

Community Water Conservation Program: Blueprint for Success 2016 to 2020

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Prepared for



Prepared by



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Glossary and Acronyms

Technical terms and acronyms used throughout the report are explained below.

AUMA: Alberta Urban Municipalities Association.

Average Day Demand: Total bulk water purchases for the year divided by 365 days.

Billed Consumption: The volume of water consumed by utility customers as recorded by their meters, which is then collected and entered into the billing systems by the City.

CEP: Conservation, Efficiency and Productivity.

CII: Commercial, Industrial and Institutional. Customers that use water in their business operations, either as a production input or for domestic-like purposes.

Conservation Measure: A tool used to generate water savings in the community. These tools can be financial (e.g., fixture rebates), educational (e.g., booths at community events), technical (e.g., leak detection) or regulatory (e.g., outdoor watering bylaw).

CRPWSC: Capital Region Parkland Water Services Commission.

LCD: Litres per capita per day. This unit is used to measure consumption on a per person basis. While overall demand may be increasing with population, the LCD can decrease as water efficiencies are gained.

Lpf: Litres per flush.

Lpm: Litres per minute.

m³: cubic metre (= 1000 litres = 220 imperial gallons).

ML: Megalitre (= 1000 cubic metres = 1,000,000 litres = 219,969 imperial gallons).

Multi-Family Residential: Apartments, townhouses, row houses or other similar residential units. These units have a single water meter servicing multiple dwellings.

NRW: Non-Revenue Water. Water that has been treated and pumped to the distribution system, but is generally not metered, not billed, and therefore does not contribute to utility revenues. There are more than 20 sources of NRW, including consumptive uses such as distribution system leakage (“system loss”) and hydrant water taken by municipal public works and fire departments for various maintenance and training purposes (AWWA, 2009).

Peak Day Demand: Peak day production divided by total serviced population, reported in litres per capita per day (LCD).

Per Capita Average Day Demand: Average day demand divided by total serviced population, reported in litres per capita per day (LCD).

Residential or Total Residential: Includes both Single Family and Multi-Family Residential dwellings.

Single Family Residential: Standalone dwellings, typically houses but also includes duplexes and sometimes triplexes. These units have a single water meter servicing each individual dwelling.

Total Water Purchased (or Total Water): The total volume of water purchased from CRPWSC, including all water that is consumed by users (revenue water) and non-revenue water.

Executive Summary

The City of Spruce Grove is committed to continuously providing residents and businesses with high quality water services. By working together on efficient use in private dwellings, businesses and municipal operations, the community will collectively ensure that our water resources are sustainable into the future.

This document puts forward a plan to improve the efficiency of water use in the City of Spruce Grove.

This plan was developed under the framework created by the Government of Alberta in 2003's *Water for Life: Alberta's Strategy for Sustainability* and the subsequent *Water for Life: A Renewal* in 2008. It also builds on the Alberta Urban Municipalities Association's (AUMA) *Water Conservation, Efficiency and Productivity Plan* (2009) and the 2014 Conservation, Efficiency and Productivity Plan update. Finally, it is guided by the City's *Environmental Sustainability Action Plan* (2011) and the foundation set out in the original *Community Water Conservation Program: Blueprint for Success* in 2012.

Spruce Grove is fortunate to draw its water from the North Saskatchewan River which continues to enjoy abundant flows. As a result, significant supply shortages have not been a problem to date. However, this does not create a case for complacency. Water use efficiency will mitigate future risks posed by population growth, climate change and other factors. It also leads to a number of other specific environmental, community and financial benefits. Responsibility is shared by homeowners, businesses, and government. The course of action set out in this plan will not only improve the quality of life today, but will leave a desirable place to live for future generations.

Spruce Grove Water Use Profile

Spruce Grove is home to 32,036 people (2015), living in 12,025 households. The City has experienced steep population growth over the past decade, averaging 5.9% per year. Indeed, the population has more than doubled since 2001. Projecting into the future, a slightly lower rate of growth rate of 3% is anticipated, with a 2030 population reaching about 50,000.

Such statistics have various implications for water use efficiency. On one hand, penetration of efficient technology like low flow toilets is much higher than the national average, and the new age of distribution infrastructure leads to very low levels of system leakage. On the other hand, the large portion of people living in single family homes means that outdoor water demand for irrigation is an important discretionary use to target in the future. As well, new development is a nexus to promote even newer, more cutting edge technology.

Figure E1 shows historic total water purchased from EPCOR via the Capital Region Parkland Water Services Commission as well as forecasted total water purchases to 2030, overlaid with population growth. Total water purchases increased by an annual average of 2.3% between 2004 and 2014. In the future, total water purchases are expected to continue to increase over time with population growth, albeit at a diminishing rate as efficiency continues to improve.

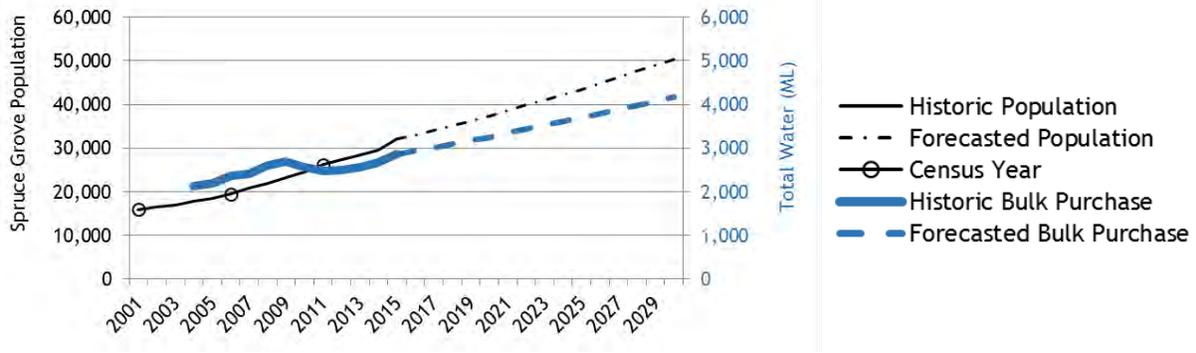


Figure E1: Historic and Forecasted Population and Total Water Purchased

Typical of most communities, Spruce Grove’s single family residential sector consumes most (61%) of all water purchased, with multi-family residential accounting for 11% (see Figure E2). Commercial, industrial, and institutional (CII) activities use 17% of the water purchased by the City. Only 5% is considered to be non-revenue water, already well below the AUMA target of 10%.

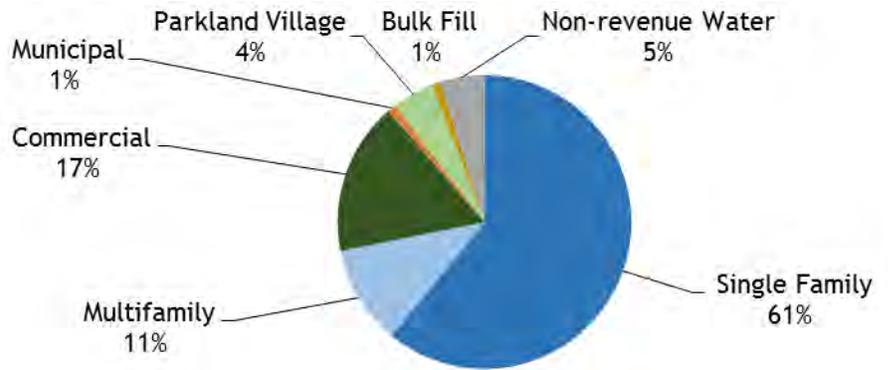


Figure E2: Consumption by Sector (2014)

Figure E3 compares average per capita total system demand (which is based on total water purchased) with average per capita residential demand (which is based on total residential metered water use, combining both single and multi-family use) from 2012 to 2014. AUMA’s Conservation, Efficiency and Productivity (CEP) planning targets are also provided for reference. With per capita residential consumption of 177 litres per capita per day, note that Spruce Grove’s demand is already well below AUMA’s 2020 target and also low by Canadian standards more generally. A variety of factors explain this fact, high among them the new age of most homes and infrastructure.

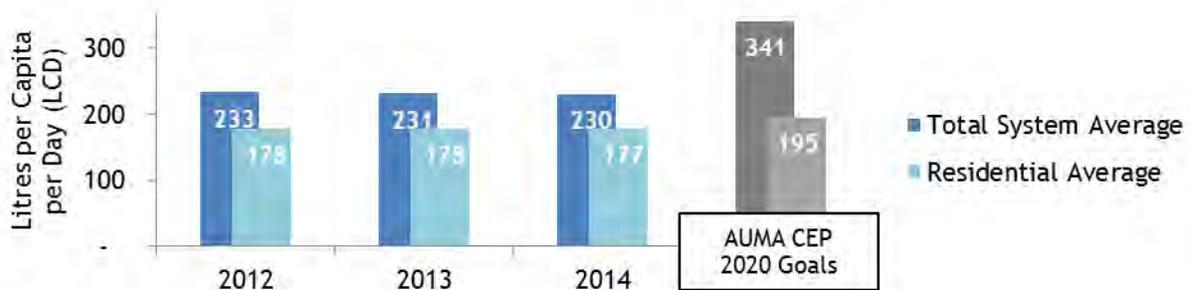


Figure E3: Total System and Residential Average per Capita Demand

2016-2020 Water Conservation Program

In 2012, the first Water Conservation Program Blueprint set out a vision to guide implementation that remains wholly relevant and appropriate today:

Using an integrated approach, the City of Spruce Grove fosters sustained declines in water consumption amongst its utility customers. It does this by implementing conservation measures to increase efficiency and reduce waste as well as by applying best practices to program design and utility management.

