



Leduc's 10 Year Plan  
2015-2025



## Water Conservation, Efficiency and Productivity Plan



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# EXECUTIVE SUMMARY

## RELIABLE ACCESS TO SAFE WATER HAS PLAYED AN IMPORTANT ROLE IN THE CITY OF LEDUC BECOMING THE PROSPEROUS COMMUNITY THAT IT IS TODAY.

While shortages have not impacted the area to date, Leduc strives to mitigate future risks posed by population growth, climate change and other factors through this Water Conservation, Efficiency and Productivity (CEP) Plan. Promoting efficiency will bring a number of social, ecological and economic benefits to Leduc. These will not only improve the quality of life today, but will leave a desirable place to live for future generations.

## PLANNING FRAMEWORK

In 2003, the Government of Alberta released a provincial water management vision and strategy, entitled *Water for Life: Alberta's Strategy for Sustainability* ("Water for Life", 2003). One of the actions it identifies is for water-using sectors to prepare Conservation, Efficiency and Productivity (CEP) plans. This direction was re-affirmed in *Water for Life: A Renewal* (2008).

In 2012, the City of Leduc completed Phase 1 of its *Environmental Plan*, which puts forth a ten-year vision for a healthy and clean environment. One of many actions it identifies is to develop a CEP plan and report on it regularly (City of Leduc, 2012a). In 2014, the City contracted Econics, a Canadian leader in municipal water sustainability planning, to assist with development of this plan.

## LEDUC'S WATER USE PROFILE

In 2013, the population of Leduc was 27,241. The City is growing extremely quickly, by 60.6% since 2006, with a 5-year average annual rate of 5.8%. It is projected that by 2025, the population will reach 46,591 residents. This will have a significant impact on the way the City plans its water services in the coming years (Econics, 2014).

The City of Leduc receives its potable supply in bulk from Capital Region Southwest Water Services Commission (CRSWSC), which purchases it in bulk from EPCOR. In 2013, the annual amount purchased from CRSWSC was 2,989 megalitres (ML)<sup>1</sup> and the total average daily demand was 301 Lcd (litres per capita per day). Demand on the heaviest water use day in a year has been as much as 1.7 times that of an average day.

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<sup>1</sup> One megalitre is equal to 1 million litres of water (or 1000 cubic metres).



## CEP PLAN VISION: LEDUC IS A MORE EFFECTIVE STEWARD OF WATER RESOURCES IN 2020

Typical of most communities, Leduc's residential sector consumes most (61%) of all water purchased. Over the next couple of years, newly-implemented automated meter reading technology will enhance data quality and confirm consumption estimates. However, as an interim baseline for planning purposes, total residential per capita consumption is set at 184 Lcd. Compared with provincial and national statistics, this is very efficient and already exceeds AUMA's proposed 2020 target of 195 Lcd (AUMA, 2014).

Industrial, commercial and institutional (ICI) activities use 28% of the water purchased by the City and the remainder, 11%, is considered to be non-revenue water (NRW).

### CEP PROGRAM BACKGROUND

The vision of this CEP Plan is that "Leduc is a more effective steward of water resources by 2020". This vision, and the objectives contained herein, were established by residents through the planning process associated with the City's *Environmental Plan* (2012).

The City of Leduc has been delivering demand management programs for many years. Current measures include:

- The Water Bylaw and Voluntary Program of Lawn Watering;
- universal metering;
- a volume-based rate structure;
- giveaways, including rain gauges and toilet dye tabs; and,
- education resources, including the City's website and a water handout.

In the past, the City has also offered appliance and fixture rebates as well as discounts on rain barrels. The future program will build on the successes of these measures.

### METHODOLOGY

In response to feedback collected during consultation on the *Environmental Plan* (City of Leduc, 2012a), the 2015-2025 program put forth in this document has a strong education component, particularly around efficient landscaping and seasonal outdoor use.

Work for this plan was led by Econics. Analysis was conducted using their proprietary WaterWorth™ software that has been developed and tested with municipalities across the country. More detail can be found in Appendix 4.

