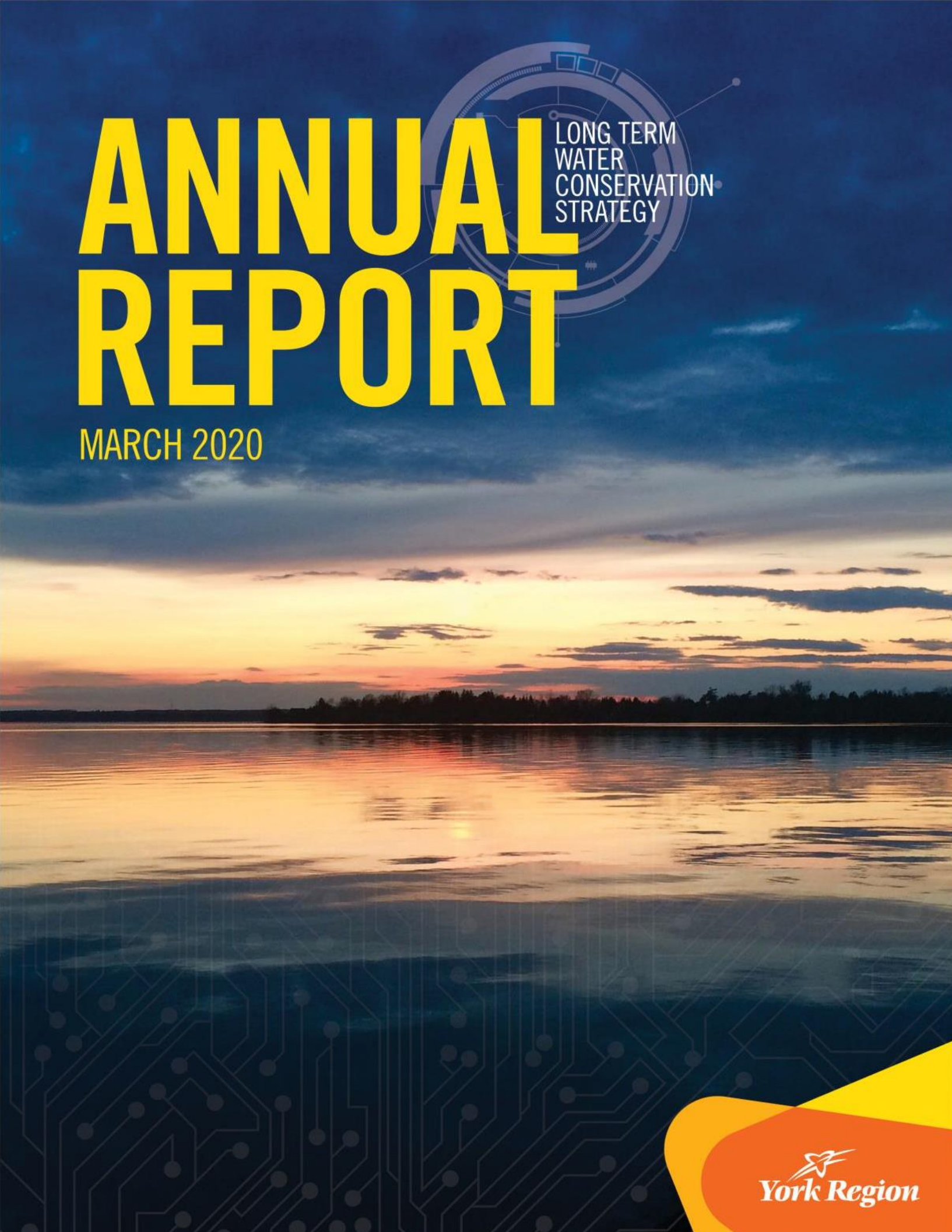
ANNUAL REPORT
LONG TERM WATER CONSERVATION STRATEGY
MARCH 2020
York Region

EXECUTIVE SUMMARY

This report is York Region's ninth annual report to the Ministry of the Environment, Conservation and Parks (MECP) addressing Conditions 8.8 and 8.9 of the Minister's Conditions of Approval for the Southeast Collector Trunk Sewer Individual Environmental Assessment (SEC IEA), and Schedule B of the Permits to Take Water (PTTWs) regulating the Region's intra-basin transfer. 2019 intra-basin transfer volumes can be found in the **Appendix.** This annual report details the 2019 progress on implementation of York Region's 2016 Updated Long Term Water Conservation Strategy (the "Strategy"), submitted to the former Ministry of the Environment and Climate Change on March 31, 2016. On July 4, 2019, the Central Region Director provided comments on and indicated satisfaction with the eighth annual report dated March 31, 2019; acknowledging York Region's progress on the implementation of the LTWCS. The letter from the MECP also noted that the report clearly identified how the average daily water demand in York Region is decreasing even though the population in the Region is increasing.

Since implementing its Long Term Water Supply Master Plan in 1998, the Region has achieved an overall savings of over 27 million liters per day (MLD). In 2019, York Region's residential consumption was 184 litres per capita per day (LCD) compared to 194 in 2018. Since the residential LCD is sensitive to climate effects, particularly in the summer months with outdoor water use, annual variability is to be expected.

To achieve its 2019 successes, the Region continued to focus on nine program areas listed below; an overview of the Region's 2019 program activities and achievements is provided in **Table 6**.

1. Programs for ICI high water users
2. Programs for small and medium ICI facilities
3. Outdoor peak demand reduction
4. Education and outreach
5. Non-revenue water reduction
6. Sustainable residential new development
7. Water reuse
8. Collaboration and advocacy
9. Big data analytics

The Region has initiated its 2021 Long Term Water Conservation Strategy Update, this update will: evaluate the effectiveness of water conservation programming to date and refine initiatives, as needed; review additional performance metrics to capture complexity of water use and to promote targeted water conservation efforts; develop a trackable plan with quantitative objectives to help evaluate and improve on annual successes; and enhance linkages between water conservation, energy efficiency and climate change under the lens of One Water. The Region will continue to leverage its knowledge and experience as it updates its Long Term Water Conservation Strategy, and continue to demonstrate leadership in the field of water conservation and efficiency.

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1.0 INTRODUCTION

On March 31, 2010, the Southeast Collector Trunk Sewer Individual Environmental Assessment (SEC IEA) was approved subject to thirteen conditions (with seventy-four sub-conditions). Consistent with the requirements of the SEC IEA approval Conditions 8.8 and 8.9, this report is the ninth Long Term Water Conservation Annual Report prepared by York Region. In this report, progress and results achieved in 2019 on implementation of the Long Term Water Conservation Strategy Update dated March 31, 2016 (the "Strategy") within York Region are presented.

York Region has a rapidly expanding population, with growth projected to 2041. This increasing growth puts pressure on the water supply system. Recognizing the need for smart water management, York Region has integrated water conservation into its sustainable growth plans and policies. Since implementing its Long Term Water Supply Master Plan in 1998, York Region has achieved overall savings of over 27 million liters per day (MLD). York Region's current Strategy envisions a residential consumption of 150 litres per capita per day (LCD) by the year 2051; in 2019 the residential consumption was 184 LCD.

The Region has initiated its 2021 Long Term Water Conservation Strategy Update. The objective of this update is to refine the Region's long term water conservation goals and targets, develop an updated strategy, and lay out a framework for implementation of the updated strategy. It will review the attainability of the Region's existing residential water consumption target of 150 LCD by 2051, re-evaluate existing KPIs and develop new KPIs for monitoring and tracking success of the recommended water conservation programming, as needed. The 2021 Strategy Update will also evaluate the feasibility and level of effort required for the various programs in addition to their effectiveness. The Strategy Update is proceeding in accordance with the requirements of Condition 8.10 of the SEC IEA Approval.

Integrating water conservation into other Regional plans such as the Water and Wastewater Master Plan, and One Water Action Plan will further support York Region's commitment to delivering and promoting environmentally sustainable services.

2.0 BACKGROUND

Centrally located in the Greater Toronto Area (GTA), York Region (the Region) is one of the fastest growing regions in Canada. The Region is the only regional 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 the Region of Peel (88 per cent), as well as from Lake Simcoe and groundwater sources (12 per cent). The population of the Region is currently 1.2 million and is projected to increase to about 1.8 million by 2041. Without conservation, demand for drinking water and wastewater treatment will increase significantly as the population grows.

2.1 WATER CONSERVATION TARGETS AND TIMELINES

Per capita residential water demands have declined over the last decade due to the impact of Regional programs, an improvement in the efficiency of key water-using fixtures and appliances (e.g. toilets, clothes washers, and showerheads), advancements in the Ontario Building Code, and a growing awareness of the importance of using our natural resources wisely.