The new program places a strong emphasis on helping residential households becoming more efficient. It also begins to engage the commercial and development sectors and continues to position the City as a leader. In many cases, measures are simply enhancements of methods that already work well. In other cases, new programs will need to be built from the ground up. Actions are organized around four themes:

Theme #1 - Efficient Outdoor Water Use

Work with other partners in the region to encourage efficient use of water outdoors through a combination of education/outreach and judicious use of regulatory tools.

Theme #2 - Targeted Measures for Key Sectors

Develop targeted measures to help key sectors do their part in water sustainability, specifically developers, residential apartments, and the City's commercial businesses.

Theme #3 - Enhanced Education and Communications

Use the established "Tap into Tomorrow" brand to create new and engaging educational materials and services that will help residents think about and act on water conservation, using both traditional and new media channels.

Theme #4 - Continued Municipal Leadership

Build on successful internal projects already implemented by the City in the areas of facilities management, parks irrigation, and efficient utility operations including system loss management.

The following table provides a consolidated list of strategy program measures.

Theme	Code	Program Measure
#1 Efficient Outdoor Water Use	T1.1	Seasonal outdoor water use bylaw
	T1.2	Develop water use bylaw enforcement capacity
	T1.3	Enhance outdoor watering education
	T1.4	Rain barrel sale promotion
#2 Targeted Measures for Key Sectors	T2.1	Pre-rinse spray valve retrofit program
	T2.2	Technical and other support for developers
	T2.3	Residential rental building efficiency pilot project
#3 Enhanced Education and Communications	T3.1	Resources for teachers and school seminars
	T3.2	Overhaul water conservation website
	T3.3	Improve print materials and giveaways
	T3.4	Targeted attention to high use households
	T3.5	Staff booths at select community events
	T3.6	Consumption spike notifications and outreach
#4 Continued Municipal Leadership	T4.1	Enhanced water use accounting
	T4.2	Efficient technology in municipal facilities
	T4.3	Best management practices in parks

It is expected that per capita demand will continue to decrease with implementation of this strategy. Outcomes will be monitored through a set of indicators and metrics under each program theme. Performance will primarily be measured through analysis of metered consumption and tracking by staff.

This strategy is considered a living document - one that is flexible, adaptable, and responsive to changes in technology, awareness, and other factors that will occur during the implementation period. Over the next five years, staff will continue to explore up-and-coming areas of water efficiency. The plan itself will be reviewed and updated in 2020.

Through adoption of this plan the City of Spruce Grove is working towards its commitment to provide sustainable and safe water to the community today and into the future. Using water as efficiently as possible is the responsibility of each and every individual. If everyone does their part, these benefits can be enjoyed by the whole community.

1.0 Introduction

Water is a valuable resource that should be used wisely. It is integral to every aspect of our community. We use it to nourish and clean our bodies, prepare our food, and maintain our homes. We require it for economic development - from food preparation, to sanitation, to industrial processes. We need it for critical public health and safety activities such as firefighting and health care. Finally, it enhances our communities through recreation uses and irrigation of valuable public green spaces.

The City of Spruce Grove is committed to continuously providing residents and businesses with high quality water services. As well, the City operates under a self-sustainable financing model, so does not receive any grant funding for its ongoing operation. As such, having a clear understanding of where water demand will be in the future is imperative.

By working together on efficient use in municipal facilities, private dwellings, and in businesses, the community can collectively ensure that our water resources are sustainable into the future.

In 2015, the City contracted Econics, a Canadian leader in municipal sustainability planning, to assist with updating its *Community Water Conservation Program: Blueprint for Success* for the years from 2016 to 2020.

This document puts forward a plan to improve the efficiency of water use in the City of Spruce Grove. The intent is not to expect users to do without, but to do more with less in a realistic and cost-effective manner without adversely impacting lifestyles or well-being. This plan builds on the water conservation framework created in the first *Blueprint for Success*, first approved by Council in 2012.

Following this introduction, this document has six main sections:

- Section 2 provides an overview of water use trends in Spruce Grove;
- Section 3 provides history and background to the development of this plan;
- Section 4 outlines the case for water conservation in Spruce Grove;
- Section 5 summarizes Spruce Grove's current water conservation efforts;
- Section 6 sets out the water conservation program for 2016 to 2020; and,
- Section 7 provides details on implementation.

2.0 Water Use in Spruce Grove

2.1 Water Source

Spruce Grove, along with many other communities, gets its water from the North Saskatchewan River, which is fed by the Columbia Icefield. Population growth, expanding industrial and commercial development, and intensification of agricultural practices are all placing pressure on this supply source. Studies about how much water will be available in the future are inconclusive as to whether or not mean annual flows will increase or decrease. However, there is better agreement that flows will increase in the winter and spring and decrease during the summer, meaning that floods and droughts may occur more frequently and with greater severity (see for example, Golder Associates (2008) and EPCOR (2010)).



Source: North Saskatchewan Watershed Alliance (nd)

Figure 1: Sub-Watersheds of the North Saskatchewan River Watershed in Alberta

Spruce Grove receives its water supply from EPCOR water services via the Capital Region Parkland Water Services Commission (CRPWSC). The Commission purchases and pumps water to Spruce Grove through a regional line which also serves Stony Plain and Parkland County (see Figure 2). The City operates several reservoirs and pump stations split into two interconnected pressure zones. Zone #1 serves the southern portion of the City, and Zone #2 the north. Key infrastructure in Zone #1 includes two underground concrete reservoirs, a regional fill station and distribution pump stations. Zone #2 includes a reservoir and pump station located south of Spruce Grove Composite High School. The City is responsible for maintaining this and other municipal infrastructure, planning for future growth, and providing customer service.

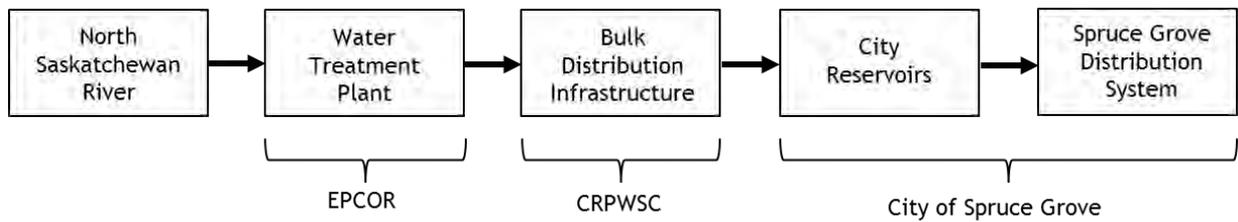


Figure 2: Relationship between Water Service Providers

2.2 Water Use Profile

2.2.1 Population and Demographics

Spruce Grove is home to 32,036 people (2015), living in 12,025 households. The City has experienced steep population growth over the past decade, averaging 5.9% per year. Indeed, the population has more than doubled since 2001. Spruce Grove is a family oriented community, with the largest age groups between 30 and 39, followed by 0 to 9 years old. Average household size is 2.66 people, higher than the average household size for the province. Most residents (about two-thirds) live in single detached dwellings (City of Spruce Grove, 2015a). Projecting into the future, a slightly lower rate of growth rate of 3% is anticipated, with a 2030 population reaching about 50,000.¹ Historic and forecasted population are depicted below in Figure 3.

These statistics have various implications for water conservation. First, most homes in the City were built after more efficient technology such as low flow toilets and front load clothes washers began to penetrate the market in the mid-1990s, meaning that a much larger than average portion of homes are so equipped. Similarly, much of the City’s water infrastructure is also relatively new, likely explaining the relatively low levels of non-revenue water, including leakage (discussed further in section 2.2.7). At the same time, continued high growth opens up the possibility of targeting new development as a nexus to promote even newer, more cutting edge technology. Lastly, the large portion of single family homes means that water consumed outdoors for irrigation and other domestic purposes remains an important discretionary use to which future effort may be directed.

2.2.2 Total Annual Purchased Water, Historic and Forecasted

Figure 3 also shows the historic total water purchased from the CRPWSC as well as forecasted total water purchases to 2030. Total water purchases increased by an annual average of 2.3% between 2004 and 2014. The forecasted water purchases are calculated based on projected population and projected per capita demands. Total water purchases are expected to increase over time with population growth, albeit at a diminishing rate as efficiency continues to improve.

¹ Note that these stated population figures and the population graph in Figure 3 exclude the population of Parkland Village, which is not within the City boundaries but does receive water services from the City. However, the forecast of total bulk water purchases shown in Figure 3 does account for Parkland Village, including an anticipated growth rate for Parkland Village at the same rate as the City.