## CONSERVATION MEASURES, 2015-2025

The measures selected were the highest performing results of an extensive screening process (see Appendix 4). They are grouped into three themes: 1) enhanced community outreach; 2) municipal efficiency and leadership; and, 3) governance improvements.

Combined with the new automated meter reading system implemented in 2013/2014, this program will create a strong foundation for future demand management measures. It will foster an informed and engaged population, collect accurate and reliable data, and position the municipality to become a community leader in water conservation, efficiency and productivity.

### Theme #1: Enhanced Community Outreach

This theme involves educating residents about water systems and conservation, with specific attention given to seasonal and outdoor demand, and engaging restaurants and other food preparation facilities in conservation activities. New measures include:

- website and social media enhancements;
- printed education material;
- newspaper notices;
- a residential outdoor community-based social marketing program;
- a residential pledge program; and,
- a pre-rinse spray valve retrofit for commercial kitchens.

### Theme #2: Municipal Efficiency and Leadership

This theme is about embedding conservation in municipal procedures, and ensuring municipal facilities and infrastructure are operating efficiently. New activities include:

- development of a municipal water efficiency purchasing policy;
- audits and retrofits at municipal facilities;
- billing information system improvements; and,
- improved understanding and control of non-revenue water.



### Theme #3: Governance Improvements

Governance improvements involve modifying or creating regulations to more effectively encourage or require water efficient behaviours. The two most common enhancements are related to high-efficiency plumbing standards and a seasonal outdoor watering program. As such, the City will:

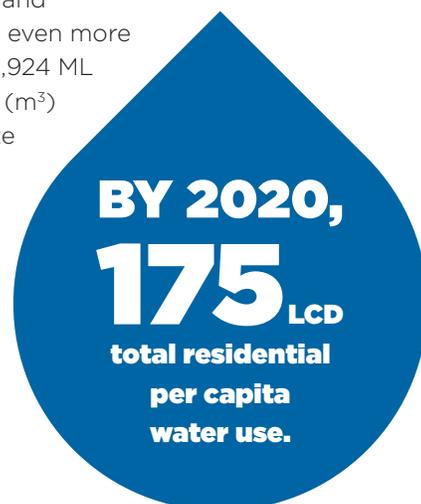
- implement a new bylaw requiring high-efficiency fixtures in new construction and major renovations; and,
- modify the current outdoor watering program to align with industry best practices, following a mandatory “evens and odds” schedule to address peak summer demand.

## PROJECTED FUTURE DEMAND

Demand for the City of Leduc will continue to increase as the population of our community grows. Although some homeowners and businesses will choose efficient fixtures and behaviours on their own, with implementation of the new conservation measures even more water can be saved. By 2025, it is expected that the City’s total demand will be 4,924 ML and that the program will avoid consumption of approximately 474 cubic metres (m<sup>3</sup>) each day.<sup>2</sup> Over the duration of the program, it is estimated that 380 Olympic-size swimming pools of water will be saved.

Even though the City already uses water very efficiently, in the spirit of being good stewards of our surrounding environment, progressive but realistic targets have been set. Based on modeling of water savings from the new measures, the following are the City’s short and long term targets:

- reduce total residential per capita water use to 175 Lcd by 2020, which exceeds AUMA’s proposed objective by 20 Lcd;
- achieve a total residential per capita water use of 170 Lcd by 2025; and,
- reduce non-revenue water to less than 9% of total water purchased by 2020, which meets the target proposed by AUMA (2014).



## IMPLEMENTATION

Implementation of this plan will require commitment from staff across many departments at the City of Leduc. Progress will be reported annually as part of the Environmental Progress Report. As well, the plan will be reviewed and updated following five years, half way through the implementation period.

Success of this plan and our ability to realize the predicted benefits depends on the support and participation of everyone who lives in the City of Leduc. Over the coming years, individuals and businesses will be provided with information and tools to help reduce water use without compromising lifestyle or productivity.

What is documented in this plan is the beginning, not the end, of our journey to improved water efficiency. With a strong focus on education and outreach, efficient municipal infrastructure, and a comprehensive governance framework, the City is laying a strong foundation to implement additional innovative and advanced measures in the future.

