Town of Orangeville
Water Conservation Plan

2020

Orangeville
Historic Charm Dynamic Future

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1. Introduction

Water conservation planning is an important best management practice that aims to manage water demand, reduce consumption, and improve water use efficiency within the municipal water supply system. Water conservation plans analyze historical and current water use data to understand existing water demand trends. The insights gained from these analyses are used to set targeted water conservation goals that aim to ensure the long-term sustainability and protection of municipal drinking water resources.

In the wake of increasing concern over the impacts of population growth and climate change on water supplies, water conservation planning has gained recognition as an important risk management strategy in the operation of municipal water systems. As the municipal water supply for the Town of Orangeville (Town) is obtained exclusively from groundwater aquifers, effective water conservation planning will be key to building resilience in the Town's supply system under increasingly challenging water supply scenarios.

Water conservation programming has been in place at the Town for many years, and several studies have been completed in support of water conservation and efficiency initiatives. Previous efforts by the Town include a Water Efficiency Study (1998) and a Long-Term Servicing Strategy (2004). Both the Water Efficiency Study and the Long-Term Servicing Strategy identified water conservation as an important tool for prolonging the viability of the Town's existing wells and laid the groundwork for much of the conservation programming currently implemented by the Town. This Water Conservation Plan updates these initial efforts while considering recent water usage trends and current data.

1.1 Legislative Framework

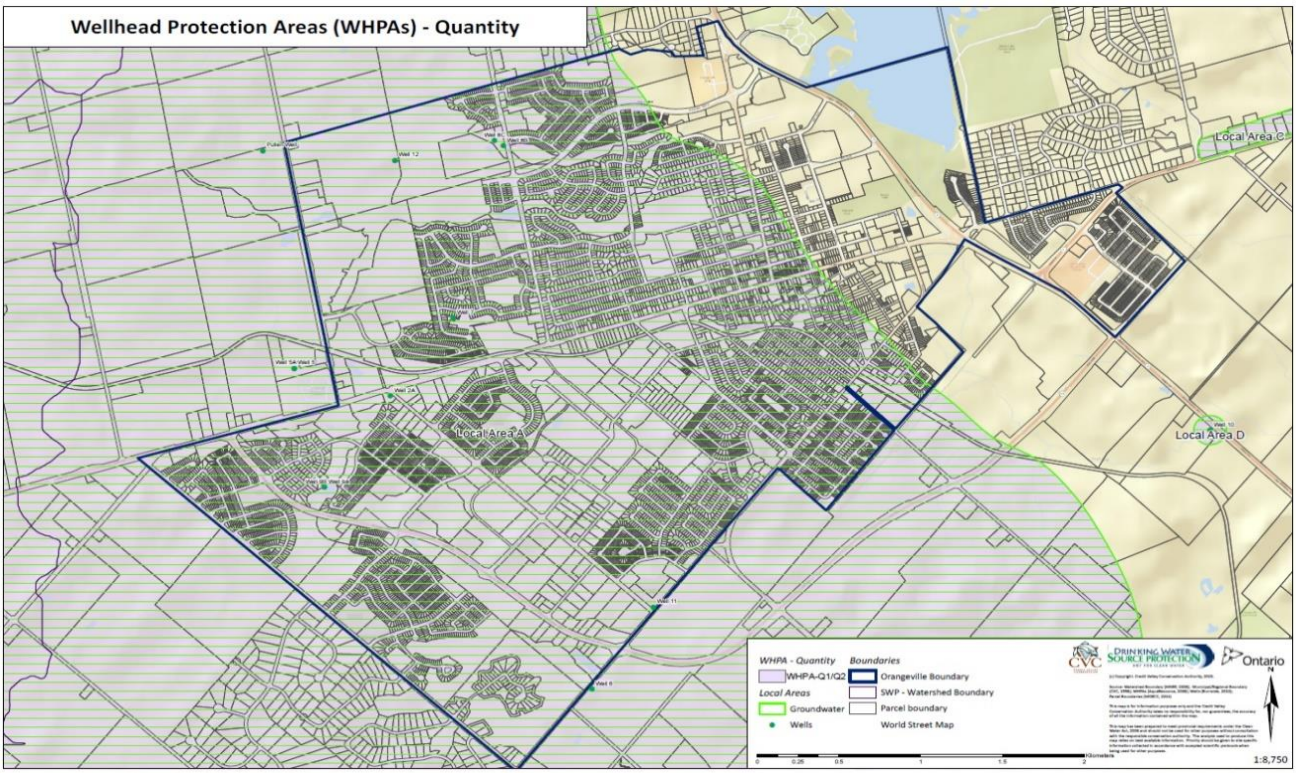
In 2006, the Clean Water Act was passed to protect the quality and quantity of existing and future sources of drinking water in Ontario. The Clean Water Act aims to ensure the long-term sustainability of clean, safe, and plentiful drinking water through the development and implementation of policy documents called Source Protection Plans. Source Protection Plans set out the actions that must be implemented to protect municipal drinking water sources.

The Town of Orangeville is located within the Credit Valley Watershed and is subject to the policies contained in the Credit Valley-Toronto and Region-Central Lake Ontario (CTC) Source Protection Plan. As part of the preparation of the CTC Source Protection Plan, Orangeville's municipal water supply system underwent a water quantity analysis in the form of a Tier 3 water budget assessment. The Tier 3 water budget assessment evaluated the system's capacity to meet existing and future water demands under a variety of climate, land use change, and population growth scenarios. This assessment determined that under drought conditions and future land use build-out scenarios, the Town would not be able to sustain the water production rates required to meet forecasted demands. As a result, a Wellhead Protection Area for Quantity (WHPA-Q1/Q2) (Figure 1) was delineated around the Town's wells. The WHPA-Q1/Q2 defines the area where new or increased water takings, groundwater use, or changes in groundwater recharge due to development could affect the quantity of water available at Town wells.

The CTC Source Protection Plan (policy DEM-4) requires municipalities with a well supply located in a WHPA-Q1/Q2 to develop a water conservation plan to help maintain a sustainable water supply. This Water Conservation Plan satisfies the Town's requirements of CTC Source Protection Plan policy DEM-4, while also endeavoring to increase public awareness and support for water conservation initiatives, and to build resiliency and reliability across the Town's water supply systems and infrastructure.

This Water Conservation Plan is also in line with the Town's Strategic Plan (Orangeville Forward, 2017), which commits to sustainable growth, well cared for infrastructure, and a healthy environment.

Figure 1: Wellhead Protection Area for Quantity (WHPA-Q1/Q2) for the Town of Orangeville



1.2 Water Conservation Plan Objectives

1) Ensure the long-term sustainability of the Town's drinking water sources and well supplies

The Town of Orangeville relies wholly on groundwater aquifers to meet the Town's drinking water supply needs. The potential for increased water demand due to the compounding pressures of population growth and climate change will result in increased stress on the Town's water sources and well supplies (AquaResource, 2011). The implementation and continued advancement of water conservation initiatives outlined in this plan will build resilience in the Town's water system and protect the sustainability of the Town's water supplies under increasingly challenging water supply scenarios.

2) Eliminate, downsize, or postpone the need for capital infrastructure projects and additional sources of water supply

Water consumption and demand rates affect how much water must be treated, stored, and transported through the water supply and distribution system. Increases in water demand trigger the need for expansions or upsizing to existing water infrastructure and facilities, as infrastructure design specifications are dependent on water flows (including maximum day, average day, and peak hour demand).

The water conservation initiatives outlined in this Water Conservation Plan aim to maintain or reduce the Town's per capita water demands. Maintaining or reducing per capita water demand will postpone or eliminate the need for water infrastructure and facility expansions, thereby deferring the capital and operating costs associated with the expansion of water infrastructure. Maintaining or reducing water consumption will help to safeguard the sustainability of existing water supplies, thereby reducing the potential need for the development of new water supplies in the future.

3) Improve operating cost efficiency for the delivery of water supply services

Reduced water use can lower the operation and maintenance expenses associated with the pumping, treatment, and distribution of water. Efficiencies realized through reductions in water demand and consumption can increase the Town's capacity to support future growth and reliably provide water supply services into the future.

4) Improve drought preparedness and build climate change resiliency

Future climate projections for Orangeville indicate that extreme heat events will become more frequent and prolonged. This, coupled with a projected decline in total summer precipitation may introduce new risks for the Town (Environment and Climate Change Canada, 2019; LAMPS, 2019). The long-term sustainability of groundwater supplies relies on sustained aquifer recharge through infiltration of surface precipitation. Changes in climatic conditions coupled with increasing land development have the potential to reduce aquifer recharge rates, presenting sustainability issues over time. Water conservation efforts improve emergency preparedness and increase the water system's ability to absorb external stresses, thus ensuring the availability of safe water yields during times of increased water stress.

2. Water System & Supply

The Town supplies water to approximately 30,000 residents, serving a total of 9,337 residential and multi-residential accounts and 480 commercial, institutional, and industrial accounts. The current water distribution system services an area of approximately 13.15 km^2, encompassing the majority of Town with the exception of the currently undeveloped north-western portion of Town. Planned growth for the Town projects a population of 36,490 by 2031, and an expansion of the service area to cover approximately 14.6 km^2. In addition to an expected expansion to the service area, intensification of development within the Town's existing urban core is also expected, with an accompanying increased demand on existing services. To meet the requirements of a growing population and to build system redundancy, the Town is completing an Environmental Assessment to identify and develop a new water supply source.

Currently, the Town relies entirely on groundwater from twelve (12) municipal wells located in nine (9) well fields (Table 1). The majority of the Town's wells are located to the north and west end of Town, with the exception of Well 10 which is situated just outside of the Town's southern-eastern boundary, in the Town of Caledon. Nine of these wells are situated in the semi-confined dolostone bedrock aquifers of the Amabel and Guelph Formations, and the remaining three wells are in unconfined overburden aquifers. While the total permitted pumping capacity in the Town's current Permit to Take Water (PTTW) for all of the wells connected to the Town's municipal system is 17,394.16 m^3/day, operating experience and analysis of pumping and water level data indicates that the safe or recommended pumping capacity is currently only 15,032 m^3/day.

The Town also owns and operates four (4) water storage reservoirs with a total usable storage capacity of 15,920 m^3. A new water storage facility may be required in the near future to ensure sufficient water storage is available for future growth in the northwest area of Town.

Table 1: Orangeville Municipal Wells - Depths, Aquifer Setting, Permitted Pumping Rates

Well	Depth (m)	Aquifer	Type	Classification	Maximum Permitted Pumping Rate (m^3/day)	Safe Pumping Capacity (m^3/day)**	Average Day Pumping Volume (2019)
2A	38.7	Guelph/Amabel	Semi-confined	GUDI	878	820	270*
5,5A	17.7	Overburden	Unconfined	GUDI with effective in-situ filtration	6,000	6,000	3,291
6	48.8	Guelph/Amabel	Semi-confined	Groundwater	3,600	1,728	1,879
7	47.2	Guelph/Amabel	Semi-confined	Groundwater	1,310.4	1,310	913
8B,8C	76.2	Guelph/Amabel	Semi-confined	GUDI	656	654	425
9A,9B	17.4	Guelph/Amabel	Semi-confined	GUDI with effective in-situ filtration	878.4	878	604
10	60.9	Overburden	Unconfined	GUDI with effective in-situ filtration	1,452.96	1,296	862
11	54.8	Guelph/Amabel	Confined	Groundwater	1,309	1,037	756
12	49.4	Guelph/Amabel	Semi-confined	GUDI with effective in-situ filtration	1,309	1,309	846

* Well 2A only operates for six months per year (April to September inclusive), as per the current PTTW. The average day volume calculated above is based on a twelve-month period (365 days). The April to September average day volume is 538 m^3/day.
** Based on 2018 Available Supply Capacity Assessment

3. Water Audit

Prior to setting water conservation goals, it is important to understand recent and historical water use patterns to help determine where conservation efforts will be most effective. This section provides a summary and analysis of water production and metered water use data for the Town.

3.1 Water Meters

Water usage data is collected through both process water meters and customer water meters. Process water meters monitor raw (untreated) water production volumes at each municipal well, the amount of treated water entering the water distribution system, and the amount of water exiting storage reservoirs. All process water meters are calibrated annually by third party contractors and are maintained as required to continue operating within the margin of error designated for each meter. Customer water meters are installed at water service connections on private property and are not tested for accuracy unless requested by the customer.

As of December 2019 there are a total of 9,817 metered water service connections in the Town's water distribution system. The majority (94%) of these meters service single family residential properties, with the remainder (approximately 6%) servicing a diverse range of industrial (1.1%), commercial (3.2%), institutional (0.6%), and multi-residential (1%) properties. The first residential water meters in Town were installed in 2002, just prior to the initiation of the universal water metering program launched in January of 2003. Since then, all new developments (including residential, industrial, commercial, and institutional) have been outfitted with water meters. The age of customer meters ranges from new to approximately 18 years old. To date, the Town has not undertaken any large-scale water meter replacement work. Many of the customer meters installed at the initiation of the water metering program are now due for replacement and Town staff are in the process of initiating a Town-wide water meter replacement program. As meters age there is a tendency to under-report on water usage amounts, resulting in an underestimation of the amount of water being used. Replacement of old meters in Town will improve the accuracy in the reporting of water usage rates throughout Town.

3.2 Historical Water Usage

Water production and metered customer usage data from 2013 through to 2019 has been compiled using Town water production records, as well as billing data collected by Orangeville Hydro. This information is considered the baseline and will be used to evaluate the performance of future water conservation efforts.

3.2.1. Water Production

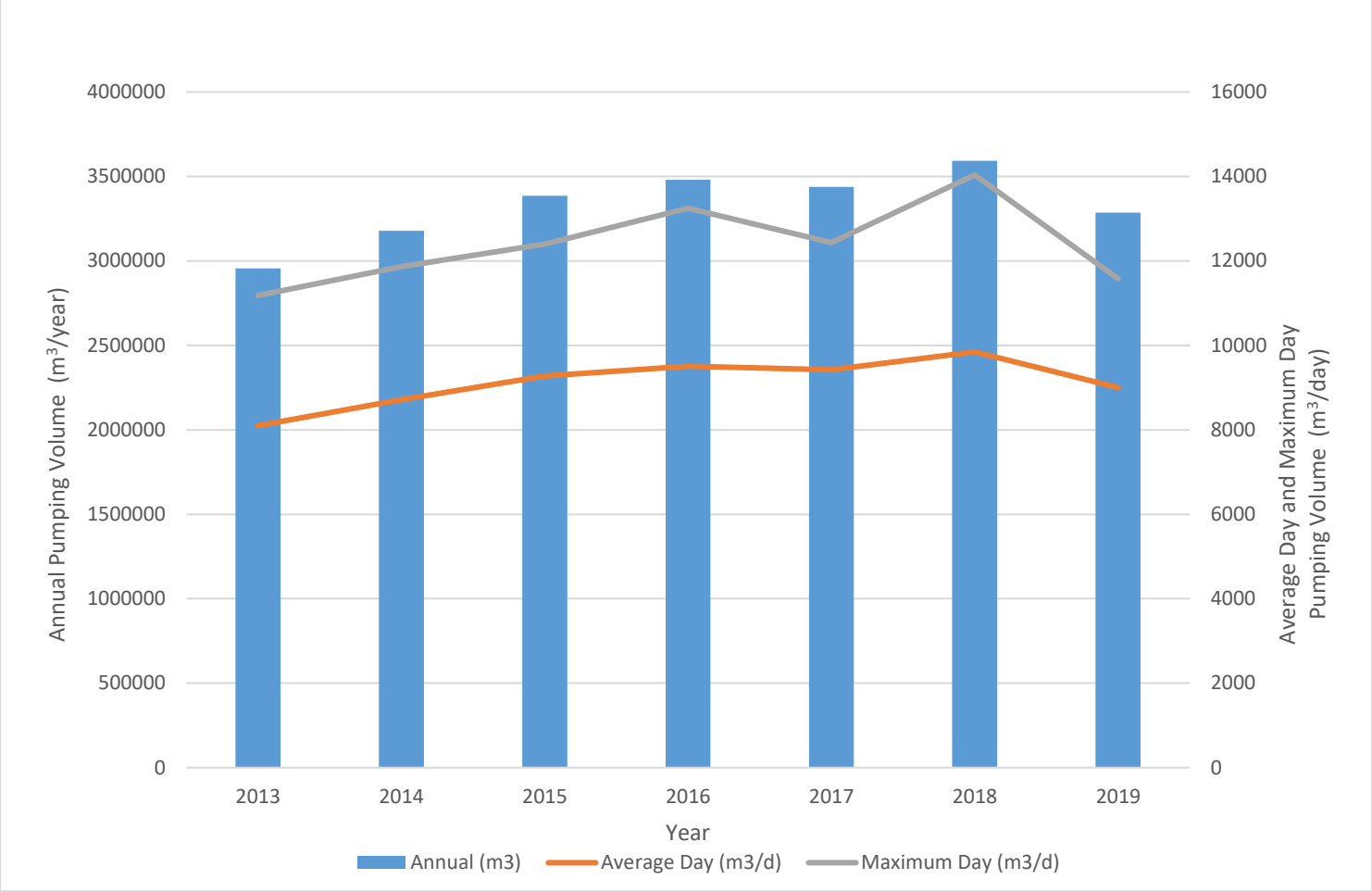
As discussed above, the Town's process water meters measure both raw (untreated) water and treated water volumes. Raw water production rates include water used for water supply system maintenance work, such as backwashing filters and conducting well efficiency tests, while treated water volumes represent the potable water sent from the water treatment facilities to the Town's water distribution system. Treated water volumes represent the amount of water used by customers, for distribution system maintenance (e.g. watermain flushing), and to fight fires. The treated water volume also includes water lost due to leaks in the distribution system.

Annual raw water production data from 2013 through 2019 is presented in Table 2 and Figure 2. This data indicates that water production (m^3/year) has fluctuated over the last seven years, despite a steady growth in population. Annual, average, and maximum day production generally increased from 2013 to 2016 and reached a seven year high in 2018. Conversely, in 2017 and 2019, a decline in production rates can be observed across all three parameters. This annual variability in production may, in part, be attributed to seasonal variations. As an example, the drop in production observed in 2017 may, to some degree, be attributed to a decrease in outdoor water use due to the above normal rainfall experienced during the spring and summer months of that year. However, regardless of the influence of seasonal variations and population growth, it is important to note that some degree of annual pumping variability is expected due to the continuously varying demands which are inherent to municipal water systems. This inherent variability is best observed in 2019, when the annual treated water production declined by approximately 9% from the previous year, despite an increase in population and an absence of any notable seasonal anomalies.

Table 2: Raw Water Production Volumes

Year	Town population	Annual Production Volume (m^3/year)	Average Day Production (m^3/day)	Maximum Day Production (m^3/day)	Average Daily Production Volume Per Capita (L/person/day)
2013	27,921	2,956,310	8,099	11,181	290
2014	28,390	3,178,990	8,710	11,865	307
2015	28,658	3,386,229	9,277	12,399	324
2016	28,937	3,480,347	9,509	13,248	330
2017	29,048	3,438,849	9,422	12,437	324
2018	29,986	3,593,509	9,845	14,037	328
2019	30,225	3,286,146	9,003	11,580	298

Figure 2: Raw Water Production Volumes 2013 - 2019 (Annual, Average Day, & Max. Day)



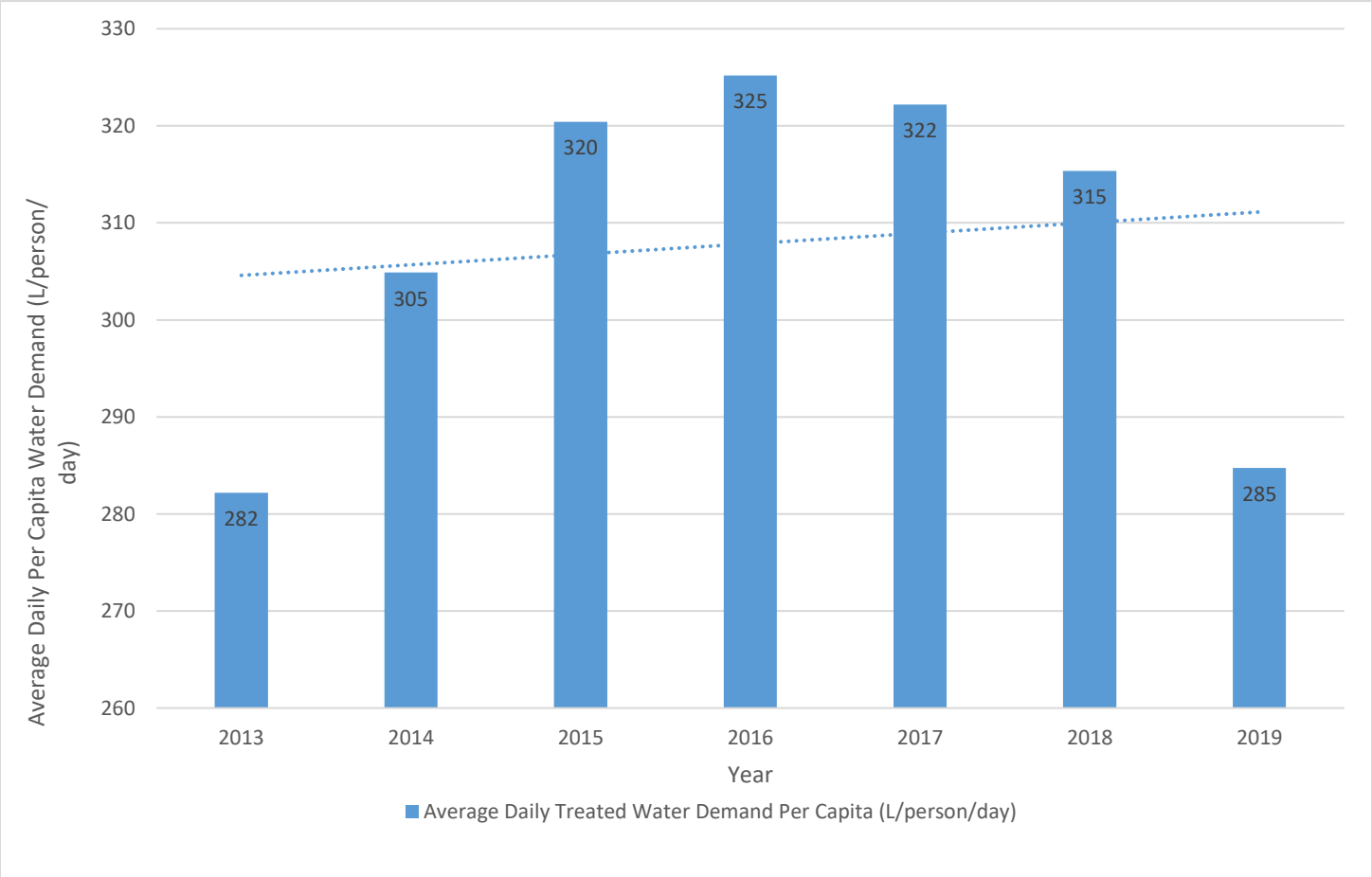
A review of annual treated water volumes from 2013 through 2019 indicates that year to year treated water volumes have also fluctuated (Table 3). To better understand treated water demand trends, per capita calculations are used to estimate average daily treated water demand per person. Looking at average per capita treated water demand can provide an indication of whether water production is increasing simply due to population growth, or if actual water demand is increasing across Town. The per capita treated demand value is a good indicator of average water demand trends as it discounts the amount of water that is lost or used before it is pumped into the distribution system.

