4134	0.3689	0.7823	0%
2001	0.4134	0.3789	0.7923	1%
2002	0.4217	0.3865	0.8082	2%
2003	0.4343	0.3981	0.8324	3%
2004	0.4560	0.4180	0.8740	5%
2005	0.4864	0.4459	0.9323	7%
2006	0.4986	0.4905	0.9891	6%
2007	0.5111	0.5396	1.0507	6%
2008	0.5239	0.5936	1.1176	6%
2009	0.5763	0.6529	1.2292	10%
2010	0.6339	0.7182	1.3521	10%
2011	0.6973	0.7900	1.4873	10%
2012	0.7512	0.8848	1.6360	10%

YEAR	WATER RATE, $/M^3	WASTEWATER RATE, $/M^3	TOTAL RATE, $/M^3	PERCENT INCREASE
2013	0.8087	0.9910	1.7997	10%
2014	0.8697	1.1099	1.9796	10%
2015	0.9345	1.2431	2.1776	10%

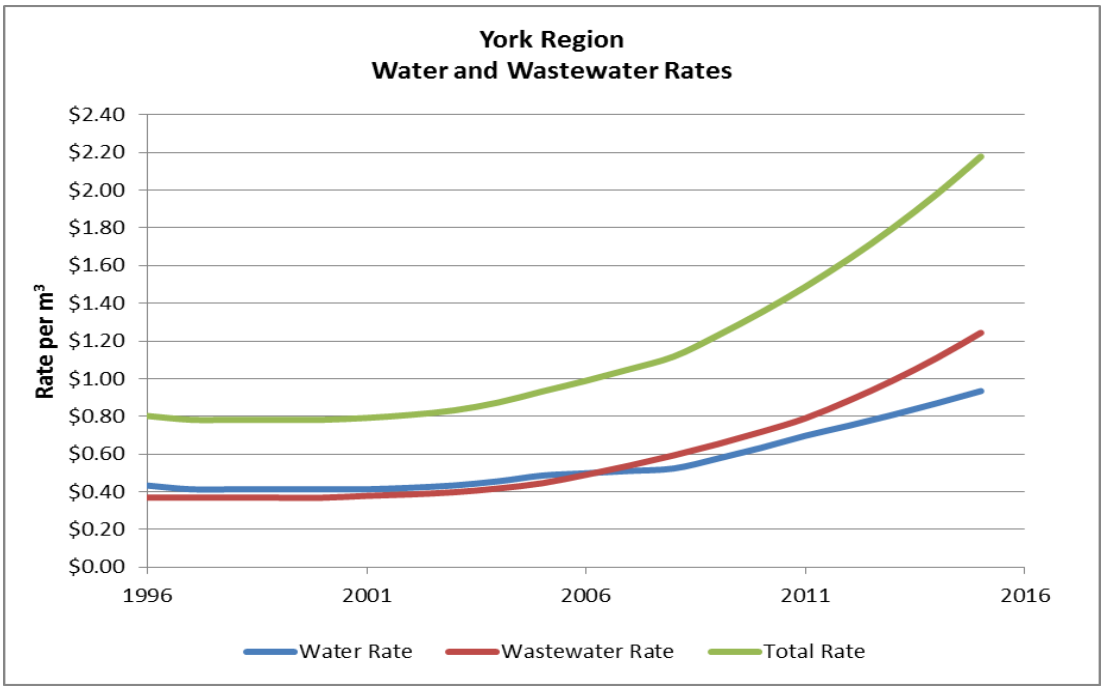

Figure 7 – Regional Water Rates 1996 - 2015

While lower water demands will result in higher customer water rates, the total cost to the customer may not change much vs. paying a lower rate for a greater volume of water.

As stated above, the Region charges its municipal customers based on a uniform rate. In 2015 the Region's wholesale rate was $2.1776 per m^3 ($0.9345 per m^3 for water plus $1.2431 per m^3 for wastewater). A uniform water rate is considered a type of conservation-based rate because the customer will pay a higher total cost if they use more water (and vice versa). Other common conservation-based rate structures include increasing block and seasonal rates. The Region's *October 2015 Water and Wastewater Financial Sustainability Study*, however, concluded that moving to a different rate structure from the current volumetric charge would require careful co-ordination to avoid administrative burden and customer confusion. Component of Regional water rate review was approved by Council in October 2015. While the local municipalities pass on increases in Regional rates to their own customers, the exact impact of an increase in Regional water rates is difficult to predict because each of the local municipalities has adopted a different municipal rate structure.

3.0 VISION AND OBJECTIVES

Additional objectives to guide the development of this 2016 Strategy Update have been included in response to evolving conditions and circumstances

The objectives of the 2011 Strategy are summarized as follows;

1. Be a municipal leader in water conservation.
2. Maximize sustainability of the water supply through applying best in class technology and practices.
3. Minimize energy consumption and reduce the Region's carbon footprint.
4. Maximize the use of energy efficient technologies, processes and practices.
5. Minimize the financial costs to York Region water customers.
6. Maximize partnerships with local municipalities and utilities for cost-effective delivery of Region's water conservation programs.
7. Maximize reliability of the water supply system.
8. Minimize risk of water service disruptions.
9. Maximize system flexibility to respond to change.
10. Ensure the Region's drinking water supply meets all existing and future Regional, provincial and federal public health and drinking water quality standards.
11. Ensure the Region meets future provincial standards for water reuse for non-potable or potable purposes.
12. Align with York Region strategic goals as set out in the Regional Official Plan, Water and Wastewater Master Plan.
13. Deliver effective water conservation and protection outreach and education programs to York Region residents, students and the business community.
14. Develop and deliver multicultural water conservation and protection programming and resources to effectively engage the Region's diverse demographics.

3.1 New 2016 Strategy Objectives

These original strategy objectives remain relevant today. However, additional objectives to guide the development of this 2016 Strategy Update have been included in response to evolving conditions and circumstances, such as new technologies, practices and processes; increasing variability in weather; and changing water demands. The additional objectives are summarized as follows:

1. Enhance integrated water management planning under the Region's "One Water" approach.
2. Integrate water and energy conservation to mitigate climate change impacts.
3. Enhance and expand data analytics, and improve Data Quality Assurance and Quality Control (QA/QC) process.
4. Enhance water conservation tracking and reporting framework.

5. Strengthen and establish strategic partnerships, committees and working groups to foster innovative ideas in water conservation.
6. Increase water efficiency in new developments/buildings.
7. Increase focus on water reuse.

These new objectives taken in conjunction with the objectives established for the original 2011 Strategy set the stage for the creation of a strategy that provides for improved water system resiliency, an adaptive approach to programming, and enhanced understanding of the myriad of variables impacting water use and water supply.

3.2 Research for the Long Term Water Conservation Strategy Update (2016 to 2020)

Armed with the lessons learned over the past five years of implementing the Region's original 2011 Strategy, research began into the current Best In Class practices of leading jurisdictions from around the world. This Best In Class research identified new directions and trends for water management in general, and for water conservation in particular.

3.2.1 2015 Best In Class Research

Leading jurisdictions, like all jurisdictions, are dealing with the ever-changing landscape of water management. It is not surprising that many of the leading jurisdictions in water conservation are located in water challenged areas, such as the southwestern United States, Australia, southern Europe and the Middle East. Based on York Region's climate and water sources, and its two-tier municipal structure, Best In Class research focused on those measures and approaches suitable for use or adaption for use in York Region.

Two significant changes from the 2011 Strategy informed the Best In Class research for the 2016 Strategy Update, specifically:

1. The Region's "One Water" perspective was applied, expanding the scope of the Best In Class research to consider efficiency on a system-wide and function-wide basis. "One Water" enables an integrated analysis across water management portfolios.

2. A research focus was placed on practices that strategically target high water users and that have the potential to leverage resources via market-based programming to cost-effectively embed water conservation in the marketplace.

3.2.2 One Water Approach

The "One Water" approach to the Best In Class research and creation of the 2016 Strategy Update moves beyond targeting specific water-conservation measures and instead takes into account the efficiency of the entire water supply and treatment system and broader water management considerations as a whole. This approach or methodology ensures that conservation measures and their implications are considered across water management portfolios and divisions.

3.2.3 A Marketplace-based Approach

Since 2012, the Region has moved to a market-based approach to water conservation programming. Research involving market segmentation and analysis are key steps in developing effective market-based strategies. Market segmentation is the identification of target market(s). For the Region, this means high water users in the ICI and residential sectors. The rationale for targeting high water users is to direct resources where they will be most cost-effective. Once the target markets have been

identified, analysis and profiling of these groups is completed. Since moving to a market-based approach in 2012, the Region has completed detailed data analysis and GIS mapping to identify and profile top residential and ICI water users. Profiling and targeting these high water users through market-driven programming is the new focus at the Region and the continued direction of the 2016 Strategy Update. Figure 8 – Market-Based Approach Process Flow provides a process flow of the market-based approach utilized by the Region since 2012 and continuing for the 2016-2020 planning horizon of the Strategy Update.

A market-based approach is about knowledge – understanding the target market intimately and understanding the sphere of influence that surrounds it. Such insights enable customization and targeting of Regional programming translating into strategic alliances and joint ventures, higher uptake, improved "trackable" and sustained return on investment (ROI) over the longer term, and benefits across multiple water portfolios. Best In Class research included a particular focus on measures and programming that are consistent with, or adaptable to, a market-based approach.

Best In Class research for the 2016 Strategy Update identified new trends and developments in water conservation.

Table 8 provides a summary of the Best In Class practices in 2010 in comparison with Best In Class practices in 2015.

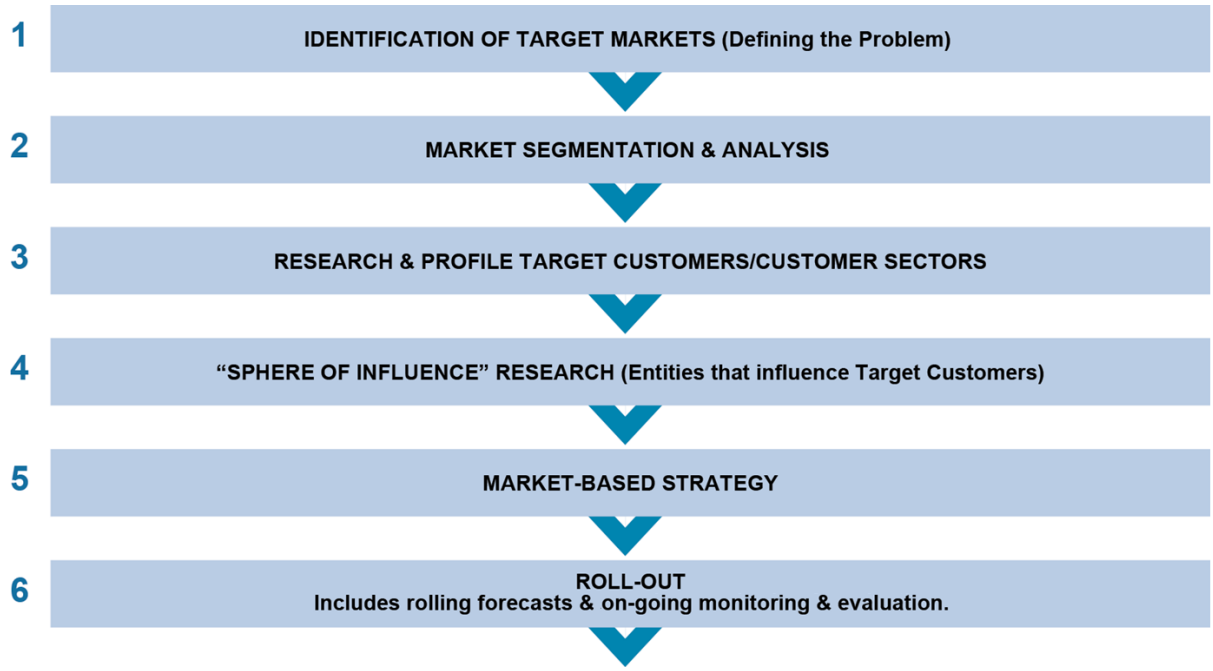

Figure 8 – Market-Based Approach Process Flow

Table 8 – Comparison of 2010 and 2015 Best in Class Practices

CATEGORY	2010 BEST IN CLASS PRACTICE	2015 BEST IN CLASS PRACTICE
PROGRAM MINISTRATION	**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.	**1. Multi-stakeholder advisory committees:** • Remains an important Best In Class practice in leading jurisdictions
	2. Program tracking and reporting: • A management tool utilised by leading jurisdictions to track and report on water saving targets and other key performance indicators. • This annual scorecard approach to tracking and assessing water savings and other key performance indicators, such as source water protection and community engagement, enables program managers to evaluate the effectiveness of undertakings.	**2. Program tracking and reporting:** • Remains an important Best In Class practice in leading jurisdictions. • As programming evolves and changes, so too do the performance indicators that are tracked, measured and reported.
		3. Integrated Water Management (IWM) oversight: • At the core, IWM is a whole system approach that considers the impact of options across and within water management and related (planning, economic development and finance) portfolios and determines the value[4] of a given measure or practice. • IWM is an emerging practice in leading jurisdictions and as such, there are still some significant challenges associated with its implementation.

[4] Informed by polices and priorities; "value" includes criteria based on return on investment, system resiliency, risk management, environmental performance, asset management and operations, customer service, etc.

CATEGORY	2010 BEST IN CLASS PRACTICE	2015 BEST IN CLASS PRACTICE
PROGRAM MINISTRATION		**4. Expanded analytics:** • A significant trend amongst leading jurisdictions is the expansion of their data capture and analytics capabilities to gain a better understanding of the complex interactions influencing water use, future design and planning, technology opportunities and impacts, system performance, etc.
		5. Regional/local innovation hubs: • Leading jurisdictions are establishing Regional or local innovation hubs to address the specific challenges in their jurisdictions, stimulate innovative solutions, develop local capabilities and expertise, and improve the local economy.
POLICY AND REGULATION	**1. Summer water conservation Bylaw:** • Intent is to restrict or limit summer water use throughout the warm weather months	**1. Summer water conservation Bylaw to restrict or prohibit non-essential water use, such as irrigation:** • Leading jurisdictions are recognizing that much of summer water use is discretional and are limiting or prohibiting the discretionary uses such as irrigation.
	2. Retrofit on resale • Requires installation of high efficiency (4L or less) toilets and showerheads (and in some cases, washing machines) prior to resale	**2. Retrofit on resale** • Remains an important Best In Class practice in leading jurisdictions
	3. Water efficient fixtures for new development Bylaw • Requires beyond building code efficient fixtures for all new construction	**3. Water conservation requirements embedded in overarching green construction programs:** • Greater water conservation requirements including water reuse (greywater or rainwater), efficient fixtures, appliances, on-demand hot water recirculation systems, water efficient or zonal landscaping for zero or low irrigation, etc.

CATEGORY	2010 BEST IN CLASS PRACTICE	2015 BEST IN CLASS PRACTICE
POLICY AND REGULATION		• Water conservation is required, in conjunction with stormwater management and source water protection measures, as well as energy conservation, GHG emissions reduction, community accessibility, etc., for any new construction
	4. Water conserving and Low Impact Development (LID) for new development Bylaw • Requires water efficient landscaping, zonal no-irrigation designs and stormwater mitigation measures.	**4. Water conserving landscaping and LID requirements embedded in overarching green construction requirements:** • As described in (3) above
	5. Unit metering for multi-family residences Bylaw	**5. Unit metering requirements embedded in overarching green construction requirements:** • As described in (3) above. It is important to note that some leading jurisdictions are moving away from requiring unit metering due to the high costs and technical difficulties associated with the measure combined with improved efficiency of fixtures and appliances.
	6. Water conservation plans for new industrial, commercial and institutional (ICI) developments: • Requires the establishment of conservation plans with measurable and reportable targets for water savings.	**6. Incorporating water conservation requirements as part of overarching green construction requirements:** • New ICI construction must comply with a range of green building requirements for water conservation, energy conservation and GHG reduction, at-source stormwater management or LID, etc.
	7. Water Efficient Irrigation systems for ICI developments • Requires new systems to meet water conservation standards and include Smart (weather-based) Controllers to reduce water wastage.	**7. Water efficient irrigation systems for ICI development / water efficient landscaping for ICI developments** • Leading jurisdictions are placing significant restrictions on the use of irrigation systems, limiting them to specific zones of a property and requiring zero irrigation zones for

CATEGORY	2010 BEST IN CLASS PRACTICE	2015 BEST IN CLASS PRACTICE
POLICY AND REGULATION		others. **8. Review and modification of design guidelines:** • State-level review of design and operational guidelines for water supply systems, water reuse, fire flow, and peak demand to achieve better, more efficient systems, maintain water quality and provide for wide-scale water reuse.
REBATES & OTHER FINANCIAL INCENTIVES	**1. Rebates for a range of water efficient products:** • High Efficiency Toilets (HETs) rebates, efficient furnace humidifiers rebates, water efficient plants discount coupons, subsidized rain barrels, subsidized water efficient landscaping design services, water efficient clothes washer rebate, water efficient fixture rebate for ICI facilities, and pre-rinse spray valve rebate for commercial kitchens	**1. Other monetary and non-monetary incentives, including limited rebated, with focus shifting to the marketplace:** • Leading jurisdictions are shifting programming emphasis on driving change in the marketplace so that water conservation become part of business practices and the "way things are done".
	2. ICI water audits and capacity buyback: • A CBB program provides financial incentives to participating customers based on the volume of water savings they achieve – or, more accurately, on the average daily "rate" of water savings achieved. • CBB programs are significantly more flexible than typical fixture rebate programs because payments are based on water savings vs. the type of product that is installed. ICI customers are free to consider all potential water conservation opportunities, including changes to equipment and processes, water reuse activities, indoor and outdoor water uses, etc.	**2. ICI water audits and capacity buyback:** • Remains an important Best In Class practice in leading jurisdictions

CATEGORY	2010 BEST IN CLASS PRACTICE	2015 BEST IN CLASS PRACTICE
REBATES & OTHER FINANCIAL INCENTIVES	**3. Full-cost recovery conservation-oriented pricing:** • The use of tiered pricing or seasonal pricing to encourage water conservation by retail customers such as local municipalities.	**3. Full-cost recovery conservation-oriented and peak-based fixed rate pricing structures:** • Full cost recovery conservation-oriented pricing structures remain an important Best In Class practice in leading jurisdictions. • In a move to provide greater revenue stability in light of changing demands, some leading jurisdictions are adopting peak-based fixed pricing which sets a fixed charged based on peak water use; the higher the peak, the higher the charge. • Peak-based fixed rate is intended to drive a reduction in peak demand.
NEW DEVELOPMENT	**1. A series of standards, Bylaws and incentives for specific water efficiency upgrades in new residential and ICI construction:** • Leading jurisdictions used various "carrots and sticks" via regulations (Bylaws) and monetary and non-monetary incentives to secure specific water conservation upgrades such as efficient fixtures or low water landscaping.	**1. Water efficiency requirements embedded in overarching green construction programs:** • Water conservation is part of overall sustainability measures to be implemented in all new construction in leading jurisdictions. • Water conservation upgrades are standard practice in leading jurisdictions.
PILOT PROJECT AND RESEARCH STUDIES	**1. Pilot projects for a range of water efficiency technologies, measures, practices and processes:** • Water efficient landscaping, in-ground irrigation system optimization, rainwater harvesting, greywater systems, groundwater recharge, and non-monetary incentives for new green construction are some examples of pilot projects undertaken in leading jurisdictions.	**1. Pilot project for a range of water efficiency technologies, measures, practices and processes:** • Pilot water conservation projects remain a significant Best In Class practice in leading jurisdictions. • Greater emphasis on large-scale water reuse; highly treated wastewater, blended water, distributed water reuse systems for new developments, etc. • Some significant pilots undertaken by leading jurisdictions at the time of the 2011 Strategy have become full-scale

CATEGORY	2010 BEST IN CLASS PRACTICE	2015 BEST IN CLASS PRACTICE
		programs, including green building programs, water banking (groundwater recharge), water efficient and LID landscaping requirements, etc.
MARKETING, OUTREACH AND EDUCATION	**1. Marketing, outreach and education plans and strategies:** • All leading jurisdictions have some form of an established plan or strategy for the delivery of water conservation education, marketing and promotion, and outreach and engagement of residential and ICI water customers. • All leading jurisdictions have informal or formal education programs targeting youth via schools, curriculum and children's water festivals.	**1. Marketing, outreach and education plans and strategies:** • Remains an important Best In Class practice in leading jurisdictions
	2. Water efficient landscaping workshops: • Workshops targeting single-family homeowners providing training and guidance on water efficient landscaping and gardening. • Workshops delivered through the jurisdiction or via area garden centres.	**2. Training and certification programs targeting landscaping and irrigation professionals** • Focus has shifted to changing the practices of landscaping designers/installers and maintenance contractors, garden centre, and irrigation contractors.
	3. Landscaping assessments: • Provision, via trained municipal staff or summer student (from post-secondary landscaping related programs), of landscape assessments for single-family homeowners. • A preliminary design, recommended plant list and water efficient landscape maintenance tips provided to homeowners to encourage DIY water efficient changes to their home landscape.	**3. Programming and incentives focused on landscaping professionals** • Focus has shifted to landscaping professionals providing water efficient (and sustainable) landscaping services to end-users. • Working through professional industry associations and closing the loop via the participation of garden centres and nurseries.