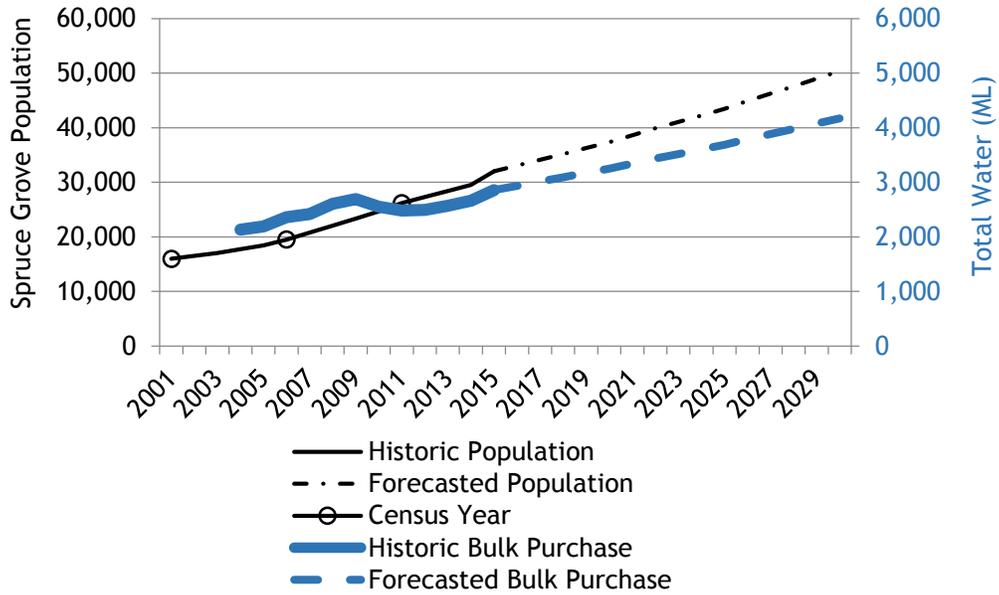


Figure 3: Historic and Forecasted Population and Total Water Purchased

2.2.3 Water Consumption Trends

Water demand fluctuates annually due to factors such as variations in summer weather (temperature; frequency and timing of rainfall), population change, and economics conditions. However, in general, per capita demand in most communities in North America has steadily declined over the past decade. This is due to a combination of factors including the natural uptake of more efficient appliances and fixtures such as low flow toilets, and the effectiveness of municipal water conservation programs. Not surprisingly, this trend can also be seen in Spruce Grove.

Figure 4, below, shows the historic total water the City purchased and distributed to residents and businesses in per capita terms (expressed in “litres per capita per day”, or LCD). Note that these figures include water consumed by both homes and businesses, as well as system loss and other non-revenue water. Also note that they account for Parkland Village consumption and population.

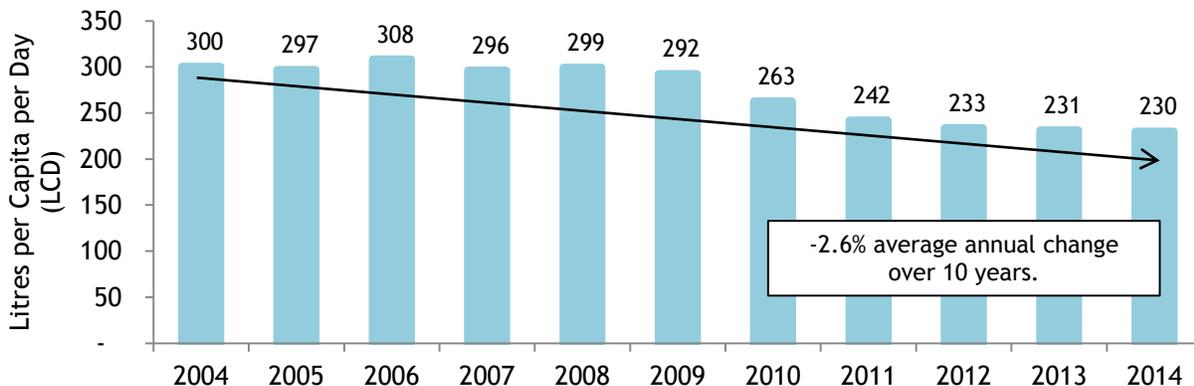


Figure 4: Annual System Total Per Capita Production

Since 2004, system per capita demand has decreased by an average of 2.6% per year, to 230 LCD as of 2014. Observers may notice that there were sharp decreases in 2010 and 2011. Unusual declines of this nature must be attributed to some cause, and in Spruce Grove’s case there are a number of explanations, as follows:

- there were significant increases to the per unit price under the volumetric component of water bills during this period, notably in 2009 and 2011;
- the City moved to monthly meter reading and billing in 2010, providing residents with much more immediate feedback on their water use and costs;
- in 2011, the City rolled out a residential meter change-out program that included installation of data loggers and new leak detection capabilities; this was accompanied by enhanced efforts to notify residents about unusual spikes in consumption and continuous flows on their properties (i.e., leaks); outreach included face-to-face home visits and other follow up.²

Note that the Alberta average across municipalities in 2009 was 395 LCD (Environment Canada, 2011, the most recent year that data is available for). As well, the Alberta Urban Municipalities Association’s (AUMA) stated goal for 2020 is 341 LCD (AUMA, 2014), so Spruce Grove is fortunate to already be well below this level. As noted elsewhere in this report, the new age of infrastructure and homes is likely another important explanatory factor.

2.2.4 Seasonal Trends

In Figure 5, total purchased water is separated into winter, shoulder and summer seasons, again shown in per capita terms (LCD). Winter demand is declining steadily at an average rate of 2.7% per year, consistent with overall trends. Winter demand predominantly corresponds with indoor water use, so this decline is expected in a growing community where new homes benefit from more efficient technology compared to the existing stock of older homes.

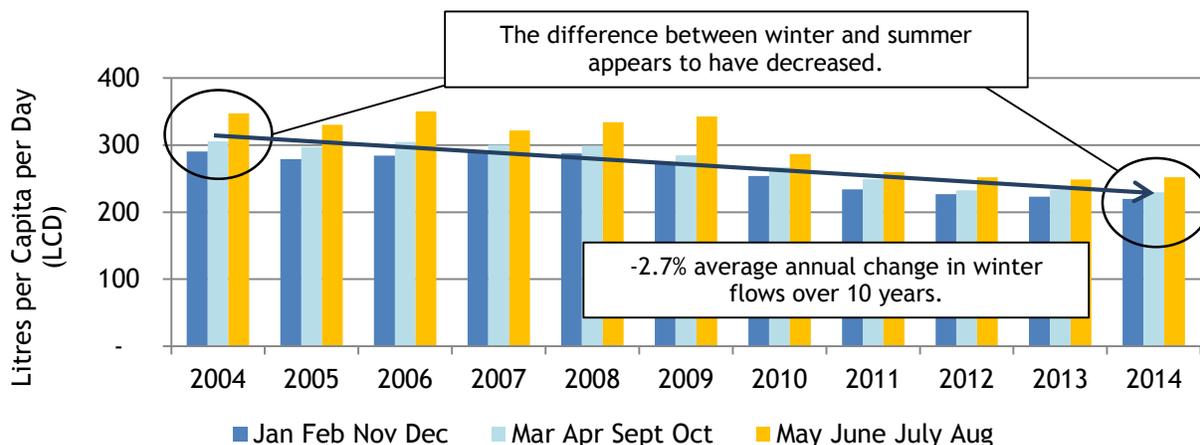


Figure 5: Seasonal Production Per Capita

² There is also anecdotal evidence that weather may have been a factor in reduced use during these years, but this was not investigated as part of this study.

Another trend seen in Figure 5 is that the spread between summer and winter demand has decreased, particularly around 2010 and continuing through to 2014. This can also be seen in Figure 6 which plots average monthly demand for five 3-year periods from 2004 through to 2014. On average, seasonal peaking has dropped significantly in more recent years. Note, however, that such trends can often be explained by climate variables, so a longer data period or climate correction analysis would be required before firm conclusions can be drawn about this.

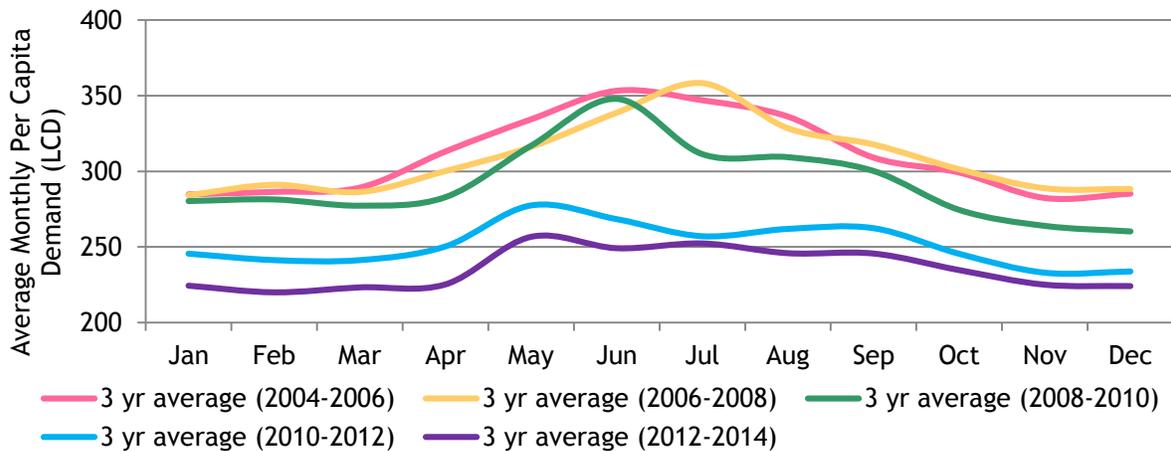


Figure 6: Average Monthly Per Capita Total Production (LCD)

2.2.5 Comparing Average Day and Annual Peak Day Demand

An important goal of the City’s conservation program is to reduce seasonal and peak day water use. All else being equal, higher peak day demand means higher costs, as the upstream provider (EPCOR) must plan for and maintain infrastructure that can handle this excess capacity. Because of this, EPCOR charges the regional customers more when they exceed their daily peak factor. Figure 7 compares annual average day demand with annual maximum day demand in terms of cubic meters per day. These figures account for Parkland Village consumption.