Table 3: Annual Treated Water Production Volumes and Per Capita Consumption of Treated Water

Year	Annual Treated Water Production (m^3)	Population	Annual Treated Volume Per Capita (m^3/person/year)	Average Daily Treated Water Consumption Per Capita (L/person/day)
2013	2,943,184	27,921	103	282
2014	3,159,237	28,390	111	305
2015	3,351,604	28,658	117	320
2016	3,434,696	28,937	119	325
2017	3,415,991	29,048	118	322
2018	3,451,668	29,986	115	315
2019	3,141,496	30,225	104	285

As presented in Table 3 and Figure 3, per capita treated water demand values in Town have varied over the last several years, ranging from a low of 282 L per person per day in 2013 to a seven year high of 325 L/person/day in 2016 (Figure 3). This variability in per capita demand further illustrates that population increase is not the only factor influencing water production and consumption rates across the municipality.

Figure 3: Average Daily Per Capita Treated Water Demand



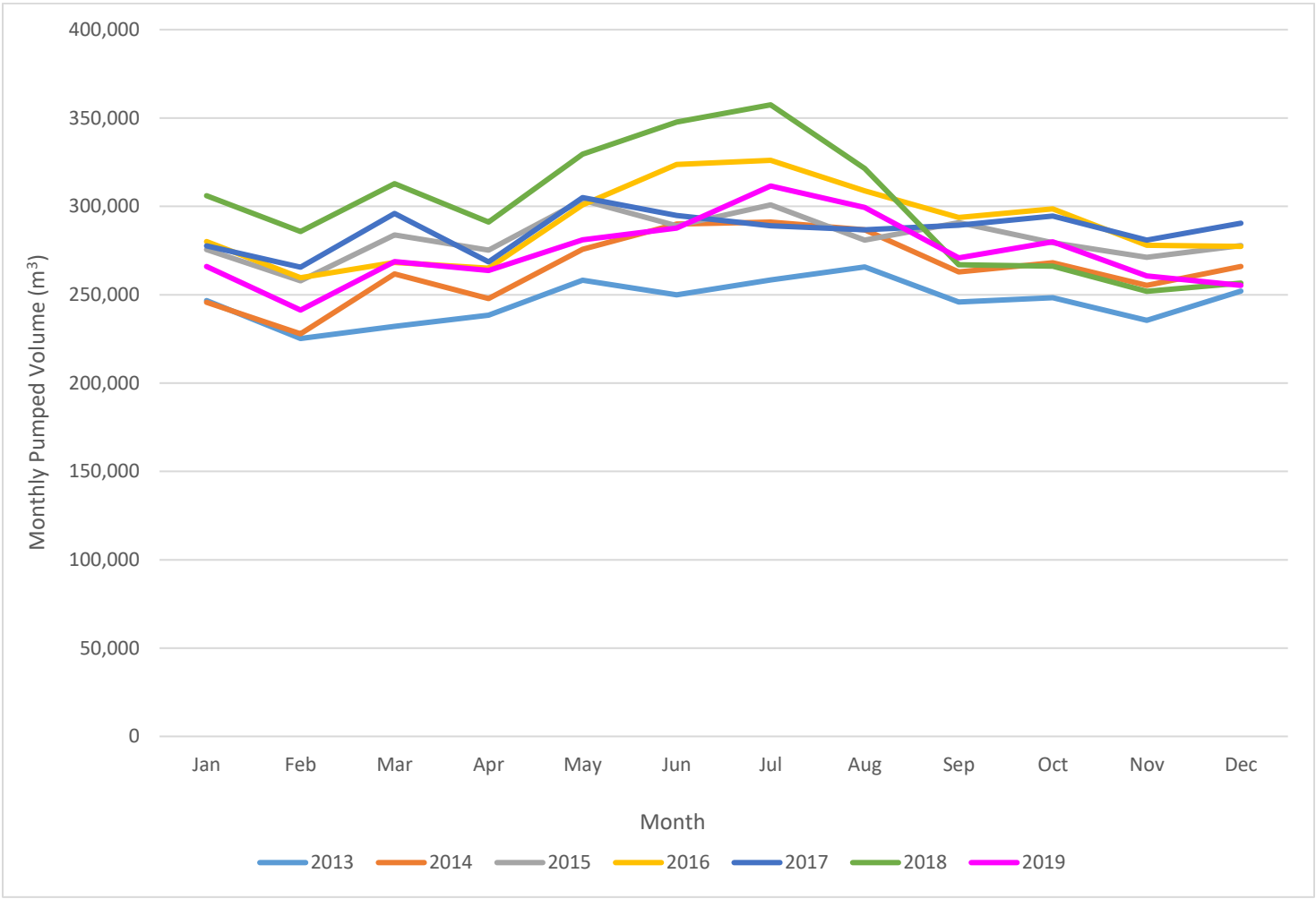
An analysis of monthly raw water production data over the last seven years reveals a pattern in seasonal water production trends (Table 4, Figure 4). Production typically increases through March and then drops in April before increasing and peaking through the summer months when discretionary water use is highest. Production drops again in September, increasing slightly through October before dropping again in November and increasing slightly through to December. Generally, the lowest production rates during the year are observed in the months of February and November.

An exception to this general monthly trend is observed in 2017, when production rates fell between the months of May through October. This reduction in spring and summer water usage may in part be due to the high rainfall and below average temperatures experienced during the summer of 2017. A slight variance to the general summer usage trend is also observed to a lesser extent in 2013 and 2015, where month to month production during the spring and summer was more variable than other years.

Table 4: Monthly Raw Water Pumping Volumes: 2013 – 2019 (m^3/month)

Month	Pumping Volumes (m^3/month)						
	2013	2014	2015	2016	2017	2018	2019
Jan	246,704	245,771	275,611	280,124	277,718	306,110	266,009
Feb	225,221	227,858	257,864	259,618	265,583	285,803	241,307
Mar	232,073	261,710	283,803	268,261	296,015	312,811	268,710
Apr	238,385	247,884	275,297	265,069	268,599	291,084	263,660
May	258,139	275,717	303,487	300,813	304,981	329,491	281,104
Jun	249,927	289,970	289,060	323,786	294,814	347,685	287,701
Jul	258,365	291,130	300,922	326,083	289,093	357,482	311,550
Aug	265,720	286,671	280,903	308,823	286,762	321,455	299,330
Sep	245,899	262,872	290,862	293,777	289,298	266,900	270,861
Oct	248,333	268,032	279,514	298,610	294,580	266,158	279,877
Nov	235,470	255,327	271,105	278,054	280,923	251,915	260,717
Dec	252,074	266,048	277,801	277,329	290,483	256,615	255,320
Totals	**2,956,310**	**3,178,990**	**3,386,229**	**3,480,347**	**3,438,849**	**3,593,509**	**3,286,146**

Figure 4: Monthly Raw Water Pumping Volumes: 2013 – 2019 (m^3/ month)



3.2.2. Metered Water Usage

Almost all water connections (99.6%) to the Town system are metered. The only exceptions are thirty-seven (37) properties where conditions were not conducive to the installation of a water meter, or where property owners refused to consent to the installation of a water meter. Although not metered, these properties are billed for water usage on a flat rate basis.

Metered water usage data is tracked and categorized into four key sectors: industrial, commercial, institutional, and residential (Table 5, Figure 5). In 2019 residential usage accounted for 75% of the total metered usage in Town, with 67% attributed to single residential dwellings, and 8% attributed to multi-residential dwellings. Commercial usage makes up 11% of total metered usage, while industrial and institutional uses each account for 8% and 6% of total metered consumption, respectively (Figure 6).

Table 5: Annual Metered Water Usage by Sector (m^3/year)

	Metered Usage by Sector (m^3/year)				
Year	**Industrial**	**Commercial**	**Institutional**	**Residential**	**Total**
2013	161,654	307,404	172,320	1,839,534	2,480,912
2014	161,354	283,863	181,129	1,901,411	2,527,755
2015	154,961	270,613	134,729	1,803,326	2,363,629
2016	191,251	293,534	128,248	1,900,548	2,513,580
2017	277,516	276,892	149,759	1,769,657	2,473,824
2018	217,393	277,738	156,459	1,861,331	2,512,921
2019	197,836	274,647	154,478	1,827,454	2,454,415

Figure 5: Industrial, Commercial, Institutional, and Residential Metered Water Usage (2013 – 2019)

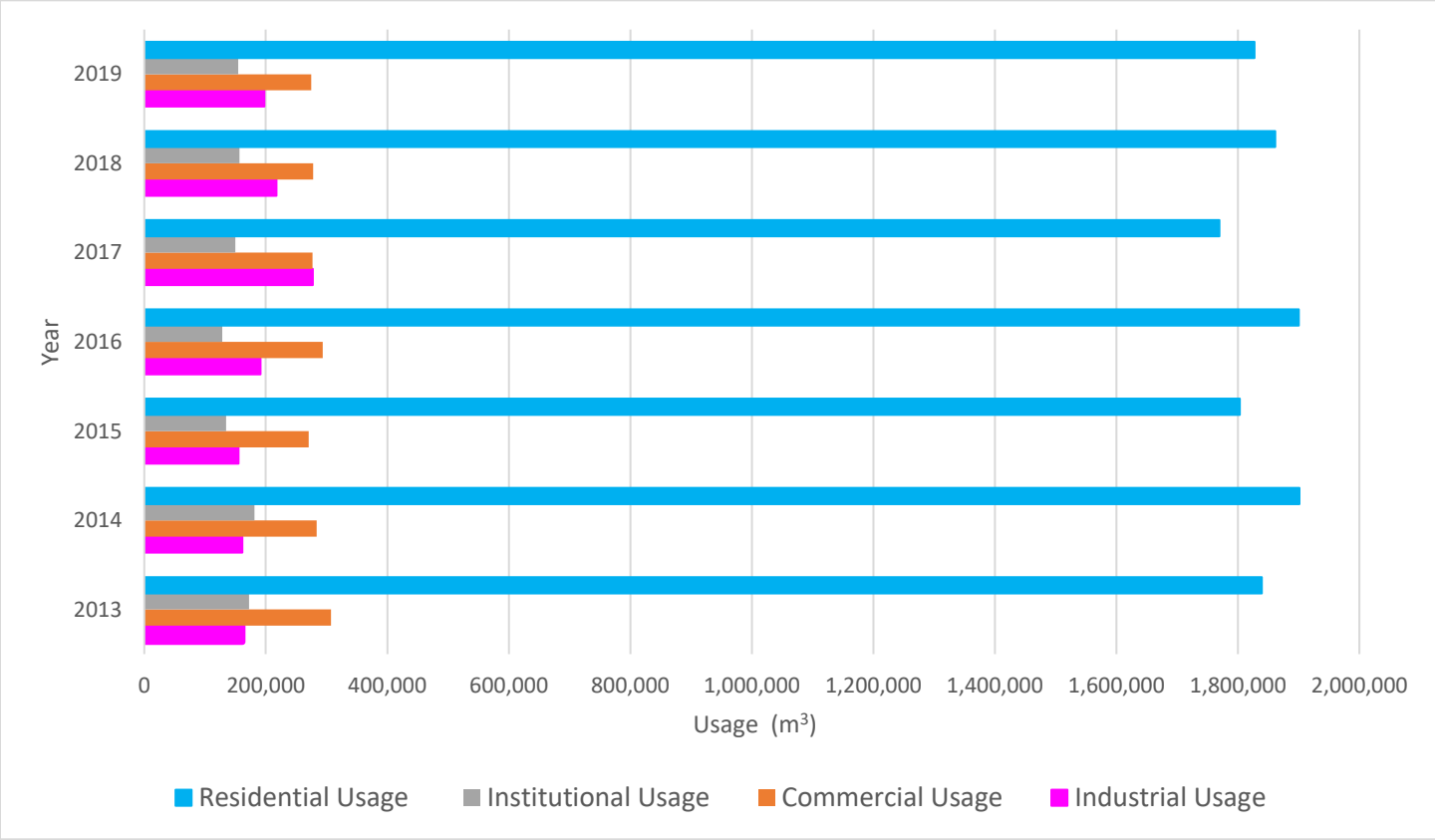
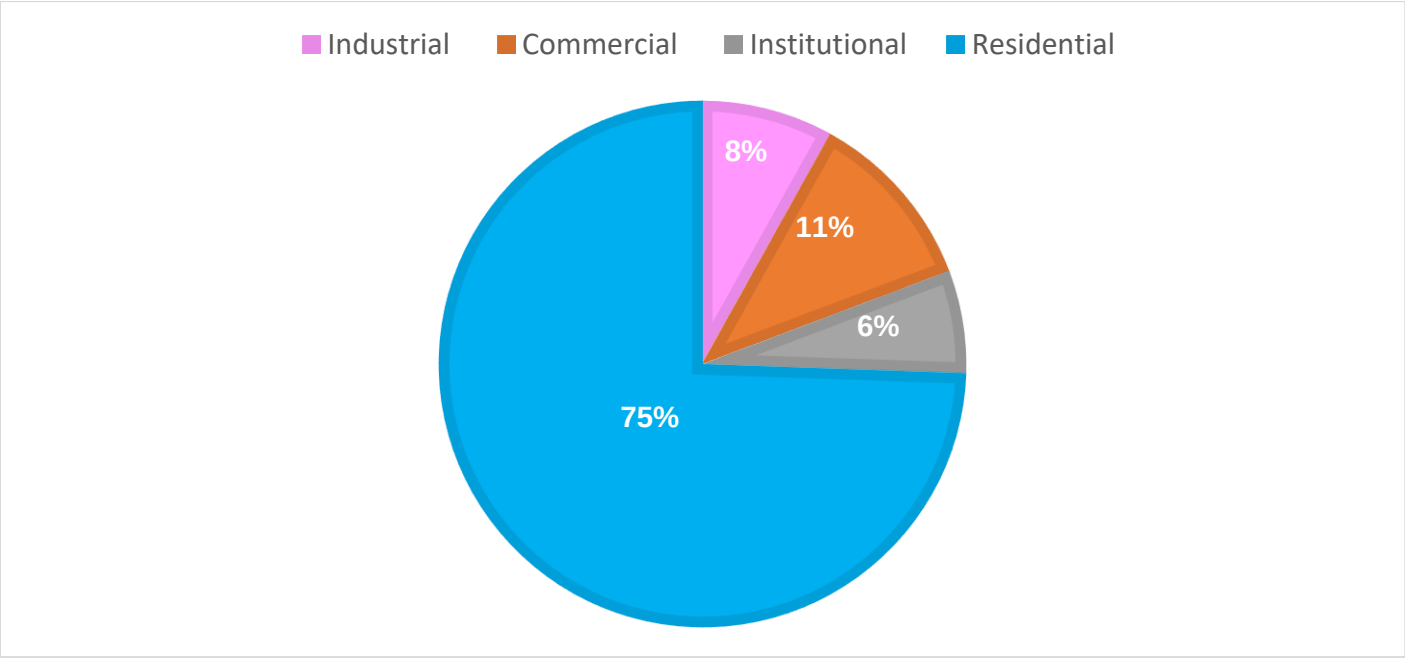


Figure 6: Metered Water Usage by Sector (2019)



Further analysis of the total residential metered usage indicates that residential consumption in Town has varied from 2013 through 2019, even though the resident population has steadily increased (Table 6, Figure 7). This suggests that population growth is not the sole driver of residential water consumption trends in Town. Once annual precipitation data are factored into this analysis, it can be observed that in general, annual residential water consumption rates increase when there is less total annual precipitation (Figure 9).

Analysis of average per capita residential usage over the last seven years indicates a general declining trend in per capita residential water consumption (Figure 8). This is in line with nationwide residential water use trends which suggest that as residents upgrade to more efficient appliances and fixtures, indoor residential water demands are declining (Water Research Foundation, 2016). However, after most residents have switched to water efficient fixtures, this decline in water demand is expected to plateau.

Table 6: Residential Usage per Capita

Year	Population	Total Residential Usage (m^3/yr.)	Annual Per Capita Residential Usage (m^3/yr.)	Average Daily Per Capita Residential Usage (L/person/day)
2013	27,921	1,839,534	66	181
2014	28,390	1,901,411	67	183
2015	28,658	1,803,326	63	172
2016	28,937	1,900,548	66	180
2017	29,048	1,769,657	61	167
2018	29,986	1,874,009	62	171
2019	30,225	1,827,454	60	166

Figure 7: A Comparison of Residential Water Usage to Population (2013 -2019)

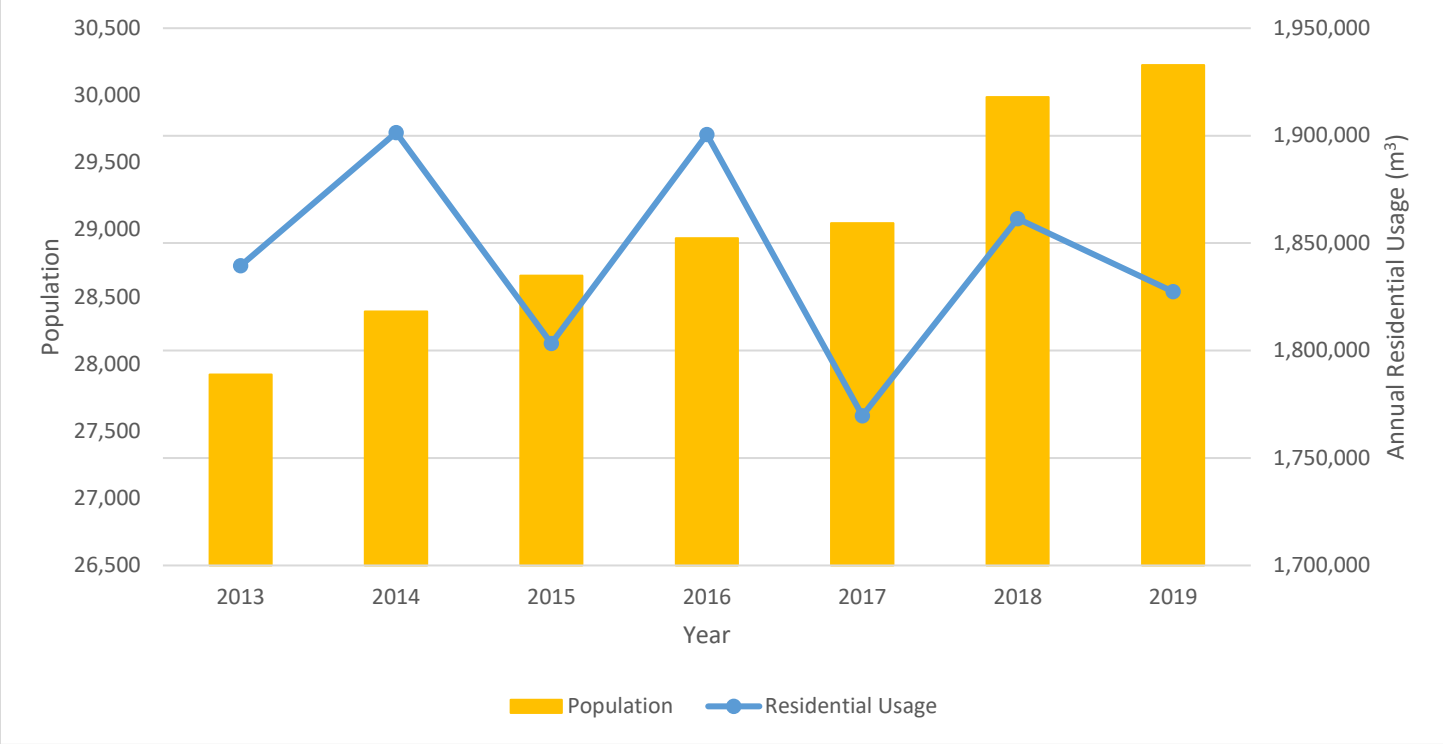


Figure 8: Residential Usage Per Capita (L/person/day)