<sup>2</sup> One cubic metre is equal to 1000 litres.



# SECTION 1

## Introduction

# 1.0

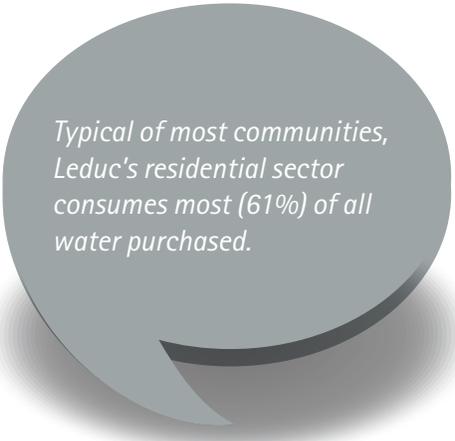
## POPULATION IS GROWING QUICKLY AND IT IS THE CITY'S RESPONSIBILITY TO PROVIDE WATER SERVICES THAT CONTINUOUSLY CONTRIBUTE TO THE HIGH QUALITY OF LIFE ENJOYED IN LEDUC.

Using water efficiently and productively throughout the community will be essential to achieving this commitment.

The purpose of this Water Conservation, Efficiency and Productivity (CEP) Plan is to put forward a strategy to manage water demand in the City of Leduc, so that water supplies are sustainable into the future. The intent of the strategy 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.

The sections of this document are ordered as follows:

- Section 2 provides background information, including the planning framework, the case for conservation, and an overview of water services and consumption patterns within the City;
- Section 3 describes the program context, including the City's vision, a brief a program history, a summary of public engagement, and methodology used in development of this plan;
- Section 4 lays out the actions that comprise the updated 2015-2025 program;
- Section 5 estimates the amount of water the program will save and its impact on future community water demand, as well as provides water efficiency targets; and,
- Section 6 sets out an implementation framework for the CEP Plan.



*Typical of most communities, Leduc's residential sector consumes most (61%) of all water purchased.*



# SECTION 2

## **Background to the CEP Plan**

# 2.0

IN 2014, THE CITY COMMITTED TO COMPLETING A WATER CEP PLAN THAT LAYS THE GROUNDWORK FOR DEMAND MANAGEMENT ACTIVITIES OVER THE NEXT 10 YEARS. Significant research and analysis was completed by Econics, Canadian leaders in municipal water sustainability planning, who were contracted by the City to assist with the development of this plan. To supplement this document, additional information and analysis is contained in a separate reported entitled *Water Conservation Efficiency and Productivity Plan Background Report* (Econics, 2014).

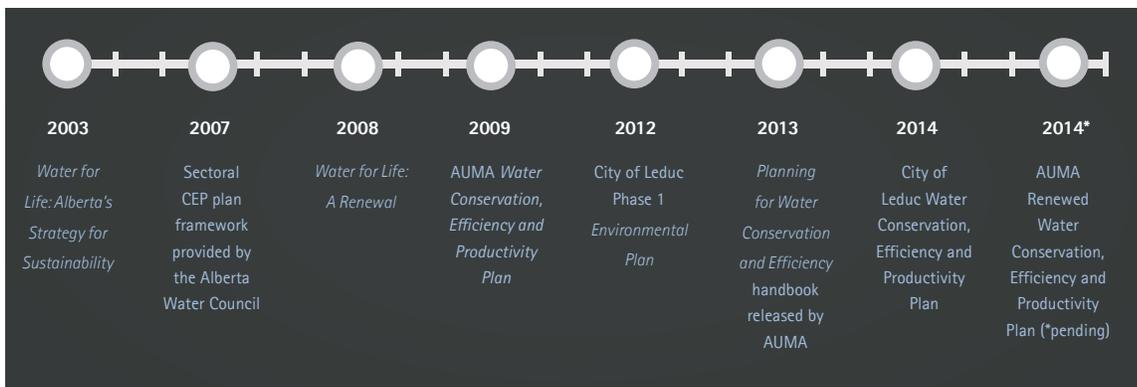
## 2.1 CEP PLANNING FRAMEWORK

In 2003, the Government of Alberta released a provincial water management vision and strategy entitled *Water for Life: Alberta's Strategy for Sustainability* ("Water for Life"). One of three goals set within this document states that "Albertans will be leaders in conservation by using water efficiently and effectively".