CATEGORY	2010 BEST IN CLASS PRACTICE	2015 BEST IN CLASS PRACTICE
INFRASTRUCTURE	**1. Increasing land-use density, to compact, higher density development** • Increasing land-use density is considered more efficient from an infrastructure perspective and the smaller the individual housing units and the less land area involved, the more opportunity for water conservation.	**1. Increasing land-use density, to compact, higher density development** • Remains an important Best In Class practice in leading jurisdictions.
	2. Water reuse via dual systems: • Dual systems have been in place in areas of the world for over 50 years and some studies have shown significant evidence of increased efficiency compared with conventional, single distribution systems.	**2. Water reuse via dual systems:** • Dual water systems are becoming more common in leading jurisdictions. • "Once-through" water use is considered inefficient and unsustainable in the long term in leading jurisdictions as most are dealing with limited water availability.
	3. District Metered Areas (DMAs): • DMAs enable the identification and measurement of leakage in the distribution system. • 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.	**3. District Metered Areas (DMAs):** • Remains an important Best In Class practice in leading jurisdictions.
	4. Supervisory Control and Data Acquisition (SCADA): • A system that can monitor flow rates and pressures in a water distribution system, remotely control equipment or valves, and track water levels in storage towers and reservoirs.	**4. Supervisory Control and Data Acquisition (SCADA):** • Remains an important Best In Class practice in leading jurisdictions.
		5. Risk-based asset management for pipe replacement: • A complex risk assessment methodology is utilized to identify individual or groups of pipes that are statistically more likely to fail.

CATEGORY	2010 BEST IN CLASS PRACTICE	2015 BEST IN CLASS PRACTICE
INFRASTRUCTURE		• Pipe clusters where failure (break) rates are higher than average or acceptable levels are targeted first for replacement, while replacement of pipes in clusters with low failure rates is deferred. • Risk-based pipe replacement program reduces the likelihood of pipe failures and resulting water loss, reduces utility liability, and reduces repair and replacement costs.
		6. Large scale or system-level water reuse for <u>potable</u> purposes: • Related to dual-water systems, this involves direct, blended or indirect water reuse within the system. • Highly treated wastewater is fed back into the system, either directly as treated potable water or via blending by feeding the water into a water treatment plant downstream of the wastewater plant.
		7. Scalable distributed water systems: • Distributed water reuse systems involve the use of development-level or district-level rainwater and grey water harvesting and reuse systems for non-potable purposes and water banking (aquifer recharge).

3.2.4 Consultative Research

Building on the substantial data and insights garnered through the 2011 strategy consultation process, project staff undertook strategic consultative research for the 2016 Strategy Update. As discussed, "One Water" provides for integrated analysis across water management portfolios. With this in mind, interviews were conducted with senior management and program staff representing multiple disciplines/divisions in both the Region and the nine local municipalities. Finance, planning and development, infrastructure and asset management, environmental services, economic development, operations, stormwater, and source water protection were areas covered through the consultative research process. Guiding questions were developed for the interviews with Regional and local municipal staff. Although the guiding questions provided direction for the interviews to ensure the information sought from respondents was obtained, an open discussion approach to interviews was taken. This approach allowed the interviewers to follow a line of conversation and explore important areas of discussion in greater detail.

Interviews explored the experience of staff in the Region and local municipalities during the five-year implementation of the 2011 Strategy. Insights into past, present and future challenges and opportunities related to water management, growth and development, infrastructure planning, financing, etc., were secured through the interviews.

Interview summaries capturing Regional and local municipal staff responses were generated upon completion of the interviews. The common themes, key constraints and opportunities identified during the interviews helped inform the direction for the Strategy Update.

3.2.5 Water Conservation Advisory Committee

During the research and development phases of the Strategy Update, meetings with Water Conservation Advisory Committee (WCAC) members were held to secure input, feedback and guidance on the direction forward. Advisory members represent the Lake Simcoe Region Conservation Authority (LSRCA), the Toronto Region Conservation Authority (TRCA), area residents, environmental non-government organizations, community groups, school boards, and the Ministry. Meetings with WCAC members involved presentations, open discussions and interactive exercises for more in-depth exploration of topics, issues and research findings.

3.2.6 Evaluating Water Conservation Measures

Screening and evaluation criteria specific to York Region were developed to assess and rank viable measures for inclusion in the 2016 Strategy Update. Culling the list of potential measures to create an integrated "One Water" strategy, utilizing a market-based approach to deliver cost effective and adaptive system-wide water conservation programming was the objective in developing the screening and evaluation criteria.

A range of considerations were taken into account in order to screen and evaluate potential measures. The purpose of screening criteria is to filter out measures, while evaluation criteria are used to rate components and identify timelines and other considerations for implementation, such as pilot projects for new practices or technologies that are not yet proven effective.

The qualitative analysis allows for an assessment of potential measures against requirements related to sustainability of the water supply, health, climate suitability and Regional strategic alignment. These are within the control of the Region or potentially achievable through partnerships with local municipalities or other stakeholders.

3.2.6.1 Screening of Potential Measures

Mandatory criteria were used to screen potential program components identified through the Best In Class global research study. Application of this screening or "knock-out" criteria helped to cull the list of potential measures. 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

3.2.6.2 Evaluation of Measures

Water conservation measures that passed the screening process were then assessed using evaluation criteria shown in Table 9. To assess and rank those measures for inclusion in the Strategy Update, an evaluation matrix was developed based on the evaluation criteria. The evaluation criteria also helped identify the timeframe for implementation of measures and the potential for pilot testing or demonstrations.

Each parameter was scored from one (1) to five (5) to represent fit or achievement of the criteria. The scoring was qualitative, based on the expertise and opinion of specialists, engineering staff and consultants, as well as the Region's multi-stakeholder Water Conservation Advisory Committee (WCAC). Parameters that scored higher are more likely to offer a better opportunity or value to the Region than those that scored lower.

Table 9 – Evaluation Criteria

CRITERIA	EXAMPLE INDICATOR
A. Within York Region's purview	• The programs / measures / applications are within the responsibility and purview of the Region.
B. Water savings value equal or greater to cost of delivery/implementation.	• Costs of water savings program / measures / applications, including internal administrative costs, is equal to or less than the value of the water savings achieved within an acceptable margin of error.
C. System operations & maintenance: considers opportunities within the water system for increased water efficiency	• Reduction in system leakage. • Lower water loss due to pipe failures
D. Climate change resilience	• Ability to maintain future supply through improved efficiency, alternative sources and reuse. • Reduction in peak water demand
E. Source water protection: considers protection of aquifer and surface water quantity and quality	• Ability to maintain withdrawals from water sources such that water levels are sustainable. • Practices such as water capture for aquifer recharge, and water reuse via grey water and rain water systems do not impact quality of water entering receiving water.
F. Energy conservation and GHG emission reductions	• Reduction of energy demands and GHG emissions concurrent with optimization of the water system through efficiency (reduction in water withdrawals, pumping, discretionary water use, etc.)
G. Focuses resources on the source of the problem	• Addresses high or excessive water use across all sectors and all demographics in the Region.
H. Water efficiency in new construction/ re-development	• Reduction in water demands on a unit basis for all new development exceeding those expected through Ontario provincial Building Code requirements (e.g., 3.8 L toilets, hot water recirculation systems, increased soil depth and organic content, water efficient landscaping, etc.)
I. Value to the economy of York Region	• Ability to identify socio-economic benefits of individual programs / measures / applications to the local economy of the Region.

CRITERIA	EXAMPLE INDICATOR
J. Technology is applicable, provides proven, cost effective water savings	• Cost effective reduction in water demands via proven technology and applications. • Readily implementable with reasonable return on investment to the Region and an acceptable administrative responsibility for the Region

Table 10 provides a description of the qualitative grading.

Table 10 – Qualitative Scoring Description

RATING	GRADE
1	Practice does not contribute to criteria
2	Practice contributes very little to meeting criteria
3	Good alignment with criteria
4	Significant alignment with criteria
5	Full value or alignment is expected

Following the grading of each of the measures for a total score out of a possible fifty (50) points, the program components were then ranked highest to lowest score as shown in the Evaluation Matrix (Table 11). This last step helps identify those measures that offer the highest potential return on investment (ROI). For many of the identified measures, detailed implementation plans with full cost-benefit analysis are required prior to final determination as to their inclusion in Regional water conservation programming.

The first step in implementation planning will be a comprehensive assessment of the new water conservation measures 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 and align with the Region's commitment to "One Water".

Table 11 – Evaluation Matrix

		CRITERIA										SCORE
		A	B	C	D	E	F	G	H	I	J	
PROGRAM CATEGORY	**MEASURE**	**(1-5)**	**(1-5)**	**(1-5)**	**(1-5)**	**(1-5)**	**(1-5)**	**(1-5)**	**(1-5)**	**(1-5)**	**(1-5)**	**/50**
PROGRAM ADMINISTRATION	Water Conservation Advisory Committee	5	1	1	3	3	2	5	1	4	1	**26**
	Tracking and reporting framework	5	4	5	5	5	5	3	3	1	2	**38**
	One Water Infrastructure Optimization Team	5	4	5	5	5	5	5	3	3	5	**45**
	Expanded analytics	5	3	5	4	4	4	4	2	2	2	**35**
	One Water Innovation	5	3	5	5	3	4	4	4	5	4	**39**
	Water Reuse Plan	5	5	5	5	5	3	5	4	3	3	**43**
	Integrated Master Planning	4	4	4	4	3	4	4	4	2	4	**37**
POLICIES & REGULATION	Building code standard for water conservation upgrades in new residential development	1	5	4	5	3	2	4	5	3	3	**35**
	Summer water restriction Bylaw	2	3	1	5	5	4	5	1	1	4	**31**
	Establish water conservation requirements for Region's high-rise incentive program	5	4	4	5	4	4	4	5	3	5	**43**
	Plumbing retrofit on resale Bylaw	1	3	1	4	4	4	5	1	4	5	**33**
	Water efficiency and reuse standards for all Regional buildings	5	2	4	5	5	3	4	5	3	5	**41**
	Full cost, conservation oriented water pricing or fixed peak rate pricing	5	3	1	3	3	3	5	1	1	1	**26**
	Requirement for all facilities with in-ground irrigation systems to be optimized	4	5	3	5	5	4	5	3	3	5	**42**
	Individual metering for multi-unit residences	3	1	3	1	1	3	1	3	1	1	**18**
	Water system design criteria advisory group and advocacy	4	5	5	5	5	5	5	3	2	5	44
	Irrigation system sensor Bylaw for ICI	2	5	4	5	4	4	5	3	3	5	**40**
	Process water reuse Bylaw for ICI	2	3	3	3	1	3	3	1	1	4	**24**
	Servicing Incentive Program (SIP)	1	5	4	5	3	2	4	5	3	3	**35**
	Expedited planning review for green building (beyond code water conservation)	2	5	2	5	5	5	5	5	4	5	**43**

		CRITERIA										SCORE
		A	B	C	D	E	F	G	H	I	J	
PROGRAM CATEGORY	**MEASURE**	(1-5)	(1-5)	(1-5)	(1-5)	(1-5)	(1-5)	(1-5)	(1-5)	(1-5)	(1-5)	/50
REBATES AND OTHER FINANCIAL INCENTIVES	Incentive for hot water recirculation systems for single-family homes	5	1	1	1	1	4	2	1	3	4	**23**
	Low income incentive program	5	3	2	3	2	2	2	1	4	5	**29**
	Unit metering subsidy or incentive for multi-unit residential	5	1	1	1	1	3	1	2	3	2	**20**
	Capacity Buy Back (CBB) program for ICI facilities	5	5	5	4	4	4	5	2	5	5	**46**
INFRASTRUCTURE	District Metered Areas (DMAs)	5	5	5	5	5	4	5	1	4	5	**44**
	Plumbing retrofit on resale Bylaw	3	4	2	4	3	3	4	1	4	4	**32**
	Stand-Alone System Water Conservation Plan and Program	4	4	4	5	5	4	5	5	4	4	**44**
	Conservation-oriented rate structure, including Peak-based Fixed Rate	5	3	1	3	3	3	5	3	3	5	**34**
	Risk-based asset management for pipe replacement	5	4	5	5	5	4	5	2	3	4	**42**
	Pressure management	4	5	5	5	5	4	4	3	1	5	**41**
	Water Energy Nexus	5	3	5	5	2	5	3	2	4	5	**39**
PILOT PROJECTS AND RESEARCH STUDIES	Development-scale water reuse and/or rain water harvesting	5	4	5	5	5	4	5	4	4	3	**44**
	Water banking (aquifer recharge)	4	4	5	5	5	3	5	2	3	4	**40**
	Mains flushing public outreach campaign	5	5	5	4	3	4	4	3	2	3	**38**
MARKETING OUTREACH AND EDUCATION	Sector specific water conservation seminars and workshops	5	2	1	2	2	2	4	2	2	2	**24**
	Water conservation outreach program for new Canadians	5	3	1	2	2	2	3	3	2	3	**26**
	Market-based Programming	5	5	3	4	4	3	5	4	5	3	**41**
	Water Smart Irrigation Professional (WSIP) program	5	5	3	5	5	4	5	3	5	5	**44**
	Fusion Gardening® program	5	5	3	5	5	3	4	4	5	4	**43**
	"Water Is" Campaign	5	3	1	3	3	2	3	3	2	3	**28**
	Children's Water Festival	5	3	1	5	5	2	2	2	2	3	**30**
	Student Education Initiatives	5	3	1	5	5	3	2	2	2	3	**31**
INNOVATION	Water Reuse Pilot	4	4	5	5	5	3	5	2	3	4	**40**
	Water conservation innovation grant program	5	3	3	5	5	5	4	4	4	1	**39**


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4.0 2016 LONG TERM WATER CONSERVATION STRATEGY UPDATE

The 2016 Strategy Update follows a proactive approach to ensure water conservation programs are effective, responsive and adaptive to change.

As part of the Ministry requirements, the strategy is to be reviewed and updated every five years. This update also corresponds with the Water and Wastewater Master Plan Update and the Inflow and Infiltration Reduction Strategy Update.

Over the last 12 months the Region has completed an assessment of successes and challenges of the 2011 Strategy. The Region conducted extensive on-line research of Best In Class practices, and explored and evaluated potential new options for water conservation programming for the coming years. This extensive assessment has culminated in this 2016 Strategy Update.

Many factors influence how water is used within a community. These factors create both opportunities and challenges for water conservation. A changing marketplace, new technologies and processes, better data analytics, increasing weather variability, intensification of development in municipal corridors and new growth in northern municipalities are some of the many factors impacting water use now and in the future. Change is indeed the new norm.

The 2016 Strategy Update is a key component of the Region's proactive approach to managing change and ensuring that water conservation programming is both responsive and adaptive.

4.1 Testing and Implementation Phase

York Region has been a recognized leader in water conservation in Canada since the late 1990s. When York's 2011 Strategy was released, it was widely considered a "Best in Class" water conservation strategy. The 2011 Strategy expanded on existing Regional plans, strategies and programs and set the stage for innovative and jurisdiction-leading water conservation programming from 2011 to 2051. However, much has changed regarding best practices for water management since 2011. For example, the U.S. EPA's WaterSense® and Energy Star programs have had a significant impact on the efficiencies of products being developed by manufacturers and sold in the marketplace.

The significant improvement in the efficiency of residential plumbing fixtures and appliances over the last decade or so has resulted in an unparalleled decline in indoor residential per capita demands, and this decline is expected to continue for several more years. While a major component of York's 2011 Strategy (and the water conservation strategies of most North American municipalities) involved offering rebates to customers replacing inefficient fixtures and appliances with efficient models, the recent and significant change in the plumbing fixture marketplace has eliminated the need for these types of rebate programs. Instead of focusing on fixture rebate programs, the Region can shift its resources to help foster marketplace changes in other areas, such as landscape

irrigation optimization and water reuse programs.

There has also been an improvement in the quality of water supply and water demand data since the development of the 2011 Strategy, and further improvements are expected. With better data comes more accurate water demand projections; with more accurate water demand projections there is a better opportunity to refine future infrastructure requirements, revenue projections, and rate setting.

Recent Best In Class research has also identified the benefits associated with leveraging resources by forming strategic partnerships with external agencies, such as electrical and gas utilities, irrigation associations and contractors, conservation authorities, etc., to deliver integrated, innovative, and wide-reaching programs.

While an investigation of the potential water savings associated with the Region adopting a conservation-based pricing structure was a key consideration of the 2011 Strategy, the recently completed pricing study concluded that the current uniform fee structure is the most practical structure for both the Region and local municipalities at this time.