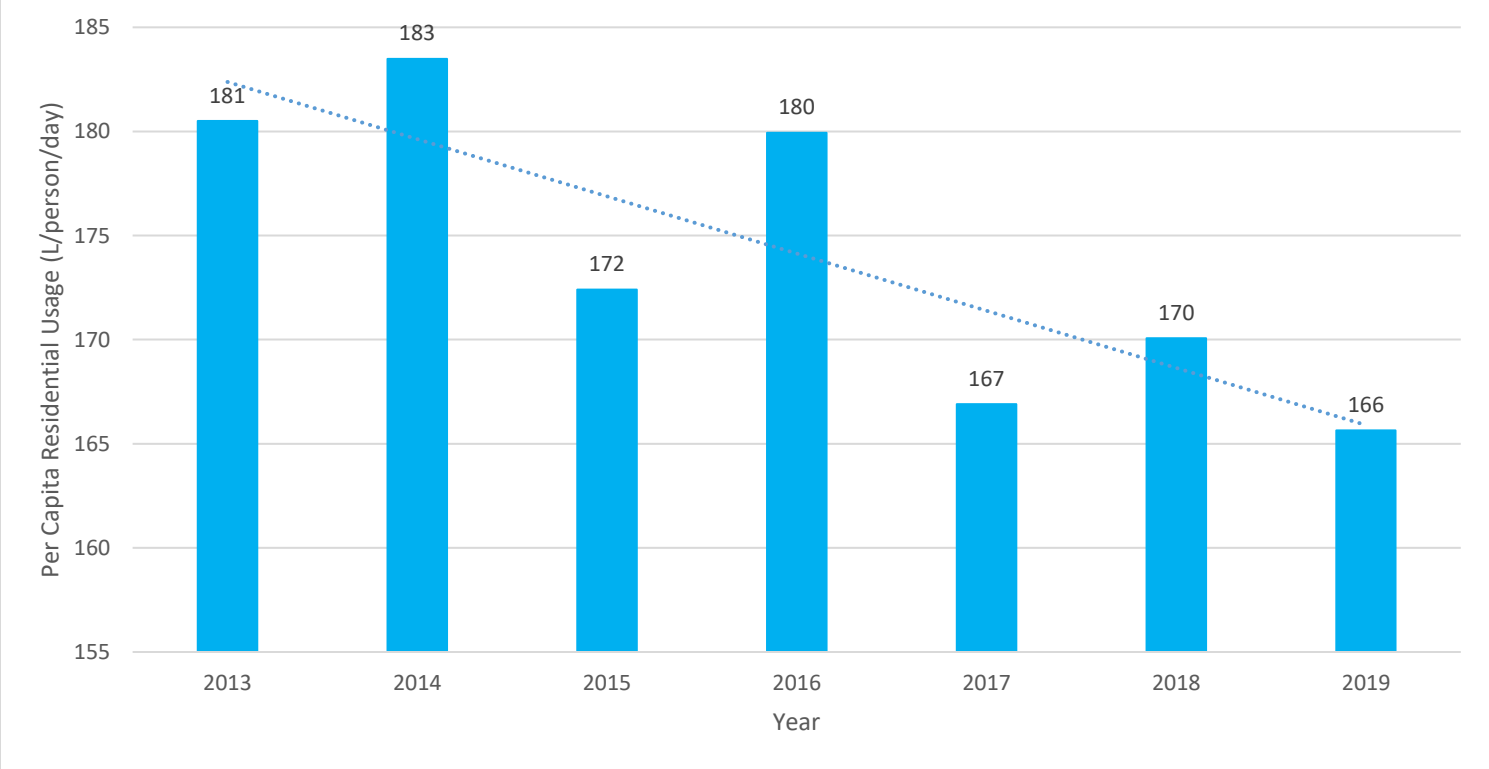
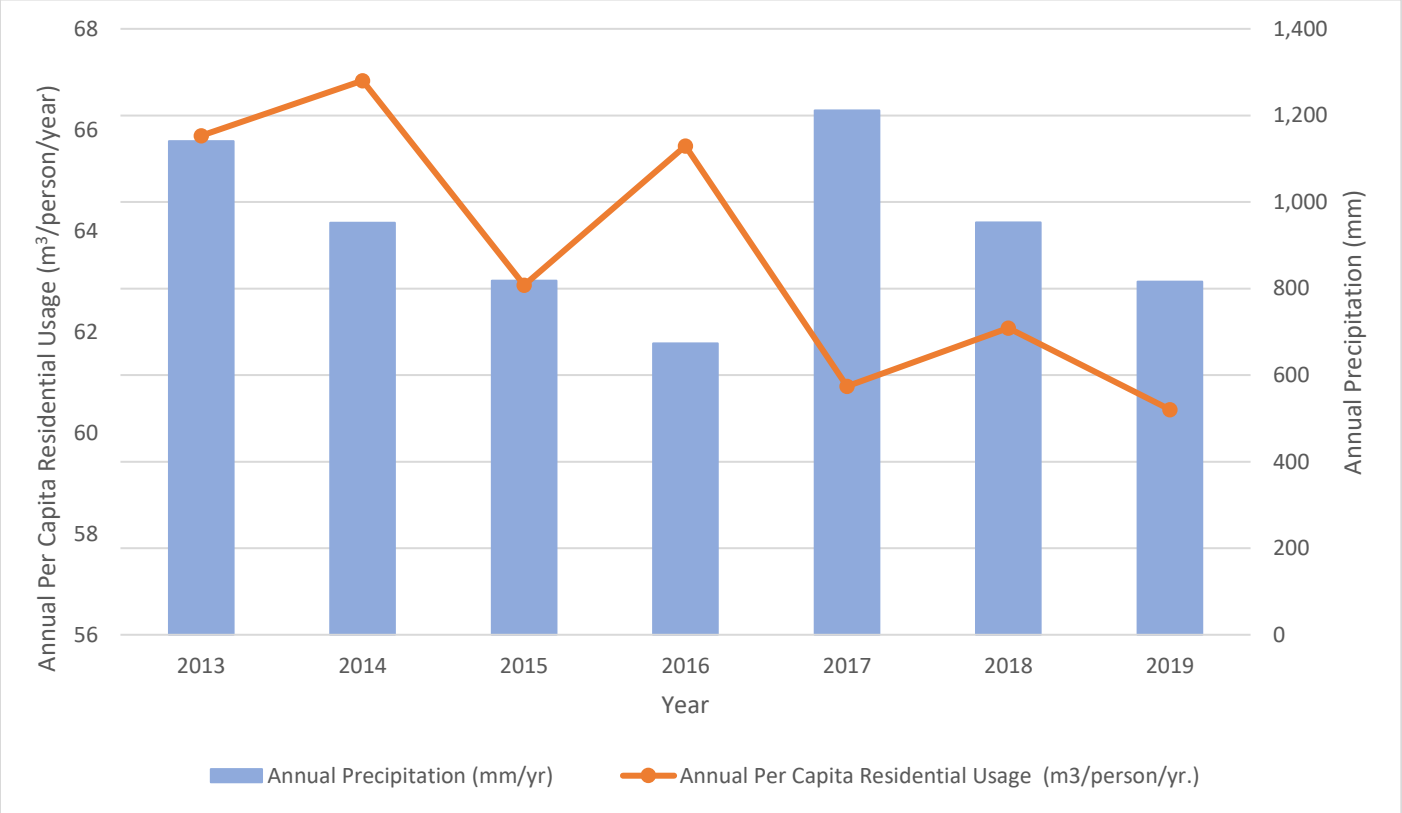


Figure 9: A Comparison of Average Annual Per Capita Residential Usage to Total Annual Precipitation



3.2.4 Top User Analysis

An analysis of the top water users can inform where conservation efforts can be targeted to achieve meaningful impact and significant water savings. In 2019, residential usage accounted for the largest portion of water usage, however the top individual water users are industrial, commercial, and institutional customers. Industrial, commercial, and institutional (ICI) properties comprise approximately 5% of the total number of water service connections in Town and account for 25% of total metered water usage; of that 25%, the top ten individual customers account for 43% of the total water used by the ICI sectors.

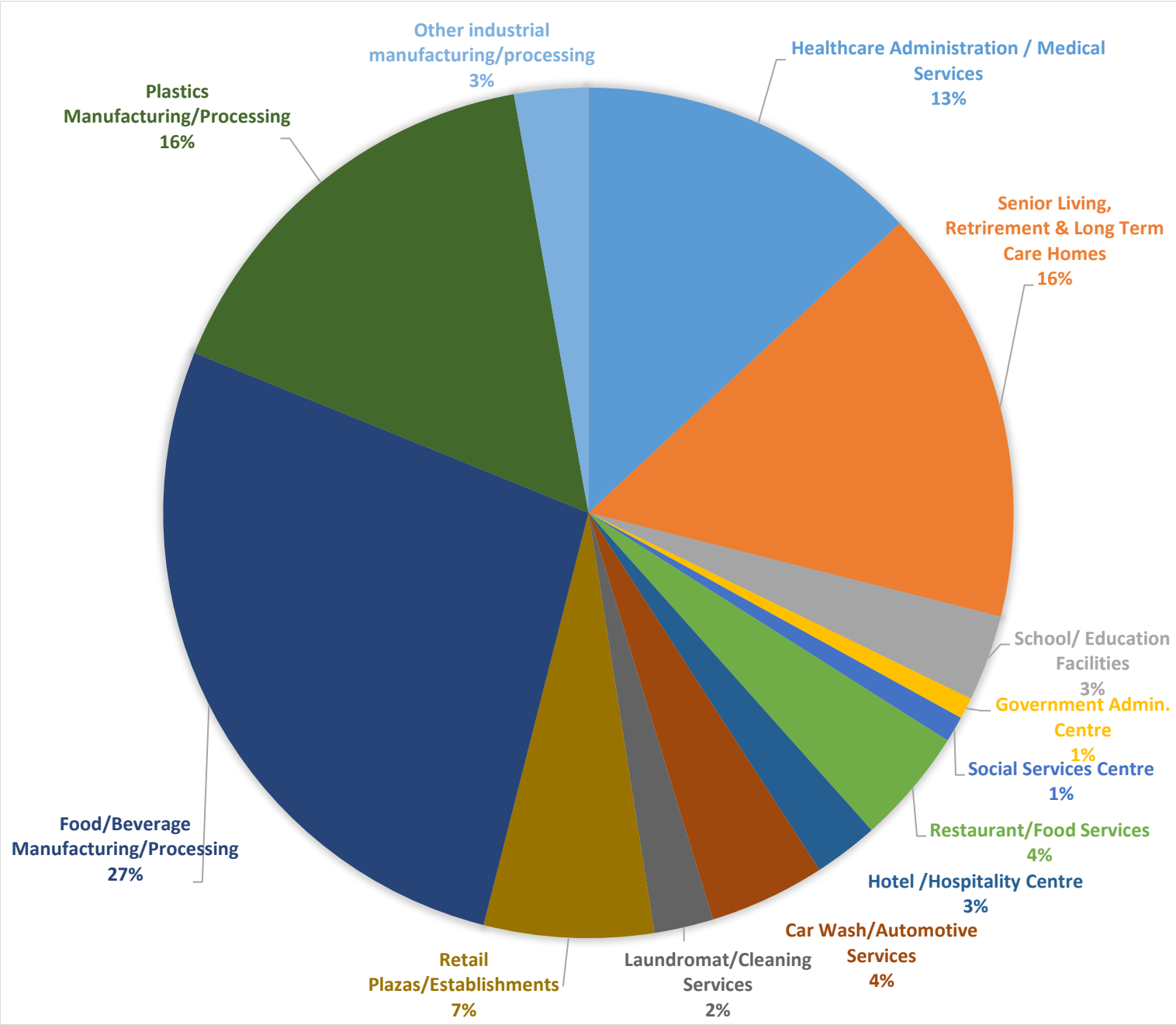
Table 9 lists the top 10 individual water users in each sector and their annual water usage in 2019. As presented in Figure 12, the top water users in the Town of Orangeville by industry/organization type are food manufacturing/processing facilities, plastics manufacturing/processing facilities, senior living and long-term care homes, and healthcare administration. The individual users highlighted in Table 9 represent the top 10 overall individual water users in Town.

Table 7: Top Water Users by Sector (2019)

Sector	Top 10 Water Users by Sector	2019 Water Usage (m^3/yr)
Institutional	Healthcare Administration Centre	45,517
	Senior Living/ Long-term Care Home	35,750
	Senior Living/ Long term Care Home	12,632
	Senior Living/ Long term Care Home	10,121
	School/ Educational Facility	5,545
	School /Education Facility	3,845
	Social Services Centre	3,631
	Government Administration Centre	2,989
	Healthcare Administration/ Medical Services Centre	2,800
	School /Educational Facility	2,702
Commercial	Restaurant/ Food Services	10,495
	Hotel/ Hospitality Centre	9,060
	Car Wash/ Automotive services	8,779
	Laundromat/ Cleaning Services	8,320
	Car Wash/ Automotive Services	7,515
	Retail Plaza	6,629
	Retail Plaza	6,274
	Restaurant/ Food Services	5,805
	Retail Establishment	5,460
	Retail Plaza	5,459
Industrial	Food/ Beverage manufacturing/ processing	59,141
	Food/ Beverage manufacturing/ processing	36,085
	Plastics manufacturing/processing	32,180
	Plastics manufacturing/ processing	13,705
	Plastics manufacturing/ processing	11,490
	Food/Beverage manufacturing/ processing	5,123
	Industrial Hardware/ Parts manufacturing	4,560
	Steel fabrication/ Industrial Equipment Manufacturing	3,652
	Asphalt /Concrete processing	2,163
	Plastics manufacturing/processing	1,913

* Highlighted cells identify top 10 overall individual users in Town.

Figure 10: Distribution of Water Usage Amongst Top Water Users in the ICI Sector



3.2.3. Non-Revenue Water

Water use in Orangeville can be classified into two categories: revenue water and non-revenue water. Revenue water includes all water usage that is both billed and metered, while non-revenue water refers to the portion of treated production water volumes that is not captured through billing data from service line water meters and includes water used for Town operations, as well as real and perceived water losses such as pipe leakages and under-reporting water meters. Non-revenue water can be classified into three key categories, including unbilled authorized consumption (metered, or non-metered), apparent water losses, and real water losses (Table 8). The activities that comprise each category are outlined below:

Table 8: Revenue and Non-Revenue Water

<table>
<tr><td rowspan="6">Treated Water</td><td rowspan="3">Authorized Consumption</td><td rowspan="2">Billed</td><td>Metered Consumption:
Service line meter customers
Bulk water customers</td><td rowspan="2">Revenue Water</td></tr>
<tr><td>Unmetered Consumption:
Flat rate customers</td></tr>
<tr><td rowspan="2">Unbilled</td><td>Unmetered Consumption:
Fire fighting & training
Flushing of Mains & sewers
Cleaning storage tanks
Parks irrigation
Ice pad flooding
Construction
Frost protection</td><td rowspan="5">Non-Revenue Water</td></tr>
<tr><td>Metered Consumption:
Town facilities
Well filter backwash</td></tr>
<tr><td rowspan="3">Water Losses/ Unaccounted for Water</td><td rowspan="2">Apparent</td><td>Unauthorized Consumption:
Theft from hydrants
Illegal connections</td></tr>
<tr><td>Meter Inaccuracies:
System input errors
Under-reporting by aging water meters</td></tr>
<tr><td>Real</td><td>System Leakage:
Watermains (including breaks)
Overflows at storage tanks
Leakage on service connections
Leakage on distribution and transmission mains</td></tr>
</table>

Table 9 and Figure 11 compare annual treated water production volumes to total metered usage from 2013 – 2019, while Figure 12 presents non-revenue water as a percentage of total treated water production. From 2013-2019 non-revenue water made up between 16% to 29% of total treated water production. Figure 11 illustrates that non-revenue water use significantly increased from 2013 to 2015. From 2015 to 2018, non-revenue water demand stayed largely consistent, accounting for between 27% - 29% of total treated water production. In 2019, total metered usage was comparable to previous years, but total treated production dropped, indicating a slight decrease in non-revenue water.

Understanding and minimizing the proportion of non-revenue water that is attributed to water losses and unaccounted for water is essential to effective water conservation programming. In order to better define true water losses and unaccounted for water in the Orangeville system, it is necessary to first quantify unbilled, authorized consumption to the greatest extent possible. Unbilled authorized consumption includes metered authorized usage, including water used at Town facilities, as well as unmetered authorized usage, such as water used for parks irrigation, firefighting, and watermain flushing. Metered authorized water usage at Town facilities was quantified to the greatest extent possible for 2013-2019. However, as unmetered authorized water usage was not available for 2013 through 2019, the unmetered authorized water consumption volumes quantified in 2012 for activities such as parks irrigation, hydrant flushing, and flat rate consumption were used to estimate unmetered authorized consumption for 2013 through 2019. Together the metered authorized usage at Town facilities, and the estimated unmetered authorized water usage were used to derive an overall estimated unbilled authorized consumption value (Table 9). It is important to note that the estimated 2013-2019 unbilled authorized consumption values do not include water used for construction, frost protection work, or firefighting, as these volumes are highly variable from year to year, and consumption volumes from one year do not serve as a reliable indicator of consumption volumes in other years. Water usage associated with these activities was not available for 2013-2019, and could not be reliably estimated based on previous years; as a result, the unmetered authorized consumption estimates are to some extent underestimated.

Inferred non-revenue authorized water usage values for 2013-2019 were used to estimate water loss and unaccounted for water values in the Orangeville system. As presented in Table 9, estimates of unaccounted for water in the Orangeville system are between 13 - 27% for 2013-2019. It is important to note that these unaccounted for water values are somewhat overestimated, as they also include unmetered authorized water takings for fire-fighting, frost protection, and construction activities. Quantifying non-revenue water usage and minimizing water loss are critical components of an efficient and sustainable municipal water supply system. A key goal of this Plan will be to accurately enumerate non-revenue water volumes and reduce water loss.

Table 9: Non-Revenue Water

Year	Annual Treated Volume (m^3/year)	Total Metered Usage (m^3/year)	Non-Revenue Water (m^3/year)	Percent (%) Non-Revenue Water	Estimated Unbilled, Authorized Water Usage *	Estimated Unaccounted for Water (m^3/yr)**	Estimated Percent (%) Unaccounted for Water**
2013	2,943,184	2,480,912	462,272	16%	83,633	378,639	13%
2014	3,159,237	2,527,755	631,482	20%	149,013	482,470	15%
2015	3,351,604	2,363,629	987,975	29%	94,452	893,523	27%
2016	3,434,696	2,513,580	921,116	27%	92,067	829,049	24%
2017	3,415,991	2,473,824	942,167	28%	75,453	866,714	25%
2018	3,451,668	2,512,921	938,747	27%	113,117	825,630	24%
2019	3,141,496	2,454,415	687,081	22%	94,773	592,308	19%

* Values calculated using metered water usage + estimates of non-metered usage based on 2012 unmetered, authorized usage data; estimates exclude authorized usage for firefighting and training, frost protection, and consumption for construction and building purposes

** Unaccounted for Water estimates include real and apparent water losses in addition to some unmetered, authorized usage for firefighting, construction, and frost protection.