The policy also describes an outcome: "all sectors are demonstrating best management practices and improving efficiency and productivity associated with water use". Specifically, it sets a target of 30% improvement in water efficiency and productivity from 2005 levels across the province by 2015. One of the actions identified to meet this target is for water-using sectors to prepare CEP Plans (Government of Alberta, 2003). This direction was re-affirmed in *Water for Life: A Renewal* (2008).



Text Box 1: Water Conservation Planning Timeline



To achieve this target, in 2007 the Alberta Water Council (AWC), a multi-stakeholder partnership that is mandated to implement *Water for Life*, recommended a CEP plan framework for water-using sectors. Using the tools provided by the AWC, the Alberta Urban Municipalities Association (AUMA) developed a broad CEP Plan for the municipal sector, which includes background information on municipal consumption across the province and a framework to guide communities in their own local CEP planning processes (AUMA, 2009). This plan is currently being updated with a renewed version, anticipated in the fall of 2014.

In 2012, the City of Leduc completed Phase 1 of its *Environmental Plan*, which puts forth a ten-year vision for a healthy and clean environment. One of many actions identified to support achievement of this is to develop a water CEP plan and report on it regularly (City of Leduc, 2012a). See Box 1 for a timeline of planning activities.

## 2.2 LEDUC'S CASE FOR CONSERVATION

While shortages have not impacted the area to date, Leduc strives to mitigate future risks posed by population growth, climate change and other factors through this CEP Plan. By encouraging homeowners, businesses, and government to share the responsibility of becoming more water-wise, Leduc will protect this precious resource and provide leadership in sustainability. Promoting efficiency will bring a number of social, ecological and economic benefits to Leduc (see Box 2). These will not only improve the quality of life today, but will leave a desirable place to live for future generations.

### *Text Box 2: Possible Benefits of Conservation*

As less water is consumed by the City of Leduc, in general, the following benefits can be realized:

#### **ECOLOGICAL BENEFITS**

- ✓ reduced chemical use in 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 needs

#### **COMMUNITY BENEFITS**

- ✓ promotion of an environmental stewardship ethic in the community
- ✓ improved community drought resiliency
- ✓ more water retained in reservoirs for firefighting and other emergency needs

#### **FINANCIAL BENEFITS**

- ✓ cost savings from reduced energy use with less water pumping and heating
- ✓ reduced operations and maintenance costs

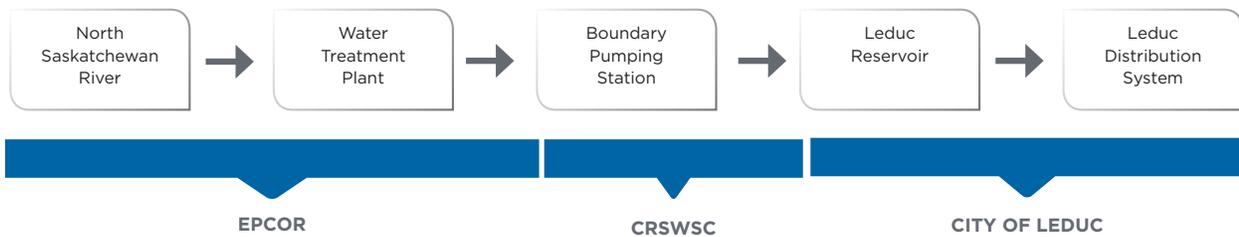
#### **REGULATORY & POLICY BENEFITS**

- ✓ contribute to achieving the vision described in the City's Environmental Plan
- ✓ demonstrate regional leadership by meeting or exceeding AUMA Municipal CEP plan targets
- ✓ contribute to realizing the goals established by *Water for Life*
- ✓ keep consumption within water licence limits defined under the Water Act
- ✓ contribute to meeting Apportionment Agreements with other prairie provinces