The following sections help illustrate the changes that have occurred since the Region's 2011 Strategy was released.

4.1.1 Data Quality

One of the most important aspects of accurate water demand forecasting is having access to accurate historical data, including customer-billing data on a customer sector basis, water production data, water loss data, population data, etc.

A number of Regional business areas rely on the same data. For example, the Finance Department relies on accurate water demand forecasts to develop their rate structures to ensure that sufficient revenues are generated by water sales. The Environmental Services Department relies on accurate forecasts to properly size water supply and water recovery infrastructure. If the water demand forecasts are inaccurate, the Department runs the risk of either under-sizing infrastructure elements and compromising the integrity of the system or over-sizing portions of the system – not only wasting money but negatively impacting water quality. Additionally, the water conservation group relies on accurate water demand forecasts to evaluate how well their programs are performing.

The 2011 Strategy identified improvements for the collection and analysis of water billing/water production data. As a result, the quality of data collection and analysis has improved and this improvement continues as new technology and resources become available. Beginning in 2011, the local municipalities started providing the Region with comprehensive customer water billing data on a quarterly basis. The Region continues to work with some of the local municipalities to improve and harmonize data collection.

The data provided by the local municipalities is uploaded to the York Region Water Consumption Database (WCD) application. The Region uses the WCD application to develop water demand profiles for each community. These profiles identify historical demands on a customer-sector basis and allow the Region to accurately project demand trends in the future. With the availability of better customer demand data, the Region was able to update the water demand value used in the 2011 Strategy. For example,

the 2011 Strategy identified an average residential demand of 252 LCD. After analyzing the municipal customer billing data it was determined that the actual average residential water demand in 2011 was significantly lower at approximately 215 LCD. The analysis also determined that average residential water demands are continuing to decline – for example, demands in 2012 were 210 LCD, in 2013 were 205 LCD, and in 2014 it was estimated to be 200 LCD. While average residential demands in the Region have declined more quickly than projected in the 2011 Strategy, the rate of decline will eventually slow down as the installed base of efficient plumbing products reaches saturation and there is less opportunity for additional savings.

While the quality of water demand/supply data currently available to the Region is far better than that available when the 2011 Strategy was developed, the quality will need to continue to improve as the Region moves towards the 2051 target year and reductions in per capita water demands become less pronounced.

4.1.2 Market-Based Programming

The law of diminishing returns predicts that the potential to achieve water savings reduces as the customer becomes more efficient. As such, a program has a better chance of saving water if it targets high-use or inefficient customers. In spite of this situation, most municipal water conservation programs have traditionally centred on offering broad-based programs (generally rebate programs) that target high-water-use and low-water-use customers equally.

There are inherent limitations with broad-based (non-targeted) programs, which are usually promoted through newspaper advertising, bill inserts, web sites, workshops and other customer-focused vehicles, specifically:

- variable uptake,
- program participants are volunteers, therefore, unlikely to be "water wasters",
- high water users may or may not be reached,
- costly to deliver,
- require continuous and increasing investments with an ever-decreasing return in water savings,
- impact, in terms of water savings, is questionable and/or difficult to quantify with some initiatives such as landscaping workshops, and
- as market forces take over and efficient products become the "products of choice", the percentage of free ridership in the program increases.

In the past, the Region has offered a number of broad-based programs including rebates for toilets, clothes washers, and whole-home furnace-mount humidifiers, residential landscape visits; discount coupons for water efficient plants, and subsidized rain barrels. Now, while some programs will continue to have broad-based elements (e.g., the ICI Capacity Buyback program), the Region's program focus has shifted to a more targeted and market-based approach.

4.1.3 Return on Investment

Because the Region, like the local municipalities, will be operating its water supply and water recovery system on a full-cost recovery basis, all of the costs associated with operating these systems will eventually passed onto the end use customer. The Region and local municipalities are committed to operate their systems in a fiscally responsible manner.

While the Region's earlier plumbing fixture rebate programs have been instrumental in

reducing per capita residential demands, changes to the residential fixture and appliance marketplace over the last 10 to 15 years have made water efficient toilets, clothes washers, dishwashers, showerheads, and faucet aerators the "fixtures of choice". While it is currently difficult to find inefficient fixtures and appliances in retail outlets, within a few years the marketplace will be fully migrated to efficient plumbing fixtures.

Rebates are used to influence the customer's decision, for example, to purchase a certain product that they would be less likely to purchase without the rebate. Rebates reduce the effective price of the product or service that the rebating agency is promoting, thereby making the product more affordable or more desirable. Rebates are cost-effective to the rebating agency if the cost of the rebate is lower than the benefit realized by the agency when the customer chooses to buy the rebated product. For example, York previously offered customers a $75 rebate if they replaced an inefficient toilet model with a WaterSense® certified model. At the time, the value of water savings achieved by an efficient toilet model was worth more than the $75 rebate paid by the Region.

As stated above, however, almost all toilets, clothes washers, showerheads, etc., currently being developed by manufacturers and sold by retail outlets are efficient. As such, there is no longer any need to try to influence the customer's decision to purchase the efficient plumbing product. Customers that receive a rebate to purchase a product that they would have purchased anyway are called "free riders". Because it is no longer cost-effective for the Region to provide rebates for residential plumbing fixtures, these programs have been or are being phased out.

4.1.4 Strategic Partnerships

There are two types of strategic partnerships that can help a municipality move towards a "One Water" approach to water management – internal and external partnerships.

Internal strategic partnerships are formed when different departments in the same organization coordinate their efforts to achieve a single overarching goal; the best overall result for the organization regardless of impact on an individual department. Historically, many government agencies have operated with very little data and information sharing between departments. This type of management structure is known as "working in silos". Each department or silo uses their own data sets and develops their own projections without consultation or agreement with other departments. Because information and overall corporate goals are not shared between departments, programs introduced by one division might not support, and in some cases may be contrary to, programs introduced by another division.

During the summer of 2015, the Region's Water Conservation team hosted a number of interview meetings with Regional staff from different divisions to identify opportunities and barriers to achieving the Region's goal of "One Water". A number of common themes were identified during these interviews, with one of the most repeated comments being the need for better communication, data sharing, and goal sharing between departments. A more complete list of the common themes includes the following:

- Have the different Regional departments work better as a team for the overall betterment of the Region.

- Need for better sharing of data and information between Region departments.
- Need for high quality data when making planning decisions or projecting future demands or revenues.
- The Region to increase resilience in their water supply.
- Maintain role of the Region as a leader in water conservation programming by implementing more innovative pilot projects.
- Need to re-evaluate design guidelines used by the Region in light of the significant recent changes in per capita water demand values, and
- Enhance collaboration between the Region and its nine local municipalities.

External strategic partnerships are formed when different organizations share information and cooperate with each other to the betterment of all. For example, by forming strategic partnerships with retailers (e.g., hardware stores, garden centres, nurseries) and service providers (e.g., plumbers, irrigation and landscape contractors, and renovation contractors) the Region can leverage its resources to influence the marketplace to help ensure that water efficient fixtures and practices are highlighted for customers to purchase. Strategic partnerships with other utilities (e.g., energy utilities), community and environmental organizations (e.g., conservation authorities), builders/developers, and the educational community in general will help ensure that water efficient fixtures and practices are promoted to customers. The benefits of this approach include:

- Residents and businesses use retailers and service providers who promote water conservation.
- Community and educational groups become water conservation ambassadors.
- Lower program delivery costs.
- Ensure water savings are sustained over the long term.

Since the development of the 2011 Strategy, the Region has been establishing a greater number of external partnerships. For example, in 2012 the Region began working closely with the Town of Newmarket, the Lake Simcoe Regional Conservation Authority, the Toronto Regional Conservation Authority, and Mosaik Homes to evaluate the feasibility of offering an expedited approvals process as an incentive to promote green (i.e., environmentally sustainable) development and to establish the appropriate water savings targets and criteria that would be used to rank green applications. The project resulted in a number of water efficient measures being evaluated or included in new homes. In 2013 the Region began certifying irrigation contractors that successfully completed specialized training on how to maximize the efficiency of automatic irrigation systems. This program, the Water Smart Irrigation Professional (WSIP) program, focused Regional resources on the "trusted advisor" – the irrigation contractors – vs. the end-use customer in an effort to expand the Region's reach and leverage the expertise of the marketplace.

4.1.5 Value of Water Campaign

The Region's 2011 Strategy identified commitments to look at innovative ways to reduce water demands, to enhance source water protection, to reduce system energy demands,

and to reduce greenhouse gas emissions. One of the other key recommendations of the Strategy was to develop a full-cost recovery conservation-based water pricing model, including the development of a multi-level public campaign strategy to demonstrate the "value of water" and to establish acceptance and understanding of full-cost pricing. The Region's "Water Is" campaign had four main objectives:

1. To help water become more visible in those areas where it has been hidden and to foster a respect of water.
2. To provide new context to cultivate a refreshed relationship to water.
3. To provide a menu of components for various groups such as non-government organization (NGOs), businesses, community groups, individuals, and municipalities to utilize while also providing conductivity between the groups.
4. To create opportunities for stakeholders to appreciate water's multifaceted value and, in turn, to advocate for true pricing and full cost recovery.

This program strives to inspire people to act rather than to explain the scientific terms of why water is valuable.

4.1.6 Conservation Rate Analysis

The Region undertook a *Value of Water* Study subsequent to the 2011 Strategy. This Study included two sub-studies: a Full-Cost Recovery Study and a Water Conservation-Based Rate Structure Study. The Water Conservation-Based Rate Structure Study evaluated how changes in the water pricing model used by the Region to bill local municipalities might affect demands, i.e., how higher rates might affect demands. The Study concluded that for a rate increase to significantly reduce water demands, it would need to be substantial.

The Study included quantitative tests to evaluate how alternative wholesale rate structures could affect revenue stability. While the adoption of a relatively high fixed fee could improve revenue stability for the Region, it would also reduce the effective unit cost of water used by the municipality and have the opposite effect of introducing a conservation-based rate structure. The analysis completed for the conservation rate study was incorporated into the comprehensive Water and Wastewater Financial Sustainability Plan, which sets out rates to achieve full cost recovery pricing by 2021. The Plan confirms the Region will continue to employ a uniform rate.

4.1.7 Regional-Municipal Committees

<u>York-Area Municipal Liaison Committee</u>:

This committee, comprised of senior management, meets quarterly and its priority objectives are to increase co-operation & collaboration between the Region and local municipalities to enhance customer service and leverage resources, establish standards and manage resources effectively, coordinate infrastructure and asset management projects, and improve coordination for long-term infrastructure planning projects.

<u>Water and Wastewater Steering Committee</u>:

This committee meets every two to three months. This committee is a sub-committee of the Municipal Liaison Committee with a focus on water and wastewater programs. Their objective is to guide strategic and operational decisions pertaining to the Inflow and Infiltration Reduction program and other relevant water conservation programs as warranted.

<u>Water and Wastewater Liaison Committee</u>:

The committee was created to help coordinate water and wastewater business, improve

communications between Regional and municipal staff, increase infrastructure efficiencies, and foster continuous improvement of processes across the local municipalities and York Region.

4.1.8 Peak Day Water Demand

Each year, the single day when water demands are greatest is known as "peak day" water demand. The peak day generally occurs in summer during an extended period of hot and dry weather when outdoor water uses (primarily irrigation demands) are the greatest. As such, the magnitude of the peak day demand is dependent on local weather conditions and can vary significantly from year to year (Figure 9). Although there are fluctuations because of weather conditions from year to year, between 2007 and 2015 peak day demands averaged about 154% of average annual day demands in the York Water System (i.e., not including Georgina or other stand-alone systems).

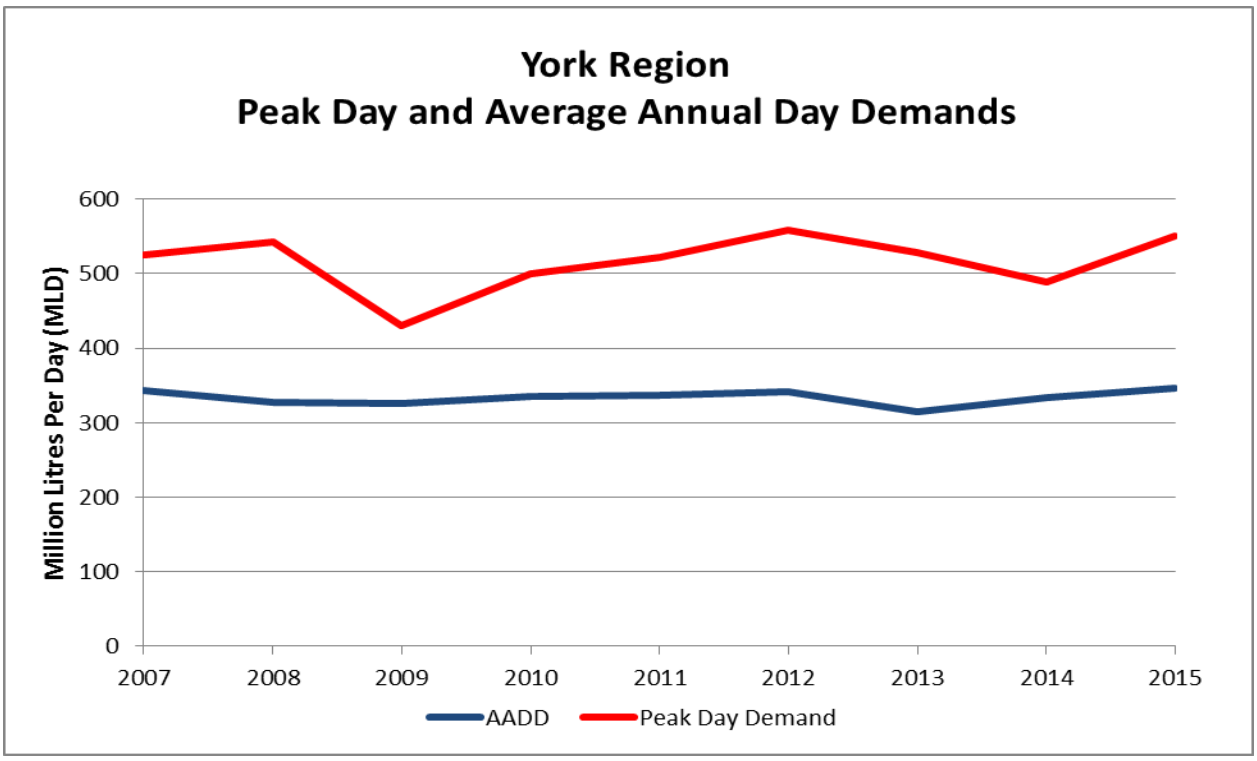


Figure 9 – Peak Day and Average Annual Day Demand (AADD) chart

Water systems must be designed to service customer needs throughout the entire year. As such, the timing and sizing of future water supply system expansions are often based on meeting projected peak day demands. But, since peak day demands are very weather dependent and difficult to predict for future years, planners tend to plan with caution and project slightly higher than average future peak demands. As such, water systems tend to be over-sized and under-utilized most days of the year.

As stated above, the primary driver of the peak day demand is the additional irrigation that occurs after an extended drought period. Water conservation measures that are designed to reduce irrigation demands, e.g., that promote drought tolerant landscapes or that target customers with automatic irrigation systems, can have a significant impact on peak day demands. Since the additional revenues generated by the sale of water on peak demand days is minimal (total outdoor water use accounts for only about 10% of annual water demands and sales on peak days would only be a fraction of the total outdoor water use), reducing peak day water demands can significantly reduce the size and cost of future infrastructure expansion projects while having little impact on Regional or local municipal revenues.

As stated earlier, in 2013 the Region began targeting reductions in outdoor and peak demand as part of their Water Smart Irrigation Professional (WSIP) program. The WSIP training informs qualified irrigation contractors how to make changes to their customers' automatic irrigation systems, including changes to runtimes and scheduling, the use of more efficient heads, the adoption of a weather-based controller, etc., to maximize the water savings while ensuring that the landscape remains vibrant and healthy. The Region recently conducted interviews with participating contractors and is evaluating ways to improve the effectiveness of the program delivery.

In 2015 the Region began developing their Fusion Gardening program. While terms like "water-efficient gardening" and "drought tolerant" gardening don't tend to resonate positively with homeowners because of the perception that an efficient landscape will be less beautiful and appealing than a more water-hungry landscape, the Region's Fusion Gardening® program is specifically designed to resonate with homeowners' wishes and desires for their gardens, e.g., beauty, tranquility, peace, etc., while somewhat downplaying the fact that a Fusion garden requires less maintenance and water. Full rollout of the Fusion Gardening program is expected in the spring of 2016.

4.1.9 Average Annual Day Water

While many elements of water supply infrastructure are based on peak day demands, revenue projections are commonly based on average annual day demands (AADDs) that reflect the total volume of water sold during the year. AADDs are calculated as the total annual volume of water demand divided by 365 days in the year. AADD values are impacted by changes in both winter (e.g., indoor demands) and summer demands (e.g., outdoor demands), however, reductions in indoor demands (since they occur 365 days per year) are the most impactful.

In 2011, the Region had a gross per capita demand (total water demand divided by the serviced population of approximately one million people) of about 338 LCD and an AADD of 338 MLD. Without any improvement in efficiency, i.e., if gross per capita demands remained at 338 LCD between 2011 and 2051, the Region's 2051 AADD would be about 646 MLD – about 91% higher than the Region's "No New Water" goal based on 2011 demands.

As stated earlier, residential per capita water demands have been declining on an annual basis over the last decade or so due to the impact of Regional water conservation measures and the growing presence of efficient plumbing fixtures and appliances in the

marketplace. In 2014, average residential demands in the Region had declined to approximately 200 LCD. However, even with declining residential demands, the significant growth expected in the Region will result in higher AADD values unless a portion of future water demands can be provided by water reuse projects. In fact, even if average residential demands can be reduced to 140 LCD by 2051 (i.e., 10 LCD lower than the Region's target of 150 LCD), per capita water demands in the ICI customer sector will need to decline by about 71% by 2051 if the Region is to meet its "No New Water" objective. A large portion of this saving will need to come from offsetting potable water demands with water provided by water reuse projects – water that is "fit for purpose".

4.1.10 Phasing Out Rebates

While fixture and appliance rebates have historically been the cornerstone of most municipal water conservation programs, including York Region's program, relatively recent changes in the marketplace have largely eliminated the need for municipal rebates to drive the installation of efficient fixtures and appliances. For example, in 2006 the U.S. EPA introduced their WaterSense® water efficient product labeling program. This program certifies water-using products that save at least 20% of the water used by standard "to code" products. Toilet models, for instance, needed to flush with no more than 4.8 litres (20% less than the then "to code" requirement of 6 litres) to be certified by WaterSense®. The WaterSense® program currently certifies toilets, showerheads, lavatory faucets, urinals, commercial pre-rinse spray valves, and weather-based irrigation controllers. Almost immediately after the introduction of the WaterSense® program, product manufacturers realized that having their products certified by WaterSense® would result in an increase in sales. As such, manufacturers began to focus their efforts on developing and producing products that were at least 20% more efficient than "to code" products and would meet the WaterSense® efficiency requirements. Virtually all toilet and showerhead models currently being developed are designed to meet or even exceed WaterSense® standards. A similar situation is happening with the efficiency of clothes washers because of the Energy Star program. Energy Star-certified clothes washers use only about 60% of the water of a non-certified top-loading washer and many retailers carry only Energy Star-certified washers. As such, it is becoming increasingly difficult for both customers and service providers to find inefficient plumbing fixtures and appliances and, within a few years, it will be virtually impossible.