Figure 11: Annual Production vs. Metered Usage (2013 – 2019)

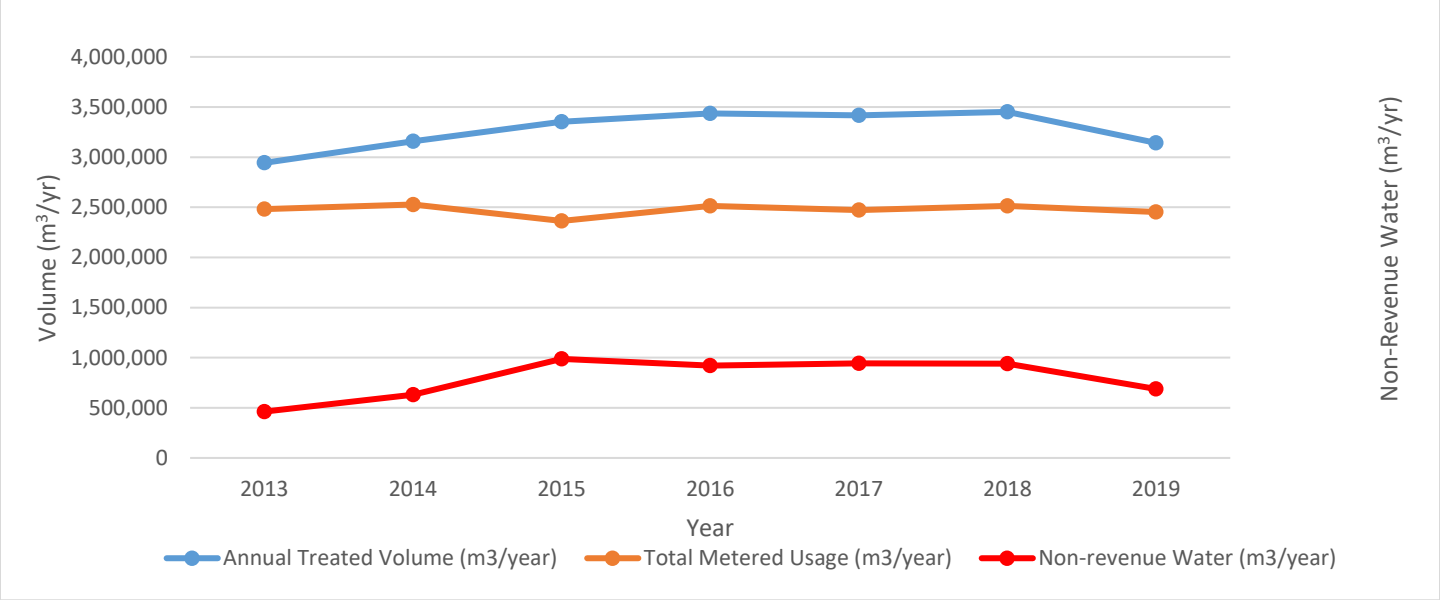
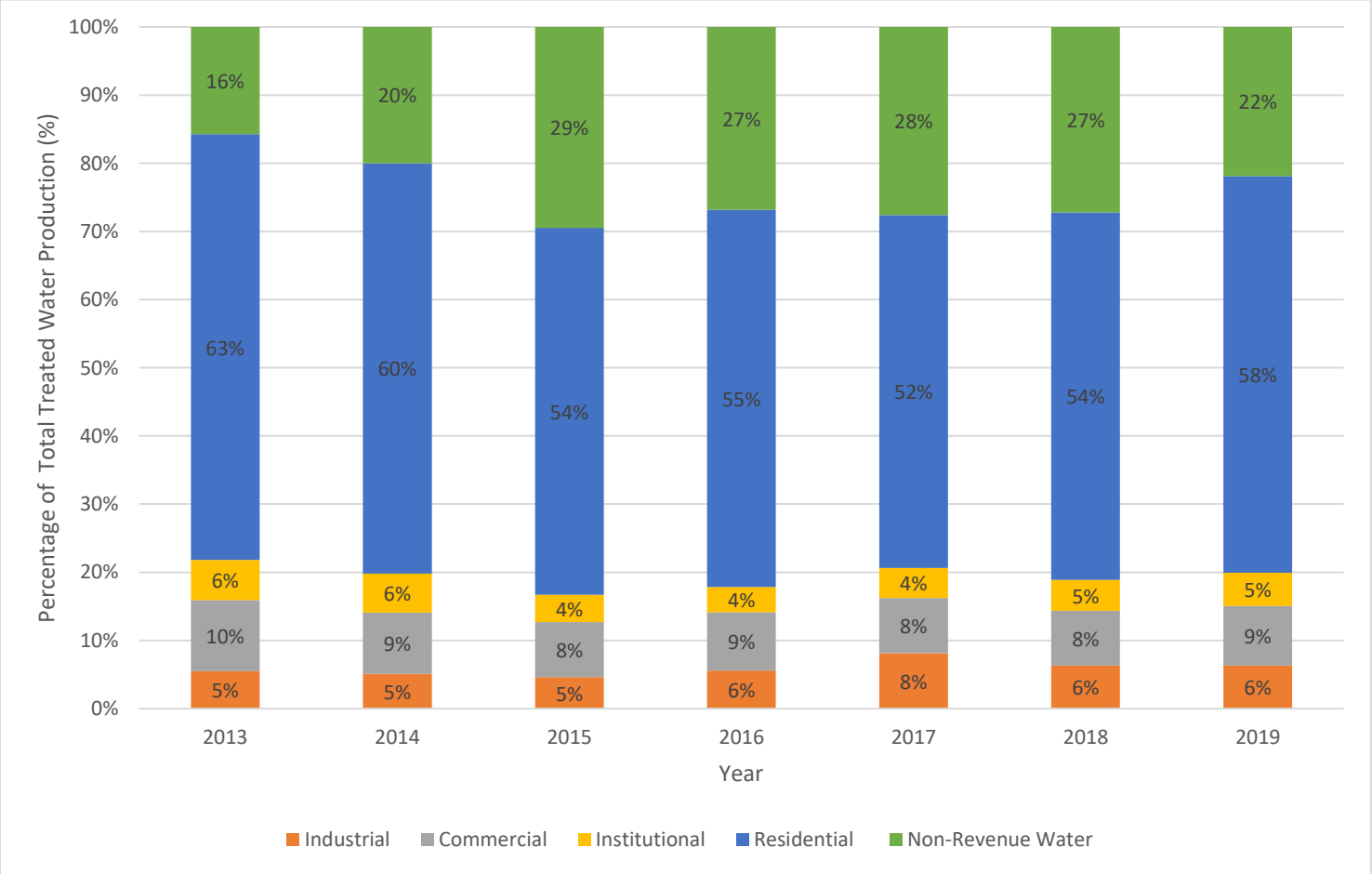


Figure 12: Metered Water Demand and Non-Revenue Water as a Percentage of Total Treated Water Production



4. Existing Water Conservation Programs & Practices

Many of the water conservation programs already in place in Orangeville are the result of recommendations made in past water efficiency and servicing studies completed by the Town. The Town intends to continue implementing many of the existing water conservation programs currently in place, but the efficacy of these programs will be evaluated on an annual basis. The following section provides an overview of conservation programs currently in place.

4.1 Leak Detection

The Town actively implements a leak detection and repair program on an annual basis. Over the past three years, the Town has surveyed between 5 to 10 km of watermains annually, or approximately 50-75% of the metallic pipes in the distribution system. This program generally prioritizes older sections of the distribution system and trouble areas where past watermain breaks have occurred, or where resident complaints of wet lawns or leaky basements and running sump pumps have been received.

Contractors using sonic leak detection have performed the leak detection surveys for the Town in the past. This methodology involves listening for leaks on hydrants, valves, and fittings, and moving sequentially through a prioritized area of the water distribution system. Results from the leak detection surveys have identified some minor leaks in the system, which were repaired upon detection. The repair of these minor leaks has been essential to preventing more significant and potentially critical leaks in the system.

4.2 Water System Upgrades and Operation

The Town of Orangeville actively maintains and upgrades equipment and infrastructure for the efficient operation of the Town's water supply and distribution system, replacing approximately 200 m of old watermain each year. Prioritization is generally given to watermains with a break history or at end of (or past) useful service life.

The Town also conducts well efficiency testing (step drawdown tests) every 2 years, and performs rehabilitation work as required. Routine inspections, maintenance, repairs and rehabilitation are also performed for all water storage facilities as required.

Routine calibration is performed on all flow meters connected to the Town's system. A number of water flow meters for the Town's supply system have recently undergone replacement and upgrades.

4.3 Water Rates

The most significant water conservation initiative in Town has been the implementation of Universal Water Metering for all residential, industrial, commercial, and institutional properties. Prior to the adoption of the Town-wide metering program in 2003, industrial, commercial, and industrial customers were metered while residential properties were charged a flat rate fee for water usage. The introduction of universal water metering has resulted in a 20% reduction in the average per capita daily water demand (based on a 7 year average) and, despite population growth, the Town has also seen a decrease in the maximum day demand by approximately 30% since the introduction of water metering (based on a 7 year average) (Table 10).

Table 10: Average Daily Per Capita Production and Maximum Day Demand (2002 vs. 2013 – 2019)

Year	Average Daily Per Capita Production (L/cap/day)	Maximum Day Demand (m^3/day)
2002	390	17,980
2013	290	11,181
2014	307	11,865
2015	324	12,399
2016	330	13,248
2017	324	12,437
2018	328	14,037
2019	298	11,580

The Town's Water and Wastewater Rates By-law (By-law 020-2015) establishes the applicable water rates on a per cubic metre basis and is reviewed and updated every 5 years. The Town establishes its volumetric water rates through the completion of a water rates study. The goal of the rates setting exercise is to provide adequate revenues to operate the utility in a fiscally sound manner with rates designed to recover the full costs associated with providing the water service, while also maximizing motivations for conservation. The most recent update to the Water and Wastewater Rates By-law was completed in January 2020 and establishes volumetric rates up to and including the year 2024. To encourage conservation, the current by-law uses an increasing block rate structure where the consumer pays increased rates for consumption beyond an established volume threshold. Usage in excess of the established block threshold is charged 35% more for each cubic meter used above and beyond the established block rate threshold. Prior to 2020, the block rate threshold for residential meters was set to 50 m^3/month. In an effort to further encourage conservation, the by-law was revised in 2020 to lower the residential block rate threshold to 20 m^3/month. Separate rate blocks (or thresholds) are established for different meter sizes. The Town's block rate structure and current water rates are provided in Tables 11 and 12 below, respectively. Water rates continue to be an important water conservation measure for the Town, as well as being the key mechanism for funding the continued operation and maintenance of the Town's water supply service.

Table 11: Volumetric Block Rate Thresholds (2020)

Meter Size	Water Consumption/ Month	Wastewater Consumption/ Month
5/8" & 3/4"	**>20m^3**	**>20m^3**
1"	**>100m^3**	**>100m^3**
1 ½"	**>500m^3**	**>500m^3**
2'	**>1,000m^3**	**>1,000m^3**
3"	**>3000m^3**	**>3000m^3**
4"	**>6,000m^3**	**>6,000m^3**

Table 12: Town Water Rates (2020)

Year	Customer Type	Water Per Cubic Metre Rate	Wastewater Per Cubic Metre Rate	Total Per Cubic Meter Rate
2020	Residential	$2.12	$1.90	$4.02
	Non-Residential	$2.23	$1.99	$4.22
	Bulk Water Purchases	$2.78	n/a	$2.78

4.4 Lawn Watering By-Law

By-Law Number 21-2005, passed by Council on March 21, 2005 regulates lawn and garden watering in Town to help ensure that adequate water supply is available for use by residents, businesses and industry. The By-Law is in force throughout the year and permits lawn and garden watering under the following conditions.

- Properties with even numbered addresses may water lawns and gardens on even numbered calendar dates, between the hours of 5:00 a.m. and 8:00 a.m. and between the hours of 7:00 p.m. to 10:00 p.m.
- Properties with odd numbered addresses may water lawns and gardens on odd numbered calendar dates, between the hours of 5:00 a.m. and 8:00 a.m. and between the hours of 7:00 p.m. to 10:00 p.m.

4.5 Toilet Replacement Program

On October 3, 2005, Council approved the recommendation of staff to implement a Toilet Replacement Program as part of the Town's overall water conservation initiatives. This program established a rebate of $50 for every 13 L or 20 L per flush toilet that was replaced with a 6.0 L per flush toilet. While the program focused on the Town's residential sector, rebates were also issued for institutional, commercial, and industrial replacements.

In 2012, the Ontario Building Code (OBC) was updated to include regulations for water consumption per flush for sanitary fixtures. Maximum water consumption per flush cycle flow rates for sanitary fixtures in a Group C Occupancy (new residential construction) is now set at 4.8 L per flush. High efficiency water closets which provide a dual-flush cycle option of 4.1 L (or less) and 6.0 L flushes are also deemed to comply with the new OBC regulations (i.e. the effective flush volume is less than 4.8 L). Rebate applications for these higher efficiency replacement toilets have been accepted as of January 1, 2014.

As of March 4, 2014, the Town revised the program such that only WaterSense® certified toilets be eligible for a rebate under Town's toilet rebate program. These toilets are rigorously tested and have an effective flush volume of 4.8 L or less. The amount of rebate was also increased to $60 for these more efficient toilets at that time.

With the update to the Ontario Building Code, many of the commercially available toilet models now conform with the 4.8 L flush volume standard. As a result, water efficient toilets are now commonly being installed in both new housing developments, and by residents replacing old toilet fixtures. Given that the installation of water efficient toilets has largely become standard practice, the impact of these toilets on reducing water demand is expected to plateau. The Town intends to review the viability of continuing the toilet rebate program into 2021.

Table 13: Toilet/Water Closet Replacements (2013 – 2019)

Program Year	Number of Toilet/Water Closet Replacements
2013	286
2014	182
2015	133
2016	112
2017	279
2018	86
2019	159
Total:	1237

4.6 Rain Barrels

Using rain water to water flower beds and gardens reduces the amount of water that has to be pumped and treated and saves the consumer money. Rain barrels are designed to collect fresh rain water from the roof of the house and have screens to keep leaves and most insects out of them. Rain barrels are purchased by the Town in bulk and re-sold to residents “at cost”. The rain barrel resale program has been in effect since 2010, with 730 sold in total over the last ten years. The Town intends to continue to undertake and promote the rain barrel program.

Table 14: Rain Barrel Sales (2010 – 2019)

Year	No. of Barrels Sold
2010	192
2011	78
2012	46
2013	57
2014	35
2015	70
2016	105
2017	44
2018	50
2019	53
Total:	**730**

4.7 Public Education

Town source water protection staff coordinate a number of public education initiatives aimed at raising awareness and uptake of water conservation practices. The Town’s Source Water Protection website page provides extensive information on water conservation techniques. Staff also employ traditional media (including brochures, newspaper ads, pamphlets) and social media to conduct outreach and keep water conservation top of mind for residents. Staff also attend community events to educate the public on the Town’s source protection program and conservation actions. Staff intend to continue to implement and advance public education efforts.

5. Water Conservation Goals & Performance Targets

In order to establish an effective water conservation program, it is important to define specific conservation goals and targets. Table 13 highlights the water conservation goals and targets of this Water Conservation Plan. The defined goals and targets layout the strategy to achieve the greater objectives of the Water Conservation Plan as outlined in Section 1.1. A future evaluation of the Town's success at meeting the defined goals and targets will allow for adaptive management of the Town's water conservation initiatives and programs, and the inclusion of additional measures and actions as needed.

Table 15: Water Conservation Goals and Targets

Goal	Target
1) Reduce unaccounted for water Unaccounted for water makes up a substantial proportion of the total water production volume and therefore represents a significant impact on associated operating, treatment, and maintenance costs. Reductions in unaccounted for water will reduce annual system operation and maintenance costs. The water saved by reducing unaccounted for water will become available to build redundancy in the supply system, thereby increasing system resilience.	By 2026: a maximum of 10% of total annual treated water production volume should be attributed to water losses.
2) Reduce outdoor water use Outdoor water use has a significant impact on maximum day demand for a municipality's water system. The maximum day demand value represents the maximum water consumption during any one day of the year, and is the key parameter used to evaluate the need for water infrastructure expansions. Reducing maximum day demand will help postpone or eliminate the need for near-term infrastructure upgrades and expansions.	By 2026: a reduction in the maximum day factor (MDF) by 3% from the 2013-2019 average. This would put the 2021-2025 average target maximum day factor to 1.32.
3) Reduce indoor water use Indoor water use accounts for the largest proportion of water demand in Town. Given the significance of indoor water use on the Town's overall water demand rates, the success of the Town's water conservation efforts will largely depend on reducing indoor water use across both residential and ICI (industrial, commercial, and institutional) sectors.	By 2026: a 5% reduction from the 2018 baseline in average residential daily per capita demand from November 1 to April 30th. This would put the 5 year average target daily per capita residential demand from November 1 to April 30th to 158 L/day. By 2026: A 7% reduction in average daily per capita treated water demand from the 2013-2019 baseline. This would put the per capita daily treated water demand at 293 L/person/day.
4) Enhance rainfall infiltration and aquifer recharge Recharge of groundwater takes place when precipitation and snowmelt percolates through soil to reach the water table. Increasing urbanization reduces groundwater recharge rates due to the construction of hard surfaces that act impede water from percolating through soil. The impacts of climate change coupled with increasing urbanization may further exacerbate stress on groundwater recharge processes. Increasing infiltration by enhancing and restoring opportunities for increased water capture in key areas will improve natural aquifer recharge and protect the long-term viability of drinking water supplies under water stress scenarios.	By 2026: Complete two pilot projects to restore and enhance groundwater recharge processes on public lands in the Wellhead Protection Area for Quantity. Pilot projects should utilize a combination of low impact development, naturalization, afforestation, and environmental restoration techniques to achieve an enhancement in groundwater infiltration rates.

6. Water Conservation Initiative Evaluation

In order to achieve the goals and targets set out in Section 5, the Town will need to introduce new conservation initiatives to supplement the existing conservation programs outlined in Section 4. A comprehensive review of recommended water conservation standards and practices for the municipal sector was undertaken during the preparation of this Plan. The following section identifies and describes the initiatives and management practices determined to be best suited to help the Town meet the specific water conservation goals set out in Section 5.

6.1. Initiatives to Reduce Unaccounted for Water

Analysis of water production data and billed customer usage indicates that in 2019 unaccounted for water made up an estimated 19% of total treated water production. As discussed in Section 3.2.3, the primary sources of unaccounted for water in Orangeville are predicted to be:

- real water losses and leakage from the Town's distribution system
- perceived water losses due to water metering under-reporting
- unbilled, non-metered authorized water usage for essential services including fire department training and emergency response
- water main and sewer flushing
- frost protection services, and
- water used for construction and building purposes

Environment Canada's Municipal Water Use Report indicates that municipal system water losses due to leaks, meter errors, system flushing, and maintenance work, on average account for 13% of total treated water production across Canadian municipalities and vary from a low of 6% to a high of 19%. Although the Town's unaccounted for water estimate is on the higher end of this spectrum at 19%, it should be noted that this estimate includes unmetered authorized water usage for fire fighting, construction, and frost protection work; therefore the true water loss value is somewhat less than 19% of total treated water production. Notwithstanding, water losses still account for a considerable portion of the Town's total treated water production. A reduction in water losses is critical to the success of municipal water conservation efforts. In addition to lowering operation, treatment, and maintenance costs, water saved by reducing unaccounted for water becomes available to build redundancy in the supply system, in turn increasing system resilience. The following sections summarize a number of recommended initiatives to minimize water loss and unaccounted for water within the municipal distribution network.

6.1.1. Leak Detection Program

As discussed in Section 4.1, the Town of Orangeville conducts leak detection work annually and routinely checks for leaks during other system maintenance work. The current scope of the leak detection program includes surveying several kilometers of older, higher risk metallic water mains annually using sonic leak detection methodologies to identify and pinpoint leak locations. The program is an effective way of preventing significant water waste and should be expanded in the future to include leak detection work on non-metallic watermains in Town; this will require the employment of alternative leak detection methodologies capable of surveying non-metallic pipes.

Future expansions to the leak detection program should focus on exploring the feasibility of setting up district based, ongoing leak detection monitoring to further identify and reduce system water losses. District metering in water systems involves the establishment of “District Metering Areas” (DMAs) to proactively monitor the occurrence of leaks and water losses before they appear at the surface. The “District Metering Area” technique involves temporarily closing selected valves to divide the water distribution system into districts and measuring the flow demand in each district during a specified period of time. The actual measured flow into each area or “district’ is then compared with a calculated legitimate usage demand which establishes the typical metered usage in the district based on proven usage allowances or actual meter readings. Areas with a large discrepancy between the calculated legitimate demand and the actual measured flow tend to have a high level of unaccounted for water. Detailed leak detection surveys are then performed in areas with large discrepancies. This approach enables the effective prioritization of leak detection efforts in addition to detecting leaks that would not have been discovered by traditional leak detection methods. A targeted leak detection program can reduce the overall leakage in the distribution system by 25%-40% (City of London, 2014).

Additional benefits of the district metered area leak detection method include:

- A transition from a reactive to a proactive management approach to leakage and water main breaks.
- Water that is saved increases system capacity which can be used accommodate future increases in demand, or build system redundancy and resilience during emergencies and drought
- The collection of more accurate and timely water use data that assists in the management of the water system without the need to conduct special flushing programs;
- Better overall knowledge of the distribution system;
- Reduced pumping and treatment costs;
- Reduced property damage due to the proactive management approach which repairs leaks before they result in water main breaks;
- Reduced risk of water contamination (City of London, 2014)

6.1.2. Water Meter Maintenance and Replacement Program

In January 2003 the universal water metering program was fully implemented and operational in the Town of Orangeville. Since implementation, significant reductions in per capita demand have been realized and water metering coupled with water rates continues to be an important strategy for encouraging efficient water use amongst residents. Since the inception of the water meter program 18 years ago, many of the water meters installed at program initiation are now due for replacement.

Older water meters underestimate water usage and result in under-reported readings and errors. A Town-wide replacement of water meters is an important strategy for addressing unaccounted for water and meter reading

errors and inaccuracies. To ensure continued accurate readings from water meters, the Town intends to implement a replacement program with the goal of replacing all meters in Town by 2024. The water meter replacement program should be coupled with the introduction of a long-term water meter asset management and replacement program. The asset management program should at a minimum, track the installation date of all meters in Town, and set out a replacement schedule to guide staff with the planning of future meter replacement initiatives.

As part of the next Town-wide water meter replacement initiative, staff should evaluate the feasibility of introducing meters with advanced data transfer functionality. The manual touchpad meter systems currently in place across Town require meter readings to be manually collected by staff. In contrast, 'Smart" meters with advanced data transfer capabilities are equipped with transmitters that allow for the automatic upload of water meter data to a centralized database on a set schedule decided by the Town. Smart meters eliminate manual meter reading expenses in addition to minimizing meter reading error. When coupled with the adoption of data management software, Smart meters can provide Town staff with greater access and working control of water meter data. Depending on the frequency at which data is recorded, Smart meters can also provide greater insight into consumption trends, allowing for better system understanding and control.