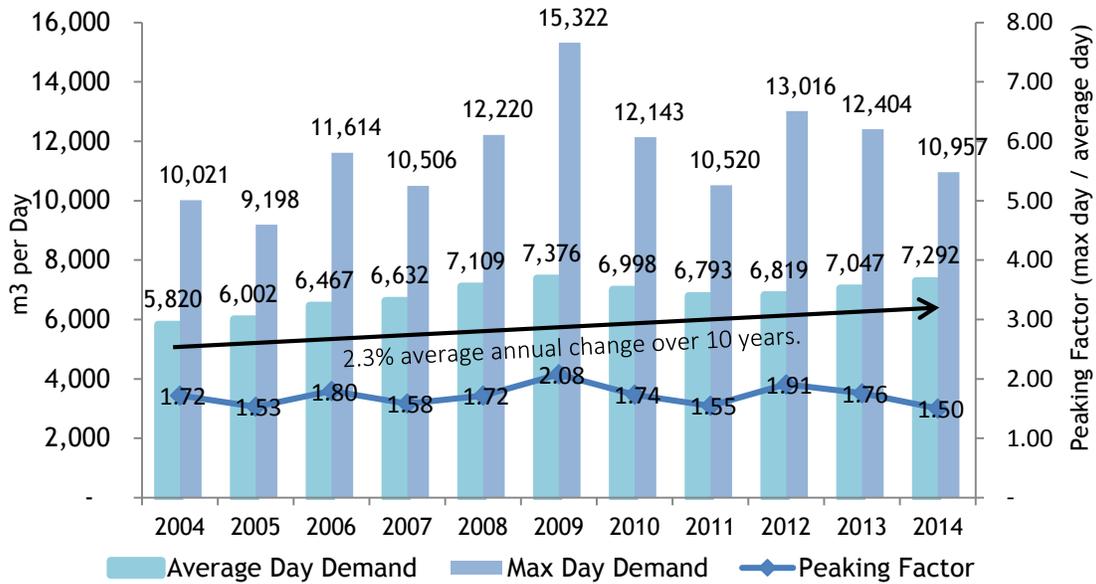


Figure 7: Average Day and Max Day Demand (2004-2014)

2.2.6 Sectoral Distribution of Water Use

Figure 8 is a breakdown of how total water purchased in 2014 is distributed between sectors. The difference between the total purchased quantity and the amount that was sold as metered consumption is referred to as non-revenue water (NRW).³ The sectoral distribution is generally consistent with what would be expected of a community of this age, population and industry composition, although non-revenue water - at 5% - is unusually low (discussed further below).

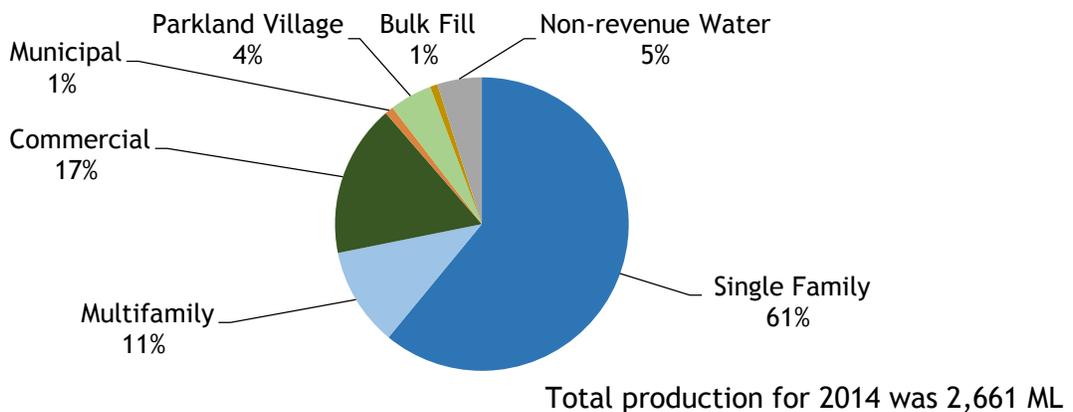


Figure 8: Consumption by Sector (2014)

³ In the case of City of Spruce Grove this figure includes some unmetered water that is used during subdivision development, for example to flush and charge lines, but for which the City does charge a fee (so technically revenue water, but not accounted for as such here).

Figure 9 compares average per capita total system demand (which is based on total water purchased) with average per capita residential demand (which is based on total residential metered water use) from 2012 to 2014. Note that these figures exclude both Parkland Village consumption and population. AUMA’s Conservation, Efficiency and Productivity (CEP) planning targets are also provided for reference. Again, note that Spruce Grove’s demand is already well below AUMA’s 2020 target.

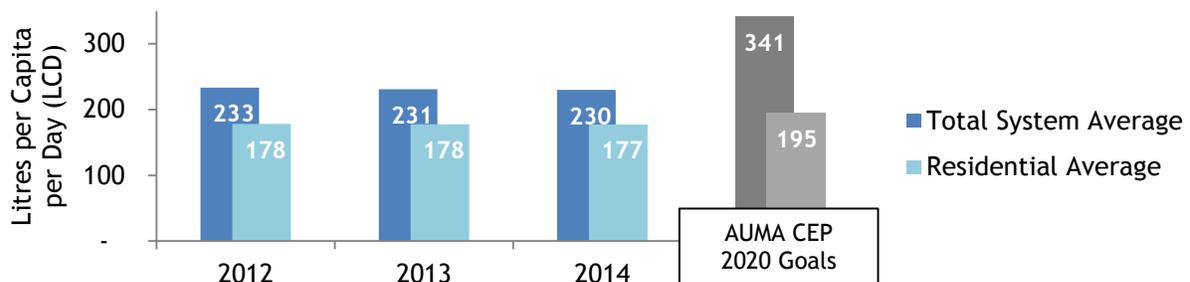


Figure 9: Total System and Residential Average per Capita Demand

Per capita residential consumption of 177 LCD is very low by Canadian standards, but these results are supportable based on the following factors:

- the community has grown very rapidly in recent years, bringing along massive penetration of efficient plumbing fixtures and appliances compared to national averages;
- the growing season in Spruce Grove is relatively short, which will tend to reduce household outdoor irrigation, and therefore the average;
- average household size is slightly higher than the national average; higher occupancy households tend to be more efficient on a per person basis;
- lot sizes in newer development are considerably smaller on average than in older parts of town and compared to the average in other communities, likely meaning that less water is being used for irrigation at these homes;
- multi-residential consumption is included in this average, which is typically lower than single-family residential on a per person basis;
- in general, Alberta’s average per capita demand tends to be lower than other provinces - 209 LCD in 2009 compared to 274 LCD nationally in the same year (Environment Canada, 2011).

2.2.7 Non-Revenue Water

As part of its operations, the City tracks the difference in the amount of water purchased from the CRPWSC and the amount of water billed to utility customers. The difference is considered Non-Revenue Water and includes loses through line breaks and leakage, hydrant flushing, construction water, water used in City operations and a number of other minor uses (see footnote 3 and the definition in the glossary). Non-revenue water has been around 5% for the past 3 years, as shown in Figure 10.

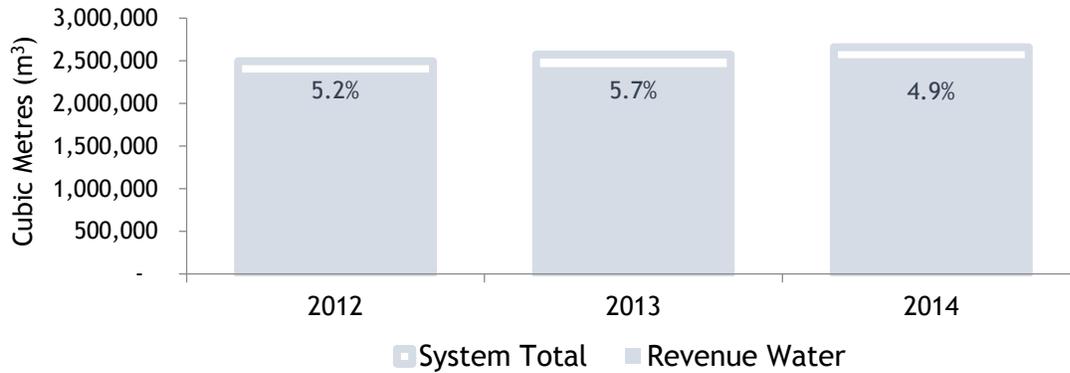


Figure 10: Total Bought Water Compared to Total Billed Consumption

As much as reducing non-revenue water and system loss is an important component of any water conservation program, the City has already surpassed its 2012 target 7% (City of Spruce Grove, 2012) and is well below the 10% target suggested by AUMA (2014). Again, this is likely largely explained by the very new age of most of the distribution system. Realizing further reductions may become difficult and more costly as the unavoidable system loss level is approached. However, further analysis may help validate this conclusion. This issue is discussed further in section 6.6, below.