The Region recognized this market shift to more efficient plumbing products as early as 2011 and, since that time, has been migrating their water conservation efforts away from offering fixture rebates (which, in today's market, would result in a high level of '"free ridership") and towards more focused programs that target high water users and market sectors that are unlikely to achieve significant water savings without direct involvement by the Region.

4.1.11 Two-Tier System

The Region and its nine local municipalities operate as a two-tier system. The Region acts as a water "wholesaler" to the local municipalities, responsible for water supply, treatment, storage, pumping, and the construction and maintenance of transmission mains. In turn, the local municipalities are responsible for distributing water to their local customers.

Responsibility for wastewater servicing is also divided between the local municipalities, (wastewater collection and local pumping) and the Region (major pumping stations, trunk sewers, and treatment facilities).

Operating as a two-tier system provides certain challenges to the Region's "One Water" goal of operating as a truly integrated system, for example:

- end use customers are billed by their local municipality,
- customer water rates are set by the local municipalities,
- watering restrictions are enforced by the local municipalities,
- water quality issues are often resolved by mains flushing done by the local municipalities,
- with almost 90% of the distribution system owned by the local municipalities, the likelihood of leakage is greater in local municipal systems,
- storm water is primarily managed by local municipalities,
- there is a significant difference in the size and available resources in each of the 9 local municipalities, and
- local municipalities are the approved agency for new development, including setting efficiency standards or criteria.

In an effort to move past some of these challenges, during the late summer and early fall of 2015, the Region met separately with local municipal representatives to identify barriers and opportunities to achieving the Region's "One Water" goal. The local municipal representatives were asked to identify:

- major water management challenges they were facing (including potable water, storm water, and wastewater),
- aspects of Regional-municipal water management they felt were working well / not working well,
- what they felt was their most important water management issue over the next five years,
- how to achieve better coordination and cooperation between the Region and local municipalities,
- any potential risks they faced regarding water management, and
- how the Region and local municipality can work together in the future to move closer to achieving the "One Water" goal.

A number of common themes emerged from the interviews with municipal staff, including:

- revenue shortfalls for local municipalities caused by declining customer water demands,
- multiple points of contact with the Region for various water related issues, therefore difficult to get answers and there's limited co-ordination of support.
- impact of Region's water conservation program on customer water demands,
- over-sizing of infrastructure caused by over-estimating future demands,
- over-sizing of infrastructure and influence on water quality (increased water residence time in distribution system),
- achieving lower customer water demands does not financially benefit the local municipalities,

- higher customer water rates because of lower per capita demands,
- desire for increased allocation in response to lower than expected demands,
- potential negative public perception of water quality associated with treated wastewater reuse for potable purposes (water resource recovery),
- the need for better communication between the Region and the local municipalities,
- the need for the Region to take the lead in progressive new programs (Region has more resources than the local municipalities),
- the need for the Region to provide more support to the smaller local municipalities regarding rate setting, demand projections, etc.

While operating as a two-tier system has its inherent challenges, the information obtained through the interviews with local municipal staff support the direction the Region is taking regarding better cooperation and information sharing between the two tiers, and future planning based on the notion that all water within the Region, whether it is under the authority of the Region or one of its local municipalities, should be considered and managed as "One Water".

4.1.12 Provincial Policy – Water Reuse

As stated earlier, water reuse will help the Region meet its goal of "No New Water" by 2051. Water reuse refers to reusing treated wastewater (including greywater) and to harvesting and using rainwater. The total volume of water on Earth remains constant, in a broad sense, and through the hydrologic cycle water is reused many times. Water reuse, though, generally refers to projects that use technology to speed up the natural process. Water recycling is often characterized as "unplanned" or "planned". The Region currently engages in unplanned water recycling because it receives approximately 90% of its water from Lake Ontario, and Lake Ontario receives wastewater discharges from many other communities located upstream in the Great Lakes watershed. Planned projects are those that are developed specifically with the intent of reusing wastewater or rainwater.

With today's technology, reused water could satisfy most of our water demands – even potable demands – as long as it is properly treated for its intended use. Although reused water is typically used for non-potable purposes, such as irrigation, cooling, toilet and urinal flushing, etc., it can also be used indirectly for potable purposes such as aquifer recharging or even augmenting surface water supplies. Water reuse could provide a dependable, locally-controlled water supply.

The current version of the *Ontario Building Code*[5] *– section 7.1.5.3(2)* – permits storm sewage or greywater to be used as a water supply for:

(a) water closets,
(b) urinals,
(c) sub-surface irrigation, or
(d) the priming of traps.

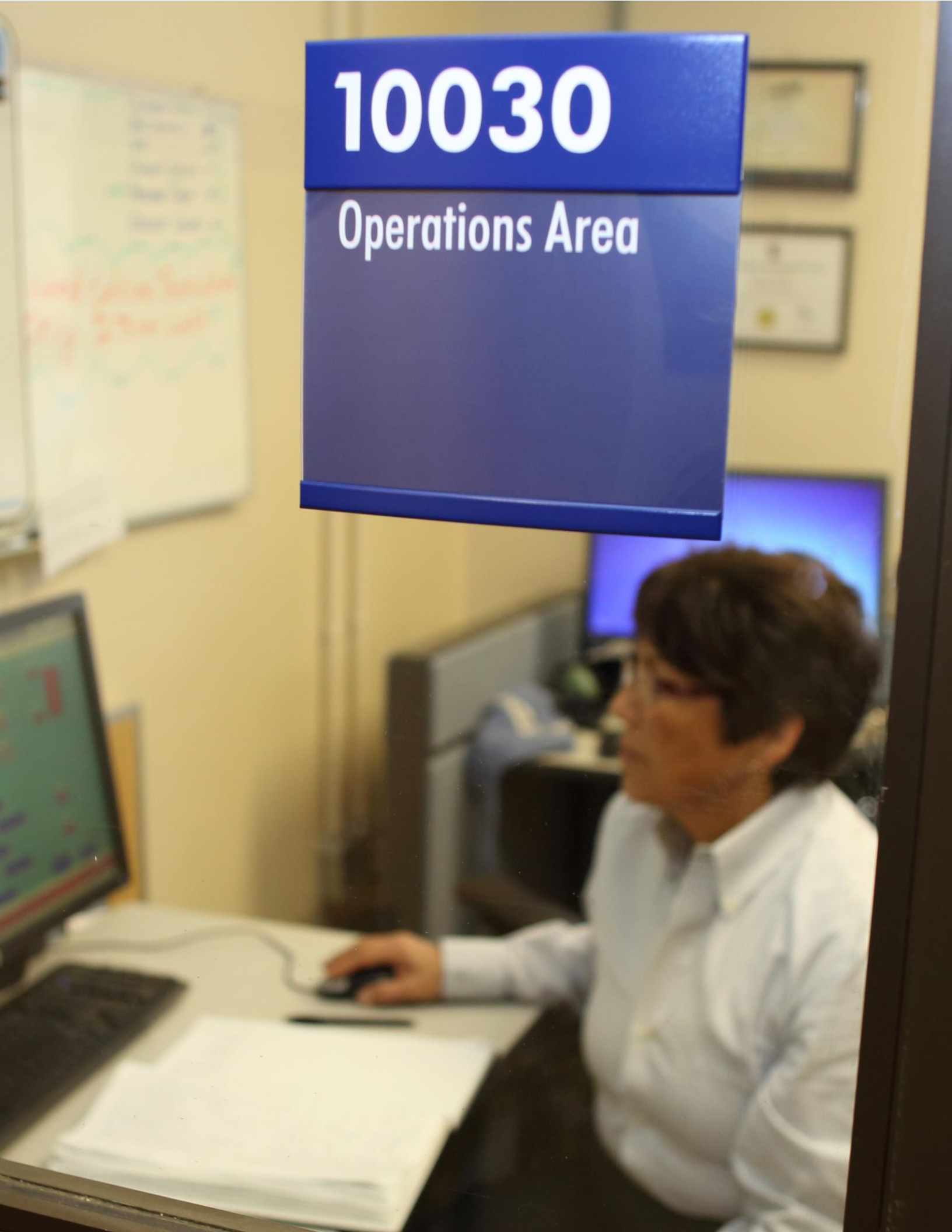
The current version of the *Ontario Building Code – section 7.1.5.3(3)* – permits rainwater to be used as a supply for:

(a) clothes washers,

[5] *Building Code Act*,, 1992 Ontario Regulation 332/12, Building Code

(b) laundry trays,
(c) mop sinks,
(d) bedpan washers,
(e) water closets,
(f) urinals,
(g) hose bibbs,
(h) sub-surface irrigation, or
(i) the priming of traps.

With further advances expected in wastewater treatment technology and the cost of this technology becoming more affordable, water reuse projects could become commonplace in the Region by 2051. Although there are currently no active water reuse projects in York Region, the Region is working with the Ministry to explore opportunities for water reuse as part of the Lake Simcoe Water Reclamation Centre (WRC) project proposed under the Upper York Sewage Solutions individual environmental assessment.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Operations Area

5.0 2016 UPDATED MEASURES AND PROGRAMS

Prior to undertaking the process of developing the 2016 Strategy Update, the decision was made to examine opportunities for new programming and measures through the "One Water" lens. This meant exploration of Best In Class practices and measures that provided, or could be adapted to provide, integrated, system-wide strategies for water conservation.

Market-based measures, both in the context of water management or potentially adaptable for use in water management, were a particular focus of the Best In Class research. Market-based options reflect the Region's new direction to deliver long-term sustained water savings and embed water conservation in the marketplace.

"One Water" and market-based programming represent directional shifts and a modified approach to water conservation planning and programming, and indeed for all facets of water management at the Region. Change is occurring on all fronts of water management - new and emerging technologies and processes, climate variability with increasing frequency and severity of droughts and storms, significant population growth with changing demographics, intensification of development in southern municipalities and new greenfield development in the more northern municipalities, a continually evolving market with new water efficient fixtures and appliances, and expanded data capture and greater analytic requirements. "One Water" and market-based programming provide an adaptive platform to respond to change and evolving conditions impacting water management on all fronts.

5.1 One Water

"One Water" provides for the sustainability of the water system and water resources in the aggregate and involves research into, and consideration of, the following:

- Efficiencies across the water supply and treatment system and exploration of constraints and opportunities on a system-wide basis in both the nearer and longer term.
- Potential new water management options and models to drive system efficiency and sustainability.
- Efficiencies in the context of capital infrastructure investment and asset management and operations.
- Rate structures as drivers for conservation with consideration to long-term financial stability and targeting problem water use (e.g., high water use, water loss, peak demand, etc.).
- Market drivers for water conservation and mechanisms for securing market transformation to greater efficiency measures and products.
- Achieving efficiencies through strategic partnerships and/or joint ventures.

"One Water" provides a responsive platform in this era of change. Since the 2011 Strategy, the Region has evolved its approach to water management concurrent with changing conditions. Regional water conservation programming has progressively moved beyond typical 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 – towards integrated water management and the use of market-based approaches.

"One Water" is a holistic approach that considers the cross-functional nature of water management, including water conservation. Via "One Water", the Region is building on previous efforts to ensure water management programming is complementary and responsive to change, and that decisions made in one area do not adversely affect another.

5.2 Individual Measures and Programs

The measures and programs identified herein include both existing and new initiatives. For ease of reference the measures and programs have been categorized as follows: *Program Administration*, *Policies and Bylaws*, *Rebates and other Financial Incentives*, *Infrastructure*, *Pilot Projects and Research Studies*, *Marketing, Outreach and Education*, *Innovation*, and *New Development*.

5.2.1 Program Administration

Mechanisms that facilitate an integrated, "One Water" approach to water conservation and to support local municipalities in the optimization of their systems are the primary focus of the measures discussed under Program Administration.

5.2.1.1 Water Conservation Advisory Committee (WCAC)

The WCAC provides multi-stakeholder feedback and guidance for Regional water conservation programming. Expanding representation on the committee to include local municipalities and key business associations will be evaluated in 2016 – 2017. The rationale for expanding representation on the WCAC is to align the membership with the Region's commitment to "One Water" and the realization of conservation across all water systems in the Region. Other mechanisms exist to include local municipalities and key business association input to Regional water conservation programming. The Region will assess options to determine the best vehicle for securing municipal and business perspectives.

5.2.1.2 Tracking and Reporting Framework

The Region will expand on its existing mechanism for reporting on water conservation key performance indicators (KPIs). The development of an internal report card (Figure 10) is based on modified and expanded key performance indicators. The measurement and reporting framework will be consistent with international best practices and will draw on successful reporting structures from similar leading jurisdictions in water conservation.

The goal of the internal report card is to monitor progress against KPIs as a means of ensuring water saving and system optimization targets are being met. Given that water reuse will be critical to the Region meeting water use reduction targets, KPIs for water reuse pilot projects will need to be established as these projects develop.

The public report card will provide York Region residents and other water users with quantitative results, such as quantity of water saved and quantity of water reused, as well as qualitative results, such as students receiving educational programming and landscape contractors trained and promoting Fusion Gardening amongst customers.

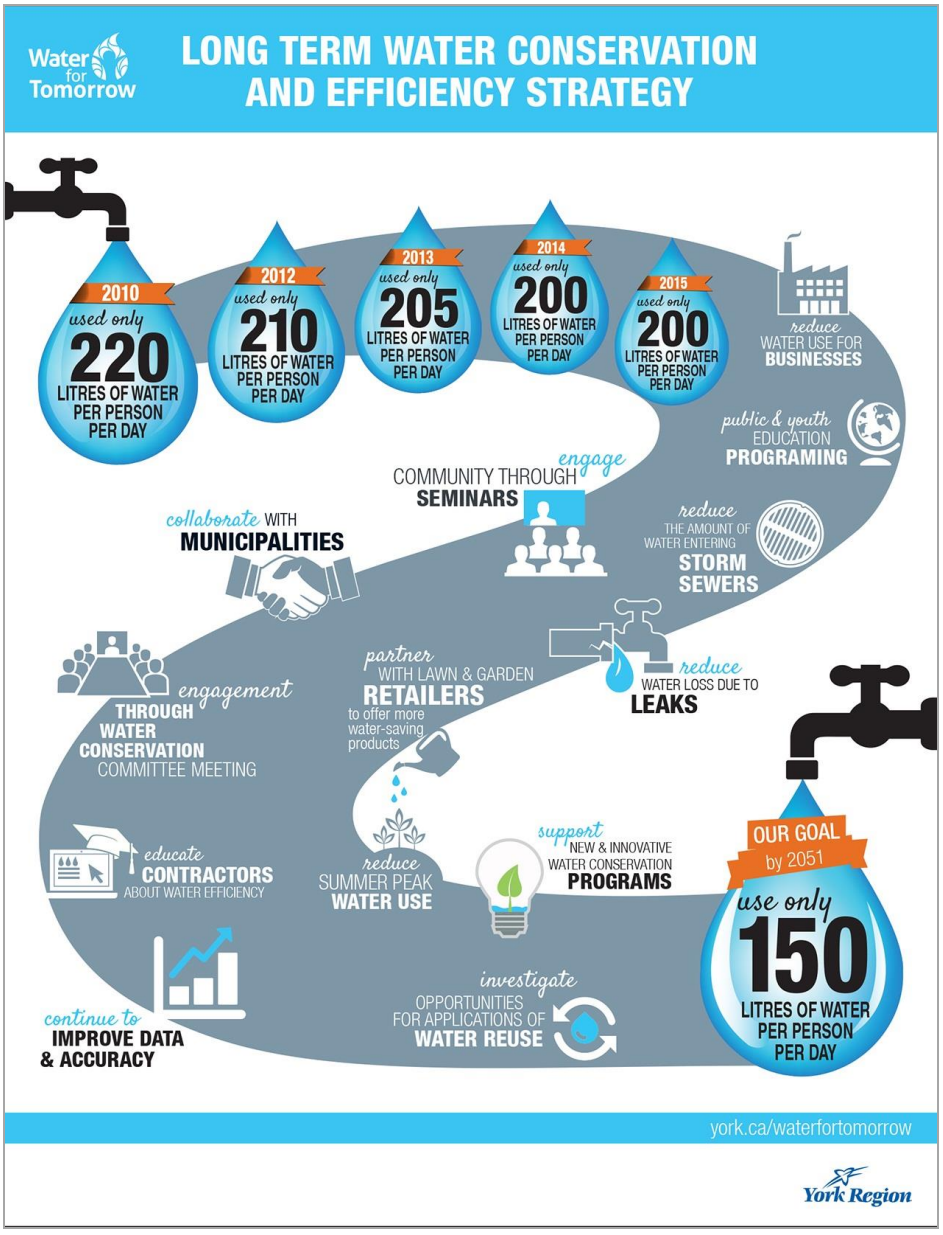


Figure 10 – 2015 Report Card

5.2.1.3 One Water Infrastructure Optimization

The Region works closely with local municipalities to ensure greater co-operation and harmonization of the water systems. Through measures undertaken to date, the Region and local municipalities have reduced water loss due to leaking pipes, identified processes and mechanisms to minimize water used for flushing, and improved water system and billing data collection. The Region's goal of continuous improvement for greater water conservation, energy savings, water reuse, reduction of Inflow and Infiltration can be realized through integrated system optimization. The Region will identify mechanisms, including the Regional-Municipal Steering Committee to achieve this objective under the auspices of "One Water". Building on existing efforts to optimize and harmonize water systems, staff will:

- investigate capital project optimization opportunities (e.g., modular design, energy capture, pipe sizing, water storage, water reuse, new technology, etc.),
- identify additional internal metrics and reporting needs,
- research and evaluate opportunities for water reuse and integrated water reuse (rainwater harvesting to reduce potable water use and mitigate storm flows from roof leaders or at-source Low Impact Development (LID) measures to reduce water use for irrigation and Inflow and Infiltration),
- identify and secure opportunities to reduce system wastage/flushing due to water quality issues and other potential joint operational initiatives,
- identify and secure opportunities for local municipalities to implement pressure management protocol where possible to reduce leakage levels,
- develop a process(es) and mechanism(s) to identify areas for harmonization with local municipalities and secure committed participation and action, and
- work with local municipalities and other GTA municipalities to develop a policy position paper advocating the updating of design specifications for water supply and wastewater infrastructure including the peak demand and fire flow requirements.