## 2.3 LEDUC'S WATER SYSTEM

The City of Leduc receives its potable supply in bulk from Capital Region Southwest Water Services Commission (CRSWSC), which purchases it in bulk from EPCOR. EPCOR holds a licence from Alberta Environment to extract water from the North Saskatchewan River (see Box 3). It then treats it in Edmonton at the E.L. Smith and Rossdale Water Treatment Plants and delivers it to CRSWSC's pumping station. CRSWSC then distributes it to communities in the region, including to Leduc's reservoirs (see Figure 1). Maps of EPCOR's and CRSWSC's service areas are found in Appendix 3.

Figure 1: Relationship between Service Providers



The City of Leduc is universally metered, meaning that every service connection is equipped with a device that measures water use. In 2013, the City began implementing automated meter reading for all connections, which will improve data quality.

Figure 2: Sub-watersheds of the North Saskatchewan River Watershed in Alberta



Source: North Saskatchewan Watershed Alliance (nd)

*Text Box 3: The North Saskatchewan River*

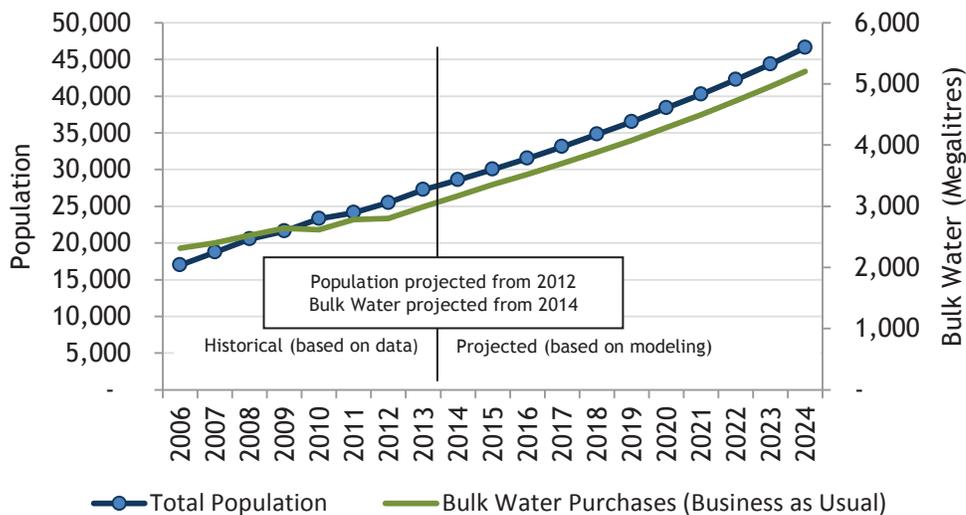
Leduc’s water supply comes from the North Saskatchewan River, which is fed by the Columbia Icefield. Two dams located in the headwaters, Brazeau and Big Horn, redistribute the flow of the river so that winter flows are higher than what they would be naturally and summer flows are lower. As well, 50% of the natural flow is passed into Saskatchewan (EPCOR, 2010).

Several cities, including Edmonton, rely on this river as their municipal water source (see Figure 2). Other types of activities that use water from the North Saskatchewan River include agriculture, resource exploration and extraction, and recreation (EPCOR, 2010). Population growth, expanding industrial and commercial development, and intensification of agricultural practices are all placing pressure on this water supply (Golder Associates, 2008).

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 (see for example, Golder Associates (2008) and EPCOR (2010)). 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.

Flow regulation at the two headwater dams and water conservation measures may help to mitigate some of these impacts of a changing climate (EPCOR, 2010).

Figure 3: Annual Bought Water & Population Growth



2.4 LEDUC’S WATER USE PROFILE

In 2013, the population of Leduc was 27,241. The City is growing extremely quickly, by 60.6% since 2006, with a 5-year average annual rate of 5.8%. It is projected that by 2025, the population will reach 46,591 residents. This will have a significant impact on the way the City plans its water services in the coming years (Econics, 2014).