Table 1 summarizes target residential consumption rates that can be achieved over time if three water saving scenarios are implemented. For Scenario 1, the targeted consumption rate assumes reduced water use from Region's water conservation programs only. For Scenario 2, the targeted consumption rate assumes reduced water use from the Region's water conservation programs plus additional water savings from Provincial legislation such as mandating water efficient fixtures in new homes through the Ontario Building Code (effective January 2014). For Scenario 3, the targeted consumption rate requires implementation of water reuse and Provincial guidance on water reuse applications. For example, adoption of grey water reuse systems in the residential sector would be a good opportunity to reduce water demand and reach York Region's goal of 150 LCD.

Table 1: Residential Water Saving Targets and Timelines

Water Saving Scenarios	2015	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 on Water Reuse Applications			180	165	150

2.2 ONE WATER ACTION PLAN

In 2017, York Region released its first One Water Action Plan. One Water promotes approaching water management in an integrated manner by recognizing the interconnectedness of traditionally separated water systems. One Water is an emerging concept that reduces the burden on water sources and infrastructure, and supports York Region in meeting the growth of water demands while achieving both financial and environmental sustainability.

The Region is building a One Water approach into its service delivery through the continued development and implementation of the One Water Action Plan. There are three high-level goals within the One Water Action Plan falling under the broad headings of Integrate, Innovate and Infra-stretch[1] as illustrated in **Figure 1**. The action plan brings together existing programs and identifies new opportunities that promote integrated water resource planning and innovation.

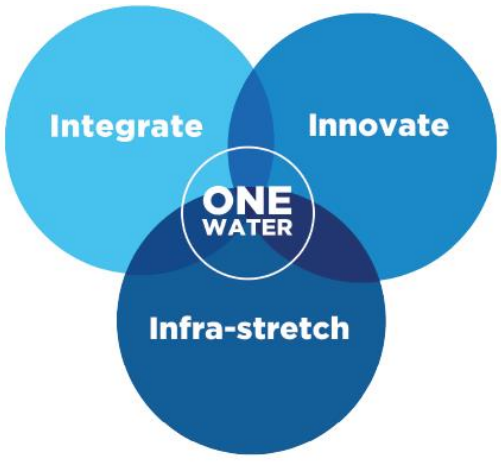

Figure 1: One Water Action Plan

The plan foresees inflow and infiltration reduction, water conservation and water reuse, as fundamental elements of the Region's water system and encourages greater conservation and the use of natural processes to manage water. It

[1] "Infra-stretch" is a term used by York Region to describe the concept of maximizing the useful capacity and useful life of built infrastructure to minimize and/or defer capital investment.

also finds valuable new sources of water in rainfall, snow melt and the safe reuse of treated wastewater.

Water conservation and inflow and infiltration reduction efforts help sustain existing sewer infrastructure by reducing wastewater flows, thereby “infra-stretching” or maximizing the existing capacity of the infrastructure. The reclaimed servicing capacity can then be used to support planned growth. Energy savings associated with reduced water consumption and wastewater flows also helps York Region fulfill its commitment to reducing greenhouse gas emissions.

To support program development, the Region completed an interjurisdictional scan in partnership with the Water Research Foundation in 2019 to examine global best practices for One Water implementation for consideration in York Region’s One Water approach. Successful continued implementation of the plan will require ongoing support and expertise within York Region and from external partners. An important aspect of the One Water Action Plan is continuing to build collaborative partnerships in order to manage challenges and explore new opportunities to optimize and improve the resiliency of our critical infrastructure systems. An example of leveraging partnerships to explore innovative solutions is the Water Reuse Demonstration Project (see **Table 6** for further details on project progress in 2019). Continued work to develop the One Water approach and integrating it in service delivery is underway through the Region’s Water and Wastewater Master Plan update that is currently ongoing.

3.0 WATER DEMAND ANALYSIS

In 2019, York Region's water demand was 184 LCD, based on single-family residential households only. York Region is on track to achieve its interim target of 190 LCD in 2021 as consumption has generally been on a downward trend as shown in **Figure 2**. The decline in LCD over the course of 2019 is interpreted to be related to the cooler and delayed summer season experienced in York Region compared to 2018. Since the residential LCD is sensitive to climate effects, particularly in the summer months with outdoor water use, annual variability is to be expected. Further discussion related to the 2019 seasonal influences on water use is provided in **Section 3.2.2**.

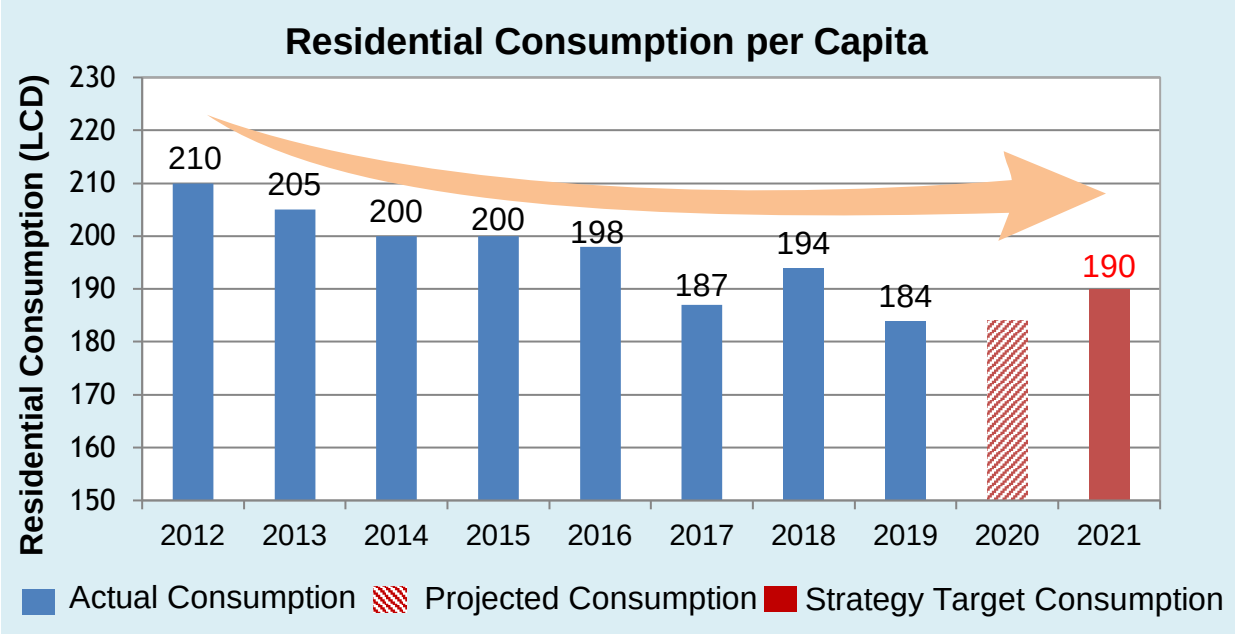

Figure 2: Residential Consumption (LCD)[2]

[2]The 2020 LCD was estimated by using 2020 projected weather forecasts, data was obtained from the following sources: http://climate-scenarios.canada.ca/?page=cansips-prob, https://weather.gc.ca/saisons/image_e.html?img=s234pfe1t_cal&bc=prob https://www.almanac.com/weather/longrange/region/ca/3.
The 2021 LCD is based on the Strategy targets and timelines shown in Table 1 above.

3.1 WATER DEMAND BY SECTOR

Through enhanced development of the Water Consumption Database, the Region has developed better analytics to estimate the water demand by sector, including residential, industrial, commercial and institutional (ICI), and non-revenue water. Tracking water demand by sector provides a greater insight into how water demand is distributed among homes, businesses, and non-revenue uses—thus enabling the Region to better target its conservation programming.