5.2.1.4 Expanded Analytics

As the Region's and local municipalities' capacity to collect and analyze data expands, so does the ability to examine the water system, manage assets, meet changing demands, plan for growth and optimize and harmonize water management across the Region and local municipalities. In the 2011 Long Term Water Conservation Strategy, the challenge of insufficient and accessible data and issues with data management was identified as a key priority for achieving greater coordination. The Region committed to enhanced data collection and adoption of a Quality Assessment-Quality Control (QA-QC) system for improved data capture and analysis. Much of this work has been completed, but as part of the Region's commitment to continuous improvement, greater integration of data capture and analytics across key divisions and local municipalities to maximize water system conservation and ensure a continued and growing focus on "One Water" planning and decision-making is a key objective over the next five years. Continued work with the local municipalities to enhance and harmonize data

collection for improved integrated decision-making in areas of importance; reducing water lost to leakage, preventing excessive flushing, reducing Inflow and Infiltration, monitoring demand trends, measuring and assessing program performance, planning for growth, optimizing operations protocols, etc., will remain a priority for the Region in the near and longer terms.

5.2.1.5 One Water Innovation Group

The water industry is experiencing an unprecedented wave of emerging technologies and practices in the areas of water conservation and system optimization. The Region is committed to continuing its exploration and development of innovative approaches to water management, including opportunities for enhanced water conservation and system optimization. The Region will establish an internal "One Water" Innovation Group to explore opportunities for enhanced and adaptive water conservation and management. Where appropriate, research and pilot studies will be undertaken to test and evaluate viability and applicability in the Region. The Region will investigate the potential of evolving the internal Innovation Group into an Innovation Incubator over the course of program 2016 – 2018. An innovation incubator involving key external stakeholders could significantly expand the scope and capacity for "One Water" innovation in the Region.

Incubators and innovation hubs in leading jurisdictions such as Chicago, Philadelphia, and San Jose stimulate the local economy, support innovation, develop local capabilities and expertise, and generate public sector-private sector-academic joint ventures. Linkages with the province's WaterTAP initiative, the Ontario Water Centre, the York University campus in Markham, the LSRCA and TRCA Living City Campus and the Sustainable Technologies Evaluation Program (STEP), and the Canadian Water Network could be made through a "One Water" Innovation Incubator.

Over the next five years, the Region's "One Water" Innovation group will develop a Water Reuse Plan, complete a water banking (aquifer recharge) study, and investigate water main recirculation technologies options used at pipe termini to reduce water loss due to flushing.

5.2.1.6 Water Reuse Program

The Region is beginning the formation of an internal team to develop a cross-functional water reuse plan. Investigating water reuse possibilities is part of the Region's long-term strategy for achieving its "No New Water" target by 2051. Under the Region's "One Water" approach, research into leading water reuse technologies and practices, and the identification and exploration of potential water reuse opportunities across the Regional and local municipal systems, will culminate in the development of a water reuse program plan. Water reuse technology is evolving rapidly and creating new larger-scale potable and/or non-potable opportunities. Participation of local municipalities will be critical to the creation of a viable, cost-effective and sustainable Water Reuse Program Plan for the Region. The plan will incorporate research into available and emerging technologies and practices for water reuse with potential for use in York Region, including the following:

- treated and/or blended wastewater for direct potable or non-potable use,
- treated rainwater potentially blended with water from Regional-municipal system for potable or non-potable use (irrigation,

boiler water makeup, district energy, toilet flushing, process water, etc.), and

- treated greywater and/or rainwater systems for development-scale non-potable reuse.

The plan will explore opportunities for water reuse pilot projects across the Regional and local municipal systems. These pilot projects may include satellite water harvesting and reuse systems for underserviced or pre-build out areas, district-scale water reuse (including the investigation of combined district water-energy systems) and system-level reuse via Water Resource Recovery Facilities.

The Region's Upper York Sewage Solution (UYSS) Individual Environmental Assessment (IEA) has proposed exploring opportunities for water reuse to be undertaken as part of the cross-function water reuse plan development.

It is important to note that substantial water reuse will be required to meet the Region's aspirational target of "No New Water" by 2051. Currently there is no provincial guidance for large-scale water reuse. To develop large-scale water reuse opportunities, the Region will work closely with the Ministry on regulatory and programming guidance.

5.2.1.7 Integrated Master Planning

Integration of "One Water" and the Strategy Update in the master planning process is fundamental to maintaining continuity and ensuring full consideration of water conservation in all future infrastructure plans and projects.

Over the past decade the Region has taken significant steps to integrate water conservation into the operation and capital side of infrastructure planning. This approach will continue with greater focus on system-level water conservation and water reuse in the master planning process.

5.2.2 Policy and Regulation

Policies and Bylaws are the "hard" components of the 2016 Strategy Update and provide a formal mechanism to secure water use reductions over the short and long terms. A combination of "carrots and sticks" will be required to achieve the necessary water savings to meet water use reduction targets. Evaluation of potential policy and regulatory measures to drive water conservation will be undertaken over the course of this strategy update.

5.2.2.1 Review Water Conservation Requirements for Single- and Multi-Family New Construction

The Region's current Sustainable Incentive Program (SIP) for new single-family homes and high rise includes water conservation measures, such as 4-litre toilets or 4/4.8 litre dual-flush toilets, rough-ins for on-demand hot water re-circulation systems and water efficient landscaping where possible.

The Region's water conservation program for multi-residential apartment (high rise) buildings is based on the 2009 Canada Green Building Council (CaGBC) "Sustainable Development through LEED" Guidelines for high rises. Given the Ontario Building Code (OBC) was updated in 2012, the water conservation requirements set out in the CaGBC LEED Guidelines are out of date.

Between 2017 and 2019 the Region will review "beyond OBC" and "beyond LEED" options for

improving water conservation in new residential construction.

5.2.2.2 Water Conservation and Water Reuse Standards for Regional Buildings

The Region will develop requirements for water use conservation and, where viable and feasible, water reuse for all new construction and re-development of Regional buildings. The requirements will identify indoor and outdoor water conservation upgrades and provide supporting guidance for the water reuse and/or rainwater harvesting.

5.2.2.3 Optimization of In-ground Irrigation Systems at ICI Facilities

In 2020 – 2021, the Region will assess the value of establishing a requirement that all in-ground irrigation systems at ICI facilities have optimization audits by certified contractors and install weather-based "smart" controllers to reduce water wastage.

A pilot project completed in Ontario identified average savings of 10,000 litres per day per acre of irrigated turf when an audit of a system was undertaken, leaks and broken spray heads replaced and a weather-based controller installed. The Region has worked in partnership with Landscape Ontario and Peel Region to deliver a pilot irrigation system audit program, involving training and certifying irrigation contractors and providing an incentive for those contractors to audit and upgrade inefficient in-ground irrigation systems. More information on this program is provided in section 5.2.6.2.

5.2.2.4 Water System Design Criteria Advisory Group

In 2017 – 2018, the Region will investigate opportunities to bring key stakeholders (e.g., GTA or other Ontario municipalities and/or associations such as AWWA, FCM, AMO, CWN, etc.) and relevant provincial ministries together as an advisory group to discuss design guidelines for water supply systems, including fire flow requirements, and to explore the efficacy of potential changes to the guidelines for enhanced efficiency, cost-effective operation and quality maintenance, and capital cost reduction. Developing a recommendation for updating the design criteria would be the key deliverable of the Advisory Group.

5.2.3 Rebates and Other Financial Incentives

Financial incentives in the form of rebates and other instruments, such as low interest financing and grants, may increase uptake of water conservation products and services if effectively applied. The Region has implemented multiple incentive programs in the past, including its highly successful toilet rebate program for residents of York Region, however, fixture rebates have been phased-out due to both the saturation of the end user marketplace and the natural market shift toward the manufacture of more efficient plumbing fixtures and appliances. Two potential financial incentive measures are discussed in the next two sections.

5.2.3.1 ICI Capacity Buyback Program

Unlike fixture rebate programs where the level of rebate is fixed for each type of fixture or appliance, a CBB program provides financial incentives to participating ICI customers based on the volume of water savings that is achieved on site, more accurately, on the average rate of water savings achieved on a daily basis. The CBB program is significantly more flexible than fixture rebate programs because Regional payments are based on water savings vs. the type of product that is installed. As such, ICI customers are free to consider all potential water conservation activities, including changes

to equipment and processes, water reuse activities, indoor and outdoor water uses, etc.

The Region will continue to implement their CBB program to ICI customers over the 5-year term of the 2016 Strategy Update.

5.2.4 Infrastructure

The Region's "One Water" approach to water management considers water conservation on a system-wide basis to maximize the use of existing infrastructure and limit the need for new infrastructure. This "Infrastretching" approach is a continuation of the Region's commitment to achieve water savings and ensure the sustainability of the water supply system and long-term source water protection. Under the "One Water" umbrella, opportunities for water savings within the Regional and local municipality water supply infrastructure were identified via the Best In Class research and consultation via key informant interviews with Regional and local municipal staff. Measures for enhanced system efficiency are discussed below.

5.2.4.1 District Metered Areas (DMAs)

The Region has provided DMA support to local municipalities to reduce leakage, improve pressure management, and the efficiency of municipal systems over the course of the initial Strategy (2011). The Region will continue to provide this support throughout the 2016 – 2020 period of the 2016 Strategy Update. Over 2016-2017, the Region will assess the value of bringing the DMA program under a designated team.

5.2.4.2 Stand-alone Systems

The Region, in consultation with local municipalities that are serviced by stand-alone systems, will develop targeted water conservation programming to reduce water demands in these communities. By delivering focused water conservation programming to these areas, it may be possible to reduce water demands to the degree that expansion in water resource recovery facilities do not correspondingly require heavy investment in water system expansion. The water reuse plan will consider options for communities with stand-alone systems and will be integrated with the *Stand-Alone System Communities Water Conservation Plan*. The plan will be developed over 2017 – 2018

5.2.4.3 Risk-Based Asset Management for Pipe Replacement

The Region has a corporate commitment to continuous improvement and, as such, regularly measures the effectiveness of its water system and explores options to enhance or improve current practices. As part of this commitment and recognizing the trend toward integrated risk management, the Region is committed to continue the enhancement of its risk-based asset replacement program to prioritize susceptible water mains for replacement. This approach involves an integrated assessment of consequence of failure based on interruption of services, contamination to environment, and probability of failure based on pipe material, timeframe installed, diameter, ground type, soil type, pipe depth, and operating and transient pressures to identify groups of pipes that have statistically significant higher failure rates as well as high consequences of failure. Pipe clusters where failure (break) rates and consequence of failure are high are targeted for replacement first, thus reducing the level of system leakage.

5.2.4.4 Pressure Optimization

While the Region has previously undertaken some preliminary investigation into the use of pressure reduction/management to reduce

leakage and increase the longevity of water mains, this type of program is only applicable to local municipal distribution systems. Between 2016 and 2018 the Region will investigate the potential of offering support to local municipalities regarding pressure optimization programs as part of its DMA support program.

5.2.4.5 Water Energy Nexus

The Region is currently evaluating energy recovery opportunities within the Regional water system. This work will continue throughout the planning horizon of the 2016 Strategy, securing energy capture where viable and cost-effective. Water conservation, reducing the demand for water and in turn the energy needed to treat and pump the water is the other key element of the water energy nexus that will continue to inform water conservation efforts in the Region over the 2016 – 2020 timeframe of the 2016 Strategy Update.

5.2.5 Pilot Projects and Research Studies

Pilot projects and research studies continue to be a significant component of Regional water conservation programming. Taking a leadership role requires exploring new approaches, such as market-based programming and "One Water" integrated water management. Pilot projects and research studies provide the basis for testing new technologies, practices and processes to determine their efficacy.

5.2.5.1 Community Plans that Include Water Reuse or Rainwater Harvesting

The Region will work with local municipalities and the local builder/developer industry to identify opportunities for development-scale water reuse or rainwater harvesting projects for non-potable purposes, such as toilet flushing and irrigation in new green field residential developments; and building-scale water reuse or rainwater harvesting for non-potable purposes, such as toilet flushing, boiler systems, and irrigation for commercial and residential development/re-development projects. Pilot project opportunities will be identified during 2016 – 2017 with the goal of implementation in 2018 – 2020. The goal of the pilot project is to complete an assessment of the costs, potential and constraints of development-scale water reuse or rainwater harvesting for non-potable purposes.

5.2.5.2 Water Banking

The Region will investigate the potential and value of water banking (aquifer recharge) as a mechanism to support and sustain ground water resources. Water harvesting and/or reuse will be considered as potential sources of supply for aquifer recharge. Given high water levels in some of the Regional wells, a determination as to the need, efficacy and value of water banking is required. A feasibility study will be undertaken in 2019 – 2021.

5.2.5.3 Local Municipal Mains Flushing

The Region, in partnership with local municipalities, will evaluate the feasibility of co-ordinating seasonal water main flushing activities. This evaluation will explore the potential of coordinating water main flushing in target areas with residential outreach for spring-time filling of pools, hot tubs, ornamental water features, etc., and irrigation of new plantings during this time of year.

5.2.6 Marketing Outreach and Education

Effectively engaging the marketplace, residents, students and businesses throughout the Region is a critical component of water conservation programming. Since the 2011 Strategy, the Region has moved toward market-based programming which focuses resources on specific aspects of the marketplace to drive

longer-term transformative change to water efficient products and practices. Education and engagement of youth, students, residents and other stakeholders will continue to be a significant part of the Region's marketing, outreach and education programming for water conservation.

5.2.6.1 Market-based Programming

The Region will continue to pursue market-based programming to drive water conservation transformation in the marketplace. Market-based measures identified in the Peak Reduction and AADD Implementation Plans developed in 2012 will continue through the pilot study phase and, where appropriate (based upon the results from pilot studies), be implemented Region-wide over the 2016-2020 period.

5.2.6.2 Water Smart Irrigation Professional (WSIP) Program

The WSIP program is a market-based program involving a 3-way joint venture of York and Peel Regions and Landscape Ontario (LO). WSIP involves the training and certification of irrigation contractors who then qualify for an incentive to optimize the efficiency of existing automatic irrigation systems. WSIP has the potential to save on average 10,000 litres per day per acre of irrigated turf and, therefore, WSIP is a significant program for reducing peak demand and tackling high outdoor water use (ICI and residences with automatic irrigation systems typically use far more water for irrigation vs. comparable customers who do not have automatic systems).

5.2.6.3 Fusion Gardening Pilot Project

The Fusion Gardening® pilot project is a market-based program utilizing landscape professionals to develop, design, install and maintain sustainable landscapes in the single-family residential market in the Region. The Fusion Gardening® program involves the training and certification of landscape designers/installers and landscape maintenance and irrigation contractors in Fusion gardening/landscaping. In 2015 the Region began implementing a pilot project in Kleinburg, a community with a significant percentage of high peak season residential water users. Fusion landscapes are water efficient and incorporate LID/green infrastructure features, such as rain gardens, bioswales, increased vegetative cover (including tree canopy cover), dry river beds, and soak-away pits. Fusion landscapes require little or no supplemental irrigation once established, mitigate stormwater runoff and contaminant loadings to source waters, help reduce flooding, and enhance vegetative cover. The Fusion Gardening® pilot program will continue in 2016 through 2018 and will be evaluated to determine if the program will be implemented Region-wide beginning in 2019 (Figure 11 and Figure 12). As market transformation programs typically take 4-7 years before measurable results are recognized, Fusion Gardening® will be delivered on a small scale until 2018. If it is determined at that time that the tactics are successful, it will be rolled out to other high water use neighbourhoods.

Figure 11 – Fusion Gardening

Figure 12 – Fusion Gardening

5.2.6.4 "Water Is" Campaign

The "Water Is" campaign rolled out in the fall of 2013 in the Region. The first phase created an emotional connection between residents and water and included multi-pronged communication tactics; ads (newspaper, bus shelter, and movie theatre), social media, event attendance, photo contest, posters, etc. The second phase is currently under way and is more informational in context – showcasing hidden infrastructure and how York Region keeps drinking water safe and clean, this includes videos, posters, social media, Water Hero campaign and advertorials. Although the "Water Is" program does not focus directly on water conservation, it raises awareness about the importance of water. Making the connection with the value of water and the need to conserve is a key component of the Region's water conservation outreach and engagement program. The "Water Is" campaign will continue over 2016 at which time an assessment as to whether or not to continue the campaign will be made.

Figure 13 – "Water Is" Campaign

5.2.6.5 Children's Water Festival

The Children's Water Festival currently targets Grade 4 students across York Region and provides them with the opportunity to learn about water conservation through interactive, curriculum-linked activities. The Children's Water Festival is a five-day event that helps approximately 5,000 students understand the importance of a clean, plentiful supply of water. The children learn respect for a healthy environment and make a commitment to use natural resources wisely. The festival is limited to schools in York Region and each teacher must register his/her own class separately. The Children's Water Festival 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.

The Region is currently reviewing the Children's Water Festival as part of the five-year strategic plan for outreach and education.

5.2.6.6 Student Education Initiatives

In recognition of the value of outreach and education in fostering a sustainability ethos amongst water customers and the Region's youth, a number of water conservation outreach and education initiatives are delivered annually throughout York Region.

Current educational tactics include Grade 5 in-class program, a Grade 7 curriculum-linked lesson plan document and a Language Instruction for Newcomers to Canada (LINC) centre water program. The Region also offers a calendar drawing initiative for Grade 7 students. Students' drawings reflect their views and opinions on water conservation, protection and responsibility. The drawings are first judged at each school and then submitted to York Region for final judging. The 12 winning art pieces are printed in the *Water for Tomorrow* student calendar which is available online. Each winning artist is personally recognized for his/her contribution at his/her school. Finally, the Region offers a children's activity book and colouring pages that are typically handed out at events through the *Water for Tomorrow* booth or *Tap'd In* trailer.

In 2016 Regional staff will be developing a five-year education strategic plan addressing youth engagement and education.

The strategy will continue the Region's multiple touch-point approach to student learning and the leveraging of key partnerships to cost effectively expand the scope and breadth of educational programming and the dissemination of the water conservation message to the Region's youth.

The strategy will involve a review of current public outreach and education programming and determine messaging, communication vehicles and materials, special events, demonstration projects and joint ventures and strategic partnerships.

The objectives of the strategic plan for outreach and education may be summarized as follows:

- Convey the York Region water message most effectively,
- Create multiple touch points across multiple age groups, and
- Utilize formal, non-formal, and informal education methodology.

5.2.7 Innovation

The Region recognizes that innovation is a significant part of developing solutions to the challenges of quickly evolving conditions – new and emerging technologies and processes, climate variability with increasing frequency and severity of droughts and storms, significant population growth with changing demographics, intensification of development in southern municipalities and new green field development in the more northern municipalities, a continually evolving market with new water efficient fixtures and appliances, and expanded data capture and greater analytic requirements. As discussed under *Program Administration*, Section 5.2.1, the Region will evaluate establishing a "One Water" Innovation Group to advance water management and water conservation innovation within the Regional and local municipal systems and potentially externally in areas such as new building/development and re-development. Innovation comes with a price tag and the Region recognizes that funding limitations often inhibit exploration of innovative solutions.