Smart metering can be coupled with the deployment of a customer account website where service users can view their consumption data. Customer access to regularly updated water consumption data provides the added benefits of increased awareness of water usage, faster detection and notification of abnormally high water use within the home, and more accurate water use profiles.

With the initiation of the next water meter replacement initiative, the Town should also consider launching a meter accuracy testing program. Meter testing programs test the accuracy of a designated number of water meters on a scheduled basis. During the test, staff run water through the meter at different volumes and check the amount of water registered on the meter against the amount of water used in order to determine the efficiency of the meters. As meters age, accuracy testing will help inform estimates of water loss due to underperforming meters and assist staff with planning and budgeting for future replacement initiatives.

6.1.4. Non-Revenue Water Quantification Program

Authorized non-revenue water refers to unbilled water usage that is authorized by the Town. The major sources of authorized non-revenue water takings include:

- Water use by the Fire Department for training and emergency response,
- Sewer system flushing and well efficiency testing
- Public parks and garden irrigation
- Water use at Town facilities
- Water use for construction and building activities

All of the above activities have the potential to consume significant amounts of water and should therefore be quantified. On-going quantification of these non-revenue authorized water uses would also provide a more accurate understanding of the true value of real water losses and unaccounted for water in the distribution system.

Going forward the Town should improve data collection procedures for authorized, non-revenue water takings. Actions to improve non-revenue water usage data collection and tracking include:

- Working with the fire department to initiate a procedure for collecting, recording, and reporting water usage data for fire fighting and training exercises
- Establishing a protocol for systematically quantifying, recording, and reporting water used for distribution and sanitary sewer flushing activities, well efficiency testing, and well filter backwash water

- Working with facilities and parks staff to identify opportunities to track water usage and establish a procedure for collection, recording, and reporting usage data to Town water staff
- Regularly maintaining up-to-date records of metered water usage at Town facilities
- Requiring construction and building contractors to report the volume of water obtained from hydrants to the Town

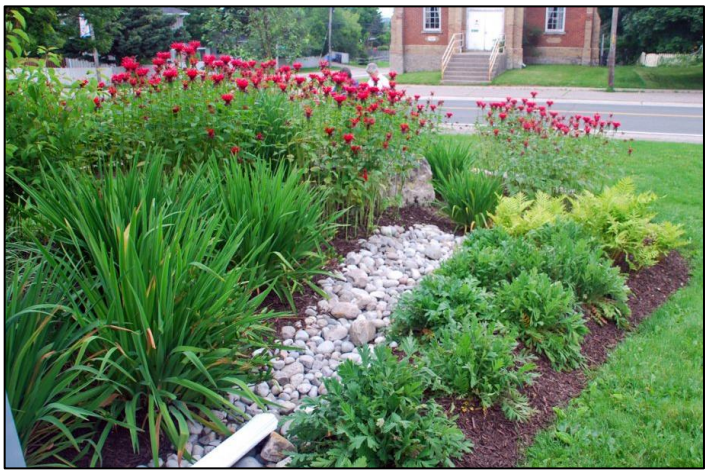
6.2 Initiatives to Reduce Outdoor Water Use

Water supplies are typically under greater stress during warmer months when higher temperatures and dry conditions increase the potential for drought events, and water demand escalates due to seasonal discretionary water uses such as lawn irrigation and pool filling. Seasonal stress on the Town's water supplies is expected to be exacerbated under a changing climate, with projections indicating that Orangeville could experience more prolonged and intense summer heat events coupled with a decline in total summer precipitation (LAMPS, 2019; Environment and Climate Change Canada, 2019). Given local climate change projections, conservation initiatives that encourage the reduction of outdoor water use will be essential to building system resiliency and maintaining reliable water yields under increased water stress scenarios.

The most significant impacts of seasonal water use such as summer lawn/garden watering, and pool filling are on maximum day demand values. The maximum day demand value represents the maximum water consumption during any one day of the year, and is the key parameter used to evaluate the need for water infrastructure expansions. Typically, the maximum day demand occurs in summer when outdoor discretionary water use is highest. A key objective of this Water Conservation Plan as outlined in Section 1.1 is to eliminate or postpone the need for water infrastructure expansions. In order to ensure maximum day demand does not exceed the capacity of existing infrastructure under population growth scenarios, reductions in outdoor water use will need to be achieved. The following section identifies a number of initiatives the Town may choose to implement in order to reduce outdoor water use.

6.2.1 Landscape Water Efficiency and Low Impact Development Program

Implementation of programming to encourage the adoption of efficient landscaping and low impact development practices would reduce discretionary water use for irrigation purposes. An effective landscape efficiency and low impact development program should encourage "water-wise" landscapes that combine water efficient plants with stormwater management techniques that work to capture and use rainfall run-off from roofs and hard surfaces to nourish gardens and lawns, while replenishing groundwater supplies, and mitigating against flooding.



In order to demonstrate commitment and garner public support for landscape efficiency programming, the Town should lead by example and consider implementing low impact development and water efficiency practices on Town properties. In addition to modeling positive water conservation behaviors, municipal adoption of landscape efficiency and low impact development practices will serve as an invaluable educational tool for raising awareness and buy-in for landscape water conservation practices. Consideration should be given to the following initiatives:

- Demonstration sites and gardens at highly frequented locations, such as public parks, recreation centers, and Town Hall
- Implementation of large-scale rainwater harvesting infrastructure and use of rainwater for irrigation at Town parks and properties

- Partnerships with local garden centres to promote the use of native and water efficient plant species and low impact development landscaping practices
- Landscaping consultations with residents to promote the adoption of water efficient landscaping and low impact development techniques
- Incentive programs to encourage the installation, adoption, and continued maintenance of low impact development features such as rain gardens, soakway pits, infiltration trenches, permeable paving, and downspout disconnections; promotion of the rain barrel program should be continued
- Public education through promotional messaging via social media platforms, Town website, and brochures should be continued

To advance the uptake of water efficiency landscaping and low impact development measures across the Town, the Town's Official Plan, Zoning By-Law, and Town development standards and guidelines should be revised and updated to strengthen the implementation of low impact development and landscape water efficiency techniques in the development and re-development approval process. An example of this approach could include changes to the zoning by-law to introduce limitations on impermeable surface areas of properties and/or minimum permeable area and landscaping area requirements. Town development standards and guidelines should require the use of alternative paving materials to allow for increased infiltration where increases in paved areas are proposed. Requirements for downspout disconnections, water efficient landscaping, and direction of runoff to infiltration features such as soakaway pits, infiltration trenches and chambers, bioretention facilities, enhanced swales, and other low impact development measures should also be incorporated into site development guidelines, engineering standards, and application submission requirements.

6.2.2 Lawn Watering By-Law Review

To reduce peak summer demands the Town currently implements a lawn watering by-law which requires that properties with even numbered addresses to restrict lawn watering activities to even numbered calendar dates, and odd numbered addresses to restrict watering to odd numbered dates. In both cases, watering is restricted to the hours of 5:00 am to 8:00 am and 7:00 pm to 10:00pm.

The Ontario Water Works Association (OWWA) Outdoor Water Use Reduction Manual, 2008, provides an update to the practice of lawn-watering restrictions and suggests that odd/even watering restrictions can promote over-watering by reminding people to water on their designated days. The suitability of odd/even restrictions in Ontario has also been called into question, with many suggesting that it is not necessary for property owners to water their lawn every second day. Moreover, it is widely accepted that watering deeply once or twice a week is more beneficial to lawn health than frequent shallow watering. A movement away from odd/even water restrictions towards a one-day-per-week restriction has been a growing trend across municipalities in Ontario.

It is recommended that the Town consider revising the existing lawn-watering by-law to a one or two-day per week restriction. This practice should help curb maximum day demand, and when combined with the time-of-day restriction should ensure peak hour demand does not exceed system capacity. An accompanying promotional and education campaign should be put in place in advance of by-law implementation to allow residents and businesses to adjust their watering practices.

6.2.3 Phased Water Restriction Policy & Procedure

Climate projections for the Town of Orangeville indicate a potential decline in summer precipitation leading to increased risk for local drought conditions (LAMPS, 2019). To build emergency preparedness and increase resiliency in the face of a changing climate, the Town should develop a phased water restriction policy and procedure to guide the implementation of water restrictions during times of drought and water stress. The aim of a phased water restriction policy is to reduce demand for drinking water through specific water restriction measures that become increasingly more restrictive. The stages of the restriction policy and procedure are generally activated in successive order but can also be activated immediately in any order. Examples of restrictions may include lawn watering bans, car-washing bans, swimming pool or hot tub filling restrictions, operating restrictions on splash pads, and limitations on other non-essential water uses.

Restrictions are activated with the goal of ensuring a sustainable supply until the concerns that caused activation of the restriction have been resolved. Water restrictions are intended to deal with short term problems and are not designed to bring about long-term reductions in usage.

6.3 Initiatives to Reduce Indoor Water Use

According to Environment Canada's Report on Municipal Water Use, households consume about 60% of the potable water produced in Ontario with an estimated 95% of this consumption occurring indoors (Environment Canada, 2010). In Orangeville, approximately 75% of metered usage is attributed to household usage, with the largest portion of that usage occurring indoors for use by toilets, washing machines, showers, faucets, and water softeners. Given the significant proportion of water demand attributed to indoor residential water use, conservation initiatives aimed at reducing residential indoor water demand will be essential to achieving the conservation objectives outlined in this Water Conservation Plan.

Industrial, commercial, and institutional (ICI) uses account for approximately 25% of metered water usage in Town. Most of this usage is attributed to indoor water uses associated with various industrial processes and other general indoor uses. Despite only accounting for a quarter of metered water usage, a small number of ICI properties make up a significant portion of all ICI water demand. Conservation initiatives targeted at top water users could yield significant overall water savings. The following section summarizes a number of recommended initiatives to reduce indoor water use in Town.

6.3.1 Establish and Formalize a Water Use Database and Water Use Data Review Protocol

The Town of Orangeville contracts Orangeville Hydro to conduct monthly meter readings to compile and record customer usage data. The collected monthly metered usage data is provided to the Town on an annual basis. Water production data is collected and recorded by the Town. Going forward it is recommended that the Town compile both production and metered usage data into a common database and update the database on a regular basis while performing regular analysis on water supply/usage trends. Performance of regular analyses could provide a better understanding of water demand trends as well as provide early indication of leaks and other operational discrepancies in the distribution system.

6.3.2 Water Softener Rebate

Water softeners are widely used across Town to address hard water issues resulting from the mineral rich aquifer sources that supply the Town's wells. Water softeners work by exchanging hardness ions (calcium and magnesium) for salt (sodium) ions. This ion exchange occurs within the resin tank of the water softener when water flows through the resin beads and hardness ions trade places with salt ions. Water softeners regenerate

to remove the hardness ions that have accumulated in the resin beads and recharge the beads with salt. During this regeneration process the softeners use water to recharge the resin that removes the minerals from the water. Older “time-based” softener models regenerate at set increments, whereas new, more efficient on-demand systems monitor the amount of water used in the household so that the system can regenerate only when needed. By regenerating only when it is needed, on-demand systems use less water, less salt, and less energy, saving the property owner operating costs, as well as helping reduce water consumption (City of Guelph, Region of Waterloo, 2019).

The implementation of a water softener rebate program would encourage property owners with older time-based softener systems to upgrade to higher efficiency “on-demand” softener systems or seek alternative technologies that work to reduce scale build-up without the use of salt or water. Alternatives such as the Template Assisted Crystallization (TAC) or Nucleation Assisted Crystallization (NAC) systems have been shown to reduce scale buildup on water heater elements by over 90 per cent, matching the effectiveness of salt-based water softeners. The NAC/TAC units operate by using polymer beads to convert the hard minerals in water into microscopic crystals that do not form scale on appliances or pipes (City of Guelph, Region of Waterloo, 2019). Since these alternative systems do not require salt or water to operate, they lower water demand and help to address water quality issues by eliminating additional salt loadings into wastewater effluent and therefore reduce impacts on local waterways.

6.3.5 Rainwater Harvesting & Greywater Reuse Program

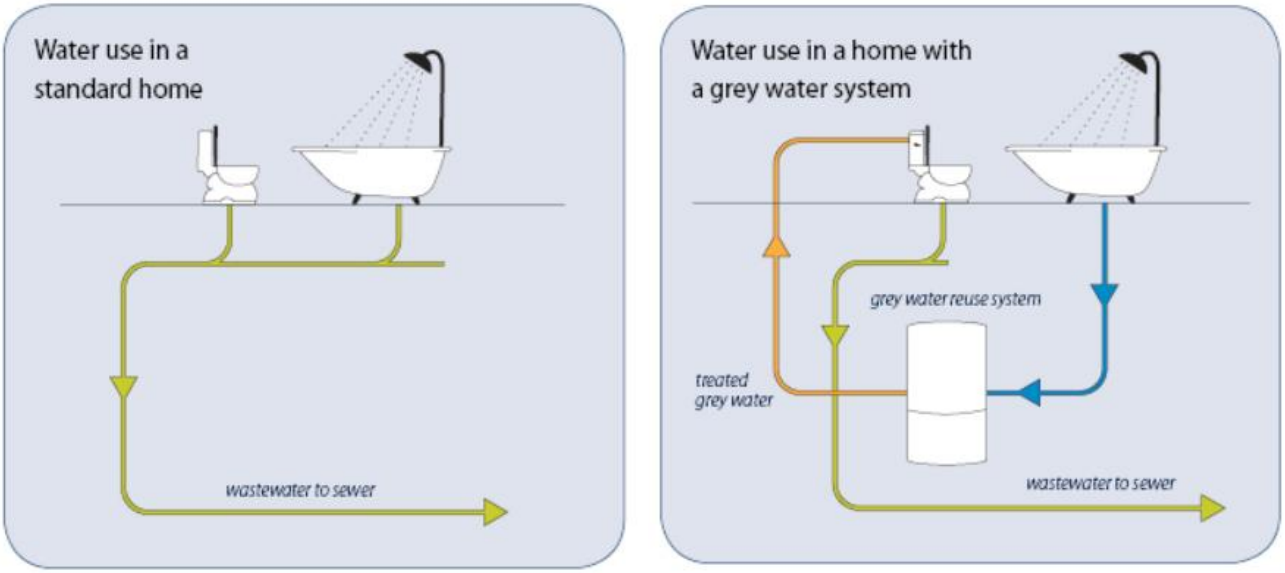
The Town should explore the feasibility of implementing rainwater harvesting and greywater re-use facilities on Town properties. Rainwater harvesting involves collecting rainwater from a roof or other surface and storing it in large cisterns for later use in toilets, urinals, and for irrigation.

Greywater harvesting systems collect water from showers, baths, or sinks, treat (filter and disinfect) the water collected, and resupply it for toilet flushing or other non-potable uses. In standard plumbing systems the water used to flush toilets is the same quality as the water we drink. Potable water is not required for this function. As toilet flushing represents a significant water use in public recreational facilities, using reclaimed greywater from showers ,sinks, and other water uses eliminates the use of potable water for toilet flushing, resulting in annual water and wastewater cost savings.

In order to demonstrate commitment to water conservation and gain insight into the feasibility of greywater and rainwater harvesting systems, the Town should explore the feasibility of implementing rainwater harvesting or greywater reuse at municipal facilities for non-potable water uses including toilet flushing, fleet vehicle and equipment washing, and site irrigation.

To advance the adoption of rainwater harvesting and greywater reuse infrastructure and technologies in new developments and re-development projects in Town, the Planning Division, through site development conditions and planning guidelines should consider requiring new subdivision, condominium, and ICI developments to provide a Water Conservation Plan that outlines how water use is minimized in building and site design. Significant water use efficiencies can be achieved when consideration is given to factors such as water reuse, water efficient fixtures, and landscape design.

Figure 13: Standard Home Plumbing System vs. Greywater System (City of Guelph, 2019)



6.3.5 Implement a Water Audit Program for Industrial, Commercial, and Institutional Properties

As discussed in Section 3.2.4, the top ten individual Industrial, Commercial, and Institutional (ICI) water users in Town account for 41% of all ICI water use in Town. Reducing consumption amongst the top water users in Town has the potential to result in significant water savings.

To reduce ICI water use, the Town should consider implementing a water auditing program targeting top water users in the ICI sector. Industrial, commercial, and institutional water audits involve a comprehensive review of all processes and technologies pertaining to water consumption at a given facility. Audits are generally performed by a qualified professional who identifies and provides a list of recommendations that the client can undertake in order to realize water savings.

Once the audit is complete, encouragement towards implementation of identified recommendations is often necessary. Approaches to encourage the uptake can include the establishment of a recognition program for organizations that implement the recommendations identified through the audit. Alternatively, the Town may consider developing a capacity buy-back program that provides financial incentives to organizations for the installation of water efficiency technology that in turn increases the Town's capacity to supply others. The incentive offered is dependent on the amount of water saved by the technology upgrades. To qualify, the water savings must be sustained and must be the result of a change in process or equipment rather than a change in water usage.

6.4 Initiatives to Enhance Rainfall Infiltration and Aquifer Recharge

Increasing urbanization and changing climatic conditions affect the natural process of aquifer recharge. The maintenance of aquifer recharge is critical to the long-term viability of the Town's drinking water aquifers. Recharge of groundwater takes place when precipitation and snowmelt percolates through soil to reach the water table. Increasing urbanization throughout the Town has reduced groundwater recharge rates due to the construction of hard surfaces that impede water from percolating through soil. Increasing urbanization coupled with the impacts of climate change has the potential to further exacerbate stress on groundwater recharge processes (AquaResource, 2011; Environment and Climate Change Canada, 2014). It is projected that Orangeville will experience an increase in total precipitation during the winter, spring and fall but a decrease in summer precipitation (LAMPS,2019). Projections also indicate that the nature and patterns of local precipitation events may have greater impact on communities than changes in the total amount alone. The number of days with precipitation exceeding 10mm and 20mm is projected to increase steadily overtime, indicating an increase in the intensity of rainfall events. Predicted changes in the length and intensity of dry and wet seasons indicate that even with an overall increase in precipitation, rain may fall more intensely over shorter periods, extending dry spells (United Nations, 2014). Maintaining and where possible enhancing aquifer recharge and storage is one of the most important measures that can be implemented to mitigate impacts of increasing water stress to municipal groundwater supplies from increasing urbanization and climate change. Increasing infiltration by restoring opportunities for increased water capture in key areas will improve natural aquifer recharge from rainfall runoff and work to maintain the natural water balance, in turn protecting the long-term viability of drinking water supplies. The following section summarizes recommended initiatives to increase and enhance groundwater recharge processes in Town.

6.4.1 Investigate and implement opportunities to restore and enhance the urban tree canopy and naturalized areas in the Wellhead Protection Area for Quantity

Urban naturalization creates sustainable landscapes by returning an altered urban site to a more natural condition through the use of trees, shurbs, and flowers that are native to the area. Naturalized areas are inherently low maintenance, self-renewing, and help restore critical landscape functions. Naturalized spaces such as urban forests, tree clusters, meadows, and pollinator gardens allow water to permeate through soil and work to filter the sediment and pollutants of runoff, before recharging the underlying groundwater system. The high retention capacity of vegetation also makes naturalized spaces an important method of managing urban storm water by decreasing run-off rates and mitigating against floods. Apart from the groundwater recharge and stormwater mitigation capabilities, naturalized areas also contribute to improved living environments by improving air quality, and creating habitats for urban biodiversity (United Nations, 2018).

The Town should investigate the feasibility of a pilot project to increase the urban tree canopy and naturalize public lands in the Wellhead Protection Area for Quantity (WHPA-Q1/Q2). The naturalization and reforestation of lands in the Wellhead Protection Area for Quantity will help to restore infiltration and groundwater recharge processes by creating areas to capture water, in turn supporting the replenishment of groundwater aquifers and helping to maintain the long-term sustainability of the Town's drinking water supplies.

6.4.2 Incorporate Low Impact Development Infrastructure and Urban Naturalization Techniques into Town Infrastructure Projects

Low Impact Development (LID) uses design strategies that mimic the natural movement of water to replenish groundwater and manage stormwater runoff, while urban naturalization creates sustainable landscapes through the use of native plant species that work to restore critical landscape functions such as groundwater recharge and stormwater attenuation on urbanized sites. While conventional methods of stormwater management collect and convey stormwater directly into the storm sewer system, LID and naturalization techniques collect and infiltrate run-off close to the source of runoff. This decreases the volume of runoff entering the storm sewer and in turn replenishes local groundwater supplies while also enhancing the Town's resilience to flooding and erosion.

The Town should consider the inclusion of LIDs and naturalization techniques into the design of future Town infrastructure projects. Road reconstructions, parking lot retrofits, and parks and recreation properties all provide excellent opportunities for implementation of LIDs and nature-based landscaping. LIDs in public spaces can also educate the public about water conservation initiatives and demonstrate the Town's commitment to sustainable infrastructure.

7. Implementation Plan

The following section outlines several of the proposed conservation initiatives described in Section 6 and developed in support of the water conservation goals and targets outlined in Section 5.

The outlined initiatives build on the Town's existing conservation efforts and have been developed based on research and reviews of similar initiatives undertaken in other Canadian municipalities.