The breakdown of 2019 regional water demand was determined based on the following: (i) Analysis of local municipal customer water consumption data; and (ii) York Region water supply data. The results are shown in **Table 2**. The total water demand is approximately 325.9 Megalitres per Day (MLD). A percentage break down by sector can be found in **Figure 3.**

Table 2: 2019 Water Demand by Sector (MLD)

Sector	2019 Average Daily Demand (MLD)
Residential	204.3
- Single-Family Residential	148.4
- Multi-Residential	41.6
- Other Residential	14.2
Industrial, Commercial and Institutional	69.2
Other	1.7
Non-Revenue Water	50.7
Total Demand	**325.9**

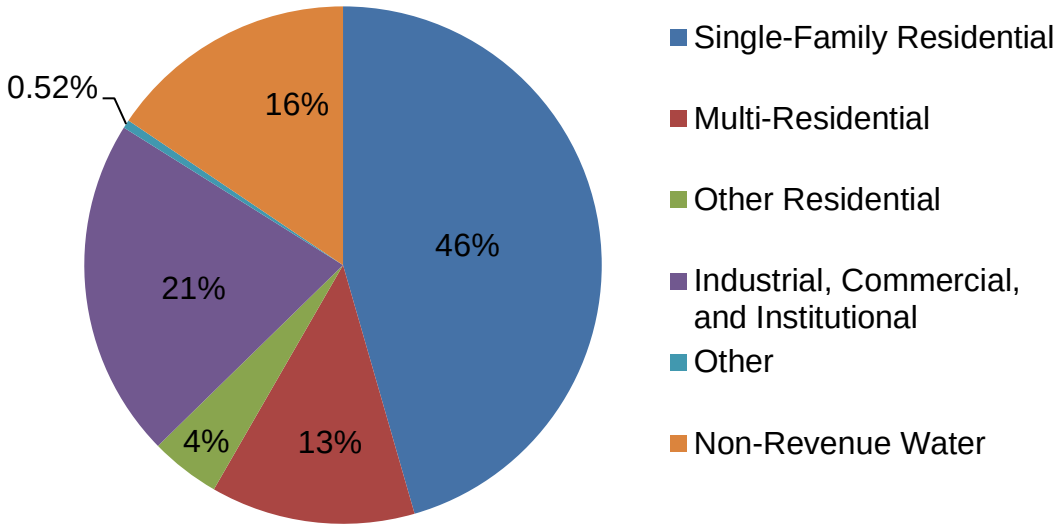

Figure 3: 2019 Water Demand by Sector (%)

3.2 FACTORS AFFECTING WATER DEMAND

In addition to the Region's water conservation programs and initiatives (which are detailed in **Section 4.0**), numerous factors such as weather, population growth, water rates and changes to the Building Code have an influence on water demands each year.

3.2.1 Population Growth

York Region is one of the fastest growing regions in North America. The Region's commitment to innovation and being a leader through water conservation strategies has assisted in a general downward trend of water demand since 2011 despite increases in population, as shown in **Figure 4**. This trend is expected to continue into the future as the Region continues to deliver its Long Term Water Conservation Strategy.

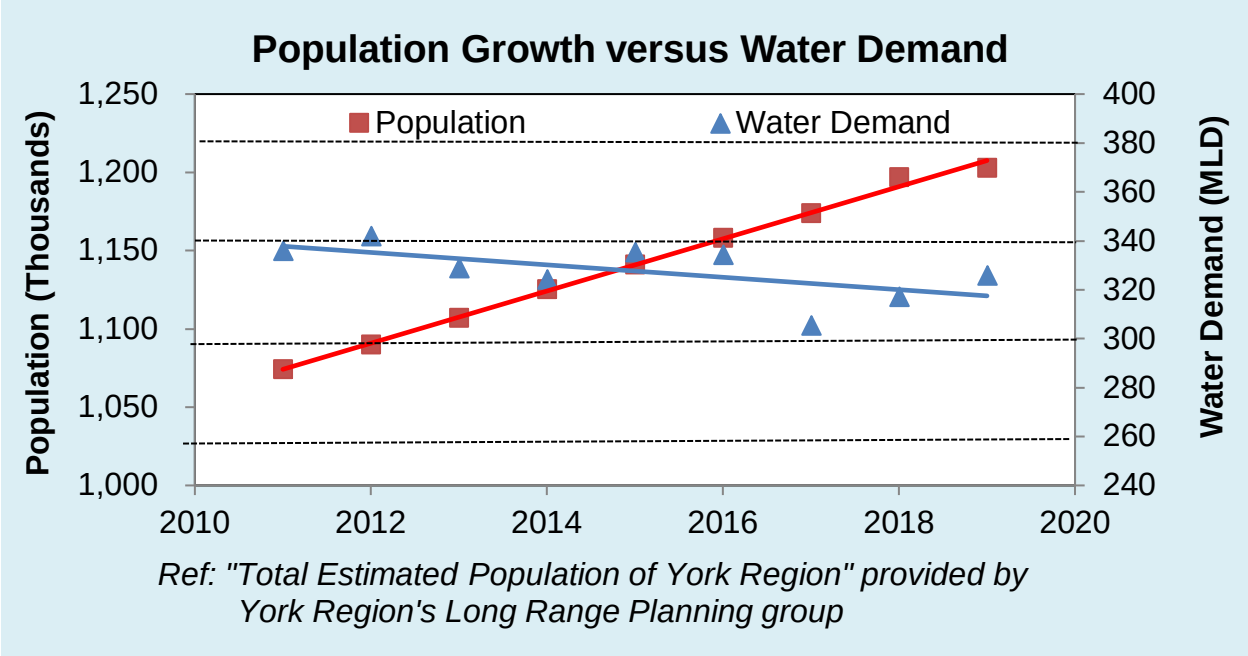

Figure 4: Population Growth and Average Daily Water Demand, 2011-2019

3.2.2 Weather Conditions

Weather plays a significant factor in overall water demand from year to year. As a rule of thumb for outdoor water consumption, the hotter and drier the weather, the greater amount of water is consumed (such as for filling pools, watering lawns with sprinklers, etc.). Furthermore, over the winter and fall seasons, outdoor water consumption is typically at a minimum due to decreased outdoor water use.

Detailed spring and summer weather statistics from 2017 through 2019 at the Toronto International Airport weather station are provided in **Table 3**. To confirm that these weather statistics were applicable to York Region, temperature and rainfall data from

the 68 rain gauges in York Region was obtained, as shown in **Table 4**; the data obtained from both sources portrayed similar trends.

The data presented in **Tables 3** and **4** shows that both climate markers, cooling degree days (CDD) and days above 30°C, were higher in 2018 when compared to 2019, and are in-line with 2017. In addition, temperatures above 30°C occurred in May in 2018, whereas in 2019, such temperatures did not occur until July, indicating that there was a delay in the summer season. This comparison of weather data explains the decrease in annual demand from 194 LCD in 2018 to 184 LCD in 2019.

Another connection can be drawn between the weather data in 2017 and 2019. The spring and summer of 2017 and 2019 had very similar average temperatures and rainfall patterns. Even though this weather data is very similar, residential water demand still decreased from 187 to 184 LCD. This decrease in LCD has been likely influenced by the Region's water conservation programs as well as changes in behavior and market transformation.

Table 3: York Region Weather Statistics for 2017-2019, April to September[3]

Year	Litres per Capita per Day (LCD)	Max Temperature (°C)	Total Rainfall (mm)	Number of Days with Rainfall	Temperature over 30°C (Days)	Cooling Degree Days (°C)
2017	187	33.6	490.8	77	13	340.4
2018	194	35.4	452.8	67	29	510.5
2019	184	33.0	493.6	80	12	336.9

Table 4: York Region Weather Statistics from the 68 Rain Gauges in York Region, April to September

Year	Litres per Capita per Day (LCD)	Max Temperature (°C)	Total Rainfall (mm)	Number of Days with Rainfall	Temperature over 30°C (Days)
2017	187	34.6	608	115	18
2018	194	35.9	521	101	42
2019	184	34.4	568	123	29

3.2.3 Water Rates

The Region charges each local municipality a uniform cost per cubic meter regardless of the volume of water purchased or season of use. With this rate structure, the revenue

[3] Weather data obtained from https://climate.weather.gc.ca/historical_data/search_historic_data_e.html

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). Each local municipality, in turn, is responsible for developing their own rate structure to bill their own customers. Some municipalities are starting to implement stormwater rates to recover the operational and capital costs of stormwater infrastructure.

Table 5 summarizes the Region's historical water rates since 2011 and future blended rates through to 2022, as endorsed by Regional Council in October 2015. Annual water rate increases are determined based on full cost recovery analysis: water demands analysis, population growth, maintaining existing assets, day-to-day operations, and building reserves for future asset rehabilitation and replacement.

Table 5: York Region Water Rates, 2011-2021[4]

Year	Water Rate ($/M3)	Wastewater Rate ($/M3)	Blended Rate ($/M3)	Increase (%)
2011	0.6973	0.7900	1.49	-
2012	0.7512	0.8848	1.64	10
2013	0.8087	0.9910	1.80	10
2014	0.8697	1.1099	1.98	10
2015	0.9345	1.2431	2.18	10
2016	0.9582	1.4158	2.37	9
2017	1.0021	1.5855	2.59	9
2018	1.1051	1.7154	2.82	9
2019	1.2178	1.8565	3.07	9
2020	1.3330	2.0180	3.35	9
2021*	1.3810	2.0672	3.45	2.9
2022*	1.4109	2.1373	3.55	2.9

*Anticipated water rates

The Region's water rates were approved by the York Regional Council and are effective in April of each year. Since 2011, the annual water rate increased by 9-10% each year; this increasing rate is determined based on full cost recovery analysis: water demands analysis, population growth, maintaining existing assets, day-to-day operations, and building reserves for future asset rehabilitation and replacement. Numerous York Region studies have shown price to be an important driver of demand for water. As water rates in York Region increase, some residents consider adopting additional water conservation practices. Responsiveness varies widely with location, however, because of the impact of such factors as local climate, attitudes, incomes and relative price of water.