3.0 Background to the Water Conservation Blueprint Update

This plan was developed under the framework created by the Government of Alberta in 2003's *Water for Life: Alberta's Strategy for Sustainability*. This strategy includes a goal that "Albertans will be leaders in conservation by using water efficiently and effectively". One of the actions identified to meet this goal is for water-using sectors to prepare Conservation, Efficiency and Productivity Plans (Government of Alberta, 2003). This direction was re-affirmed in *Water for Life: A Renewal* in 2008.

In support of this, the AUMA developed a broad Conservation, Efficiency and Productivity Plan for the municipal sector, which included a framework to guide communities in their own local planning processes (AUMA, 2009). In 2014, AUMA updated its strategy with an outcomes-based approach to achieving water savings, including volume-based water use and water loss targets, as follows:

1. Alberta's urban municipal sector will achieve an average per capita residential water use of 195 LCD and a total per capita water use of 341 LCD (30% below reported water use 2001-2006) by 2020; and,
2. Alberta's urban municipal sector will maintain the volume of "unaccounted for" water at 10% of total water use (AUMA 2014).

In February 2011 Spruce Grove's Mayor's Task Force on the Environment released its *Environmental Sustainability Action Plan*. It identifies priority areas, goals and strategies to direct the City's environmental sustainability approach from 2011 to 2021. Goal #8 in the Action Plan is to "reduce water consumption" (p. 11), with a number of potential future strategies are identified under this goal.

Guided by the Action Plan, in 2012 the City approved the *Community Water Conservation Program: Blueprint for Success 2012-2015*. Under this blueprint, numerous conservation measures were implemented between 2012 and today, many of which are discussed further in section 5.0, below. As envisioned then, the document you are reading now sets out how the City will continue to foster water sustainability over the next five years.

Text Box 1: Key Water Conservation Policy Developments

2003	<i>Water for Life: Alberta's Strategy for Sustainability</i> released by the Province
2007	Sectoral CEP plan framework provided by the Alberta Water Council
2008	<i>Water for Life: A Renewal</i> released by the Province
2009	AUMA Water Conservation, Efficiency and Productivity Plan
2011	Spruce Grove unveils <i>Environmental Sustainability Action Plan</i>
2013	<i>Planning for Water Conservation and Efficiency</i> handbook provided by AUMA
2012	Spruce Grove releases <i>Community Water Conservation Program: Blueprint for Success</i>
2014	AUMA approves <i>CEP Plan - Targets and Actions for the Urban Municipal Sector</i>

4.0 The Case for Water Conservation in Spruce Grove

Water conservation can result in environmental, financial, and community benefits, some of which are listed below in Table 1. It also helps the City meet local, provincial and federal policy and regulatory objectives.

Table 1: Benefits of Water Conservation in Spruce Grove

Environmental Benefits	Reduced chemical use and disposal for water and wastewater treatment
	Reduced sewage disposal to the environment
	Reduced energy use and greenhouse gas emissions due to reductions in water treatment and pumping
	Enhanced environmental flows for streams, fish and aquatic ecosystems
Financial Benefits	Reduced operations and maintenance costs
	Cost savings for both the City and residents from reduced energy use associated with pumping and heating water
	Reduced maximum day demand can lead to future system infrastructure downsizing or deferrals
	Improved certainty about future demand and therefore revenue under the City's self-sustainable financing model
Community Benefits	Enhanced resilience to prolonged drought and a changing climate
	More water retained in reservoirs for firefighting and other emergency needs
	Promotion of a stewardship ethic within the community
Policy and Legislative Benefits	Contribute to achieving the vision described in the City's <i>Environmental Sustainability Action Plan</i>
	Demonstrate regional leadership by exceeding AUMA CEP plan targets
	Contribute to realizing the goals established by the Province's <i>Water for Life</i> strategy
	Contribute to meeting Apportionment Agreements with other prairie provinces

As discussed further in the next section, along with other communities in the region, City of Spruce Grove is fortunate to draw its water from the North Saskatchewan River which continues to enjoy abundant flows. As a result, significant supply shortages have not been a problem to date. However, this does not create a case for complacency. Water use efficiency will mitigate future risks posed by population growth, climate change and other factors. Responsibility for this is shared by homeowners, businesses, and government. The course of action set out in this plan will not only improve the quality of life today, but will leave a desirable place to live for future generations.

5.0 Spruce Grove’s Current Water Conservation Efforts

Since Council approved the first Water Conservation Blueprint in 2012, the City has successfully implemented an ongoing program that has realized sustained reductions in per capita water use, as demonstrated in the previous section. This section provides an overview of continuing and recently completed conservation measures. These are inventoried according to categories set out by AUMA: regulatory; financial; structural and operational; education and outreach; and partnerships and collaboration (see Text Box 2).

Text Box 2: Demand Management Categories

Program measures are organized in this strategy according to water demand management policy tools categories set out by AUMA in its planning for water conservation and efficiency handbook, as follows:

- **Regulatory tools** typically consist of bylaws and permits. These can be used to reduce institutional, legal or economic barriers to water conservation, or alternatively to establish barriers against unnecessary water use. For the most part, a regulatory approach requires little financial outlay and is highly effective in influencing demand.
- **Financial tools** include both incentives and disincentives (i.e., carrots and sticks) to reward conservation and to penalize overconsumption of water. Such tools are typically used to convey the message that water is valuable and can assist in motivating users to reduce consumption.
- **Structural and operational tools** include physical improvements to infrastructure, and/or the adoption of management processes to achieve improvements in water conservation and efficiency.
- **Education and outreach tools** are used to inform and engage the community and to encourage voluntary action. They are an essential component of any program; even mandatory measures such as sprinkling restrictions are rarely successful without education and outreach.
- **Partnerships and collaboration** is an effective way of pooling expertise and resources, and decreasing implementation costs associated with the delivery of municipal programs.

(based on AUMA, 2013)

5.1 Regulatory Tools

Water Efficient Fixtures Bylaw

In 2012, the City amended Municipal Utility Services Bylaw (C-866-14) to mandate the installation of water efficient fixtures in all new construction and renovations needing a plumbing permit. Requirements include that toilets must use volumes of less than six litres per flush and faucets in non-public applications must have a flow rate of less than 8.3 litres per minute. The bylaw also prohibits installation of “once through” cooling, air conditioning or refrigeration systems.⁴

⁴ See http://www.sprucegrove.org/future/green_living/conservation/water/bylaw.htm

Regional Watering Restrictions

In partnership with other communities in the capital region and EPCOR, City of Spruce Grove has the capacity to bring in seasonal watering restrictions to curb peak demand. This may be done to sustain reservoir levels during particularly hot summer weather. For example, in early July 2015 a voluntary ban on non-essential water use was briefly imposed. A voluntary “even and odds” system was also in place throughout much of the summer (i.e., odd-numbered addresses may water on odd numbered days only; even-numbered addresses may water on even numbered days only).

5.2 Financial Tools

Volume-Based Pricing

Under Bylaw C-929-15, as of January 2016 City of Spruce Grove charges customers \$5.068 for each cubic meter of water consumed to cover costs of water and sewer services.⁵ Consistent with best practices, Spruce Grove is universally metered and all customers pay for their water based on the volume they use. This conservation-oriented price structure provides an important financial incentive to residents to avoid waste and to invest in water efficient fixtures and appliances (See Brandes, Renzetti and Stinchcombe, 2010).

Toilet and Clothes Washer Rebates

Between 2010 and 2014, Spruce Grove participated in the Climate Change Central (C3) Water and Energy Rebate Program, which provided residents with rebates on pre-selected efficient products. Residents could receive \$100 for an Energy Star qualified clothes washer, \$75 for a WaterSense labelled dual-flush toilet, and \$50 for a WaterSense labelled low-flush toilet. Over the four year period, rebates on 522 dual flush toilets, 279 low flow toilets and 318 clothes washers were issued. Estimated water savings of nearly 20 million litres per year were achieved (Climate Change Central, 2014).

5.3 Structural and Operational Tools

Efficient Municipal Operations

The City endeavors to demonstrate leadership to the community by ensuring its own operations are efficient, including the following activities:

- **Facility retrofits and efficient new construction** - fixture retrofits have been completed in a number of municipal facilities including City Hall; construction of the new 77,000 square foot Public Works Facility included a 23,000 litre cistern to collect rainwater for on-site reuse in wash bays. The City also has a green building policy (Policy #2,017) that specifies how green building practices will be incorporated into the planning, design, construction, management and renovation of City buildings.⁶

⁵ See <http://www.sprucegrove.org/services/taxes/utilities.htm>

⁶ See http://www.sprucegrove.org/Assets/pdf/policies/green_buildings_policy_2017.PDF

Tap into Tomorrow is also used to brand the elementary and middle school program. The City offers two standardized workshops - one for grade 5 and one for grade 8 students. Each workshop is designed to complement the Provincial curriculum and fit into one 50 minute class.⁸ A *Teacher's Resource Guide* (City of Spruce Grove, nd) is also provided at no cost. Education kits are made available with tools such as leak detection tablets and drips meters to help students evaluate how their home or school performs from a technical perspective. Other resources such as home water audit worksheets with City branding are also part of the package (see Figure 13). This program was developed with the support of Inside Education and the RBC Blue Water Project.