5.2.7.1 Water Reuse Pilot – Development and Implementation

Water reuse is a key component of the Region's long term approach to water management. Via pilot projects the Region will explore opportunities and options for water reuse across its system, local municipal systems, new residential and ICI development.

To begin laying ground work for future water reuse opportunities, such as those proposed for the Upper York Sewage Solutions (UYSS), an initial pilot project will be developed and implemented over the 2016 – 2019 period. The project involves the use of bio-membrane (tertiary) treated wastewater from the Keswick Water Resource Recovery Facility (WRRF) for irrigation of sod crops. Monitoring and testing protocol will be developed at the outset of the project. Water sampling and profiling from output at the WRRF to groundwater at the application site will be on-going. This pilot study will be conducted in co-operation with the MOECC, LSRCA and other relevant stakeholders. The findings of this pilot project will inform future water reuse policy and programming.


BODY GLOVE

6.0 SUMMARY

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

6.1 Recommendations

The recommended measures for inclusion in the Region's 2016 Long Term Water Conservation Strategy are identified in Table 12.

Table 12 - 2016 Strategy Update Water Conservation Measures

2016 STRATEGY WATER CONSERVATION PROGRAMS AND MEASURES
PROGRAM MANAGEMENT
1. Water Conservation Advisory Committee (WCAC)
• While the WCAC will continue to play similar role in the Region's Water Conservation programming as in the past, initiation of a new term and focus will begin in 2016. • Expanded representation to include local municipalities and business associations on the committee will be evaluated over 2016-2017. • The goal of expanded representation on WCAC is to align the membership with the Region's commitment to One Water and the identification and realization of conservation opportunities system-wide.
2. Tracking and Reporting Framework
• Expand on the existing Key Performance Indicator (KPI) mechanism currently in use in the Region to track and report water conservation KPIs on an annual basis. • A water conservation (or One Water) reporting framework could be updated on a regular basis to keep pace with Best In Class practices. • A format for a report to provide a summary of water conservation programming KPIs will be developed in 2016 with initial testing in 2017. • As programming evolves and changes, so too do performance indicators that are tracked, measured and reported without losing year over year comparability.
3. One Water Infrastructure Optimization
• The Region works closely with local municipalities via the Regional-Municipal Steering Committee to ensure greater coordination in the operation of the water systems. • With the goal of continuous improvement and recognition that through system optimization, opportunities for greater water conservation, energy savings and capture, water reuse, reduction of Inflow & Infiltration, etc., can be realized; the Region will investigate over the course of 2016 opportunities for optimization including establishing of an Infrastructure Optimization Steering Committee under the auspices of One Water. • Enhanced resiliency in light of climate change and potential increases in extreme and variable weather, changing market demands, significant planned growth and related new

Note: Existing Programs | New Programs | New Pilot Programs

2016 STRATEGY WATER CONSERVATION PROGRAMS AND MEASURES
construction/re-development, evolving technologies, full-cost recovery, etc. These speak to the importance of a continued emphasis on efficiency and greater co-operation and co-ordination of planning, operation and management of the Regional-municipal water systems.
4. Expanded Analytics • As part of the Region's commitment to continuous improvement, greater integration of data capture and analytics across key divisions to maximize water system efficiency and ensure a continued and growing focus on a One Water approach to planning and decision-making is a key objective over the next five years. • Continued work with local municipalities to enhance and coordinate water billing data collection for improved integrated decision-making in areas of importance – reducing water loss through leakage, preventing excessive flushing, reducing Inflow and Infiltration, monitoring demand trends, measuring and assessing program performance, planning for growth, optimizing operations protocols, etc. – will remain a priority for the Region in the near and longer terms.
5. One Water Innovation • With rapid advances in physical and information technology and infrastructure, significant challenges and opportunities exist to bring the two together. • A One Water Innovation Group could work to identify, explore, test and develop new processes, equipment, and technologies related to water management. • The Innovation Group could bring together leading business, academic, and public sector expertise to create innovative solutions and expansion of the Regional Innovation Group to include key external stakeholders via an innovation incubator or innovation hub. This could significantly expand the scope and capacity for One Water innovation in the Region. • Incubators and innovation hubs in leading jurisdictions such as Chicago, Philadelphia, and San Jose stimulate the local economy, support innovation, develop local capabilities and expertise, and generate public sector-private sector-academic joint ventures. • The One Water Innovation Group would be responsible for identifying opportunities for innovation across the Regional and local municipal systems. • Linkages with the province's WaterTAP initiative, the Ontario Water Centre, the York University campus in Markham, the LSRCA and TRCA Living City Campus and the Sustainable Technologies Evaluation Program [STEP], and the Canadian Water Network could be made through a One Water Innovation Incubator.
6. Water Reuse Plan: • In the final quarter of 2015, the Region formed an internal team to develop a cross-functional water reuse plan. • Water reuse is part of the Region's long-term strategy for achieving its ambitious target of 150 litres per capita per day (LCD) over the next 35 years. • Under the Region's One Water program, research into leading water reuse technologies and practices, and the identification and exploration of potential water reuse opportunities across the Regional and local municipal systems will culminate in development of a water reuse plan.

Note: Existing Programs | New Programs | New Pilot Programs

2016 STRATEGY WATER CONSERVATION PROGRAMS AND MEASURES
• This work commenced in 2015 and will continue over the next 3 years of the Strategy Update. • Region's Upper York Sewage Solution (UYSS) Individual Environmental Assessment (IEA) has proposed opportunities for water reuse to be undertaken as part of the cross-function water reuse plan development. • Substantial water reuse will be required to meet the Region's aspirational target of "No New Water" by 2051. Currently there is no provincial guidance for large scale water reuse. In order to develop large scale water reuse opportunities, the Region will work closely with the Ministry on regulatory and programming guidance.
7. Integrated Master Planning
• Integration of One Water and the Strategy Update in the master planning process is integral to maintaining continuity and ensuring full consideration of water conservation in all future infrastructure plans and projects. • Over the past decade the Region has taken significant steps to integrate water conservation into infrastructure planning; this approach will continue with greater focus on system-level water efficiency and water reuse in the master planning process.
POLICY AND REGULATION
1. Building Code Standard for Water Efficiency Upgrades in New Construction
• The Region will investigate the potential to require water efficiency upgrades, specifically 4.0 litre toilets, on-demand hot water recirculation systems, increased top-soil depth and quality, and fusion landscaping in new construction - or to include these measures under the Sustainable Incentive Program (SIP) in 2016-2018.
2. Water Efficiency and Water Reuse Standards for all Regional Buildings
• The Region to develop requirements for all new and redevelopment projects of Regional buildings to require 4.0 litre or less toilets, water efficient fixtures, fusion landscaping, and water reuse where viable and feasible. • The Region will develop water conservation requirements and supporting guidance for all new and redevelopment projects of Region-owned buildings.
3. Requirement for all Facilities with In-ground Irrigation Systems to be Optimized
• Over the 2020-2021 period, the Region will investigate a requirement for ICI facilities with in-ground automatic irrigation systems to install smart (weather-based) controllers to reduce water wastage.
4. Water System Design Criteria Advisory Group
• The Region will investigate opportunities to bring key stakeholders from local municipalities, other GTA or Ontario municipalities and/or associations (American Water Works Association, Federation of Canadian Municipalities, Association of Municipalities of Ontario, Canadian Water Network, etc.) and relevant provincial ministries together. This advisory group will discuss design guidelines for water supply systems, including fire flow requirements, and to explore the efficacy of potential changes to the guidelines for enhanced efficiency, cost-effective operation and

Note: Existing Programs | New Programs | New Pilot Programs

2016 STRATEGY WATER CONSERVATION PROGRAMS AND MEASURES

quality maintenance, and capital cost reduction.

- The key deliverable from this collaborative work is developing a recommendation for updating design criteria for water supply systems.

REBATES AND OTHER FINANCIAL INCENTIVES

1. Capacity Buyback (CBB) Program

The Region continues to implement its Capacity Buyback program to ICI customers. The program offers financial incentives to ICI customers based on average daily water savings achieved.

INFRASTRUCTURE

1. District Metered Areas (DMAs)

- The Region continues to offer support to local municipalities in implementing District Metered Areas to reduce system leakage.
- Localized DMA methodology involves comparing the theoretical demand of an isolated area of the system to the measured actual demand; a high actual demand compared to the theoretical demand can indicate leakage.
- The Region will determine the value of bringing the DMA program under the One Water Optimization Working Group.

2. Stand-Alone System Water Conservation Plan and Program

- The Region, in consultation with local municipalities in service areas supported by stand-alone systems such as Kleinburg where serviced population is generally less than 10,000 and peak demand is high, will develop targeted water conservation programming to reduce water demands in these communities.
- The plan will be developed over the next two years.

3. Risk-based Asset Management for Pipe Replacement

- The Region will enhance its risk-based pipe replacement program through adopting advanced condition assessment technology, improving data collection, partnering with other municipalities and educational institutions to research pipe deterioration curves, investing in pressure monitoring and developing a transient model to identify areas of vulnerability.
- A complex assessment risk methodology is used to identify pipes that are statistically more likely to fail, pipe clusters with higher than average or acceptable levels of failure (break) rates are targeted first for replacement, while deferring replacement of pipes in clusters with low failure rates.
- Risk-based pipe replacement reduces the likelihood of pipe failures and resulting water loss, reduces utility liability, and optimizes repair and replacement costs.

Note: Existing Programs | New Programs | New Pilot Programs

2016 STRATEGY WATER CONSERVATION PROGRAMS AND MEASURES

4. Pressure Management

- The Region has investigated the use of pressure reduction/management to reduce leakage in system pipes. Pressure management in the water supply system is achieved via the use of pressure-reducing valves and is generally done during low demand periods, usually overnight.
- As part of its One Water system-wide efficiency assessment, the Region will investigate the potential change in system pressure due to system expansion to minimize system pressures that may increase leakage. This investigation will be undertaken in the next three years.

5. Water Energy Nexus

- The Region is currently evaluating energy recovery and operational optimization opportunities within the Regional water system.
- This work will continue throughout the planning horizon of the 2016 Strategy, securing energy capture where viable and cost effective.
- System-wide water conservation work will provide energy savings concurrent with water savings.

PILOT PROJECTS AND RESEARCH STUDIES

1. Development-scale water reuse (greywater) and/or rainwater harvesting

- The Region will work with local municipalities and the local builder/developer industry to identify opportunities for development-scale water reuse or rainwater harvesting projects for non-potable purposes. Opportunities such as toilet flushing and irrigation in new residential developments and building-scale water reuse or rainwater harvesting for non-potable purposes such as toilet flushing, boiler systems, and irrigation for commercial and residential development/redevelopment projects.
- Water reuse involves capturing of greywater (water from showers and sometimes laundry), on-site treatment, storage and subsequent reuse for non-potable purposes.
- Pilot project opportunities will be identified during 2016-2017 with the goal of implementation in 2018 – 2020.
- The goal of the pilot project is to assess the costs, potential savings and constraints of development-scale water reuse or rainwater harvesting for non-potable purposes.

2. Water Banking

- The Region will investigate the potential and value of water banking (aquifer recharge).
- Water harvesting and/or reuse will be considered as potential sources of supply for aquifer recharge.
- Given high water levels in some of the Regional wells, a determination as to the need, feasibility, efficacy and value of water banking is required.
- The study of the potential of water banking to the long term sustainability of Regional aquifers will be carried out over 2019 – 2021 of the Strategy Update.

Note: Existing Programs | New Programs | New Pilot Programs

2016 STRATEGY WATER CONSERVATION PROGRAMS AND MEASURES

3. Mains Flushing Public Outreach Campaign

- The Region will investigate the potential of co-ordinating water main flushing activities with a spring-time "fill your pools/water features and irrigate new plantings" public outreach and engagement campaign.
- In areas where significant flushing is required to maintain water quality, the potential and viability of redirecting flush water to fill pools, hot tubs and ornamental water features and for irrigation of new plantings at a peak demand time for these activities (generally the 2nd and 3rd weekends of May), will be evaluated in 2018-2019.

MARKET BASED PROGRAMS

1. Market-based Programming

- The Region will continue to pursue market-based programming to drive water conservation transformation in the marketplace.
- Market-based measures identified in the Peak Reduction and Average Annual Day Demand Implementation Plans developed in 2012 will continue through the pilot study phase and, where appropriate (based upon results from pilot studies), will be implemented Region-wide over the 2016-2020 period.

2. Water Smart Irrigation Professional (WSIP) Program

- A market-based program involving a 3-way collaboration of York Region, Peel Region and Landscape Ontario.
- Involves training and certification of irrigation contractors who then qualify for an incentive to optimize the efficiency of existing automatic irrigation systems.
- The potential average water saving for Industrial, Commercial, and Institutional facilities is in the range of 10,000 litres per day per acre of irrigated turf. WSIP is potentially a significant program for reducing peak demand and for tackling high outdoor water use.

3. Fusion Gardening® Program

- A market-based program using landscape design/install and maintenance service providers.
- Involves training and certification of landscape designers/installers and landscape maintenance contractors in fusion gardening/landscaping.
- In 2015 the Region began implementing a pilot project in Kleinburg, a community with a significant percentage of high peak season residential water users.
- Fusion landscapes are water efficient and incorporate LID/green infrastructure features such as rain gardens, bioswales, increased vegetative cover (including tree canopy cover), dry river beds, and soak-away pits.
- Fusion landscapes require little or no supplemental irrigation once established, mitigate stormwater runoff and contaminant loadings to source waters, help reduce flooding, and enhance vegetative cover.
- The Fusion Gardening® pilot program will continue in 2016 – 2018 and will be evaluated to determine if the program will be implemented Region-wide beginning in 2019.

Note: Existing Programs | New Programs | New Pilot Programs

2016 STRATEGY WATER CONSERVATION PROGRAMS AND MEASURES

EDUCATION AND OUTREACH

1. "Water Is" Campaign

- "Water Is" campaign rolled out in the fall of 2013.
- First phase of campaign created an emotional connection between residents and water and included multi-pronged communication tactics including ads (newspaper, bus shelter, and movie theatre), social media, event attendance, photo contest, posters, etc.
- The second phase of campaign is more informational – showcasing hidden infrastructure and how York Region keeps drinking water safe and clean and included videos, posters, social media, Water Hero campaign, advertorials.
- The "Water Is" program raises awareness about the importance of water. Making the connection between the value of water and the need to conserve is a key component of the Region's water conservation outreach program.

2. Children's Water Festival

- Grade 4 students across York Region learn about water conservation through interactive, curriculum-linked activities.
- The Children's Water Festival is a five-day signature event that helps approximately 5,000 students understand how important a clean and plentiful water supply is. Children learn respect for a healthy environment and make a commitment to use natural resources wisely. The festival has been held for over ten years for schools in York Region where each teacher registers his/her own class separately.
- The York Children's Water Festival is a major component of York Region's *Water for Tomorrow* program and is a partnership between York Region and the Toronto Region Conservation Authority.

3. Student Education Initiatives

- York Region offers a number of educational water conservation programs for elementary schools.
- Teachers and students are encouraged to participate in events and activities linked to the Ontario curriculum.
- The Region developed a new elementary-level, in-class presentation to demonstrate where water comes from and the systems that move it, and the safety and reliability of the Region's supply. The presentation features hands-on activities and engaging discussion about how water is needed and used.
- The Region offers a calendar showing Grade 7 student drawings reflecting the students' views on water conservation, protection and responsibility.
- Student drawings are first judged at each school and then submitted to York Region for final judging.
- The 12 winning art pieces are printed in the Water for Tomorrow student calendar which is available online. Each winning artist is personally recognized for his/her contribution at his/her school.

Note: Existing Programs | New Programs | New Pilot Programs

2016 STRATEGY WATER CONSERVATION PROGRAMS AND MEASURES
INNOVATION
1. Water Reuse Pilot – Development and Implementation
• Water reuse is part of the Region's long term strategy for achieving its ambitious targets. The Region's Upper York Sewage Solution Project has proposed exploring opportunities for water uses. • The Region will be piloting a project to utilize water reuse for irrigation purposes from a Regional Water Resource Recovery Facility from 2016 -2019.

Note: Existing Programs | New Programs | New Pilot Programs

6.2 Updated Water Saving Targets And Timelines

The 2011 Strategy envisions a residential water consumption rate of 150 litres per capita per day (LCD) by 2051. While per capita residential water demands have declined over the last decade or so because of the impact of Regional programs, an improvement in the efficiency of key water using fixtures and appliances (e.g., toilets, clothes washers, showerheads), and a growing awareness of the importance of using our natural resources wisely, further savings are required if the Region is to reach its targets.

Table 13 summarizes the projected water savings and consumption rates that can be achieved over time under three scenarios.

Scenario 1 represents consumption rates that can be achieved through Region's water conservation programs only. Scenario 2 represents consumption rates that can be achieved through the Region's water conservation programs plus additional water savings from provincial legislation such as mandating water efficient fixtures in new homes through the new Building Code (effective January 2014). Scenario 3 represents a 2051 target consumption rate of 150 LCD. It requires implementation of water reuse and provincial guidance on water reuse applications.

Through implementation of the 2016 Strategy Update over the next five years, coupled with additional savings from new building code, the Region is on track to achieve the 2021 target consumption rate of 190 LCD. Piloting water reuse project in the next five years is essential to prepare for implementing water reuse measures from 2021 to 2051, in order to achieve the 2051 water consumption target of 150 LCD.

The 2016 Strategy Update recommends the Region form a team to develop a water reuse plan, including providing support and input to the implementation of water reuse in the proposed Upper York Water Reclamation Centre, and working with the Province on policy and regulatory changes to permit large scale water reuse.

The 2011 Strategy also envisions a "No New Water" goal by 2051. It is expected that achievement of this goal requires large scale water reuse. Currently there is no provincial guidance for large scale water reuse. In order to develop large scale water reuse opportunities, the Region will work closely with the Ministry on regulatory and programming guidance.

Table 13 – Residential Water Consumption Targets and Timelines

WATER SAVINGS SCENARIOS	2014	2021	2031	2041	2051
	Residential Consumption Rate (LCD)				
Scenario 1 Regional Incentive Programs	200	192	185	179	173
Scenario 2 Regional Incentive Programs + Existing Provincial Programs and Legislation		190	183	176	170
Scenario 3 Regional Incentive Programs + Existing Provincial Programs and Legislation + Water Reuse and Provincial Guidance and Legislative Changes			180	165	150

6.3 The Implementation Phase

As mentioned earlier, technology is advancing at an unparalleled pace and the marketplace is changing almost daily. For example, while plumbing fixture rebates were the cornerstone of most municipal water conservation programs for many years, water efficient plumbing products now dominate the marketplace. Ongoing improvements in membrane technology are resulting in lower cost and higher performance water reuse systems. Where governments at all levels have traditionally operated with each department diligently managing and working in their own silo, leading agencies in water conservation are embracing the "One Water" philosophy for water management – sharing information and program goals among all related departments to the betterment of the entire organization. Progressive agencies are forming strategic partnerships with other agencies, other utilities, service providers, retail outlets, etc., to leverage resources and expertise, and to maximize the return on investment.