[4] Rates from 2011 to 2019 were obtained from The Regional Municipality of York Bylaw 2011-2019. Rates for 2020 through to 2021 were approved by the Council of The Regional Municipality of York on October 8, 2015. Annual rates are effective April of each year.

4.0 LONG TERM WATER CONSERVATION ACHIEVEMENTS

Since 2011, the marketplace has adopted water conservation measures identified the Ontario Building Code Act which includes water efficient fixtures and appliances. This shift in the marketplace enabled the phase-out of Regional rebates, with little impact on water conservation. While some programs will continue to have broad-based elements (e.g., the ICI Capacity Buyback Incentive program), the Region's program focus has shifted to a more targeted and market-based approach. The Water Smart Irrigation Professional program and the Fusion Landscape Professional program are excellent examples of adopting a market-based approach as they enable the industry sector to influence the marketplace towards making water efficient practices the new standard. An overview of York Region's 2019 program activities and achievements is provided in **Table 6**.

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:

1. Programs for ICI high water users
2. Programs for small and medium ICI facilities
3. Outdoor peak demand reduction
4. Education and outreach
5. Non-revenue water reduction
6. Sustainable residential new development
7. Water reuse
8. Collaboration and advocacy
9. Big data analytics

Table 6: 2019 Long Term Water Conservation Strategy Achievements

Program Components	Program Summary	2019 Progress Update
1. Programs for ICI High Water Users		
ICI Capacity Buyback Incentive Program	York Region offers water audits at no cost to high water using ICI facilities. These water audits are aimed at helping ICI facilities within York Region reduce their water consumption which can be high in many cases. Offering an incentive program and including water audit services can assist businesses with the cost of implementing identified water savings opportunities.	Conducted seven ICI water audits in 2019; 73 cumulative audits to date (2009-2019). The 2021 Strategy Update will evaluate the level of effort required for the program in addition to program effectiveness. Demonstrating leadership in water efficiency, York Region won the 2019 OWWA Award of Excellence, Public Sector & Utilities for its ICI Capacity Buyback Incentive Program. This award recognizes outstanding initiatives in water efficiency in both the public and private sector. In 2018 York Region conducted a water audit at the Regional administrative building, and recommended water efficiency fixtures replacement for washroom renovations. In 2019 the design for the renovations was finalized; implementation will start in 2020.
	Facilities which participated in the water audit within the last three years will qualify for the ICI Capacity Buyback incentive. Once eligible retrofit(s) are completed at the facility, York Region or its agent will conduct a verification audit to verify post-retrofit water savings. York Region will issue a one-time incentive of up to 50% of the cost to a maximum of $50,000.	Completed three verification audits in 2019; 13 cumulative audits to date (2009-2019).

Program Components	Program Summary	2019 Progress Update
2. Programs for Small to Medium ICI Facilities		
Water Efficiency Equipment Replacement Incentives	The Water Efficiency Equipment Replacement Incentives Program was created to target small to medium ICI facilities and multi-unit residential buildings. This program offers financial incentives for replacing inefficient equipment with new water-efficient models.	In 2019, the Region received one application from a multi-residential property for the replacement of 91 inefficient toilets to efficient 3.0 litres per flush models.
3. Outdoor Peak Demand Reduction		
Water Smart Irrigation Professionals (WSIP)	To help reduce peak demands, York Region in collaboration with the Region of Peel and Landscape Ontario developed the Water Smart Irrigation Program (WSIP). This specialized training and certification program teaches irrigation contractors to conduct "water smart" irrigation system efficiency and maintenance services to clients in the Region of Peel, and York Region.	Completed 2019 training with 19 individual attendees from 12 irrigation companies. There are now 40 WSIP companies and 89 individuals certified to date in York Region and the Region of Peel. In 2019, WSIP contractors completed 126 assessments; savings of over 29,000 m_3 was achieved through schedule changes and controller upgrades. To date, 257 assessments have been completed (2015-2019).
		Demonstrating the success of the WSIP program, York Region in partnership with the Region of Peel won the 2019 Trillium Award at Landscape Ontario's Awards of Excellence Ceremony for its outstanding leadership and contribution to the irrigation sector through the development and delivery of the WSIP program. York Region in partnership with the Region of Peel also won the Smart Water Application Technologies, Outstanding Industry Partnership Award, which recognizes the efforts of programs or campaigns

Program Components	Program Summary	2019 Progress Update
		to increase partnerships with landscape professionals, irrigation contractors and other professionals with irrigation responsibilities to promote outdoor water conservation.
Fusion Gardening®	The Fusion program is another outdoor peak demand reduction program. Fusion Gardening® is a style of landscape design that creates beautiful outdoor spaces while reducing watering needs. Fusion gardens include many different elements and concepts such as choosing the right plant for the right place, efficient irrigation systems, permeable pavement, rainwater harvesting and more.	York Region worked with the Region of Peel and Landscape Ontario on a feature garden at Canada Blooms (March 2019) to show various low impact development features and their positive aesthetics. More than 5,500 people visited the demo garden. York Region received two awards for the Fusion demo garden at Canada Blooms; Best Overall Creativity in Garden Design and Outstanding Educational Garden for Students.
		A total of 4 “Fusion Gardening” related social media posts and stories engaged more than 5,000 residents.
Fusion Landscape Professional (FLP)	The Fusion Landscape Professional Program (FLP) aims to transform the market by making Fusion landscapes an industry standard. This training and certification program was developed in partnership with Landscape Ontario and the Region of Peel. It aims to facilitate communication and collaboration between professionals involved in the design, installation, maintenance and irrigation of Fusion landscapes as part of the Fusion program.	Completed 2019 training with 19 attendees. There are now 34 FLP companies and 44 individuals certified to date in York Region and the Region of Peel. In 2019, York Region received two incentive applications; one for an installation of a Fusion garden and one for a design.
4. Education and Outreach		
Water System,	Ongoing education and outreach aims to highlight the	Over 27,000 views of our various water system videos published on our

Program Components	Program Summary	2019 Progress Update
Conservation and Efficiency Outreach	exemplary work York Region is doing to keep the water system one of the best in its class. With the continued goal of raising public awareness about water sources, water protection, water system integrity and water conservation. This showcases the value of water while highlighting the processes, people and infrastructure behind the scenes of our clean, safe, reliable, and affordable drinking water.	YouTube channel, www.youtube.com/user/YorkRegionGovt . More than 900 visits to york.ca/waterplan where York Region's water messaging is published. More than 300 visits to york.ca/longtermwater which provides the links to the 2011 and 2016 LTWCS strategies and annual progress reports.
		2,205 elementary and 208 secondary students and 361 teacher/supervisors attended the York Children's Water Festival.
		Three youth education events, 315 students engaged.
		14 public events with 3,150 people engaged. 165 participants in the 2021 Water and Wastewater Master Plan Update in-person Open Houses where York Region's water messaging was available in multiple mediums. There were 713 viewings online version of Open House.
		Seven presentations delivered at the New Canadian *'Welcome Centres'* with a total of 197 participants. Presentations featured significant water system messaging.
		Five articles published on various aspects of the municipal water infrastructure and supply system.
5. Non-Revenue Water Reduction		
IWA Water Audit/Balance	Annually, each local municipality completes a water balance review using the IWA/AWWA Water Audit	Received all municipal IWA audits for 2018. The reported levels of non-revenue water are logged and tracked

<table>
<tr><th>Program Components</th><th>Program Summary</th><th>2019 Progress Update</th></tr>
<tr><td></td><td>software tool and submits it to the Region.</td><td>by the Region.