Each proposed initiative is assessed against the following parameters:

1) **Implementation Difficulty:** this parameter accounts for staffing, materials and resources required, implementation timeframe, and real and perceived barriers (including administrative, economic, and social barriers). The values of each parameter were combined to calculate a weighted average "difficulty" rating for each outlined conservation initiative.

2) **Cost of development and implementation**: the estimated total cost of development and implementation including additional staffing wages, material, equipment, and project administration costs

3) **Water Savings**: the estimated volume of water saved per year in m^3/year if the identified water conservation initiative is implemented.

The Town intends to undertake efforts to implement the recommended initiatives in the coming years. Implementation of initiatives will be subject to budget availability and council approval. Staff intend to undertake further research and feasibility analyses for all initiatives outlined below. Following further analyses, initiatives may be amended or removed from the implementation plan. Conversely, new initiatives may be added if deemed appropriate.

Detailed calculations for ratings of each initiative are presented in Appendix A.

7.1. Proposed Conservation Initiatives – Cost, Water Savings, and Implementation Schedule

Table 16: Proposed Water Conservation Initiatives

Goal & Target	Initiative	Description of Initiative	Difficulty • **1-3 =** no new staff required, materials easy to access/develop/install, 0-2 yr. implementation timeframe, few barriers • **4-6 =** consultant, contract staff, part time or overtime staff required, materials may be challenging access/develop/install, 3-5 yr. implementation timeframe, some barriers • **7-10 =** full-time staff or ongoing consulting contract required, materials challenging to access/develop/install, 5+ year implementation timeframe, significant barriers	Estimated Cost • **1-3=** $0 – $30,000/yr • **4-6**=$30,000 - $100,000/yr • **7-10**=$100,000/yr +	Estimated Water Savings • **1-3** = 0-5,000m^3/yr • **4-6 =** 5,000 – 15,000m^3/yr • **7 -10 =** 15,000m^3/yr+	Proposed Implementation Schedule (*subject to council approval*)	Implementation Lead & Supporting Division(s)
Goal: Reduce Unaccounted for Water **Target**: By 2026, a maximum of 10% of the total annual treated water production volume should be attributed to water losses	**Explore the feasibility of district based leak detection monitoring (District Metering Areas)**	District based leak detection monitoring involves the establishment of "District Metering Areas" (DMAs) to proactively monitor the occurrence of leaks and water losses before they appear at the surface. The technique involves temporarily closing selected valves to divide the water distribution system into districts and measuring the flow demand in each district during a specified period of time. The measured flow is then compared against the theoretical flow. If a significant difference between flow volumes is found, targeted leak detection action is taken to further pinpoint and repair the leak. District based leak detection monitoring allows for the collection of more accurate and timely water use data that assists in the better management of the water distribution system. Prior to implementing permanent DMAs, the Town should consider piloting a temporary DMA program. The pilot program would involve the use of a mobile testing unit to conduct limited flow analyses across non-permanent DMAs. Performance data gathered through the pilot program would present staff with a snapshot of the existing condition of the Town's water distribution network (i.e. a high leakage threshold would indicate poor water line condition and a need for additional monitoring). This preliminary data would allow staff to assess whether investment into a permanent DMA program is warranted.	**Rating = 8.2**	**Rating = 8**	**Rating = 10**	• Program planning, design, and pilot: 2021 – 2023 • Program implementation: 2023 – ongoing	• Lead: Infrastructure Services, Public Works • Supporting: Infrastructure Services, Environment

Goal & Target	Initiative	Description of Initiative	Difficulty • **1-3 =** no new staff required, materials easy to access/develop/install, 0-2 yr. implementation timeframe, few barriers • **4-6 =** consultant, contract staff, part time or overtime staff required, materials may be challenging access/develop/install, 3-5 yr. implementation timeframe, some barriers • **7-10 =** full-time staff or ongoing consulting contract required, materials challenging to access/develop/install, 5+ year implementation timeframe, significant barriers	Estimated Cost • **1-3=** $0 – $30,000/yr • **4-6**=$30,000 - $100,000/yr • **7-10**=$100,000/yr +	Estimated Water Savings • **1-3** = 0-5,000m^3/yr • **4-6 =** 5,000 – 15,000m^3/yr • **7 -10 =** 15,000m^3/yr+	Proposed Implementation Schedule (*subject to council approval*)	Implementation Lead & Supporting Division(s)
Goal: Reduce Unaccounted for Water **Target**: By 2026, a maximum of 10% of the total annual treated water production volume should be attributed to water losses	**Customer Water Meter Replacement**	Water meters installed at the initiation of the Town's water metering program are now due for replacement. Aging water meters under-report water usage and result in inaccurate readings. Most the Town's water meters are now 18 years old with many reaching the end of their life expectancy. A Town-wide replacement of water meters is an important strategy for addressing unaccounted for water, and meter-reading inaccuracies and errors. At a minimum, the Town should complete replacement work for all water meters installed at the initiation of the water metering program (e.g. all meters installed prior to 2003). An ongoing water meter replacement program should be implemented for all meters over 15 years of age. Strong consideration should be given to the implementation of Smart Meters. Smart meters have advanced data transfer capabilities that allow for the automatic upload of water meter data to a centralized database on a set schedule decided by the Town. Smart meters minimize meter reading error. When coupled with the adoption of data management software, Smart meters can provide Town staff with greater access and working control of water meter data. Depending on the frequency at which data is recorded, Smart meters can also provide greater insight into consumption trends, allowing for better system understanding and control.	**Rating =9**	**Rating = 10**	**Rating = 10**	• Program planning and design: 2021-2022 • Program implementation (meter replacement work): 2022 - 2024 + (ongoing annual replacement program for meters over 15 yrs. old)	• Lead: Infrastructure Services, Environment • Supporting: Infrastructure Services, Public Works

Goal & Target	Initiative	Description of Initiative	Difficulty • **1-3 =** no new staff required, materials easy to access/develop/install, 0-2 yr. implementation timeframe, few barriers • **4-6 =** consultant, contract staff, part time or overtime staff required, materials may be challenging access/develop/install, 3-5 yr. implementation timeframe, some barriers • **7-10 =** full-time staff or ongoing consulting contract required, materials challenging to access/develop/install, 5+ year implementation timeframe, significant barriers	Estimated Cost • **1-3=** $0 – $30,000/yr • **4-6**=$30,000 - $100,000/yr • **7-10**=$100,000/yr +	Estimated Water Savings • **1-3** = 0-5,000m^3/yr • **4-6 =** 5,000 – 15,000m^3/yr • **7 -10 =** 15,000m^3/yr+	Proposed Implementation Schedule (*subject to council approval*)	Implementation Lead & Supporting Division(s)
Goal: Reduce Unaccounted for Water **Target**: By 2026, a maximum of 10% of the total annual treated water production volume should be attributed to water losses	**Non-Revenue Water Quantification Program**	Authorized non-revenue water refers to unbilled water usage that is authorized by the Town. Major sources of authorized non-revenue water include water used by the Fire Department for training and emergency response, water used for water and sewer system maintenance work and well efficiency testing, public parks and garden irrigation, water usage at Town facilities, and water used for construction and building activities. Together these uses account for a significant portion of the Town's water demand. An on-going non-revenue water quantification program should be established to more accurately track water usage attributed to these activities. An accurate understanding of non-revenue water use will help determine the true value of real water losses in the distribution system and establish a foundation for future non-revenue water conservation initiatives.	**Rating= 1.6**	**Rating =1**	**Rating = 1*** ***Although the initiative will not result in direct water savings, a better understanding of non-revenue water demand will serve to inform the direction of future conservation efforts.	• Program development: 2021 • Implementation: 2021 – ongoing	• Lead: Infrastructure Services, Environment • Supporting: Community Services,Facilities and Parks, Orangeville Fire Department • Supporting: Infrastructure Services, Public Works

Goal & Target	Initiative	Description of Initiative	Difficulty • **1-3 =** no new staff required, materials easy to access/develop/install, 0-2 yr. implementation timeframe, few barriers • **4-6 =** consultant, contract staff, part time or overtime staff required, materials may be challenging access/develop/install, 3-5 yr. implementation timeframe, some barriers • **7-10 =** full-time staff or ongoing consulting contract required, materials challenging to access/develop/install, 5+ year implementation timeframe, significant barriers	Estimated Cost • **1-3=** $0 – $30,000/yr • **4-6**=$30,000 - $100,000/yr • **7-10**=$100,000/yr +	Estimated Water Savings • **1-3** = 0-5,000m^3/yr • **4-6 =** 5,000 – 15,000m^3/yr • **7 -10 =** 15,000m^3/yr+	Proposed Implementation Schedule (*subject to council approval*)	Implementation Lead & Supporting Division(s)
Goal: Reduce Outdoor Water Use **Target**: By 2026, a reduction in the maximum day factor (MDF) by 3% from the 2013-2019 average. This would put the target maximum day factor to 1.32	**Landscape Consultations - Landscape Water Efficiency & Low Impact Development (LID) Program**	Landscape water efficiency and low impact development (LID) programs encourage the adoption of “water-wise” landscapes that combine water efficient plants with stormwater management techniques that work to capture and use rainfall run-off from hard surfaces to nourish gardens and lawns. In addition to nourishing garden and lawns, stormwater management features encourage the replenishment of groundwater and mitigate against flooding. Free-of-charge landscape consultations to educate and help residents identify LID and landscape efficiency opportunities on their properties can advance the adoption of “water-wise” landscaping across Town. During the consultation, a trained landscape advisor visits a resident’s home, inspects their lawn and garden, and provides advice on how to reduce landscape water demands. Residents participating in the program may receive a water-wise gardening kit that can include plant lists, gardening fact sheets, plant seeds, discount coupons from participating garden centres etc..	**Rating = 5**	**Rating = 2**	**Rating = 1*** ***Although this initiative is not estimated to result in direct significant water savings, the implementation of water efficient landscaping and low impact development practices will increase infiltration of rainfall runoff. This will recharge groundwater supplies and reduce stormwater runoff, thereby proactively protecting the long-term sustainability of municipal supply aquifers and mitigating against flooding.	• Program planning and development: 2021 - 2022 • Implementation: 2022 – 2025 (reassess on yearly basis based on program uptake)	• Lead: Community Services – Facilities & Parks • Supporting: Infrastructure Services, Environment
	Lawn Watering By-Law Review	Revise the existing lawn-watering by-law to a one day per week restriction. This practice should help curb maximum day demand, when combined with the existing time-of-day watering restriction.	**Rating= 3.6**	**Rating = 2**	**Rating =10**	• By-Law Revision: 2021 • Resident outreach: 2021 - 2022 • By-Law Implementation: 2022 – ongoing	• Lead: Infrastructure Services, Environment • Supporting: Corporate Services, Clerk’s (By-law division)

Goal & Target	Initiative	Description of Initiative	Difficulty • **1-3 =** no new staff required, materials easy to access/develop/install, 0-2 yr. implementation timeframe, few barriers • **4-6 =** consultant, contract staff, part time or overtime staff required, materials may be challenging access/develop/install, 3-5 yr. implementation timeframe, some barriers • **7-10 =** full-time staff or ongoing consulting contract required, materials challenging to access/develop/install, 5+ year implementation timeframe, significant barriers	Estimated Cost • **1-3=** $0 – $30,000/yr • **4-6**=$30,000 - $100,000/yr • **7-10**=$100,000/yr +	Estimated Water Savings • **1-3** = 0-5,000m^3/yr • **4-6 =** 5,000 – 15,000m^3/yr • **7 -10 =** 15,000m^3/yr+	Proposed Implementation Schedule (*subject to council approval*)	Implementation Lead & Supporting Division(s)
Goal: Reduce Outdoor Water Use **Target**: By 2026, a reduction in the maximum day factor (MDF) by 3% from the 2013-2019 average. This would put the target maximum day factor to 1.32	**Update Planning documents and guidelines to mandate the inclusion of landscape water efficiency, and low impact development (LID) techniques for new development and re-development applications.**	The Town's Official Plan, Zoning By-Law, and development guidelines should be updated to mandate the inclusion of low impact development (LID) and landscape water efficiency practices for new development and re-development applications. To achieve this, the Zoning By-law could be updated to include restrictions on impermeable surface areas for properties and/or minimum requirements for landscaped/vegetated areas. Town planning application submission requirements and development guidelines should be updated to require LID and landscape water efficiency measures to be incorporated into site plans, subdivision plans, landscape plans, and other planning submission documents. Incorporation of landscape efficiency and low impact development (LID) features into Official Plans and Zoning By-Laws is a mandatory requirement under the Source Water Protection Program. Updates to the OP and Zoning By-law will bring the Town's planning and development policies into compliance with the source protection policies and harmonize the Town's planning policy framework with source water protection requirements.	**Rating**= **2.6**	**Rating = 1**	**Rating = 3*** * LID features promote direct infiltration of stormwater and recharge municipal supply aquifers. Although they do not translate to significant direct savings in water usage, they proactively ensure supply aquifers are replenished, thereby protecting the long-term sustainability of the water supply. LID features also help mitigate against flooding.	• Research and update to OP, Zoning-Bylaw, and planning guideline documents: 2020 -2021 • Implementation : 2021 – ongoing	• Lead: Infrastructure Services, Planning Division • Supporting: Infrastructure Services, Environment

Goal & Target	Initiative	Description of Initiative	Difficulty • **1-3 =** no new staff required, materials easy to access/develop/install, 0-2 yr. implementation timeframe, few barriers • **4-6 =** consultant, contract staff, part time or overtime staff required, materials may be challenging access/develop/install, 3-5 yr. implementation timeframe, some barriers • **7-10 =** full-time staff or ongoing consulting contract required, materials challenging to access/develop/install, 5+ year implementation timeframe, significant barriers	Estimated Cost • **1-3=** $0 – $30,000/yr • **4-6**=$30,000 - $100,000/yr • **7-10**=$100,000/yr +	Estimated Water Savings • **1-3** = 0-5,000m^3/yr • **4-6 =** 5,000 – 15,000m^3/yr • **7 -10 =** 15,000m^3/yr+	Proposed Implementation Schedule (*subject to council approval*)	Implementation Lead & Supporting Division(s)
Goal: Reduce Outdoor Water Use **Target**: By 2026, a reduction in the maximum day factor (MDF) by 3% from the 2013-2019 average. This would put the target maximum day factor to 1.32	**Develop Phased Water Restriction Policy and Procedure**	A phased water restriction policy is designed to reduce demand for water during drought, water shortages, or emergency situations through specific water restrictions. The decision to activate more restrictive stages of the procedure is based on reasoned predictions and facts. The intention of water restrictions is to ensure a sustainable water supply until the concerns that caused the deployment of the restriction are addressed. Climate change predictions for the Town of Orangeville forecast the occurrence of more prolonged and intense summer heat events coupled with a decline in total summer precipitation. These conditions increase the potential for drought and stress on the Town's water supply, as water demand typically increases under hot and dry conditions. A phased water restriction policy is a key management tool for ensuing an adequate water supply during times of system stress.	**Rating = 2.2**	**Rating =1**	**Rating =1 *** ***Water restrictions are used to deal with emergency water shortages and droughts. Restrictions are an important strategy for proactively protecting water supplies during times of water stress. Restrictions are intended to deal with short-term problems and do not aim to achieve long-term reductions in usage	• Policy and procedure development: 2021-2022 • Implementation: 2022 – ongoing as needed	• Lead: Infrastructure Services, Environment • Supporting: Corporate Services, Clerk's (By-law division)

Goal & Target	Initiative	Description of Initiative	Difficulty • **1-3 =** no new staff required, materials easy to access/develop/install, 0-2 yr. implementation timeframe, few barriers • **4-6 =** consultant, contract staff, part time or overtime staff required, materials may be challenging access/develop/install, 3-5 yr. implementation timeframe, some barriers • **7-10 =** full-time staff or ongoing consulting contract required, materials challenging to access/develop/install, 5+ year implementation timeframe, significant barriers	Estimated Cost • **1-3=** $0 – $30,000/yr • **4-6**=$30,000 - $100,000/yr • **7-10**=$100,000/yr +	Estimated Water Savings • **1-3** = 0-5,000m^3/yr • **4-6 =** 5,000 – 15,000m^3/yr • **7 -10 =** 15,000m^3/yr+	Proposed Implementation Schedule (*subject to council approval*)	Implementation Lead & Supporting Division(s)
Goal: Reduce Indoor Water Use **Target**: By 2026, a 5% reduction from the 2018 baseline in average daily per capita residential demand from November 1 to April 30th . This would put the target 5 year average daily per capita residential demand from November 1 to April 30th to 158 L/day. By 2026, A 7% reduction in average daily per capita treated water demand from the 2013-2019 average. This would put the per capita daily treated water demand at 293 L/person/day.	**Establish and Formalize a Water Use Database**	The Town of Orangeville contracts Orangeville Hydro to conduct monthly meter readings and record customer usage data. The collected usage data is provided to the Town on an annual basis. Well production data is tracked, compiled, and collected by the Town. Going forward it is recommended that the Town compile both water production and metered usage data into a common database. Database updates and analyses should occur on a quarterly basis. Performance of regular analyses on the data will provide a better understanding of water demand trends as well as provide early indication of leaks and other operational discrepancies in the distribution system.	**Rating**=**1.2**	**Rating =1**	**Rating = 1*** ***Although the initiative will not result in direct water savings, a better understanding of water demand and water production trends will provide invaluable data that will be used to inform the direction of future conservation efforts.	• Database and program development: 2021 • Program implementation: 2022 - ongoing	• Lead: Infrastructure Services, Environment • Supporting: Orangeville Hydro

Goal & Target	Initiative	Description of Initiative	Difficulty • **1-3 =** no new staff required, materials easy to access/develop/install, 0-2 yr. implementation timeframe, few barriers • **4-6 =** consultant, contract staff, part time or overtime staff required, materials may be challenging access/develop/install, 3-5 yr. implementation timeframe, some barriers • **7-10 =** full-time staff or ongoing consulting contract required, materials challenging to access/develop/install, 5+ year implementation timeframe, significant barriers	Estimated Cost • **1-3=** $0 – $30,000/yr • **4-6**=$30,000 - $100,000/yr • **7-10**=$100,000/yr +	Estimated Water Savings • **1-3** = 0-5,000m^3/yr • **4-6 =** 5,000 – 15,000m^3/yr • **7 -10 =** 15,000m^3/yr+	Proposed Implementation Schedule (*subject to council approval*)	Implementation Lead & Supporting Division(s)
Goal: Reduce Indoor Water Use **Target**: By 2026, a 5% reduction from the 2018 baseline in average daily per capita residential demand from November 1 to April 30th. This would put the target 5 year average daily per capita residential demand from November 1 to April 30th to 158 L/day. By 2026, A 7% reduction in average daily per capita treated water demand from the 2013-2019 average. This would put the per capita daily treated water demand at 293 L/person/day.	**Establish a Water Softener Rebate Program**	A water softener rebate program will encourage property owners with older time-based softener models to transition to more efficient on-demand models, or adopt alternative technologies that effectively reduce scale buildup without the use of salt or additional water. Traditional water softeners require significant amounts of water to perform the regeneration process required to recharge the resin tank in the water softener. Special incentives for the adoption of more efficient models or alternatives such as the Template Assisted Crystallization (TAC) or Nucleation Assisted Crystallization (NAC) systems could result in significant household water savings. The NAC/TAC units do not require salt or any additional water to operate and instead use polymer beads to convert the hard minerals in water into microscopic crystals, thereby preventing scale buildup on appliances and pipes. In addition to lowering water demand, more efficient softener models and alternative treatment systems prevent additional salt loading into the wastewater effluent stream, thereby reducing negative water quality impacts on local waterbodies.	**Rating= 3.5**	**Rating = 3**	**Rating = 2 – 7 (Median: 4.5)** **Note**: More efficient water softeners and alternative water treatment systems also reduce the release of salt into the environment, providing savings related to preservation of water bodies, aquatic ecosystems, and infrastructure prone to degradation from salt	• Program development: 2020 – 2021 • Program Implementation: 2021 –ongoing (subject to program review)	• Lead: Infrastructure Services, Environment
	Explore greywater re-use and rainwater harvesting opportunities at Town Facilities	Explore the possibility of greywater re-use and rainwater harvesting at Town facilities (e.g. recreation centres, operations centre etc.) for non-potable water uses (e.g. toilets, urinal flushing, equipment washing etc.)	**Rating=6**	**Rating = 1**	**Rating = 5**	• Project planning and design : 2021 -2022 • Project implementation: 2022-2023	• Lead: Community Services, Facilities & Parks