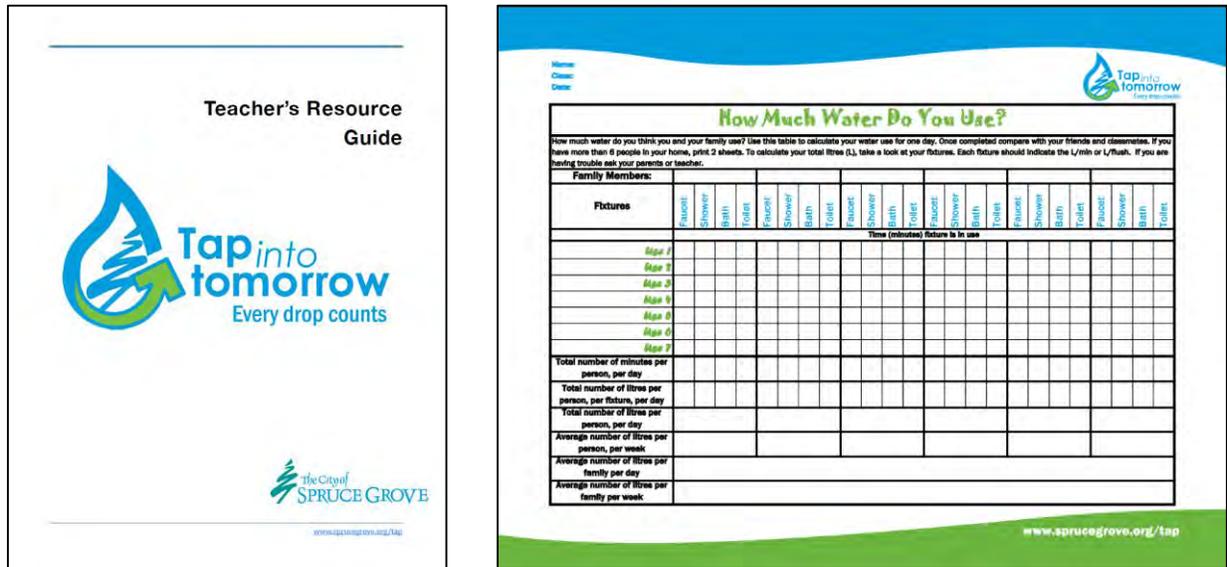


Figure 13: Tap Into Tomorrow Teacher's Resource Guide and Example Workshop

Residential Consumption Spike and High Use Notifications

Thanks to an automated meter system installed in 2011 that includes data loggers and new leak detection capabilities, the City is able to notify residents about unusually high consumption and continuous flows on their properties (usually a sign of leaks). Outreach includes rapid notifications, and in some cases face-to-face visits and other follow up.

5.5 Partnerships and Collaboration

Rain Barrel Sale

The City partners with Town of Stony Plain, Parkland County and Rona, Inc. to promote rain barrel sales at Rona's retail outlets at a discounted price of \$54.99. The municipalities provide promotional support and brand endorsement, while the retailer carries the inventory and manages financial transactions with residents.

Building on this solid foundation of successful existing measures, the next section turns attention to the City's new program for the next five years.

⁸ See http://www.sprucegrove.org/future/green_living/conservation/water/water_conserv_teach.htm

6.0 2016-2020 Water Conservation Program

6.1 Vision and Guiding Principles

In 2012, the first *Community Water Conservation Program: Blueprint for Success* set out a vision and principles to guide implementation. These remain as relevant and appropriate today as they were then:

Using an integrated approach, the City of Spruce Grove fosters sustained declines in water consumption amongst its utility customers. It does this by implementing conservation measures to increase efficiency and reduce waste as well as by applying best practices to program design and utility management. The principles guiding this program are:

- *water is a valuable natural resource worth conserving;*
- *use of water-efficient technology and best practices are essential;*
- *existing quality of life and/or service levels are maintained; and,*
- *community members play a role in realizing this change.*

(City of Spruce Grove, 2012)

6.2 Program Themes and Summary of Measures

This section describes the City of Spruce Grove’s approach to water conservation over the next five years, from 2016 to 2020. The new program places a strong emphasis on helping residents becoming more efficient, particularly around more discretionary outdoor use. It also begins to engage the commercial sector in demand management and continues to position the City as a leader in this space. In many cases, the measures are simply enhancements of tools that are already working well. In other cases, new programs will need to be built from the ground up. Actions are organized around four themes:

Theme #1 - Efficient Outdoor Water Use

Work with other partners in the region to encourage efficient use of water outdoors through a combination of education/outreach and judicious use of regulatory tools.

Theme #2 - Targeted Measures for Key Sectors

Develop targeted measures to help key sectors do their part in water sustainability, specifically developers, rental apartments, and the City’s commercial businesses.

Theme #3 - Enhanced Education and Communications

Use the established “Tap into Tomorrow” brand to create new and engaging educational materials and services that will help residents think about and act on water conservation, using both traditional and new media channels.

Theme #4 - Continued Municipal Leadership

Build on successful internal projects already implemented by the City in the areas of facilities management, parks irrigation, and efficient utility operations including system loss management.

Though not discussed in detail here, this strategy also assumes that standing and well established regulatory and financial best management practices already successfully implemented by the City will continue, specifically the following:

- implementation of the Water Efficient Fixtures Bylaw (C-866-14);
- the universal metering program; and,
- volume-based water and sewer pricing.

6.3 Theme #1: Efficient Outdoor Use

Use of water outdoors, particularly for irrigation, is more discretionary and typically places greater burden on the supply system because infrastructure like reservoirs and pipes must be sized to meet peak demands. Using less water on hot summer days ensures our supply has the highest quality possible and will also save customers money on their bills.

Measure 1.1: Work with regional partners to implement seasonal outdoor water use bylaw

The City currently works with regional partners to implement restrictions on a short-term, voluntary, “as-needed” basis. However, this approach creates communications challenges with residents, coordination challenges with other municipalities, and is not enforceable. It also may not be resulting in sustained reductions in community water demand.

Judicious use of mandatory, baseline watering restrictions that go into effect every year is a proven method for controlling peak demand and is standard practice in a great many communities across North America.

Implementing restrictions will be accomplished most effectively with a coordinated system across the Capital Region, which will require working with regional partners.

Initially, a baseline system based on the well-known and easily understood “evens and odds; mornings and evenings” system is a sensible place to start and will allow gardeners to adapt without difficulty. A framework is provided in Table 2.

Table 2: Seasonal Outdoor Water Use Program

Use	Stage 1 Careful Use	Stage 2 Reduce Outdoor Use	Stage 3 Stop Non-Essential Use
Lawns	Even/Odd Schedule from 6:00-9:00 am and from 6:00-9:00 pm	One Day Per Week from 6:00-9:00 am and from 6:00-9:00 pm	Not Permitted
Newly Planted Sod Or Seed	Allowed as Needed Until Sod is Established; Then Only on the Even/Odd Schedule	Same As Stage 1	Permit Required
Trees And Decorative And Food Gardens	No Restrictions	Must Use a Handheld Watering Device	Stage 2 and Even/Odd Schedule
Recreational Sprinklers For Children	No Restrictions	No Restrictions	No Restrictions
Recreational Sports Fields	No Restrictions	No Restrictions	Not Permitted
Filling Of Residential Swimming Pools, Hot Tubs, Garden Ponds And Fountains	Permitted Any Time	Permitted Any Time	Even/Odd Schedule
Decorative Fountains	Must Re-Circulate Water	Same As Stage 1	Same As Stage 1

Over time, the system may evolve to follow a “morning only” or “one day a week” model, as has become best practice in leading jurisdictions.

Measure 1.2: Develop outdoor water use bylaw enforcement capacity

Watering restrictions work most effectively when they are judiciously enforced. Without this, residents who comply in good faith will question the fairness of the whole system if they see neighbours not conforming. This means that the City will need to enact an appropriate bylaw and review capacity to enforce rules when needed.

At the same time, a systems that stresses compliance rather than heavy handed enforcement is much more likely to be embraced by residents. This implies an emphasis on education in the field and ample use of warnings over ticketing and penalties, an approach that is typically used by municipalities that successfully implement restrictions.

Measure 1.3: Enhance outdoor watering education

To support compliance with outdoor watering bylaws, new education and outreach material will be required. Minimally, this should include the following:

- simple print and online material explaining the watering restrictions schedule;
- improved guidance on how to be efficient outdoors (e.g., a waterwise garden guide);
- training for front counter and bylaw enforcement staff.

Measure 1.4: Rain barrel sale promotion

Rain barrels remain popular with residents and are visible way of demonstrating commitment to water sustainability. The current system of promoting “one day” sale events with a local retailer is efficient and, importantly, does not require large financial outlays or management of inventory by the City. This approach will continue for as long as partners and residents continue to demonstrate support.

Table 3: Summary of Key Actions under Theme #1 (Efficient Outdoor Use)

Code	Program Measure	Status
T1.1	Work with regional partners to implement seasonal outdoor water use bylaw	Enhance
T1.2	Develop watering restrictions bylaw enforcement capacity	New
T1.3	Enhance outdoor watering education	Enhance
T1.4	Rain barrel sale promotion	Continue

Table 4: Efficient Outdoor Use Outcomes & Indicators

Outcome	Indicators	Metrics	Methods
Sustainable reductions in summer water use	Peaking factor reduction	Maximum Day Demand / Average Day Demand	Analysis of metered consumption
	High levels of compliance with outdoor watering bylaw	# of outdoor watering bylaw warnings issued	City staff to track
	Level of engagement with the enhanced education program	# of conversations with residents	

6.4 Theme #2: Targeted Measures for Key Sectors

Most of the measures in this strategy are aimed at single family residential customers, which is appropriate given that nearly two-thirds of water use occurs in that sector. However, it is only fair that other sectors including multi-family residential apartments and businesses should also do their part. The development sector also presents an important opportunity.