<table><tr><th>Municipality</th><th>NRW %*</th><th>ILI*</th></tr><tr><td>Aurora</td><td>11.1</td><td>1.29</td></tr><tr><td>East Gwillimbury</td><td>23.9</td><td>1.65</td></tr><tr><td>Georgina</td><td>20.3</td><td>1.98</td></tr><tr><td>King</td><td>31.8</td><td>3.72</td></tr><tr><td>Markham</td><td>10.0</td><td>1.27</td></tr><tr><td>Newmarket</td><td>21.5</td><td>2.86</td></tr><tr><td>Richmond Hill</td><td>13.6</td><td>2.08</td></tr><tr><td>Vaughan</td><td>5.2</td><td>0.37</td></tr><tr><td>Whitchurch-Stouffville</td><td>14.0</td><td>1.54</td></tr></table>
*Non-revenue water percentages and the Infrastructure Leakage Index are reported by each municipality in the 2018 annual IWA/AWWA water audit summary and provided to the Region; the Region does not QA/QC the data provided.</td></tr>
<tr><td>Non-Revenue Water Management Program</td><td>Non-revenue water is defined as water that is not billable to the end user, and is comprised of losses (such as metering inaccuracies, unauthorized consumption/water theft, data handling errors, and true water system leakage) and unbilled authorized consumption (for example, usage of water for infrastructure operation and maintenance such as flushing for water quality purposes and for emergency services, such as fire flow).

The Region and its local municipalities have developed and implemented strategies to help minimize non-revenue water such as</td><td>In 2018, HydraTek & Associates (HydraTek) approached the Region to partner in and support an IESO Conservation Fund Project: Reducing Municipal Water Loss and Energy Consumption through Pressure Management. The project involves the deployment of a mobile testing unit (MTU) across 20 district metered area (DMA) sites in several municipalities across Ontario.

In 2019, York Region began work with HydraTek on the mobile flow metering and pressure regulating testing pilot. Three of York Region’s local municipalities have participated to date, with one leak detection and remediation success story. Through the mobile testing at this site, a potential leak was suspected. Subsequently, the municipality conducted a leak survey and a significant leak was identified and</td></tr>
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Program Components	Program Summary	2019 Progress Update
	conducting leak detection inspections on their water infrastructure.	repaired. Mobile testing was deployed again, post-leak repair and results showed an annual water savings of 139,000 m_3 (approximately $426,000) with other inherent savings related to energy consumption and reduction of GHG emissions. From the inception of the program in February of 2019, the MTU has been deployed at 7 of the project's 20 allocated DMA sites across Ontario. From the testing results, the overall concept has proven to be successful.
		Continued tracking both Regional and local municipal non-revenue water events. Issued quarterly reports to municipalities.
		In 2019 approximately 5km of York Region's Ductile Iron (DI) watermains were inspected using correlators/ground microphones; no leaks were detected. In 2017 and 2018 approximately 5km each year of DI watermains were inspected using correlators/ground microphones; no leaks were detected. Throughout 2016-2019 York Region undertook a valve chamber inspection program where every watermain and forcemain chamber was inspected. Several leaks were found and repaired throughout the years.
6. Sustainable Residential New Development		
Sustainable Development through LEED® (high-rise)	LEED® aims to reduce potable water demand within high density residential buildings. The Region has specific criteria that must be met in addition to the LEED® Canada mandatory requirements. Criteria include	To date, 13 buildings totaling 2,561 apartment units have been constructed through the LEED® program. An additional 4 buildings (total 835 units) enrolled in the LEED program are not yet constructed. A review of the LEED® program is underway as a continuous

Program Components	Program Summary	2019 Progress Update
	no potable water used for irrigation, an overall 40% reduction in water consumption, and WaterSense® plumbing fixtures installation.	improvement initiative based on stakeholder feedback, changes in policies, integration with other initiatives and availability of monitoring data.
Servicing Incentive Program (SIP) (low-rise)	The Servicing Incentive Program aims to reduce water demands in new low-rise (up to three storeys) construction. The program allows developers to obtain additional capacity assignment through proposed implementation of new water efficiency control measures. This includes the use of high-efficiency plumbing fixtures and hot water delivery systems which are either “roughed-in” (installation of all the necessary wiring and piping for future connection) or fully connected.	To date, 2,556 single detached equivalent (SDE) units have either been Registered or Draft Approved through the Servicing Incentive Program. A review of the Servicing Incentive Program is underway as a continuous improvement initiative based on stakeholder feedback, changes in policies, integration with other initiatives and availability of monitoring data.
Servicing Development Incentive Program (SDIP)	Specific to East Gwillimbury, the Servicing Development Incentive Program allows developers to obtain additional capacity assignment through proposed implementation of new water efficiency and inflow and infiltration control measures. The Servicing Development Incentive Program is broken out into ICI and residential; ICI criteria include plumbing fixtures, cooling equipment, landscaping, food preparation, swimming pools/non-process and ice rinks. Residential criteria	To date, 6,002 single detached equivalent units have either been Registered or Draft Approved through the Servicing Development Incentive Program.

Program Components	Program Summary	2019 Progress Update
	include water efficient plumbing fixtures which includes an on-demand hot water delivery system and landscaping/outdoor measures.	
7. Water Reuse		
Water Reuse	Development and research of water reuse applications. This includes a Water Reuse Research Demonstration project which began in 2017 and will be completed in 2020.	The second phase of the Water Reuse Research Demonstration Project was completed in 2019, this included preliminary evaluation of first growing season results and the completion of a second growing season. A workshop was held with stakeholders including MECP staff in May 2019 to review preliminary findings. Preliminary findings indicate good plant and soil health in the test plot with no significant differences between crop quality between test and control plots. MECP provided in-kind laboratory analysis for pharmaceuticals, personal care products and per/polyfluoroalkyl substances in irrigation and ground water for both growing seasons. The project will be completed in 2020 with a final stakeholder workshop. York Region is also developing an economic impact assessment for water reuse in 2020.
	To encourage implementation of water reuse in the ICI Sector, the Region offers a higher incentive rate through the ICI Capacity Buyback Incentive Program.	Six reuse opportunities have been implemented at ICI facilities since 2012; 58 ML/year cumulative water savings to date.

Program Components	Program Summary	2019 Progress Update
8. Collaboration and Advocacy		
Advocacy	York Region continuously advocates public policy to support its ability to provide sustainable water, wastewater, forestry and waste management services for York Region's growing population.	Conducted two Water Conservation Advisory Committee meetings. This committee is an advisory body that consists of a variety of stakeholders including the MECP, local municipalities, ICI businesses, school boards, TRCA, and LSRCA.
Stakeholder Collaboration	York Region continues to explore collaboration opportunities with other regions on water conservation programs and initiatives.	Collaborated with the Region of Peel for WSIP and FLP training with Landscape Ontario.
	York Region has partnered with Conservation Authorities on environmental programs covering multiple sectors and subjects.	To help promote the benefits of Fusion to landscape professionals and to residents and businesses, York Region collaborated with the Toronto and Region Conservation Authority (TRCA) to develop a quantitative tool for estimating associated storm water runoff volume reductions, water savings, and greenhouse gas emission reductions. Development was completed December 2019. The Region attended the Partners in Project Green Forum to discuss water conservation initiatives and partnership opportunities. York Region is also collaborating with the TRCA on their Sustainable Neighbourhood Action Program (SNAP). SNAP aims to accelerate the creation of sustainable neighbourhoods in older urban areas by providing a neighbourhood-based solution for achieving greater impact in urban renewal and climate action.

Program Components	Program Summary	2019 Progress Update
9. Big Data Analytics		
Water Consumption Database (WCD)	The Water Consumption Database (WCD) is an application which collects and analyzes all local municipal water billing consumption.	Collected municipal billing data for 2019 which was uploaded into the Region's WCD. Using this data, 2019 water consumption per capita per day was generated; the Region's LCD in 2019 was 184. Raw municipal billing data is provided by each local municipality to the Region; preliminary QA/QC is conducted by the WCD using a set of business rules. While the WCD helps improve accuracy and consistency in the analysis of water billing data, there are still inaccuracies. York Region will continue to work with the local municipalities to improve data quality.
		Generated water consumption heat maps to help target future programming.
Energy Reduction	In recognition of the synergy between water and energy conservation, energy savings are tracked as a result of water conservation initiatives.	Tracked water and energy savings under the corporate Energy Conservation and Demand Management Plan (ECDMP). Approximately 161,125 ekWh/year has been saved in 2019 from water conservation programs.
Greenhouse Gas Reduction	As a result of water and energy use reductions, greenhouse gas emissions are tracked to give an overall picture of the broader benefits of water conservation.	Tracked equivalent greenhouse gas emissions reduction from water saved under corporate ECDMP. Approximately 6.61 tons CO_2e savings in 2019.

5.0 WATER CONSUMPTION MAPPING

By leveraging digital technologies, the Region can gain efficiencies, increase staff productivity, gain insight and effectively make business decisions. The Water Consumption Database (WCD) application is one of the digital tools the Region uses to compile and analyze all nine local municipalities' billing data to calculate the LCD. The application assists with analyzing large quantities of data which results in improved data accuracy whilst decreasing staff time. The Region also created heat maps using Geographic Information Systems (GIS) and data from the WCD. The methodology for creating the heat maps shown in **Figure 5** through **Figure 9** involved dividing the Region into 500 m_2 blocks. All addresses were joined to the nearest corresponding block. Consumption was then aggregated for all address points within the block and then divided by the total number of address points. The data was then displayed on the map using graduated colors and the Natural Breaks (Jenks) classification method, which creates classes based on natural groupings inherent in the data.