Goal & Target	Initiative	Description of Initiative	Difficulty • **1-3 =** no new staff required, materials easy to access/develop/install, 0-2 yr. implementation timeframe, few barriers • **4-6 =** consultant, contract staff, part time or overtime staff required, materials may be challenging access/develop/install, 3-5 yr. implementation timeframe, some barriers • **7-10 =** full-time staff or ongoing consulting contract required, materials challenging to access/develop/install, 5+ year implementation timeframe, significant barriers	Estimated Cost • **1-3=** $0 – $30,000/yr • **4-6**=$30,000 - $100,000/yr • **7-10**=$100,000/yr +	Estimated Water Savings • **1-3** = 0-5,000m^3/yr • **4-6 =** 5,000 – 15,000m^3/yr • **7 -10 =** 15,000m^3/yr+	Proposed Implementation Schedule (*subject to council approval*)	Implementation Lead & Supporting Division(s)
Goal: Reduce Indoor Water Use **Target**: By 2026, a 5% reduction from the 2018 baseline in average daily per capita residential demand from November 1 to April 30th . This would put the target 5 year average daily per capita residential demand from November 1 to April 30th to 158 L/day. By 2026, A 7% reduction in average daily per capita treated water demand from the 2013-2019 average. This would put the per capita daily treated water demand at 293 L/person/day.	**Update planning documents and application submission guidelines to mandate the inclusion of water conservation measures into new development and re-development projects**	Through the development approvals process, the Planning department should require that new subdivision, condominium, institutional, industrial, and commercial development proposals provide a Water Conservation Plan as part of a complete planning application submission package. The Water Conservation Plan should outline how water use is minimized in process and site design. Significant water use efficiencies can be achieved when consideration is given to factors such as process water reuse, high efficiency fixtures, building design, and landscape design. The Planning department may enforce the implementation of such measures through subdivision and site plan agreement conditions.	**Rating= 2.6**	**Rating = 1**	**Rating = 6**	• Revision to planning guidelines and documents: 2020-2021 • Implementation and enforcement of new planning requirements: 2021 –ongoing	• Lead: Infrastructure Services, Planning Division • Supporting: Infrastructure Services, Environment
	Explore feasibility of establishing an ICI Water Audit Program	Complete facility water audits for top industrial, commercial, and institutional water users with the goal of identifying water efficiencies and recommendations that the client can undertake to realize water savings.	**Rating=5.4**	**Rating = 2**	***Variable -** Water savings will largely depend on degree of program uptake by ICI facilities. Audits will identify opportunities for water savings, however actual water savings will depend on the degree to which ICI facility managers undertake the recommendations identified through the auditing process.	• Program planning and RFP development: 2023-2024 • Program implementation: 2024 -2026	• Lead: Infrastructure Services, Environment

Goal & Target	Initiative	Description of Initiative	Difficulty • **1-3 =** no new staff required, materials easy to access/develop/install, 0-2 yr. implementation timeframe, few barriers • **4-6 =** consultant, contract staff, part time or overtime staff required, materials may be challenging access/develop/install, 3-5 yr. implementation timeframe, some barriers • **7-10 =** full-time staff or ongoing consulting contract required, materials challenging to access/develop/install, 5+ year implementation timeframe, significant barriers	Estimated Cost • **1-3=** $0 – $30,000/yr • **4-6**=$30,000 - $100,000/yr • **7-10**=$100,000/yr +	Estimated Water Savings • **1-3** = 0-5,000m^3/yr • **4-6 =** 5,000 – 15,000m^3/yr • **7 -10 =** 15,000m^3/yr+	Proposed Implementation Schedule (*subject to council approval*)	Implementation Lead & Supporting Division(s)
Goal: Enhance rainfall infiltration and aquifer recharge **Target :** By 2026, complete two pilot projects to restore and enhance groundwater recharge processes on public lands in the Wellhead Protection Area for Quantity. Pilot projects should utilize a combination of low impact development, naturalization, afforestation, and environmental restoration techniques to achieve an enhancement in groundwater infiltration rates.	**Investigate the feasibility of a pilot project to increase the urban tree canopy and naturalize public lands in the Wellhead Protection Area for Quantity (WHPA-Q1/Q2).**	Undertake a pilot project to increase the urban tree canopy and re-naturalize public lands in the Wellhead Protection Area for Quantity (WHPA-Q1/Q2). The re-naturalization and reforestation of lands in the WHPA-Q1/Q2 will help to restore infiltration and natural water balance processes by creating areas to capture rainfall runoff, and in turn replenish groundwater aquifers, while reducing stormwater run-off rates and alleviating flooding during significant rainfall events. Examples of potential project options include implementing a combination of re-naturalization techniques including establishment of tree clusters, no mow zones, and xeriscaping (use of drought tolerant vegetation) in place of existing public lawns and turf grounds, medians, boulevards, and other public spaces. The re-naturalization of urban lands significantly reduces the long-term need for irrigation systems, lowers maintenance requirements, and thereby reduces associated costs.	**Rating = 4.6**	**Rating = 5 – 7*** * The establishment of naturalized areas in place of previously manicured, or unused lawns and turf can significantly lower costs associated with the maintenance of such areas	***** Urban re-naturalization, afforestation, and environmental restoration projects promote infiltration of precipitation and recharge municipal supply aquifers. Although they do not translate to direct savings in water usage, they proactively ensure the long-term sustainability of drinking water supply aquifers. Naturalized areas also offer the additional benefits of improving both groundwater and surface water quality, generate organic soils and improve soil health, help mitigate flooding, absorb greenhouse gases, create wildlife habitat, and provide shade to mitigate temperature increases, and contribute to wind velocity reduction (CVC, 2016)	• Project planning and RFP development: 2021-2022 • Project implementation: 2022-2024	• Lead: Community Services, Facilities & Parks • Supporting: Infrastructure Services, Environment
	Incorporate Low Impact Development Infrastructure and Urban Naturalization Techniques into Town Infrastructure Projects	Undertake a pilot project to include Low Impact Development (LID) and naturalization techniques into the design of a priority Town infrastructure project. Road reconstructions, parking lot retrofits, and parks and recreation properties all provide excellent opportunities for implementation of LIDs and nature-wise landscaping. Examples include road reconstruction projects with curbless streets and infiltration trenches, parking lots with bioretention areas, rain gardens in Town right-of-ways, use of permeable rubber in playgrounds and public activity areas, use of bio-retention practices in areas of ponding in parks, use of pervious	**Rating= 4.4**	**Rating = 5 -7**	***** Low Impact Development and naturalization techniques promote infiltration of rainfall runoff and recharge municipal supply aquifers. Although they do not translate to direct savings in water usage, they proactively ensure that drinking water aquifers are replenished and maintained, thereby protecting the long-term sustainability of the Town's water supply. LIDs and naturalization also provide additional benefits including flood attenuation and surface and groundwater quality improvements	• Project planning and RFP development: 2021-2022 • Project implementation: 2022-2024	• Lead: Infrastructure Services, Environment, Transportation & Development • Supporting: Community Services, Facilities & Parks

Goal & Target	Initiative	Description of Initiative	Difficulty • **1-3 =** no new staff required, materials easy to access/develop/install, 0-2 yr. implementation timeframe, few barriers • **4-6 =** consultant, contract staff, part time or overtime staff required, materials may be challenging access/develop/install, 3-5 yr. implementation timeframe, some barriers • **7-10 =** full-time staff or ongoing consulting contract required, materials challenging to access/develop/install, 5+ year implementation timeframe, significant barriers	Estimated Cost • **1-3=** $0 – $30,000/yr • **4-6**=$30,000 - $100,000/yr • **7-10**=$100,000/yr +	Estimated Water Savings • **1-3** = 0-5,000m^3/yr • **4-6 =** 5,000 – 15,000m^3/yr • **7 -10 =** 15,000m^3/yr+	Proposed Implementation Schedule (*subject to council approval*)	Implementation Lead & Supporting Division(s)
		concrete, asphalt, or other permeable pavement installations in municipal public parking lots.					

7.2. Monitoring & Reporting

To evaluate the success of the Water Conservation Plan, staff will monitor the progress of proposed conservation initiatives on a yearly basis. To remain effective, the Water Conservation Plan will be reviewed every five years and revised as required to update conservation targets and goals, identify new conservation opportunities, and evaluate the success of established initiatives. The Town should also monitor the water conservation practices being implemented in other municipalities and consider successful practices for adoption and adaptation during the five-year review.

8. Definitions

Average Day Demand: Daily average water demand

Aquifer: An underground saturated permeable geological formation that is capable of transmitting water in sufficient quantities under ordinary hydraulic gradients to serve as a source of groundwater supply

Groundwater: Water found beneath Earth's surface in soil pore spaces and in the fractures of rock formations.

ICI: Industrial, Commercial, and Institutional

LID: Low Impact Development; an approach to managing rainfall run-off using landscaping and design strategies that mimic the natural movement of water. LID features collect run-off from hard surfaces such as roofs and infiltrate it on site instead of directing to the municipal storm sewer system.

Maximum Day Demand: The maximum consumption during any one day of the year.

Maximum Day Factor (MDF): Ratio of the maximum flow to the average daily flow in a water system calculated as the maximum day demand divided by the average day demand.

Per Capita use: A quantitative parameter that relates water use in a municipality to the population. It is calculated based on the average volume of water used per day divided by the population served

Potable Water: Treated water suitable for human consumption provided by the municipal waterworks system; water used for drinking and other domestic purposes.

Raw Water: Water that has not received any treatment for drinking

Recharge: The process by which water moves from the ground surface, and subsurface to arrive at the water table

SGRA (Significant Groundwater Recharge Area): An area conducive to infiltration, where an aquifer is replenished when rain and snow fall and seep into the ground. It is identified as specific type of vulnerable area protected under the Clean Water Act (2006)

Stormwater: Water discharged from a surface as a result of rainfall or snowfall

Water Conservation: Water management actions that improve the use of water resources to benefit the municipality's water system, people, and the environment; any actions that results in a reduction in water use, loss or waste

Water Efficiency: Carrying out a function, task, or process with the minimal amount of water feasible.

WHPA: Wellhead Protection Area; the surface and subsurface area surrounding a water well or well field that supplies a municipal water system

WHPA-Q1/Q2: Wellhead Protection Area for Quantity; an area delineated around municipal well supplies where groundwater takings or reductions in groundwater recharge could significantly impact the amount of water extractable at the municipal well supply

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APPENDIX A: Water Conservation Initiative Analysis

Goal & Target	Initiative	Description of Initiative	Difficulty • **1-3 =** no new staff required, materials easy to access/develop/install, 0-2 yr. implementation timeframe, few barriers • **4-6 =** consultant, contract staff, part time or overtime staff required, materials may be challenging access/develop/install, 3-5 yr. implementation timeframe, some barriers • **7-10 =** full-time staff or ongoing consulting contract required, materials challenging to access/develop/install, 5+ year implementation timeframe, significant barriers	Estimated Cost • **1-3=** $0 – $30,000/yr • **4-6**=$30,000 - $100,000/yr • **7-10**=$100,000/yr +	Estimated Water Savings • **1-3** = 0-5,000m^3/yr • **4-6 =** 5,000 – 15,000m^3/yr • **7 -10 =** 15,000m^3/yr+	Proposed Implementation Schedule (*subject to council approval*)	Implementation Lead & Supporting Division(s)
Goal: Reduce Unaccounted for Water **Target**: By 2026, a maximum of 10% of the total annual treated water production volume should be attributed to water losses	**Explore the feasibility of district based leak detection monitoring (District Metering Areas)**	District based leak detection monitoring involves the establishment of "District Metering Areas" (DMAs) to proactively monitor the occurrence of leaks and water losses before they appear at the surface. The technique involves temporarily closing selected valves to divide the water distribution system into districts, and measuring the flow demand in each district during a specified period of time. The measured flow is then compared against the theoretical flow. If a significant difference between flow volumes is found, targeted leak detection action is taken to further pinpoint and repair the leak. District based leak detection monitoring allows for the collection of more accurate and timely water use data that assists in the better management of the water distribution system. Prior to implementing permanent DMAs, the Town should consider piloting a temporary DMA program. The pilot program would involve the use of a mobile testing unit to conduct limited flow analyses across non-permanent DMAs. Performance data gathered through the pilot program would present staff with a snapshot of the existing condition of the Town's water distribution network (i.e. a high leakage threshold would indicate poor water line condition and a need for additional monitoring). This preliminary data would allow staff to assess whether investment into a permanent DMA program is warranted.	• <u>Staffing:</u> Consultant required to design monitoring network. One existing staff member with capacity to manage project and consultants required. Contractors required to install DMA infrastructure. Once monitoring network is established, water operations staff will be required to carry out annual monitoring work. Difficulty=7 • <u>Materials:</u> District Metering Infrastructure (including electromagnetic flow meters, flow chambers, etc.) Difficulty = 8 • <u>Timeframe:</u> 5 years for planning, development, and trial, ongoing annual implementation Difficulty=9 • <u>Barriers:</u> High capital cost Difficulty = 9 **Rating = 8.2**	• <u>Staffing:</u> - Consultant to design system + administer project = $200,000 - Continued yearly program implementation = $50,000/yr • <u>DMA Infrastructure & implementation</u> -Equipment = $20,000 -Installation +materials = $600,000 -Total Capital Cost= $820,000 -Yearly Operational Cost = $50,000 X 4 years Total Cost = 1,020,000 Total cost spread over 5 yrs. =$204,000/yr. **Rating = 8**	• Water losses and unaccounted for water make up approximately 24% of total water production based on 2018 data • Assuming system leaks and water main breaks account for 50% of unaccounted for water (approx: 412,815 m^3/yr), and that district based leak detection monitoring can mitigate up to 40% of leaks; potential water savings = 165,126 m^3/yr. **Rating = 10**	• Program planning, design, and pilot : 2021 – 2023 • Program implementation: 2023 – ongoing	• Lead: Infrastructure Services, Public Works • Supporting: Infrastructure Services, Environment

Goal & Target	Initiative	Description of Initiative	**Difficulty** • **1-3 =** no new staff required, materials easy to access/develop/install, 0-2 yr. implementation timeframe, few barriers • **4-6 =** consultant, contract staff, part time or overtime staff required, materials may be challenging access/develop/install, 3-5 yr. implementation timeframe, some barriers • **7-10 =** full-time staff or ongoing consulting contract required, materials challenging to access/develop/install, 5+ year implementation timeframe, significant barriers	**Estimated Cost** • **1-3=** $0 – $30,000/yr • **4-6**=$30,000 - $100,000/yr • **7-10**=$100,000/yr +	**Estimated Water Savings** • **1-3** = 0-5,000m^3/yr • **4-6 =** 5,000 – 15,000m^3/yr • **7 -10 =** 15,000m^3/yr+	**Proposed Implementation Schedule** (*subject to council approval*)	**Implementation Lead & Supporting Division(s)**
	Customer Water Meter Replacement	Water meters installed at the initiation of the Town's water metering program are now due for replacement. Aging water meters under-report water usage and result in inaccurate readings. Most the Town's water meters are now 18 years old with many reaching the end of their life expectancy. A Town-wide replacement of water meters is an important strategy for addressing unaccounted for water, and meter-reading inaccuracies and errors. At a minimum, the Town should complete replacement work for all water meters installed at the initiation of the water metering program (e.g. all meters installed prior to 2003). An ongoing water meter replacement program should be implemented for all meters over 15 years of age. Strong consideration should be given to the implementation of Smart Meters. Smart meters have advanced data transfer capabilities that allow for the automatic upload of water meter data to a centralized database on a set schedule decided by the Town. Smart meters minimize meter reading error. When coupled with the adoption of data management software, Smart meters can provide Town staff with greater access and working control of water meter data. Depending on the frequency at which data is recorded, Smart meters can also provide greater insight into consumption trends, allowing for better system understanding and control.	• Staffing: Contractor required to conduct Town -wide, long- term water meter replacement work. One (1) existing staff member with capacity to draft RPF, co-ordinate contractors, and manage the program will be required. Difficulty=10 • Materials: water meters, water meter infrastructure Difficulty = 8 • Timeframe: 1 year for program planning and RPF development +award, 4 years for replacement work, ongoing annual implementation Difficulty=7 • Barriers: High capital cost, resident pushback Difficulty = 10 **Rating =9**	Assume approximately 9,000 households require meter replacement • Materials + Infrastructure: - Avg. meter cost = $200 - Meter cost for 9,000 households = $1,800,000 - Education & Outreach materials for residents = $3,000 • Installation Work: - Meter installation service cost/household = $250 -$400 - Installation costs for 9,000 meters =$ 2,250,000 -$3,600,000 **Total cost** =$4,053,000 - $5,403,000 **Total cost spread over 5 yrs.** = $810,600 – 1, 080,600/yr. **Rating = 10**	• Water losses and unaccounted for water made up approximately 24% of total treated water production in 2018 • Conservatively assuming water meter under-reporting accounts for 10% of unaccounted for water, and meter replacement work will mitigate 90% of meter reading inaccuracies, meter replacement work can help substantiate approx. 74,307m^3 of water/yr. that is currently classified as unaccounted for, un-billed water • Older meters under-report usage resulting in under-billing. Water meter replacements will result in more accurate billing. Some residents may reduce water use when the true cost of water usage is realized. • Avg. residential water use per household in 2018 = 200m^3/household/year. • 9,000 households receiving water meter replacements; 200m^3/yr. X 9000 households = 1,800,000m^3 • Assuming a 3% reduction in overall residential water use due to accurate billing = 54,000m^3/yr of potential water savings **Rating = 10**	• Program planning and design : 2021-2022 • Program implementation (meter replacement work) : 2022 - 2024 + (ongoing annual replacement program for meters over 15 yrs. old)	• Lead: Infrastructure Services, Environment • Supporting: Infrastructure Services, Public Works

Goal & Target	Initiative	Description of Initiative	Difficulty • **1-3 =** no new staff required, materials easy to access/develop/install, 0-2 yr. implementation timeframe, few barriers • **4-6 =** consultant, contract staff, part time or overtime staff required, materials may be challenging access/develop/install, 3-5 yr. implementation timeframe, some barriers • **7-10 =** full-time staff or ongoing consulting contract required, materials challenging to access/develop/install, 5+ year implementation timeframe, significant barriers	Estimated Cost • **1-3=** $0 – $30,000/yr • **4-6**=$30,000 - $100,000/yr • **7-10**=$100,000/yr +	Estimated Water Savings • **1-3** = 0-5,000m^3/yr • **4-6 =** 5,000 – 15,000m^3/yr • **7 -10 =** 15,000m^3/yr+	Proposed Implementation Schedule (*subject to council approval*)	Implementation Lead & Supporting Division(s)
	Non-Revenue Water Quantification Program	Authorized non-revenue water refers to unbilled water usage that is authorized by the Town. Major sources of authorized non-revenue water include water used by the Fire Department for training and emergency response, water used for water and sewer system maintenance work and well efficiency testing, public parks and garden irrigation, water usage at Town facilities, and water used for construction and building activities. Together these uses account for a significant portion of the Town's water demand. An on-going non-revenue water quantification program should be established to more accurately track water usage attributed to these activities. An accurate understanding of non-revenue water use will help determine the true value of real water losses in the distribution system, and establish a foundation for future non-revenue water conservation initiatives.	• Staffing: no extra staff required, 1 existing staff member with capacity to develop and update database on a regular basis will be required. Co-operation from key staff across multiple Town departments will be required to regularly track and report water usage from various departmental activities Difficulty = 2 • Materials : no new materials required Difficulty =1 • Timeframe: Under 1 year; staff can begin tracking and recording usage immediately Difficulty=1 • Barriers: Maintaining continued cooperation between Town departments Difficulty=2 **Rating**= **1.6**	$0 - No new additional costs **Rating =1**	**Rating = 1*** *Although the initiative will not result in direct water savings, a better understanding of non-revenue water demand will serve to inform the direction of future conservation efforts.	• Program development: 2021 • Implementation: 2021 – ongoing	• Lead: Infrastructure Services, Environment • Supporting: Community Services,Facilities and Parks, Orangeville Fire Department • Supporting: Infrastructure Services, Public Works