This 2016 Long Term Water Conservation Strategy Update embraces a new paradigm for water management - it recommends a total of 28 water conservation measures. Twelve of these measures identified below are currently being implemented by the Region:

- Integrated Master Planning
- ICI Capacity Buyback program
- District Meter Areas (DMAs)
- Stand-Alone System Water Conservation Plan and Program
- Risk-based Asset Management for Pipe Replacement
- Pressure Management
- Market-based Programming
- Water Smart Irrigation Professional (WSIP) program.
- Fusion Gardening® Program.
- "Water Is" campaign.
- Children's Water Festival.
- Student Education Initiatives.

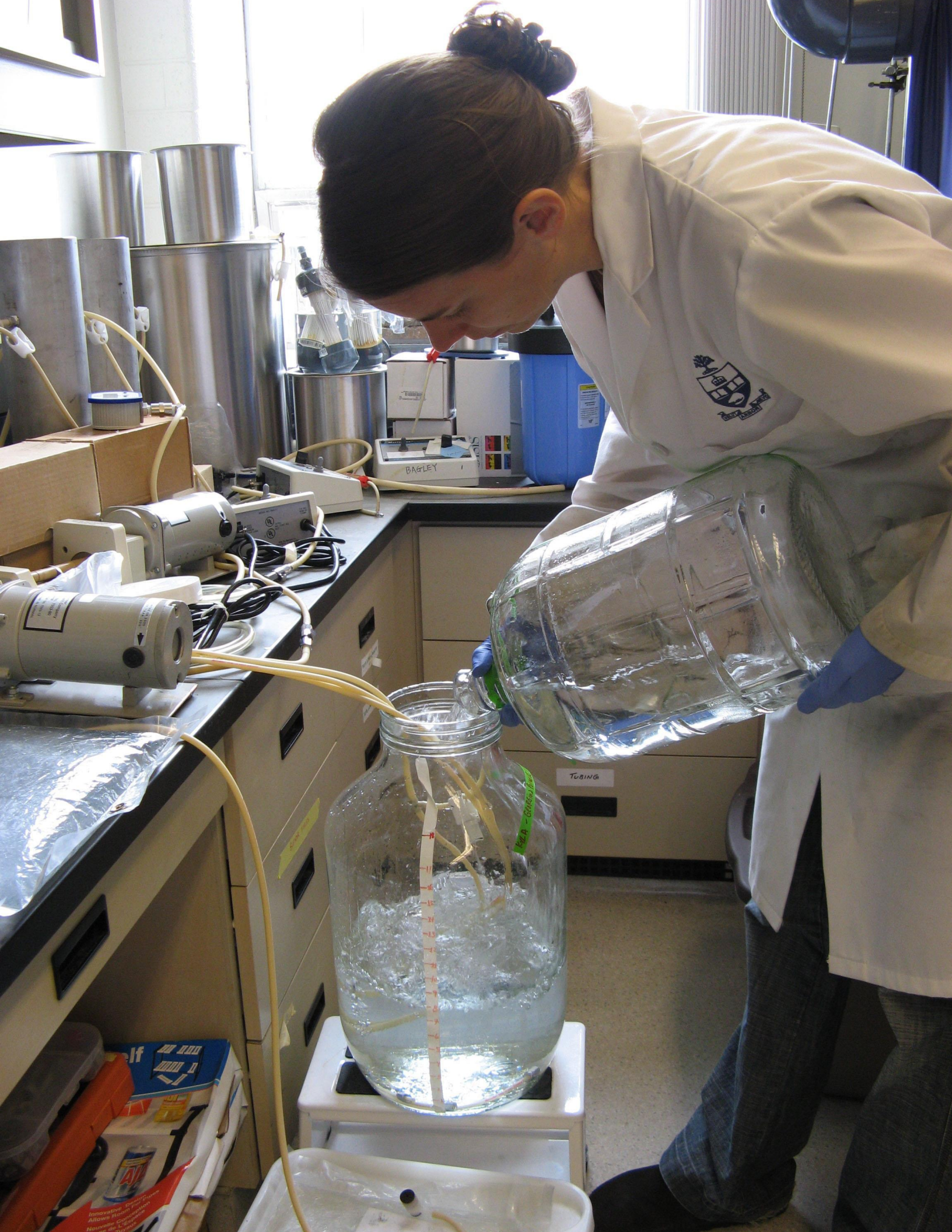
Sixteen of the recommended measures will be new additions to the Region's program. Twelve of the new measures involve:

- Water Conservation Advisory Committee (WCAC)

- Tracking and Reporting Framework
- One Water Infrastructure Optimization
- Expanded Analytics
- One Water Innovation
- Develop and implement Water Reuse Plan
- Building Code Standard for Water Efficiency Upgrades in New Construction
- Water Efficiency and Water Reuse Standards for all Regional Buildings
- Requirement for all Facilities with In-ground Irrigation Systems to be Optimized
- Water System Design Criteria Advisory Group
- Water Energy Nexus
- Water Conservation Innovation Investment

Four of the new measures identified below involve completing pilot projects to assess the effectiveness of the measure and to modify or cancel as required:

- Development-scale water reuse (greywater) and/or rainwater harvesting
- Water Banking
- Mains Flushing Public Outreach Campaign
- Water Reuse Pilot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7.0 CONCLUSION

The new direction outlined in the Region's 2016 Long Term Water Conservation Strategy Update has been informed by the recent market place changes regarding plumbing fixtures and appliances, the ongoing decline in residential per capita demands, the availability of better water production and customer water demand data, and ongoing improvements in technology.

The 2016 Strategy aligns with the Region's "One Water" approach to water management and takes a market-based approach to program implementation to leverage the resources of other agencies and to maximize the Region's return on investment. While the Region appears to be on track to reach its "150 LCD" residential water demand target by 2051, the new Strategy acknowledges that, largely because of the significant increase in population projected by 2051, achieving the Region's aspirational target of "No New Water" by 2051 is unlikely unless there is a widespread adoption of water reuse programs.

With the development and implementation of the 2016 Strategy Update, York Region maintains its position as one of the leading Canadian jurisdictions regarding water conservation.

The Region has saved an estimated 26.2 million litres (ML) per day through Water for Tomorrow program, which includes the following accomplishments:

- Replaced 106,000 showerheads to water-efficient models
- Changed 95,000 toilets to water-efficient models
- Purchased 13,000 rain barrels
- Participated in 12,000 water-efficient landscape visits
- Switched 245,000 toilet flappers with early closing models
- Completed over 35 ICI water consultation audits and over 5 Capacity Buyback incentive applications

Appendix A: 2016 Annual Long Term Water Conservation Report

1. Purpose and Need for the Annual Report

The purpose of this report is to provide the fifth annual update on progress made towards implementation of the Long Term Water Conservation Strategy (LTWCS). This annual report is being submitted as an appendix of the LTWCS update. Progress in achieving the goals of the strategies will be discussed in Table A1 below. This report is prepared and submitted in accordance with the requirements of Condition 8 for the SEC IEA.

In summary, the approval of the SEC is subject to stringent conditions based upon the following overall directions:

1. A compliance monitoring and reporting program is to be established to document that the project will be undertaken and will continue to be operated in conformance with the commitments made by York Region in the SEC IEA.
2. York Region is required to establish a stakeholder advisory committee, consisting of representatives from area and Regional municipalities, agencies, environmental groups, and residents within three months of approval of the SEC IEA to enable on-going liaison between the community and the Region during the construction period. The Southeast Collector Advisory Committee (SeCAC) was formed in April 2010 to meet this requirement.
3. Review of Best In Class water conservation and efficiency measures and development of I/I reduction strategies are to be completed in conjunction with York Region and the area municipalities. It is to be independently peer reviewed, presented to the advisory committee, submitted to the Ministry of the Environment and Climate Change (MOECC), implemented, monitored and reported on annually to the MOECC.
4. A performance management plan be developed and submitted to the SeCAC and the MOECC to document performance targets for improvements to water conservation, efficiency, and reductions in I/I.

The goal of the Long Term Water Conservation Strategy is to reduce residential water use to 150 litres per person per day by 2051. In 2015, the average residential consumption was 200 litres per person per day.

Comments and Feedback Received

On July 17, 2015, the MOECC provided comments on the LTWCS and I/I Reduction Strategy 2014 Annual Report. Comments received expressed that York Region is continuing to show strong leadership in promoting water conservation.

The comments acknowledge that York Region will update the residential per capita five-year water use targets in 2016 after completion of the Strategy Update and in coordination with York Region's Water and Wastewater Master Plan Update. This will ensure that both the Strategy and Master Plan have a coordinated approach in water demand projections and in turn allow York Region to plan infrastructure in a more sustainable, efficient and reliable manner.

2. Summary of Program Activities and Accomplishment

Since implementing York Region's 1998 Long Term Water Supply Master Plan, water conservation planning has been integral to the Region's drinking water supply strategy. York Region has been ahead of the curve in water conservation programming. Summary of York Region's 2015 program activities and accomplishment is shown in Table A1.

Key Program Activities and 2015 Accomplishments

Table A1: Long Term Water Conservation Strategy 2015 Achieved

PROGRAM COMPONENTS BASED ON BEST IN CLASS REVIEW	TACTICS	SECTOR	2015 TARGET	2015 ACHIEVED	COMMENTS
Rebates and Other Financial Incentives					
	Free ICI water consultations	ICI	10 Facilities	9 facilities	Engaged in 9 facility ICI consultations this year, cumulative to date is 35 facilities
	Capacity buy-back	ICI	1.5 Facilities	0 facilities	Completed a post audit in 1 facility, cumulative to date is 5 facilities
	Once-through Cooling Replacement Incentive	Small and Medium-sized Enterprise	-	New program under development	Currently working on program development and exploring partnership to deliver the program
	Water Efficiency Product and Program Seminars	All	5	1	This seminar was a breakfast training session which focused on the ICI sector and water conservation
New Development					
Evaluate against best in	Develop plan to increase uptake of	Single and multi-	Servicing Incentive Program	Servicing Incentive Program objectives and requirements	

PROGRAM COMPONENTS BASED ON BEST IN CLASS REVIEW	TACTICS	SECTOR	2015 TARGET	2015 ACHIEVED	COMMENTS
class	SHIP and Sustainable Development through LEED® High-Rise Residential Incentive Programs – evaluate incentives, barriers	family residential		were approved in principle by Regional Council in 2014. Program Implementation Guide were completed and disseminated to local municipalities in 2015.	
Efficient New Development Low Density Total (SIP or other)	Estimated number of units constructed to standard	Single family residential	300 units	636 units	636 units of 4,424 grade-related units completed in 2015
Efficient New Development High Density (Sustainable Development through LEED® or other)	Estimated number of units constructed to standard	Multi-family residential	300 units	505 units	505 units out of 3,459 apartments completed in 2015
Governance and Administration					
	Develop detailed implementation plans with full cost-benefit and ROI assessments	All	Ongoing	Ongoing	

PROGRAM COMPONENTS BASED ON BEST IN CLASS REVIEW	TACTICS	SECTOR	2015 TARGET	2015 ACHIEVED	COMMENTS
	Evaluate conservation based pricing	All	Ongoing	Completed	Full-cost recovery water rates approved by Council in October 2015
	Advocacy to encourage water efficiency and reuse in Provincial permit to take water and building code changes	All	Ongoing	Ongoing	
Regional-Municipal Infrastructure					
	Leak Reduction – address results of IWA audits		Leak Reduction evaluation for ILI's greater than 3	Leak Reduction evaluation for ILI's greater than 3, Markham has implemented a leak detection program and Vaughan is in the process to start	
	IWA Audit ILI – Infrastructure Leakage Index – annual audits		Ongoing	All 9 municipal IWA audits received for 2014	Coordinated all 9 municipal IWA audits
	Quantify water used in main flushing		Planning a distribution system optimization	Ongoing	

PROGRAM COMPONENTS BASED ON BEST IN CLASS REVIEW	TACTICS	SECTOR	2015 TARGET	2015 ACHIEVED	COMMENTS
			project with area municipalities to capture flushing practices and create best practices recommendations		
	Incorporate outcomes into infrastructure master plans		Ongoing	Ongoing	Master Plan Update adopted new water consumption design rate.
Regional-Municipal Processes					
	Determine consumption by sector	All	Ongoing	Completed annually	In progress, this information is captured through the water consumption database
	Document water/energy savings outcomes		Ongoing	Tracking sheets in place to document water and energy savings for specific programs and projects	
Outdoor Water Use					
	Summer water conservation bylaw	All Municipalities	Ongoing	A media release promoting the bylaw was sent to media outlets across the Region at the beginning of the summer. An ad promoting the Outdoor	Increase promotion of bylaw if hot, dry summer affects water supplies.

PROGRAM COMPONENTS BASED ON BEST IN CLASS REVIEW	TACTICS	SECTOR	2015 TARGET	2015 ACHIEVED	COMMENTS
				Summer Water Use Bylaw was also placed in 8 newspapers and 6 waste management calendars across the Region. Information regarding the bylaw was posted on york.ca and handed out at community events. Social media was also used to promote the bylaw. Four posts were posted on Facebook.	
	Outdoor water use reduction pilot – target high water users and irrigation systems.	ICI and Residential	Ongoing	High outdoor water use areas were mapped and a pilot area and two control areas were defined. Pilot began in 2015 and will be monitored and evaluated for three years before possible roll out to additional high water use neighbourhoods. Program is being marketed as “Fusion gardening”.	

PROGRAM COMPONENTS BASED ON BEST IN CLASS REVIEW	TACTICS	SECTOR	2015 TARGET	2015 ACHIEVED	COMMENTS
				Program includes an extensive marketing campaign, partnership development with garden centres in pilot area, installation of Fusion demonstration gardens, and certification courses for landscape industry in partnership with Landscape Ontario. Nine additional irrigation companies have achieved WSIP Certification in 2015. Incentives for assessments and irrigation controllers were issued. Advisory Committee developed to create a Fusion Certificate Program.	First demonstration garden installed in pilot area in fall 2015. Two additional gardens to be built in 2016. WSIP course to be held in March 2016, 20 new irrigation companies targeted Fusion course to be held Fall 2016, 20 landscape companies targeted
	Water efficient demonstration gardens		Ongoing	Installed 3 new gardens (in partnership with other organizations) that utilize stormwater in lieu of potable	

PROGRAM COMPONENTS BASED ON BEST IN CLASS REVIEW	TACTICS	SECTOR	2015 TARGET	2015 ACHIEVED	COMMENTS
				water. These gardens are being showcased as Fusion gardens. Maintained the 9 previously installed demonstration gardens.	
	Greener Home and Garden Seminars	Residential	Ongoing	York Region, along with its partners at the Toronto Regional Conservation Authority, Lake Simcoe Regional Conservation Authority, and York Region Food Network held 26 free educational seminars on a variety of topics in an effort to promote water conservation, energy efficiency and waste reduction for York Region residents. In total, 701 residents attended the seminars.	Planning for the 2016 Seminar Series is underway.
Marketing, Education and Outreach					
	Marketing strategies for each program		Ongoing	Ongoing	

PROGRAM COMPONENTS BASED ON BEST IN CLASS REVIEW	TACTICS	SECTOR	2015 TARGET	2015 ACHIEVED	COMMENTS
	component				
	Revised school curriculum	Schools	Ongoing	Completed 4 class presentations, engaging 215 students. Also participated in 8 school presentations on water.	
	Children's Water Festival	Schools	5,000 students	4,800 Grade 4 students, 791 teachers/supervisors, 404 secondary school students, and 128 York Region and partner organization staff attended the 2015 water festival. A calendar contest for Grade 7 students was completed.	
	Implementation of priority education programs based on 10-year education and outreach strategy results	Schools	Ongoing	Strategy for priority youth education programming under review – completion Q2 2016 – builds on current successes and identifies opportunities for enhancements	

PROGRAM COMPONENTS BASED ON BEST IN CLASS REVIEW	TACTICS	SECTOR	2015 TARGET	2015 ACHIEVED	COMMENTS
	Water Efficiency Outreach to new Canadians	Residential	Ongoing	Through TRCA 45 presentations were delivered to 1,042 Language Instruction for Newcomers (LINC) students with a water conservation message. 411 new Canadians also took part in an outdoor experience.	
	Youth/community project that addresses local climate change issues		Ongoing	Modified - combined into all other water related youth education	
	Multi-cultural "Praise Water Week"	Residential	Ongoing	Modified – participated in existing multi-cultural and community events throughout York Region	
	Water conservation events attended by York Region staff	All	Ongoing	Staff took part in 56 community events in 2015, engaging over 8,000 residents.	

I) Rebates and Other Financial Incentives

York Region has been providing water efficiency and conservation programs since 1998. The LTWCS recommended the continuation of the ICI Water Audit and Capacity Buyback Incentive Program, which includes free water audits for ICI properties in York Region and incentives for implementation of permanent water-saving retrofits or upgrades. The ICI Water Use Consultation program has been limited to 10 audits per year for large manufacturers as it requires in-depth water audit with monitoring, engineering analysis and report.

Typically, small and medium-sized commercial and institutional enterprises use water for the same purposes, therefore, recommendations for water savings are based on these specific end uses. York Region will pilot a Once-through Cooling Replacement Incentive program targeting small and medium-sized enterprises.

II) Water Smart Irrigation Professional (WSIP) Program

The strategic direction outline in the 2013 LTWCS strategy report to Council recommended the targeted programs in combination with initiatives that provide the motivation for market transformation. Market transformation is a strategic process of market intervention that uses specific measures to engage business towards the use of water conserving products, practices and services.

The Water Smart Irrigation Professional (WSIP) program was piloted in 2014 and developed in partnership with Peel Region and Landscape Ontario. The certification program aims to educate irrigation contractors about the importance of water efficiency in irrigation system and best practices. The goal of the WSIP program is to influence the marketplace, making efficient irrigation practices the new standard. This program educates participants about conducting assessments and adopting methodologies and techniques to reduce water use in irrigation.

The 2-day course took place again in September 2015 and was attended by 13 contractors. Training focused on water conservation principles, water efficient technology, soil-plant relationships and building sales skills to meaningfully promote water conserving assessments to clients. Participating contractors were also trained on using an auditing application, which facilitated calculating the clients' return on investment. The feedback received by participants was very positive, with many contractors beginning to realize new business opportunities. Participant feedback has been incorporated to redesign and deliver WSIP for its third year in 2016.

For a limited time, York Region and Peel Region are subsidizing the cost of the training for select contractors. Incentives are also available to irrigation contractors who perform comprehensive irrigation system assessments conducted in York Region or the Peel Region using the methodology taught in training.

III) Fusion Certificate Program

Building on the WSIP program, the Fusion Certificate Program aims to achieve market transformation by making Fusion landscapes an industry standard. It aims to facilitate communication/collaboration between professionals involved in the design, installation, maintenance and irrigation of Fusion landscapes. Communication and cross-collaboration between these sectors is vital to the long-term success and function of Fusion landscapes.