Water consumption mapping for 2019 is provided below, and includes the following:

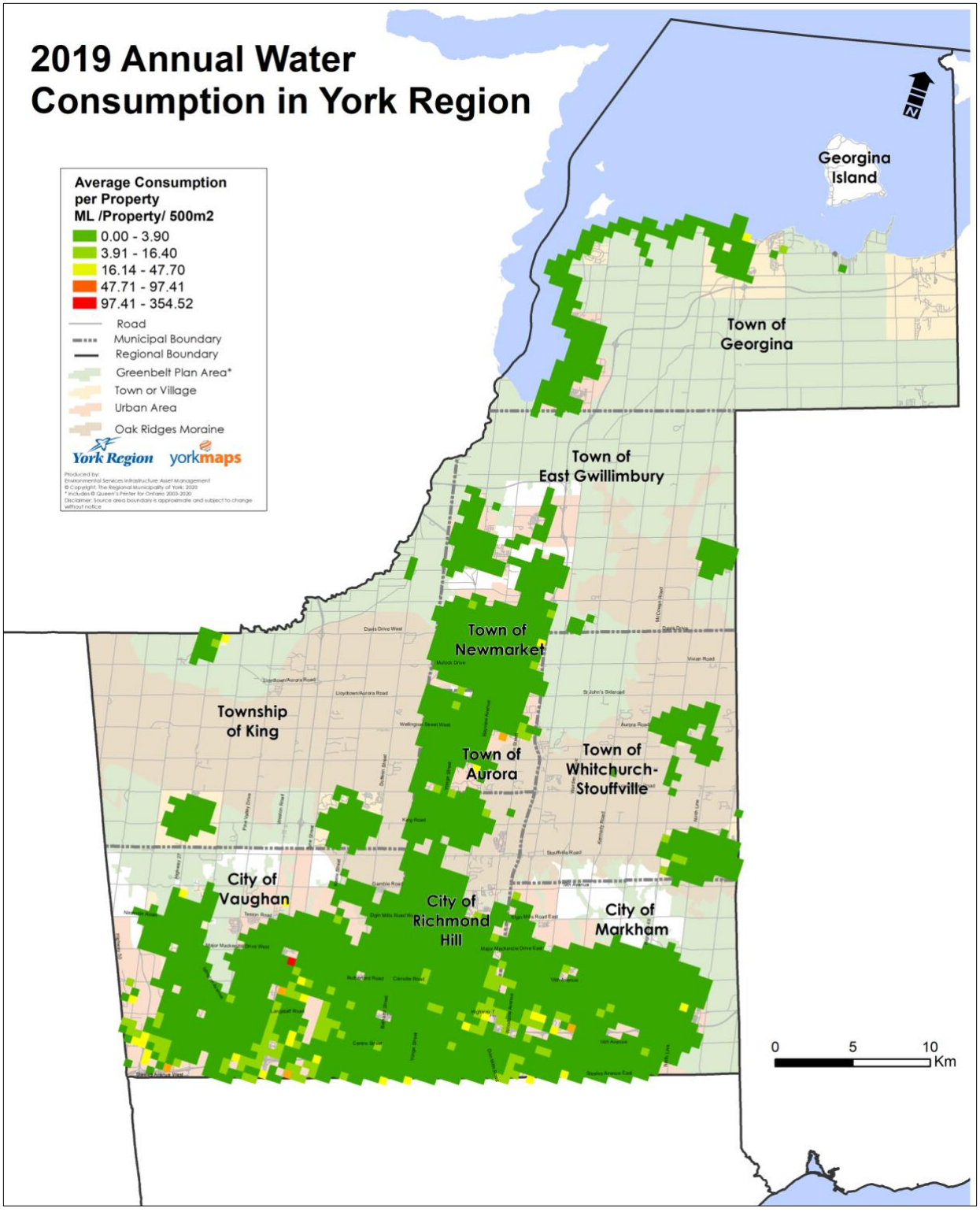
Figure 5: 2019 Annual Water Consumption
Figure 6: 2019 Single-Family Residential Water Consumption
Figure 7: 2019 Summer Outdoor Single-Family Residential Water Consumption
Figure 8: 2019 ICI Water Consumption
Figure 9: 2011-2019 Water Audited ICI Facilities and Top Users

The WCD and GIS heat maps help the Region identify areas of high water consumption, while also determining the level of granularity needed for meaningful analysis of consumption data for future programming.

In **Figure 5**, the overall annual water consumption heat map showed very little variance across all of York Region (except for some hotspots in Vaughan, Richmond Hill and Markham). However, when single-family residences and ICI properties are mapped separately (**Figure 6** through **Figure 8**), there is increased variance in consumption, with additional hotspots appearing in other municipalities, such as Whitchurch-Stouffville.

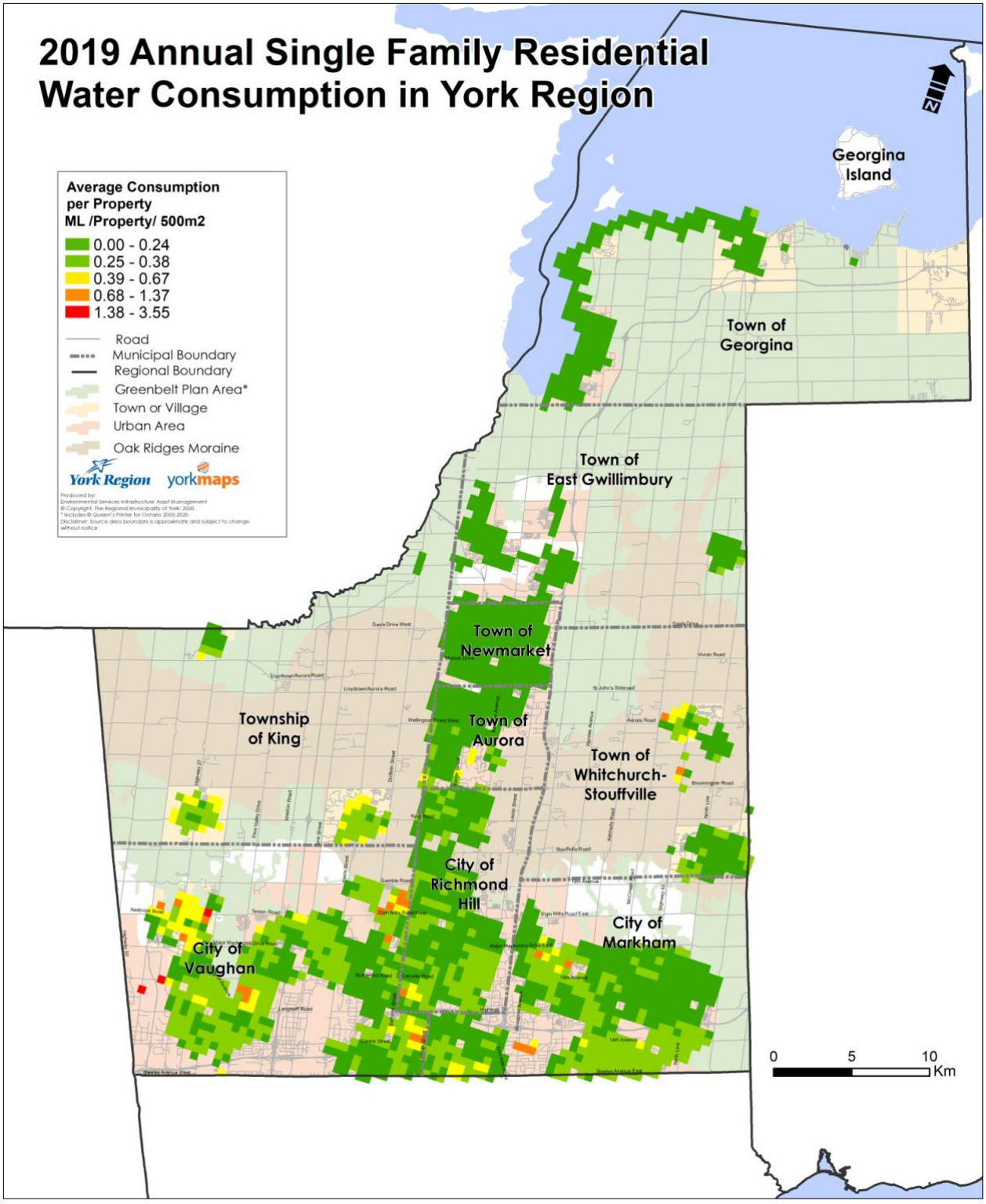
Figure 6 shows the overall annual consumption of single-family residences, with **Figure 7** showing the single- family outdoor water use. When comparing these maps, a strong correlation can be drawn between areas with high overall annual consumption and high outdoor water use. Targeting high water users with programs such as WSIP can therefore help reduce both overall and outdoor consumption.