Goal & Target	Initiative	Description of Initiative	Difficulty • **1-3 =** no new staff required, materials easy to access/develop/install, 0-2 yr. implementation timeframe, few barriers • **4-6 =** consultant, contract staff, part time or overtime staff required, materials may be challenging access/develop/install, 3-5 yr. implementation timeframe, some barriers • **7-10 =** full-time staff or ongoing consulting contract required, materials challenging to access/develop/install, 5+ year implementation timeframe, significant barriers	Estimated Cost • **1-3=** $0 – $30,000/yr • **4-6**=$30,000 - $100,000/yr • **7-10**=$100,000/yr +	Estimated Water Savings • **1-3** = 0-5,000m^3/yr • **4-6 =** 5,000 – 15,000m^3/yr • **7 -10 =** 15,000m^3/yr+	Proposed Implementation Schedule (*subject to council approval*)	Implementation Lead & Supporting Division(s)
Goal : Reduce Outdoor Water Use **Target**: By 2026, a reduction in the maximum day factor (MDF) by 3% from the 2013-2019 average. This would put the target maximum demand factor to 1.32.	**Landscape Consultations - Landscape Water Efficiency & Low Impact Development (LID) Program**	Landscape water efficiency and low impact development (LID) programs encourage the adoption of “water-wise” landscapes that combine water efficient plants with stormwater management techniques that work to capture and use rainfall run-off from hard surfaces to nourish gardens and lawns. In addition to nourishing garden and lawns, stormwater management features encourage the replenishment of groundwater and mitigate against flooding. Free-of-charge landscape consultations to educate and help residents identify LID and landscape efficiency opportunities on their properties can advance the adoption of “water-wise” landscaping across Town. During the consultation, a trained landscape advisor visits a resident’s home, inspects their lawn and garden, and provides advice on how to reduce landscape water demands. Residents participating in the program may receive a water-wise gardening kit that can include plant lists, gardening fact sheets, plant seeds, discount coupons from participating garden centres etc..	• Staffing: One (1) seasonal contract staff with expertise in landscaping, horticulture, and water-wise landscape design required to conduct landscape consultations with residents and develop educational materials. Horticulture or landscaping students are ideal candidates for seasonal positions. One existing staff member with capacity to develop core program elements and assist contract staff with development of program will also be required. Difficulty=6 • Materials: Gardening kits containing factsheets, brochures, plant list, info on LID techniques, seeds, coupons for local gardening centres etc. Difficulty = 5 • Timeframe: 2 years for program planning, development, and pilot implementation Difficulty= 4 • Barriers: Possibility for low resident uptake due to perceived implementation difficulty Difficulty = 5 **Rating = 5**	• Staffing: Seasonal contract staff 30$/hr X 35 hrs./week X 16 weeks = $16,800/yr. • Materials + Equipment: Up to $4000/yr. for educational materials, water-wise landscape kits, brochures, and other outreach materials. Total = $20,800/yr. **Rating = 2**	• Average weekly irrigation demand for single-family home in Orangeville = difference between summer day demand and winter day demand /estimated average landscaped area: 0.069m^3/186m^2= 0.000371m/m^2 per day/household or 2.6mm/week/household • Assuming weekly household irrigation demand is reduced by 80% with the adoption of water-wise landscaping, and program uptake by 12 houses/yr.: - 80% of 2.6mm= 2.08 mm of water savings a week/household or - 0.0003m/day/m^2 - 0.0003m^3/day X 186m^2 = 0.055m^3/day/household X 92 days of summer = 5.1m^3 of savings per household per summer - 61m^3 of water savings per year with participation of 12 houses **Rating = 1*** ***Although this initiative is not estimated to result in direct significant water savings, the implementation of water efficient landscaping and low impact development practices will increase infiltration of rainfall runoff. This will recharge groundwater supplies and reduce stormwater runoff, thereby proactively protecting the long-term sustainability of municipal supply aquifers and mitigating against flooding.	• Program planning and development: 2021 - 2022 • Implementation: 2022 – 2025 (reassess on yearly basis based on program uptake)	• Lead: Community Services – Facilities & Parks • Supporting: Infrastructure Services, Environment
	Lawn Watering By-Law Review	Revise the existing lawn-watering by-law to a one day per week restriction. This practice should help curb maximum day demand when combined with the existing time-of-day watering restriction.	• Staffing: No extra staff required but at least one (1) existing staff member should have the capacity to conduct research, revise by-law, and develop notification materials to inform residents of by-law revisions. One (1) existing	Materials: $6000 for printing and distribution of outreach and notification materials (e.g. pamphlets, doorhangers etc.)	• Difference between average summer day demand and average winter day demand= 704 m^3 • Conservatively assuming 80% of the difference between summer and winter day demand can be attributed	• By-Law Revision: 2021 • Resident outreach: 2021	• Lead: Infrastructure Services, Environment • Supporting: Corporate

Goal & Target	Initiative	Description of Initiative	Difficulty • **1-3 =** no new staff required, materials easy to access/develop/install, 0-2 yr. implementation timeframe, few barriers • **4-6 =** consultant, contract staff, part time or overtime staff required, materials may be challenging access/develop/install, 3-5 yr. implementation timeframe, some barriers • **7-10 =** full-time staff or ongoing consulting contract required, materials challenging to access/develop/install, 5+ year implementation timeframe, significant barriers	Estimated Cost • **1-3=** $0 – $30,000/yr • **4-6**=$30,000 - $100,000/yr • **7-10**=$100,000/yr +	Estimated Water Savings • **1-3** = 0-5,000m^3/yr • **4-6 =** 5,000 – 15,000m^3/yr • **7 -10 =** 15,000m^3/yr+	Proposed Implementation Schedule (*subject to council approval*)	Implementation Lead & Supporting Division(s)
			by-law enforcement officer should have the capacity enforce changes to the by-law. Difficulty = 3 • Materials: Outreach and notification materials (e.g. pamphlets, doorhangers, website update, notice in local papers etc.) Difficulty =1 • Timeframe: 1-2 yrs. for research, by-law revision, and implementation roll-out Difficulty= 3 • Barriers: Resident pushback and slow uptake due to high level of education and outreach required. By-law officers may have difficultly enforcing by-law. Difficulty= 7 **Rating**= **3.6**	**Rating = 2**	to irrigation means 563 m^3/day can be attributed to residential irrigation activities. • In a 2 week period 7882m^3 of water use can be attributed to irrigation activities • Under the current by-law can assume that the current irrigation demand (7885m^3/2 weeks) is attributed households watering 50% of the time, or 7 days out of a 2 week period. • If by-law is updated to a 1 day per week restriction, this would mean households can only water 2 times every 2 weeks. Household irrigation demand would be reduced to 2252m^3/2 weeks, resulting in a savings of 5630m^3/2 weeks, or an average of 402m^3/day; over the summer watering season this could result in a potential water savings of 36,997m^3/year. **Rating =10**	• By-Law Implementation: 2022 – ongoing	Services, Clerk's (By-law division)
	Update Planning documents and guidelines to mandate the inclusion of landscape water efficiency, and low impact development (LID) techniques for new development and re-development applications.	The Town's Official Plan, Zoning By-Law, and development guidelines should be updated to mandate the inclusion of low impact development (LID) and landscape water efficiency practices for new development and re-development applications. To achieve this, the Zoning By-law could be updated to include restrictions on impermeable surface areas for properties and/or minimum requirements for landscaped/vegetated areas. Town planning application submission requirements and development guidelines should be updated to require LID and landscape water efficiency measures to be incorporated into site plans, subdivision	• Staffing: No extra staff required but at least one existing staff member should have the capacity to conduct research, and make updates to the Official Plan, Zoning By-law, application submission requirements, site plan guidelines, and engineering standards. Difficulty = 3 • Materials: none Difficulty =1 • Timeframe: 1-2 yrs. of research, planning, and revision to planning documents and guidelines Difficulty= 3 • Barriers: May initially receive some pushback from development proponents due to more stringent regulations	$0 – no new additional costs **Rating = 1**	• Average irrigation demand per household= 0.069m^3/day; assuming a population of 33,000 by 2025, assume 800 new households in town. • Without landscape efficiency and LID measures ,average irrigation demand per household = 0.069m3/day X 800 household = 55.2m3/day X92 watering days = 5078m^3 (irrigation demand per summer for new developments) • Conservatively assuming an 80% reduction in irrigation demand due to implementation of water efficiency landscaping and low impact development = 4063m^3 in future water savings/ year. **Rating = 3***	• Research and update to OP, Zoning-Bylaw, and planning guidelines documents: 2020 -2021 • Implementation : 2021 – ongoing	• Leading: Infrastructure Services, Planning • Supporting: Infrastructure Services, Environment

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		plans, landscape plans, and other planning submission documents. Incorporation of landscape efficiency and low impact development (LID) features into Official Plans and Zoning By-Laws is a mandatory requirement under the Source Water Protection Program. Updates to the OP and Zoning By-law will bring the Town's planning and development policies into compliance with the source protection policies and harmonize the Town's planning policy framework with source water protection requirements.	Difficulty= 2 **Rating**= **2.6**		* LID features promote direct infiltration of stormwater and recharge municipal supply aquifers. Although they do not translate to significant direct savings in water usage, they proactively ensure supply aquifers are replenished, thereby protecting the long-term sustainability of the water supply. LID features also help mitigate against flooding.		
	Develop Phased Water Restriction Policy and Procedure	A phased water restriction policy is designed to reduce demand for water during drought, water shortages, or emergency situations through specific water restrictions. The decision to activate more restrictive stages of the procedure is based on reasoned predictions and facts. The intention of water restrictions is to ensure a sustainable water supply until the concerns that caused the deployment of the restriction are addressed. Climate change predictions for the Town of Orangeville forecast the occurrence of more prolonged and intense summer heat events coupled with a decline in total summer precipitation. These conditions increase the potential for drought and stress on the Town's water supply, as water demand typically increases under hot and dry conditions. A phased water restriction policy is a key management tool for ensuing an adequate water supply during times of system stress.	• <u>Staffing:</u> no extra staff required, 1 existing staff member with capacity to research and develop policy and procedure. Existing by-law enforcement officers will need capacity to perform inspections and enforce restrictions when restriction procedure is activated Difficulty=1 • <u>Materials:</u> Education and outreach materials (website and social media updates, notices in local newspaper and radio ads) Difficulty= 1 • <u>Timeframe:</u> 1 year to develop policy and procedure. To be implemented on as needed basis in response to drought and emergency situations Difficulty= 2 • <u>Barriers:</u> Resident compliance issues and enforcement difficulties Difficulty= 5 **Rating = 2.2**	0$ - no additional cost to develop policy and procedure. When restrictions are put in place, minimal advertising and print costs may be incurred for outreach efforts to inform residents that restriction is in place (e.g. newspaper ads, pamphlets, and radio notices). **Rating =1**	Water restrictions are used to deal with emergency water shortages and droughts. Restrictions are an important strategy for proactively protecting water supplies during times of water stress. Restrictions are intended to deal with short-term problems and do not aim to achieve long-term reductions in usage **Rating =1**	• Policy and procedure development: 2021-2022 • Implementation: 2022– ongoing as needed	• Lead: Infrastructure Services, Environment • Supporting: Corporate Services, Clerk's (By-law division) By-Law

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Goal: Reduce Indoor Water Use **Target**: By 2026, a 5% reduction from the 2018 baseline in average daily per capita residential demand from November 1 to April 30th . This would put the target 5 year average daily per capita	**Establish and Formalize a Water Use Database**	The Town of Orangeville contracts Orangeville Hydro to conduct monthly meter readings and record customer usage data. The collected usage data is provided to the Town on an annual basis. Well production data is tracked, compiled, and collected by the Town. Going forward it is recommended that the Town compile both water production and metered usage data into a common database. Database updates and analyses should occur on a quarterly basis. Performance of regular analyses on the data will provide a better understanding of water demand trends as well as provide early indication of leaks and other operational discrepancies in the distribution system.	• Staffing: no extra staff required, 1 existing staff member with capacity to build and update database on a regular basis will be required Difficulty = 1 • Materials : no new materials required Difficulty =1 • Timeframe: Under 1 year Difficulty=1 • Barriers: Maintaining continued cooperation between Town departments and the utility contractor may be difficult Difficulty=2 **Rating=1.2**	$0 – no additional costs. **Rating =1**	**Rating = 1*** ***Although the initiative will not result in direct water savings, a better understanding of water demand and water production trends will provide invaluable data that will be used to inform the direction of future conservation efforts.	• Database and program development: 2021 • Program implementation: 2022 - ongoing	• Lead : Infrastructure Services, Environment • Supporting: Orangeville Hydro

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residential demand from November 1 to April 30th to 158 L/day. By 2026, A 7% reduction in average daily per capita treated water demand from the 2013-2019 average. This would put the per capita daily treated water demand at 293 L/person/day.	**Establish a Water Softener Rebate Program**	A water softener rebate program will encourage property owners with older time-based softener models to transition to more efficient on-demand models, or adopt alternative technologies that effectively reduce scale buildup without the use of salt or additional water. Traditional water softeners require significant amounts of water to perform the regeneration process required to recharge the resin tank in the water softener. Special incentives for the adoption of more efficient models or alternatives such as the Template Assisted Crystallization (TAC) or Nucleation Assisted Crystallization (NAC) systems could result in significant household water savings. The NAC/TAC units do not require salt or any additional water to operate and instead use polymer beads to convert the hard minerals in water into microscopic crystals, thereby preventing scale buildup on appliances and pipes. In addition to lowering water demand, more efficient softener models and alternative treatment systems prevent additional salt loading into the wastewater effluent stream, thereby reducing negative water quality impacts on local waterbodies.	• Staffing: no extra staff required , but will require existing staff member with capacity to develop program guidelines and administer rebate program. Difficulty = 3 • Materials: advertising and outreach materials to promote program (e.g. website update, development of rebate form) Difficulty =2 • Timeframe: 2 years for program planning, development, and implementation Difficulty=3 • Barriers: Possible lack of program uptake by Town residents, substantial time commitment for staff to administer the program if uptake is high Difficulty= 6 **Rating**= **3.5**	100 rebates/yr. X $250/rebate = $25,000 /yr. **Rating = 3**	• Estimated amount of water used in softener regeneration process = 400 - 600 L • Older softeners can regenerate an estimated 1 -7 times/week. • Low End Estimation: 400L/ regeneration cycle X 1 regeneration cycle/week = 400 L /week X 52 weeks/yr. =20,800 L/yr. • High End Estimation= 600L/regeneration cycle X 7 regeneration cycles /week = 4,200L X 52 weeks/yr .= 218,400L/yr. • Low End: 20,800 L X 100 households = 2,080,000L/yr. (2,080m^3) • High End: 218,400 L X 100 households = 21,840,000L/yr. (21,840m^3) • Conservatively assuming rebate program for 100 households per year can reduce softener water use by 70% : total water savings = 1,456m^3 – 15,288m^3/yr. **Rating = 2 – 7 (Median: 4.5)** **Note**: More efficient water softeners and alternative water treatment systems also reduce the release of salt into the environment, providing savings related to preservation of water bodies, aquatic ecosystems, and infrastructure prone to degradation from salt	• Program development: 2020 – 2021 • Program Implementation 2021 –ongoing (subject to program review)	• Lead: Infrastructure Services, Environment
	Explore Greywater Re-use and rainwater harvesting opportunities at Town Facilities	Explore the possibility of greywater re-use and rainwater harvesting at Town facilities (e.g. recreation centres, Town hall) for non-potable water uses (e.g. toilets, urinal flushing, equipment washing etc.)	• Staffing: no extra staff required but 1-2 existing staff will be required to investigate feasibility of program Difficulty = 3 • Materials: greywater systems may require large cisterns for storage, and retrofits to plumbing. Difficulty =6	Estimate $20,000 per facility Capital costs spread over 5 years = $4000/year/facility **Rating = 1**	Total water use at Alder St. Rec Centre in 2019 was 22,376m^3. Assuming that 30% of water used can be greywater, water savings can = 6713m^3/yr. **Rating = 5**	• Project planning and design :2021 -2022 • Project Implementation: 2022-2023	• Lead: Community Services, Facilities & Parks

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			• Timeframe: 3 years for planning, development, trialing, and implementation Difficulty= 8 • Barriers: Capital costs for installing systems may raise concern. Difficulty= 8 **Rating=6**				
	Update planning documents and application submission guidelines to mandate the inclusion of water conservation measures into new development and re-development projects	Through the development approvals process, the Planning department should require that new subdivision, condominium, institutional, industrial, and commercial development proposals provide a Water Conservation Plan as part of a complete planning application submission package. The Water Conservation Plan should outline how water use is minimized in process and site design. Significant water use efficiencies can be achieved when consideration is given to factors such as process water reuse, high efficiency fixtures, building design, and landscape design. The Planning department may enforce the implementation of such measures through subdivision and site plan agreement conditions.	• Staffing: no extra staff required but at least one existing staff member should have the capacity to conduct research, draft updates to the Official Plan, Zoning By-law, application submission requirements, site plan guidelines, and engineering standards. Difficulty = 3 • Materials: none Difficulty =1 • Timeframe: 1-2 yrs. of research, planning, and initial implementation Difficulty= 3 • Barriers: May initially receive some pushback from development proponents due to additional requirements to complete the planning process Difficulty= 2 **Rating= 2.6**	None **Rating = 1**	• Assuming a population of 33,000 by 2025, and using the average per capita water production = 314 L/person/day X 3000 new residents = 942,000 additional L/ day (or 942m^3) • 942m^3/day X 365 days/yr. = additional annual water production of 343,830 m^3/yr. required for new residents. • Conservatively assuming a 4% reduction in projected water production due to water conservation and efficiency measures included in new developments = estimated 13,753 m^3/yr. of future water savings per year **Rating = 6**	• Revision to planning guidelines and documents: 2020-2021 • Implementation and enforcement of new planning requirements: 2021 –ongoing	• Lead: Infrastructure Services , Planning • Supporting: Infrastructure Services, Environment
	Explore feasibility of establishing an ICI Water Audit Program	Complete facility water audits for top industrial, commercial, and institutional water users with the goal of identifying water efficiencies and recommendations that the client can undertake to realize water savings.	• Staffing: Consultant to perform water audits. 1 existing staff member to manage initiative and draft RFP to retain consultant with relevant qualifications Difficulty = 6 • Materials: water savings kit with brochures, factsheets etc. Difficulty =3 • Timeframe: 1 year to retain consultant and develop program, 2 years to perform water audits for top ICI water users	Estimated consulting fees for water auditing services per facility =$5000 Assuming 3 facilities undertake water audit/yr. =$15,000/yr. **Rating = 2**	***Variable -** Water savings will largely depend on degree of program uptake by ICI facilities. Audits will identify opportunities for water savings, however actual water savings will depend on the degree to which ICI facility managers undertake the recommendations identified through the auditing process.	• Program planning and RFP development: 2023-2024 • Program implementation: 2024 -2026	• Lead: Infrastructure Services, Environment

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			Difficulty= 4 • Barriers: Low uptake and response by ICI sectors Difficulty= 8 **Rating=5.4**				
Goal: Enhance rainfall infiltration and aquifer recharge **Target :** By 2026, complete two pilot projects to restore and enhance groundwater recharge processes on public lands in the Wellhead Protection Area for Quantity. Pilot projects should utilize a combination of low impact development, naturalization, afforestation, and environmental restoration techniques to achieve an enhancement in groundwater infiltration rates.	**Investigate the feasibility of a pilot project to increase the urban tree canopy and naturalize public lands in the Wellhead Protection Area for Quantity (WHPA-Q1/Q2).**	Undertake a pilot project to increase the urban tree canopy and re-naturalize public lands in the Wellhead Protection Area for Quantity (WHPA-Q1/Q2). The re-naturalization and reforestation of lands in the WHPA-Q1/Q2 will help to restore infiltration and natural water balance processes by creating areas to capture rainfall runoff, and in turn replenish groundwater aquifers, while reducing stormwater run-off rates and alleviating flooding during significant rainfall events. Examples of potential project options include implementing a combination of re-naturalization techniques including establishment of tree clusters, no mow zones, and xeriscaping (use of drought tolerant vegetation) in place of existing public lawns and turf grounds, medians, boulevards, and other public spaces. The re-naturalization of urban lands significantly reduces the long-term need for irrigation systems, lowers maintenance requirements, and thereby reduces associated costs.	Staffing: Consultant required for project design; contractor may be required for project implementation; Town staff and local volunteer networks may also assist with project implementation. 1-3 existing staff member(s) with capacity to manage consultant, contractors, and volunteers required. Difficulty=6 Materials: Variety of native plant species, trees, shrubs, soil amendments, landscaping materials, machinery, and tools Difficulty = 8 Timeframe: 2 - 3 year implementation depending on scale of project Difficulty= 3 Barriers: Lack of staff buy-in and high capital cost; pushback from residents Difficulty=3 **Rating = 4.6**	Estimated $45,000 - $150,000 depending on size and scale of proposed project **Rating = 5 – 7*** * The establishment of naturalized areas in place of previously manicured, or unused lawns and turf can significantly lower costs associated with the maintenance of such areas	***** Urban re-naturalization, afforestation, and environmental restoration projects promote infiltration of precipitation and recharge municipal supply aquifers. Although they do not translate to direct savings in water usage, they proactively ensure the long-term sustainability of drinking water supply aquifers. Naturalized areas also offer the additional benefits of improving both groundwater and surface water quality, generate organic soils and improve soil health, help mitigate flooding, absorb greenhouse gases, create wildlife habitat, and provide shade to mitigate temperature increases, and contribute to wind velocity reduction (CVC, 2016)	• Project planning and RFP development: 2021-2022 • Project implementation: 2022-2024	• Lead: Community Services, Facilities & Parks • Supporting: Infrastructure Services, Environment
	Incorporate Low Impact Development Infrastructure and Urban Naturalization Techniques into Town Infrastructure Projects	Undertake a pilot project to include Low Impact Development (LID) and naturalization techniques into the design of a priority Town Infrastructure project. Road reconstructions, parking lot retrofits, and parks and recreation properties all provide excellent opportunities for implementation of LIDs and nature-wise landscaping. Examples include road reconstruction	Staffing: consultant required to design project; contractors required for project construction. 1 existing staff member required with capacity to manage consultant and contractors Difficulty=6 Materials: construction equipment and materials, machinery, landscaping materials etc. Difficulty = 8	*Estimated $40,000 - $140,000 depend on the size and scale of the project proposed and the types of Low Impact Development and naturalization techniques employed in the project design. **Rating = 5 -7**	***** Low Impact Development and naturalization techniques promote infiltration of rainfall runoff and recharge municipal supply aquifers. Although they do not translate to direct savings in water usage, they proactively ensure that drinking water aquifers are replenished and maintained, thereby protecting the long-term sustainability of the Town's water supply. LIDs and naturalization also provide additional benefits including	• Project planning and RFP development: 2021-2022 • Project implementation: 2022-2024	• Lead: Infrastructure Services, Environment, Transportation & Development • Supporting: Community Services, Facilities & Parks

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		projects with curbless streets and infiltration trenches, parking lots with bioretention areas, rain gardens in Town right-of-ways, use of permeable rubber in playgrounds and public activity areas, use of bio-retention practices in areas of ponding in parks, use of pervious concrete, asphalt, or other permeable pavement installations in municipal public parking lots.	Timeframe: 1-2 year implementation Difficulty = 2 Barriers = Lack of staff buy-in due to perceived maintenance concerns and high capital costs Difficulty= 4 **Rating= 4.4**		flood attenuation and surface and groundwater quality improvements		

End of Document