Measure 2.1: Pre-rinse spray valve retrofit program

A pre-rinse spray valve is used in commercial kitchens (e.g., restaurants, health care facilities, etc.) to rinse dishes before they go into a dishwasher (see Figure 14). Inefficient models can use up to 16 litres per minute (Lpm). Water efficient versions are relatively inexpensive (\$60 to \$80 per valve), quick to install, and use as little as 4.8 Lpm. They also save energy and reduce greenhouse emission, since hot water use is slashed.

The City will work with local restaurants and other commercial kitchens to ensure they are using high-efficiency fixtures. This kind of program is a simple and cost-effective way to reduce commercial sector demand and has been very successful implemented in many other jurisdictions.



Image: Niagara Conservation
Figure 14: Pre-Rinse Spray Valve

Measure 2.2: Technical and other support for developers

Local governments around North America are beginning to implement training and incentive programs designed to encourage green development and construction of high-performance buildings. Compared to regulatory approaches such as building codes, incentives can be more flexible and less prescriptive; they can allow developers to achieve sustainability objectives in more innovative ways. This concept is particularly of interest in Spruce Grove given the exceptionally high growth rate that is expected to continue into the future.

The City will support developers who want to incorporate higher levels of water efficiency in their projects. Initially, this will start with education and technical support provided by trained staff, pertinent print and online materials, and coordination through the City's planning department.

In future years and starting on a pilot basis, the City will also explore provision of low cost but desirable incentives in exchange for installation of easy "beyond code" features. Incentives to consider include application fee waivers, awards and other recognition, and targeted rebates.

Indoors, relevant features may include ultralow flow toilets (<4L/flush), high efficiency ENERGY STAR® washing machines (when pre-installed), efficient hot water delivery, or rainwater harvesting systems. Outdoor examples include supplementary topsoil thickness, drought tolerant plantings, reduced turf area, and other landscape transformations.

Measure 2.3: Residential Rental Building Efficiency Pilot Project

The multi-family residential sector only accounts for 11% of total water demand in Spruce Grove, but this use is concentrated in a relatively small number of accounts. A smaller portion still are older buildings, which likely have less efficient fixtures (i.e., high volume toilets). Many of these are rental units that are managed by a single corporate entity.

On a pilot project basis, the City will work with a small group of landlord customers to test the water conservation potential of retrofits. This process will start with a survey designed to identify candidate buildings, their plumbing fixture composition, and the barriers that prevent owners from updating technology. Staff will then work with interested customers to plan a suitable retrofit program. This may include providing education and completing financial analysis to understand the business case (i.e., savings on water bills). If required, a small incentive package may also be offered (e.g., targeted rebates or subsidized plumbing services). The objective will be to retrofit entire buildings in one project, thereby gaining delivery efficiencies.

Following implementation, a monitoring program will be set up to measure water use savings and cost effectiveness. This will help gauge the appropriate level of incentives to attain participation from building owners. Based on pilot project results, the City will consider expanding the program in the future.

Concurrently, staff will examine outdoor water use at this type of account, looking for low cost opportunities such as better irrigation scheduling or installation of rain sensors on automatic systems.

Table 5: Summary of Key Actions under Theme #2 (Targeted Measures for Key Sectors)

Code	Program Measure	Status
T2.1	Pre-rinse spray valve retrofit program	New
T2.2	Technical and other support for developers	New
T2.3	Residential rental building efficiency pilot project	New

Table 6: Targeted Measures Outcomes & Indicators

Outcome	Indicators	Metrics	Methods
Reduced water use in non-residential and multi-family residential sectors	Pre-rinse spray valve efficiency	# of pre-rinse spray valves installed	City staff to track
	Developer engagement in water use efficiency	# of developers utilizing City technical support	
	Reduced demand in multi-family sector	Reductions in total water use at participating accounts	Analysis of metered consumption

6.5 Theme #3: Enhanced Education and Communications

Effective communications and education is foundational to any successful water conservation program. Without this, residents cannot appreciate the personal and community benefits, nor will they know what resources are available.



Under “Tap into Tomorrow”, The City already has an established and effective brand to build upon. Going forward, successful continuing programs will be complemented by several new, cost effective measures.

Measure 3.1: Continue to offer resources for teachers and school seminars

Over the past several years, significant effort has been invested in developing resources for teachers and schools under “Tap into Tomorrow”. This material and accompanying seminars for students are well received by the school system and cost little. This program will continue for as long as there is interest from teachers, with enhancements and expansions as required.

Measure 3.2: Overhaul the City’s water conservation website

The importance and cost effectiveness of providing resources online is by now well established. The resources currently on the City’s website are quite limited and will benefit from an update. This will include addition of interactive tools to enable residents to understand how they can make changes based on their individual, unique circumstances, such as the HomeWaterWorks tool offered by the Alliance for Water Efficiency (<http://www.home-water-works.org/>).

Measure 3.3: Improve print materials and giveaways

The City already maintains a small inventory of print communications materials such as brochures and giveaways. It is important that these resources are designed and given out sparingly so that they end up changing behaviour rather than going into recycling. Staff will review how print material is managed and expand what is now available. In particular, the need for a home water audit guide has been identified, as well as new material to support the seasonal outdoor water use bylaw (see Measure 1.3, above).

Measure 3.4: Targeted attention to high use households

In Spruce Grove, as in every other community in North America, a small portion of households use a disproportionately large volume of water compared to their neighbours in the community. This can be for a variety of reasons including large families, excessive outdoor irrigation, inefficient fixtures and appliances, or simply wasteful habits.

On a pilot basis, the City will design and offer a program to work directly with these households to inform them that their water use is above average. It will offer them specific tools such as home water audit kits and other targeted education resources.

Measure 3.5: Staff booths at select community events

The City will continue to staff booths at select community events. Going forward, more attention will be devoted to quantitatively measuring the impact, for example through tracking the number of contacts made. More attention will also be given to actively connecting residents with other measures identified in this strategy and measuring their level of engagement after events.

Measure 3.6: Consumption spike and high use notifications and outreach

The City will continue its established and successful program to notify residents about spikes in high use and continuous flows (i.e., likely leaks) based on results from the automated metering system. Going forward, the program will be enhanced by linking it to new measures, including use of new online and print materials and other resource developed under Measure 3.4.

Table 7: Summary of Key Actions under Theme #3 (Enhanced Communications)

Code	Program Measure	Status
T3.1	Resources for teachers and school seminars	Continue
T3.2	Overhaul water conservation website	Enhance
T3.3	Improve print materials and giveaways	Enhance
T3.4	Targeted attention to high use households	New
T3.5	Staff booths at select community events	Continue
T3.6	Consumption spike and high use notifications and outreach	Continue

Table 8: Enhanced Education and Communications Outcomes & Indicators

Outcome	Indicators	Metrics	Methods
Informed and engaged residents	Use of online resources	# of unique visits to City's water conservation website	Web analytics
	Participation in school program	# of students attending seminars annually	City staff to track
	Water demand by high volume residential customers	Average percent reduction in metered water use against historical baseline and community average among participating households	Analysis of metered consumption
	Engagement at community events	# of conversations with residents at community events	City staff to track

6.6 Theme #4: Continued Municipal Leadership in Water Use Efficiency

When the City tangibly demonstrates its own commitment to conservation, it makes it much easier to convince residents and businesses that they also need to contribute. Spruce Grove will continue to invest resources and effort in improving its operations in facilities management, parks irrigation and efficient utility operations including system loss management.

Measure 4.1: Enhanced water use accounting

The baseline water use analysis undertaken to develop this strategy (see section 2.2) found that per capita residential demand and non-revenue water levels are already quite low by national standards. However, it also uncovered several opportunities to enhance water use accounting practices to ensure that these findings are robust enough to base future investment decisions on. Going forward, the City will put effort into the following projects:

- improve the methodology to track water use in new developments for dust suppression, main flushing and other activities;
- work with regional partners to review calibration of master meters at CRPWSC connection points and system sub-meters;
- complete a desktop infrastructure leakage index (ILI) calculation using the established International Water Association (IWA) methodology, including conducting further analysis on all the data inputs into the ILI calculation.

The results of this analysis will be used to inform decisions about what, if any, additional resources beyond what is already being done should be invested in system loss management and other non-revenue water controls.

Measure 4.2: Efficient technology in municipal facilities

Some effort has already been invested in updating water use technology in municipal buildings, and some facilities are already at the cutting edge (such as the new Public Works Building). With this positive context in mind, the City will establish a regular audit program to review municipally-owned and managed facilities for conservation opportunities. This will include gathering information on construction dates, whether equipment has been updated, how many fixtures (e.g., toilets, sinks, showers, water-cooled equipment, air conditioning units, etc.) exist in each premises, and metered water use data. Audits will look at associated outdoor water use for landscaping purposes. Installation of water-saving devices will continue until all buildings are fully water-efficient. A prioritized list of facilities to audit will be created early in the development of this program.