ICI properties with high water usage are distributed throughout York Region with higher concentrations observed in the municipalities of Markham, Vaughan, and Richmond Hill (see **Figure 8**). The Region's ICI Capacity Buyback Incentive program is focused on high water using ICI facilities within the Region. Facilities that have participated in the program to date are shown in **Figure 9**; this map illustrates how the Region has worked with many high water using facilities within its local municipalities. These heat maps will continue to be used to gain an understanding of areas of high ICI water use.



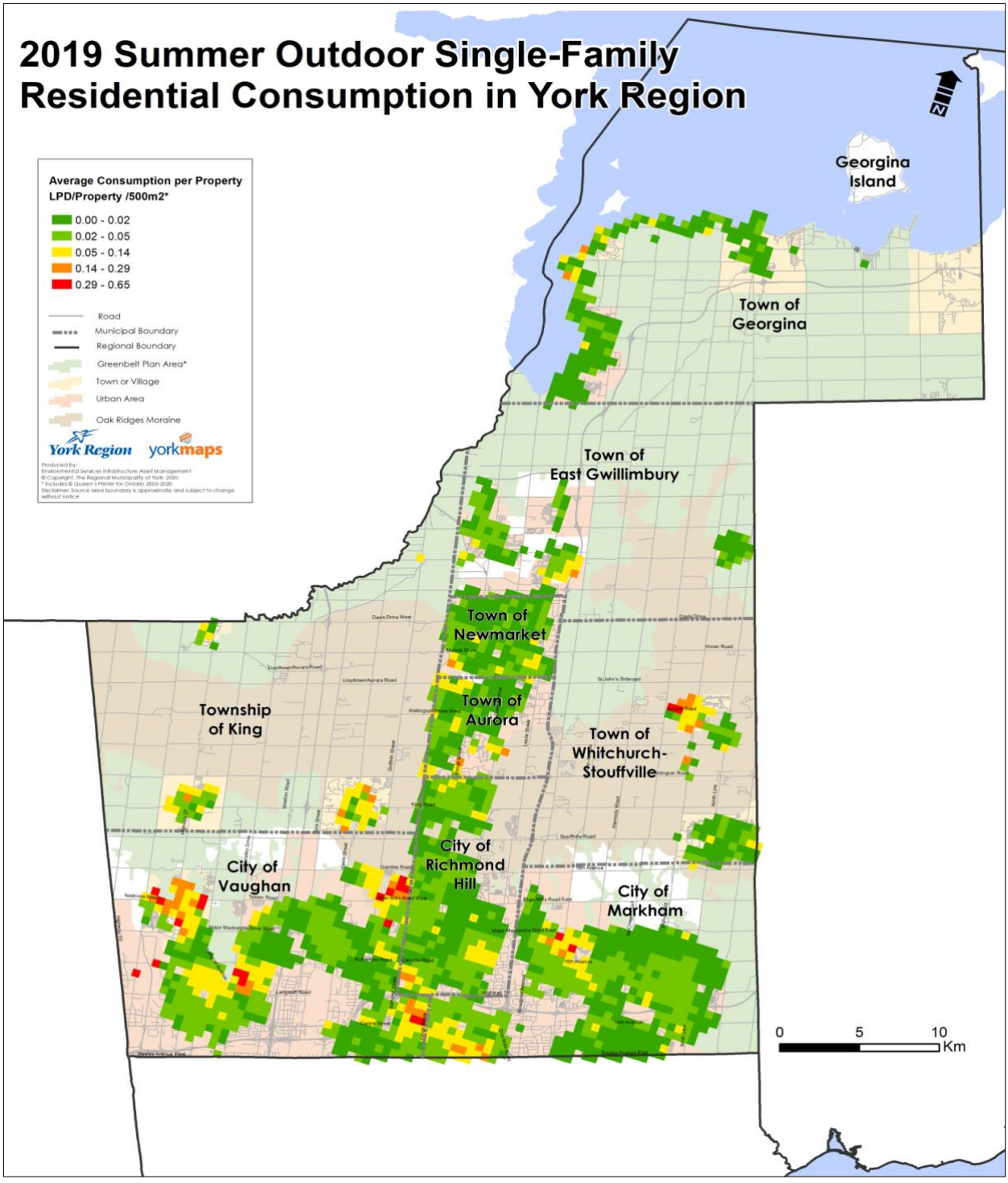
Note: Hot spot areas on the map represent high water users or high density areas e.g. multi-residential properties