Fusion Gardening® is a water efficient landscape program that also aims to manage

storm water effectively on site. The Fusion brand was developed and has been marketed by local municipalities since 2009 to address summer water use. Emphasis is placed on the beauty and appeal, as well as the health of Fusion landscapes.

The Advisory Committee formed in 2015, will be vital to the program direction and development of the program.

IV) New Development

In 2015, the program implementation guides for Sustainable Development through LEED® for High-Rise Residential Incentive Program and Servicing Incentive Program (SIP) were disseminated to the local municipalities. Staff worked closely with local municipal planners and engineers to implement both incentive programs.

In 2015, the Region conducted two sustainable development education sessions for area municipal and Regional staff. These sessions strived to increase awareness and knowledge on the impacts of climate change and extreme weather events, and discussed ways municipalities can mitigate associated risks.

V) Governance and Administration

The Water Conservation Advisory Committee (WCAC) is an ongoing stakeholder group that provides input into York Region's water conservation programs and the implementation of the LTWCS. The Committee has been providing feedback, guidance, recommendations and direction on various initiatives from the LTWCS. New members were recruited for the new term which began in Q1 2016

VI) Regional-Municipal Infrastructure

In 2014, York Region provided funding to the City of Markham to implement leak detection. Markham completed an acoustic leak detection and correlation program that included identifying and then fixing detected leaks as necessary. In an attempt to reduce leakage, Vaughan is in the process of conducting a leak detection program aimed to start in 2016 using temporary district metered areas ("DMAs") and will fix detected leaks as necessary.

VII) Regional-Municipal Processes (Water Consumption Database)

Aligning with the concept of 'big data' a database to store and analyse customer water consumption data from local municipalities was refined to improve data quality. This database serves as a common platform for all local municipalities in York Region to retrieve data and prepare:

1. Water billing records
2. Water consumption reports

Some key functionalities of the application are

- Upload water billing data
- Create and review custom reports
- Review yearly reports
- Search water consumption by address
- Search top water consumers
- Average per capita consumption

This application will support development of targeted programs as it will identify high water users and trends in water use..

VIII) Education and Outreach

York Region continued to offer its successful education and outreach programs, including free water efficient landscaping workshops and the York Children's Water Festival.

Staff developed and piloted an in-class Grade 5 water education program. The program was launched in schools in 2014.

IX) Water Efficient Demonstration Gardens

In partnership with the Town of Richmond Hill and Toronto and Region Conservation Authority (TRCA) a bioswale was installed at a local school which retrofitted their front boulevard with a garden that showcases a low impact development option that is versatile for public and private property. The school is planning to use the bioswale project as a learning tool for their students and to increase parent's awareness of alternative options for landscape design.

Two additional demonstration gardens were installed in or near the Fusion Gardening® pilot area of Kleinburg, to demonstrate to residents the beauty and functionality of this type of gardening.

X) Residential Outreach

Residential outreach increased in 2015. 1,042 new Canadians took part in 45 half day environmental education programs at English as a Second Language (ESL) centres in York Region. These partnerships were delivered through the TRCA Multicultural Connections program in partnership with York Region. In addition, York Region worked with TRCA to build capacity to deliver similar programs in northern York Region. York Region is also working with LSRCA to add York Region information into their educational presentations and material.

In 2015, York Region staff attended 56 public outreach events and provided approximately 8,100 residents with a water conservation message. Many of these events targeted diverse audiences and allowed for participant input/ideas on water conservation through electronic surveys. This information will be used to better target our future campaigns towards new initiatives, rather than promoting practices already demonstrated by residents. Further opportunities to engage a multi-cultural audience are being explored.

XI) The Water Is Campaign

The "Water Is" public campaign continued throughout 2015. This campaign is a multi-year approach to increase public awareness and education on the many values of water. The goal is to help connect residents with the physical, spiritual and natural value of water and increase awareness of what goes into providing clean, safe, reliable and affordable drinking water. This enhanced connection with water will:

- Help residents understand the role of public works (water and wastewater) and the value provided through water rates
- Inspire people to get involved with efforts to protect and improve the quality of groundwater, lakes and streams for now and for future generations
- Empower people to become leaders in their communities and advocates of water conservation, preservation and stewardship efforts
- Encourage people to improve water conservation efforts and help us reach our goal of "No New Water" by 2051.

The Water for Tomorrow program was initiated in 1998 and the report card in Figure A1 below was completed in 2014 and advertised in local newspapers, at events and posted on the York website to inform residents about the amount of water that has been reduced through the life of the program with their participation. The approximate overall savings is 26 million litres of water each day.

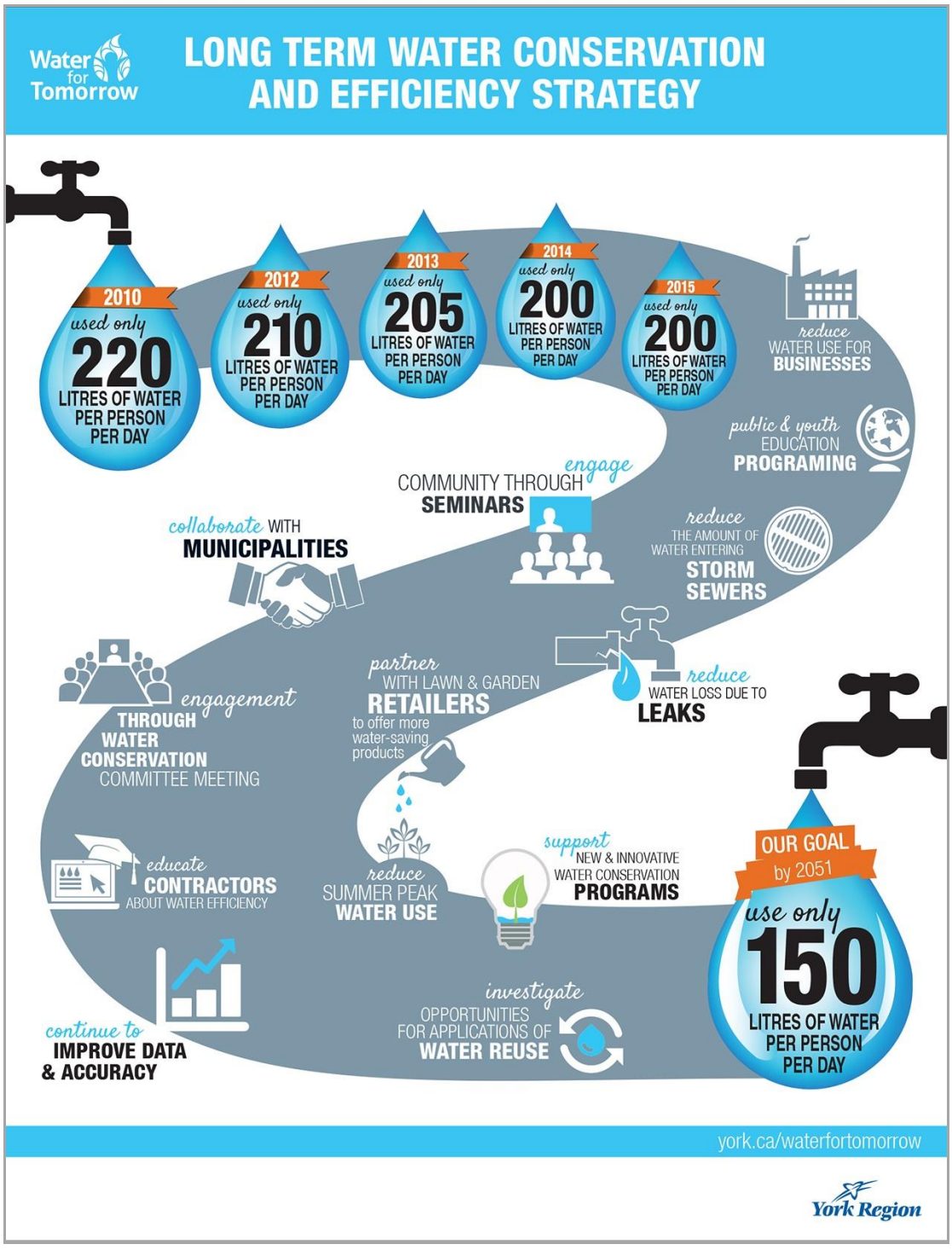

Figure A1: 2015 Report Card

3. Reporting of Water Saved to Date

Water for Tomorrow water-efficiency program is designed to provide the tools York Region residents need to conserve water in the home, the garden and at work. Participation in the program for 2015 is estimated to save a total 0.019 million litres of water per day for a cumulative total of 3.78 million litres of water per day saved since 2011. As of the end of 2015 the total savings since the beginning of the Water for Tomorrow program is 26.2 million litres of water every day. The residents of York Region's water saving efforts translate into enough savings to supply one day of water to 126,000 people or to fill 10 Olympic sized swimming pools. Water savings estimates are based on participation rates in each of the programs. These savings do not reflect changes in the market place and changes to the building code that continue to result in increased water efficiency and conservation.

Subsequent to the development of the first LTWCS in 2010, the Region has shifted their focus from broad-based water conservation programming to market-based programming. This type of programming aims to make long term change towards conservation and efficiency, which may be more difficult to measure and quantify water savings. A market-based approach utilizes the marketplace as delivery agents for water conservation with the ultimate goal of generating transformative, sustained changed.

While it is difficult to quantify water saving in market-based transformation, the Region will continue monitor and report on the overall residential per capita demand, which could provide indication on the impact of market-based programming

4. Local Municipal Participation and Collaboration – Billing Data and All Pipes Model

York Region continues to work with its nine local municipalities to improve data sharing through common database and tools. The increased availability of data is helping staff to better design water conservation programming and to provide more information for planning and forecasting models. The water consumption database and the all-pipes model represent good examples of collaboration.

In 2014, municipally-led IWA water audits were performed to continue to monitor non-revenue water, including leakage, in the water distribution system. The audits were analyzed and non-revenue water numbers was provided to the Region in 2015. The 2014 non-revenue water by municipalities is shown in Table A2. The 2015 data will be reported in the 2016 annual report.

Table A2: 2014 Non-Revenue Water by Municipality

MUNICIPALITY	2014 NON-REVENUE WATER (%)
Aurora	14.6
East Gwillimbury	26.3
Georgina	20.5
King	28.2
Markham	9.6
Newmarket	13.7
Richmond Hill	13.9
Vaughan	14.2
Whitchurch-Stouffville	9.1
Weighted Average	13.2

Non-revenue water is water used for operations and maintenance of the water system as well as for emergency services, such as fire flow. The

average percentage of non-revenue water for York Region as a whole is 13.2%.

The performance of the water distribution systems is measured through the infrastructure leakage index, which is a performance indicator of real water loss from the supply network. York Region has set its ILI target as 3.0 or below. Table A3 shows the infrastructure leakage index measured by each municipality in 2014. Each municipality's ILI is within the acceptable range.

Table A3: 2014 Infrastructure Leakage Index by Municipality

MUNICIPALITY	INFRASTRUCTURE LEAKAGE INDEX
Aurora	1.51
East Gwillimbury	0.66
Georgina	1.93
King	2.84
Markham	1.38
Newmarket	1.56
Richmond Hill	2.12
Vaughan	2.93
Whitchurch-Stouffville	0.88

5. Updated Water Demand by Sector

Access to detailed water consumption data has enabled the Region to develop a better estimate of water demand by sector, including residential, industrial, commercial and institutional (ICI), and non-revenue water.

Based on water consumption database, estimated water demand by sector is summarized in Table A4 below.

Table A4: 2015 Water Demand by Sector

SECTOR	TOTAL 2015 DEMAND
Residential	195 MLD
Industrial, Commercial and Institutional	66 MLD
Other	26.5 MLD
Non-Revenue Water	42.7 MLD
Total Demand	330.2 MLD

Analysis of customer water consumption data, along with York Region supply data, shows that the 2015 Regional demand breakdown for residential is approximately 59 percent, industrial, commercial and institutional demand at 20 percent, Other property category at 26.5 percent, and non-revenue water at 13 percent.

6. Updated Residential Water Consumption Values

The per capita demand targets stated in the 2011 LTWCS are based on previously limited available data and assumptions from the 2009 Water and Wastewater Master Plan Update. The estimated per capita residential consumption from 2010 to 2015 is shown below in Table A5. The numbers are based on customer meter consumption data available to York Region. The per capita consumption for 2015 is estimated to be 200 litres per person per day. The estimated residential demand is expected to become more accurate in future years as the data collection and quality control processes improve.

Table A5: Yearly Estimated Residential Water Consumption

YEAR	ESTIMATED RESIDENTIAL CONSUMPTION (LCD)
2010	220
2012	210
2013	205
2014	200
2015	200

In 2015 the methodology for calculating LCD was improved through the Water Consumption Database to ensure accuracy and consistency in the analysis of the water billing data. Even though water conservation programs have been ongoing effectively the 2015 estimated per capita consumption did not decline as it remained at 200 LCD. This may be due to population growth, weather also plays a significant factor in water demands from year to year. The 2015 summer was hotter, dryer and longer, which could have affected water demands.

Water use targets have now been updated as part of the 2016 LTWCS update, and are summarized in Table A6 below.

Table A6 – Water Saving Scenarios

WATER SAVINGS SCENARIOS	2014	2021	2031	2041	2051
	Residential Consumption Rate (LCD)				
Scenario 1 Regional Incentive Programs	200	192	185	179	173
Scenario 2 Regional Incentive Programs + Existing Provincial Programs and Legislation		190	183	176	170
Scenario 3 Regional Incentive Programs + Existing Provincial Programs and Legislation + Water Reuse and Provincial Guidance and Legislative Changes			180	165	150

Table A7 below shows York Region 2016 targets and goals.

Table A7: York Region 2016 Targets and Goals

PROGRAM COMPONENTS	TACTICS	SECTOR	2016 GOALS
Targeted High Water Users			
Industrial Water Use and Wastewater Consultations	Conduct facility consultations	ICI	Continue to offer program to ICI sector
ICI Capacity Buyback	Complete post audit and provide incentive	ICI	Continue to offer program to ICI sector
Once Through Cooling Pilot	Conduct water audits Post audit for replacing once through cooled equipment and provide incentive	Small and Medium-sized Enterprises Small and Medium-sized Enterprises	Launch the pilot
Outdoor Peak Demand Reduction Strategy			
Water Smart Irrigation Professionals (WSIP)	Provide training and certification to contractors Provide incentives for the assessment completed by contractors	Contractor All	Continue to offer program
Fusion Gardening Pilot	Monitor residential landscape change Evaluate water savings Demonstration gardens	Residential All Residential and ICI	Conduct annual evaluation of pilot
Education and Outreach			
Water Is Campaign	Education outreach	All	Continue campaign
Children's Water Festival	Student participation rate	School	Continue participation
Student Education Initiatives	Education content	School	Continue education initiative

PROGRAM COMPONENTS	TACTICS	SECTOR	2016 GOALS
Water Efficiency Outreach to New Canadians	New Canadian participation rate	New Canadian	Continue initiative
Non-Revenue Water			
IWA Water Audit/Balance	Identify leakage in system	Local Municipalities	Coordinate audits with local municipalities
Leak Detection Program	Minimize water leakage in system	Local Municipalities	Based on audit
Residential New Development			
Sustainable Development through LEED® (High-rise development)	Estimated number of units constructed to standard	Multi-family residential	Continue to offer program
Servicing Incentive Program (SIP) (Low-rise development)	Estimated number of units constructed to standard	Residential	Continue to offer program
Water ReUse Strategy			
Water Reuse	Development and research into water reuse applications	All	Initiate pilot
Advocacy			
Water Conservation Advisory Committee Water and Wastewater Liaison Committee	Coordinate the WCAC meeting Coordinate the WWWLC meeting	All Local Municipalities	Coordinate committee meetings
Operational			
Water consumption Database	Enhance accuracy and quality of billing data	York Region and Local Municipalities	Enhance functionality of Water Consumption Database
Tracking summer and winter water demand per capita	Comparing summer versus winter water demand	Residential	Analyze data
Identify high water users	Mapping high water users	All	Generate GIS heat maps for high water users

PROGRAM COMPONENTS	TACTICS	SECTOR	2016 GOALS
Water consumption Database	Collection of water billing data	Local Municipalities	Collection of 2016 water billing data for the 9 local municipalities
Water consumption Database	Determine consumption by sector	All	Generate water consumption reports for ICI and residential sectors
Energy-Water Nexus	Document and evaluate water/energy savings outcomes for specific programs and pilots	All	Document and evaluate 2016 water savings achieved
Program Evaluation	Improve tracking and reporting processes for programs and pilots	All	Evaluate current tracking frameworks and improve process to ensure correct data is captured and that targets are being met
Support Water and Wastewater Master Plan	Alignment of water conservation objectives	Water and wastewater systems	Continue alignment with Master Plan

Appendix B: Intra-basin Transfer Summary 2015

The Regional Municipality of York is submitting the information below in accordance with the Ministry of Natural Resources and Ministry of the Environment letter dated September 14, 2010, regarding "Successful Completion of Prior Notice and Consultation on The Regional Municipality of York's proposal for an increased intra-basin water transfer under the Great Lakes Charter."

As stipulated in the aforementioned letter, Condition (e) requires York Region to report, no later than April 1, 2016, on activities and achievements of the Long Term Water Conservation Strategy, including an analysis to document how savings achieved through the Strategy could be used to extend the life of the intra-basin transfer beyond 2031 or to supply potentially stressed areas of York Region with a stable water supply.

The 2011 and now the updated 2016 Strategy show York Region's commitment to water conservation and water resource protection to 2051. As shown in Table A6, the Region in 2014 had a residential per capita rate of 200 LCD, and is on track to achieve its future water savings targets and timelines: 180 LCD by 2031 and 150 LCD by 2051. Overall, intra-basin transfer volumes have remained relatively steady despite population growth. The Water and Wastewater Master Plan Update currently underway incorporated water conservation results into water demand modelling and determined intra-basin transfer volumes required to service future growth, among other water sources. Results indicated that required intrabasin transfer in the year 2031 is not expected to exceed 105 MLD.

Condition (f) requires York Region to monitor and report monthly volumes of its intra-basin transfer in the preceding calendar year. In satisfaction of that condition, the following table lists total monthly volumes transferred from the Lake Ontario watershed into the Lake Huron watershed with return flow to Lake Ontario:

Table B1 : 2015 Intra-Basin Transfer Volume

MONTH (2015)	TOTAL INTRA-BASIN TRANSFER VOLUME
January	551,696 m3
February	348,389 m3
March	295,526 m3
April	348,024 m3
May	530,136 m3
June	653,239 m3
July	702,483 m3
August	670,007 m3
September	706,679 m3
October	623,531 m3
November	548,571 m3
December	522,995 m3
Total	6,501,276 m3

In 2015, York Region's average daily intra-basin transfer amount was 17.8 ML.