Measure 4.3: Best management practices in parks

Parks staff will continue to implement best practices in landscape irrigation and design as identified in section 5.3 above. Going forward, they will also investigate emerging technologies and practices such as weather-based irrigation scheduling, native plant landscaping and drought tolerant turf grass cultivars.

Table 9: Summary of Key Actions under Theme #4 (Municipal Leadership)

Code	Program Measure	Status
T4.1	Enhanced water use accounting	Enhance
T4.2	Efficient technology in municipal facilities	Enhance
T4.3	Best management practices in parks	Continue

Table 10: Municipal Leadership Outcomes & Indicators

Outcome	Indicators	Metrics	Methods
Reduced water use in municipal and utility operations	Accurate water use accounting	Water balance and Infrastructure Leakage Index	City staff to calculate
	Water use in municipally-owned and operated buildings	Metered water use compared to historical baseline	Analysis of metered consumption
	Water use in municipal greenspace	Metered water use compared to historical baseline	Analysis of metered consumption

7.0 Implementation

This section describes how the water conservation program will be implemented. It also consolidates the framework for monitoring and evaluation and sets out water consumption targets.

Table 11 provides a consolidated list of strategy program measures, organized according to AUMA's demand management categories (see Text Box 2 in section 5.0). It also shows whether the measure is new, enhanced or continuing as well as the sector that it targets.

A summary schedule for implementation is outlined in Table 12, on the page that follows. As requirements are more clearly defined this schedule may be modified.

Table 11: Consolidated Table of Water Conservation Program Themes and Measures

Theme	Code	Program Measure	AUMA Category	Status	Sector
#1 Efficient Outdoor Water Use	T1.1	Seasonal outdoor water use bylaw	Regulatory	Enhance	All
	T1.2	Develop bylaw enforcement capacity	Regulatory	New	All
	T1.3	Enhance outdoor watering education	Education/Outreach	Enhance	Residential
	T1.4	Rain barrel sale promotion	Partnerships/Collaboration	Continue	Residential
#2 Targeted Measures for Key Sectors	T2.1	Pre-rinse spray valve retrofit program	Financial	New	Commercial
	T2.2	Technical and other support for developers	Outreach/ Financial	New	Developers
	T2.3	Rental building efficiency pilot project	Outreach/Financial	New	Multi-Family
#3 Enhanced Education and Communications	T3.1	Resources for teachers and school seminars	Education/Outreach	Continue	Youth
	T3.2	Overhaul water conservation website	Education/Outreach	Enhance	All
	T3.3	Improve print materials and giveaways	Education/Outreach	Enhance	Residential
	T3.4	Targeted attention to high use households	Education/Outreach	New	Residential
	T3.5	Staff booths at select community events	Education/Outreach	Continue	Residential
	T3.6	Consumption spike notifications	Education/Outreach	Continue	Residential
#4 Continued Municipal Leadership	T4.1	Enhanced water use accounting	Structural/Operational	Enhance	Municipal
	T4.2	Efficient technology in municipal facilities	Structural/Operational	Enhance	Municipal
	T4.3	Best management practices in parks	Structural/Operational	Continue	Municipal

Table 12: Implementation Schedule

		2016	2017	2018	2019	2020
Theme #1: Efficient Outdoor Water Use						
T1.1	Work with regional partners to implement seasonal outdoor water use bylaw					
T1.2	Develop bylaw enforcement capacity					
T1.3	Enhance outdoor watering education					
T1.4	Rain barrel sale promotion					
Theme #2: Targeted Measures for Key Sectors						
T2.1	Pre-rinse spray valve retrofit program					
T2.2	Technical and other support for developers					
T2.3	Residential rental building efficiency pilot project					
Theme #3: Enhanced Education and Communications						
T3.1	Resources for teachers and school seminars					
T3.2	Overhaul water conservation website					
T3.3	Improve print materials and giveaways					
T3.4	Targeted attention to high use households					
T3.5	Staff booths at select community events					
T3.6	Consumption spike and high use notifications and outreach					
Theme #4: Continued Municipal Leadership						
T4.1	Enhanced water use accounting					
T4.2	Efficient technology in municipal facilities					
T4.3	Best management practices in parks					

Legend

-  Program Development and Planning
-  Ongoing implementation

7.1 Water Savings Targets

Implementation of this strategy will result in continued decreases in both overall and residential average per capita demand. Figure 15 provides challenging but attainable targets for the next 10 years of the program.

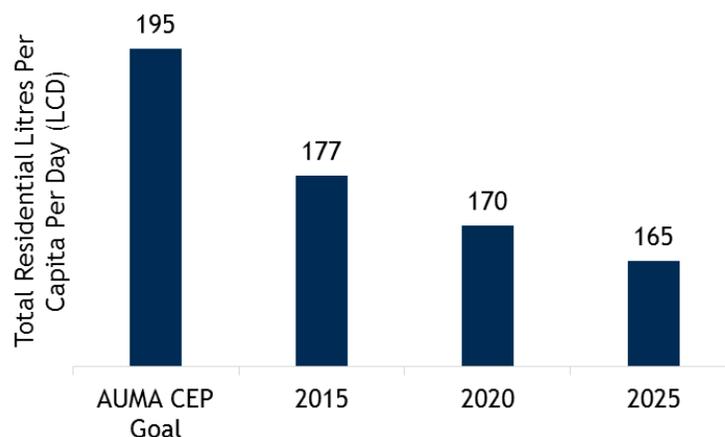


Figure 15: Spruce Grove Water Conservation Targets (2015 to 2025)

A few points are worth noting about these targets:

- They are based on average per capita daily residential consumption (including both single and multi-family demand), measure in litres per capita per day (LCD). Using this metric allows comparison with provincial and national benchmarks. However, with decreases in this area, it is also expected that total community demand (i.e., including commercial and other sectors) will also continue to fall proportionally.
- Spruce Grove’s consumption is already well below AUMA CEP planning targets (as discussed elsewhere in this report), but this does not imply that there is no room for further improvement in light of the many benefits water conservation entails.
- Over time, achieving additional savings will become more difficult as more and more homes and businesses become equipped with the most efficient fixtures and appliances and outdoor use continues to decline (a phenomenon known as “demand hardening”). However, the targets set out in Figure 15 are reasonably achievable considering the relatively new average age of homes in the community, the promise of highly efficient future development, and the impact that implementation of this strategy will have.⁹

⁹ For a discussion of water consumption in highly efficient homes see AquaCraft (2011), which establishes use of 165 LCD for indoor use for homes complying with the 1992 US Energy Policy Act plus 40% equipped with high efficiency clothes washers. Further, it establishes use of 140 LCD for indoor use for homes meeting the US EPA WaterSense New Home specification for fixtures and appliances. Note, however, that there are underlying differences between these benchmarks and the targets set out for Spruce Grove (i.e., the study benchmarks do not include outdoor use and are based on single family homes only, whereas the Spruce Grove targets allow for outdoor use (typically increasing average increasingly consumption), but also include multi-family (typically decreasing average residential consumption). For further discussion of the concept of demand hardening, see Alliance for Water Efficiency (2015).

7.2 Monitoring and Evaluation

Expected outcomes and indicators from each program theme are compiled in Table 13. Performance will primarily be measured through analysis of metered consumption and tracking by staff.

Table 13: Consolidated Table of Indicators and Metrics

Outcome	Indicators	Metrics	Methods
Theme #1: Efficient Outdoor Water Use			
Sustainable reductions in summer water use	Peaking factor reduction	Maximum Day Demand / Average Day Demand	Analysis of metered consumption
	High levels of compliance with the outdoor watering bylaw	# of outdoor watering bylaw warnings issued	City staff to track
	Level of engagement with the enhanced education program	# of conversations with residents	City staff to track
Theme #2: Targeted Measures for Key Sectors			
Reduced water use in non-residential and multi-family sectors	Pre-rinse spray valve efficiency	# of pre-rinse spray valves installed	City staff to track
	Developer engagement in water use efficiency	# of developers utilizing City technical support	City staff to track
	Reduced demand in multi-family sector	Reductions in total water use at participating accounts	Analysis of metered consumption
Theme #3: Enhanced Education and Communications			
Informed and engaged residents	Use of online resources	# of unique visits to City's water conservation website	Web analytics
	Participation in school program	# of students attending seminars annually	City staff to track
	Water demand by high volume residential customers	Average percent reduction in metered water use against historical baseline and community average among participating households	Analysis of metered consumption
	Engagement at community events	# of conversations with residents at community events	City staff to track
Theme #4: Continued Municipal Leadership			
Reduced water use in municipal and utility operations	Accurate water use accounting	Water balance and Infrastructure Leakage Index	City staff to calculate
	Water use in municipally-owned and operated buildings	Metered water use compared to historical baseline	Analysis of metered consumption
	Water use in municipal greenspace	Metered water use compared to historical baseline	Analysis of metered consumption

8.0 Conclusion

This strategy is considered a living document - one that is flexible, adaptable, and responsive to changes in technology, awareness, and other factors that will occur during the implementation period. Over the next five years, staff will continue to explore up-and-coming areas of water efficiency. The plan itself will be reviewed and updated in 2020.

Through adoption of this plan the City of Spruce Grove is working towards its commitment to provide sustainable and safe water to the community today and into the future. Using water as efficiently as possible is the responsibility of each and every individual. If everyone does their part, these benefits can be enjoyed by the whole community.

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