Figure 5: 2019 Annual Water Consumption



***Megalitres/single family residential property/500m2 area**

Figure 6: 2019 Single-Family Residential Water Consumption



***LPD/single family residential property/500m$_2$ area**

Figure 7: 2019 Summer Outdoor Single-Family Residential Water Consumption

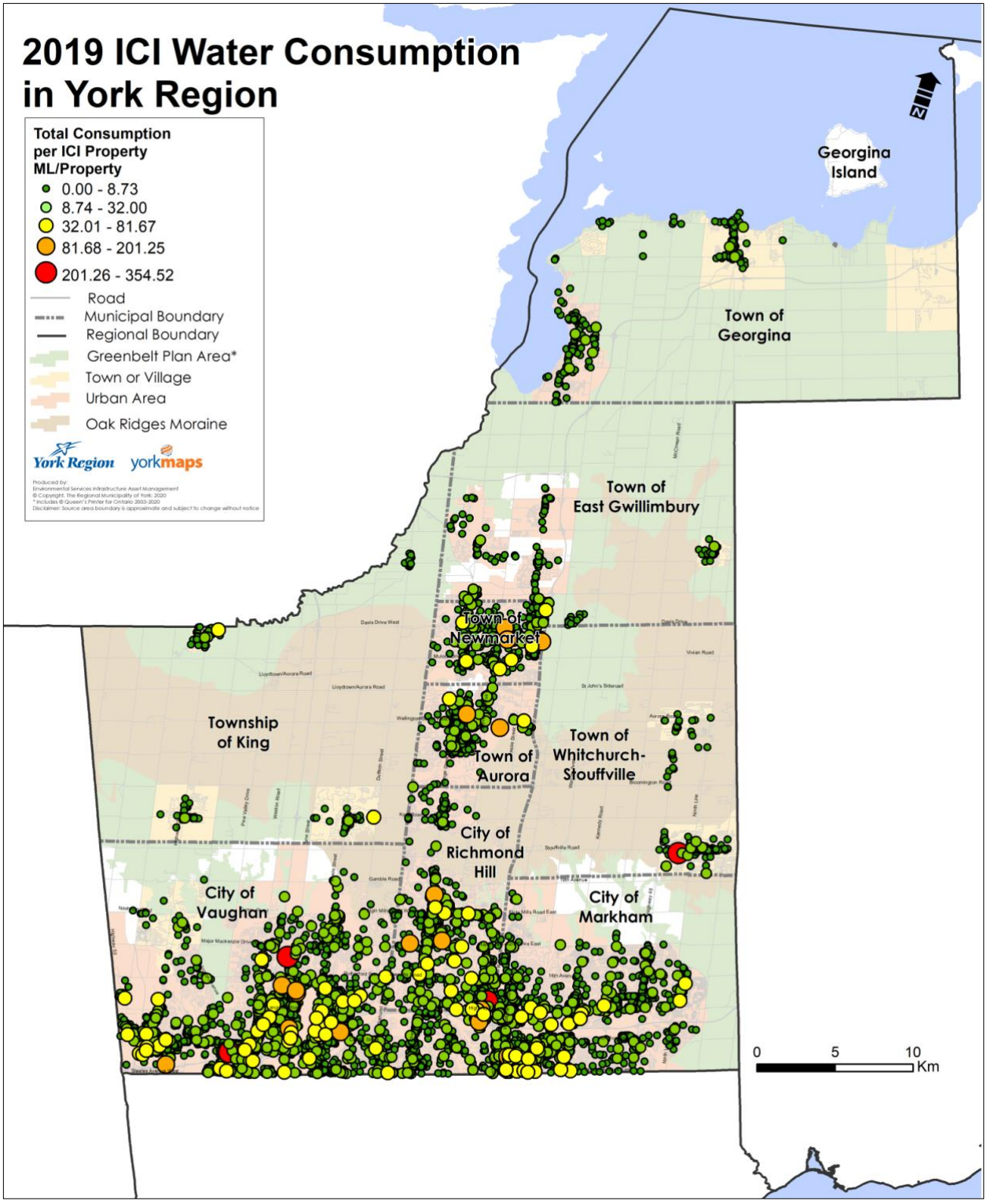


Figure 8: 2019 ICI Water Consumption

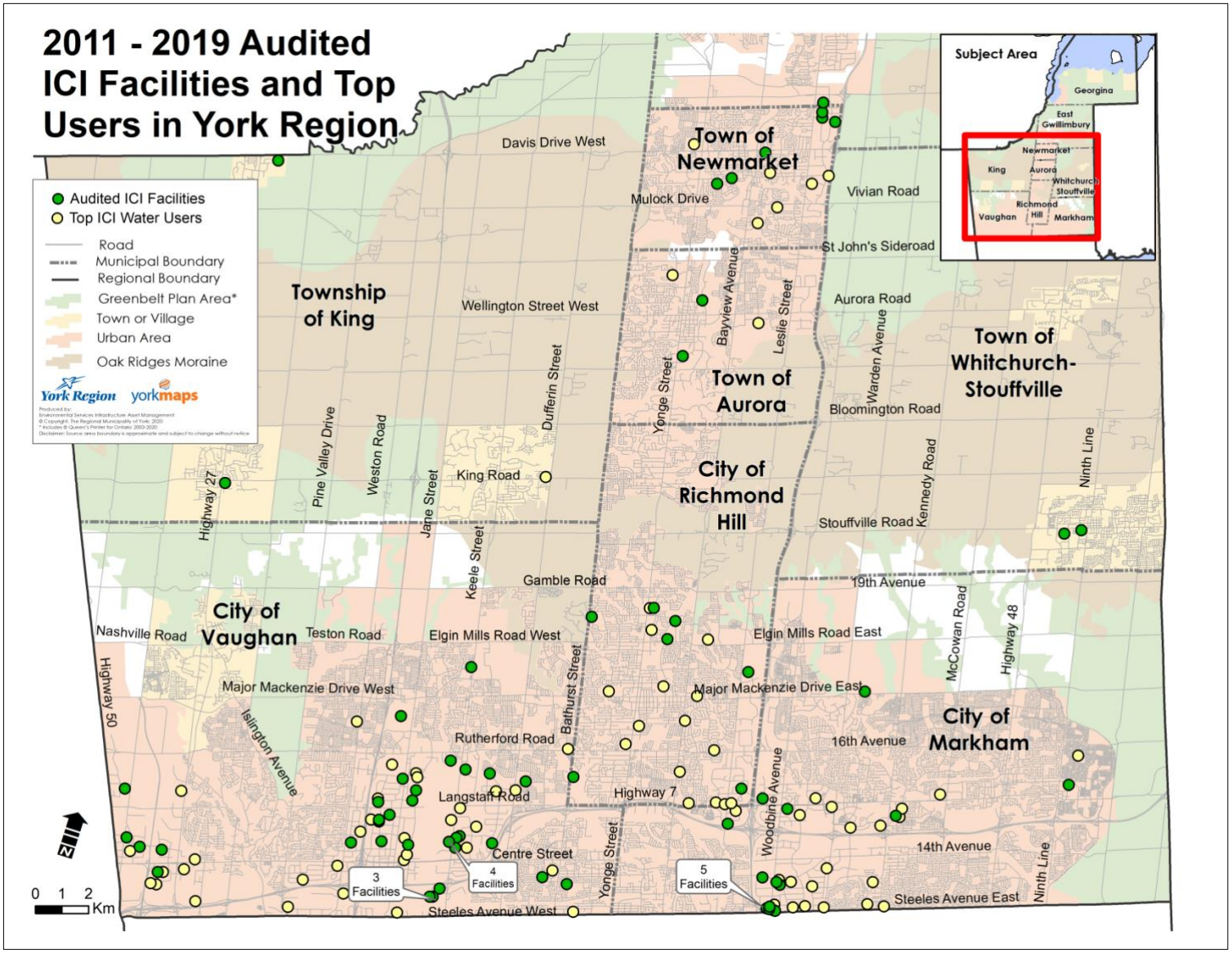


Figure 9: 2011-2019 Water Audited ICI Facilities and Top Users

6.0 CONCLUSION

York Region continues to demonstrate strong leadership in water conservation. Since 1998, the Region has achieved overall savings of over 27 million liters per day. This is enough water for more than 146,000 people. Despite increases in the Region's population, water demand has been on a general downward trend since 2011. There are a number of factors that influence water demands with weather having the most significant impact. The comparison of climate data (i.e. temperature, rainfall and CDD) in 2018 and 2019 explains the decrease in annual demand from 194 LCD in 2018 to 184 LCD in 2019.

In 2019, the Region continued to provide water audits and incentives for businesses that carried out water-saving retrofits and upgrades. As part of the outdoor peak demand reduction strategy, the Region educated irrigation and landscape contractors on water efficient practices and technology and issued incentives for WSIP assessments and retrofits.

The ongoing education and outreach highlighted the excellent work York Region is doing to keep the water system one of the best in its class. York Region will have the continued goal of raising public awareness about water sources, water protection, water system integrity, and water conservation. Furthermore, the Region collaborated with local municipalities to identify and minimize leakage in water systems. The Region also offered servicing allocation assignment credits for sustainable residential building developments.

Focusing efforts on water reuse, the Region completed the second phase of the Water Reuse Research Demonstration Project, which included preliminary evaluation of the first growing season and completion of a second season. Preliminary results indicate good plant and soil health in the test plot with no significant differences between crop quality between test and control plots. Through the ICI Capacity Buyback Incentive program one water reuse retrofit was implemented in 2019; the Region will continue to pursue and identify opportunities for water reuse in the ICI sector. Currently, Ontario does not have a regulatory framework that supports robust water reuse applications. As described in **Table 1**, policy and legislation surrounding water reuse has been identified as a critical component to reaching the Region's final goal of 150 LCD by 2051.

The Region will focus on the following key initiatives in 2020:

1. **Non-revenue water** – Non-revenue water is a growing concern across all municipalities and the practice of water loss management in Canada is not widespread. In efforts to reduce non-revenue water the Region will be pursuing collaborative pilot leak detection project opportunities and innovative strategies and will also be exploring ways to make use of necessary flushing water.
2. **Outdoor peak demand reduction programs** – Outdoor peak demand is a significant factor for system capacity design; programs aimed at reducing peak demands can delay capacity increases.
3. **Big data analytics** – York Region will continue to use water consumption data and heat maps to identify high water use neighborhoods for strategized programming such as WSIP, Fusion, and water audits.

APPENDIX: INTRA-BASIN TRANSFER VOLUMES

The Regional Municipality of York is submitting the information below in accordance with Schedule B of the following Permits to Take Water that relate to York Region's intra-basin transfer agreement between the Permit Holders and York Region, the Related Transferor, and that supply water to be transferred to York Region.

- PTTW No. 1866-A6QHRP, issued to the City of Toronto on March 23, 2016
- PTTW No. 0726-A6QJTA, issued to the City of Toronto on March 23, 2016
- PTTW No. 6604-A6QKEB, issued to the City of Toronto on March 23, 2016
- PTTW No. 0016-A6QKN2, issued to the City of Toronto on March 23, 2016
- PTTW No. 5860-BFRQTF, issued to the Region of Peel on September 6, 2019 (An amendment to PTTW No.1064-A6KQKQ, issued to The Region of Peel on March 23, 2016)

As stipulated in Schedule B of the aforementioned permits, Condition (e) requires York Region to report, no later than March 31st of every year, on monthly volumes and a calculated daily average amount of its intra-basin transfer in the preceding calendar year. **Table A** lists total monthly volumes transferred from the Lake Ontario watershed into the Lake Huron watershed with return flow to Lake Ontario. In 2019, York Region's average daily intra-basin transfer amount was 25.7 ML.

Table A: 2019 Intra-basin Transfer Volumes

Month (2019)	Total Intra-Basin Transfer Volume (m^3)
January	766,238
February	671,857
March	710,144
April	670,728
May	720,995
June	816,965
July	944,765
August	961,577
September	820,039
October	771,796
November	738,022
December	797,397
Total	**9,390,524**

THE REGIONAL MUNICIPALITY OF YORK

ANNUAL REPORT

LONG TERM WATER CONSERVATION STRATEGY

MARCH 2020

The Regional Municipality of York
Environmental Services Department
Administrative Center
1-877-464-9675

Accessible formats or communication Supports are available upon request

York Region

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