2.4.1 ANNUAL BOUGHT WATER

Figure 3 graphs the total water Leduc bought from CRSWSC each year from 2006 to 2013 against the population. The amount purchased has gradually increased by about 3.7% each year. In 2013, the annual amount of water bought from CRSWSC was 2,989 megalitres (ML).<sup>3</sup> Figure 3 also projects future population against anticipated total demand without an enhanced conservation program (i.e., based on a “business as usual” scenario).

<sup>3</sup> One megalitre is equal to 1 million litres of water (or 1000 cubic metres).

Figure 4: Annual Total Per Capita Bought Water

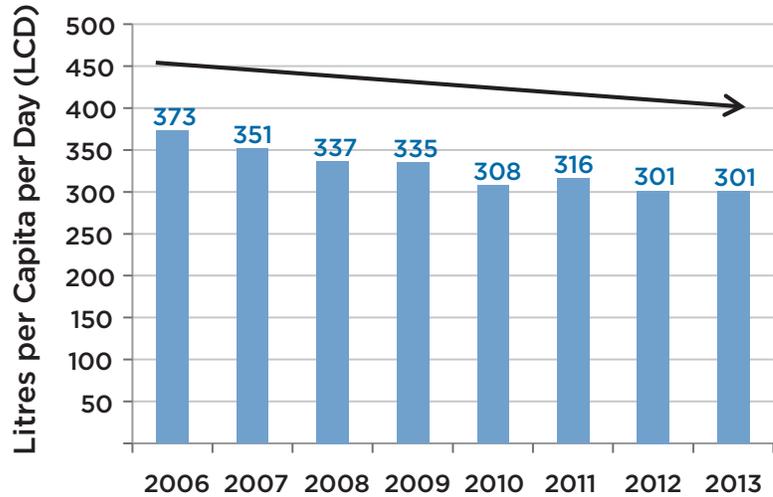
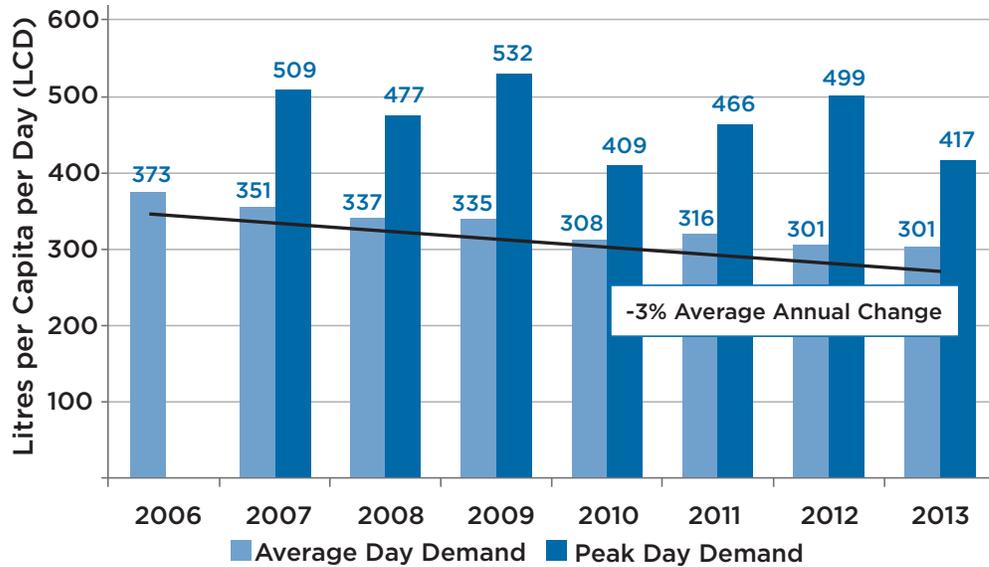


Figure 5: City of Leduc Average Day vs Peak Day Demand



Although the total amount purchased is increasing, the quantity purchased per person has declined (see Figure 4). This indicates that efficiencies have been gained (e.g., by installation of efficient fixtures and fittings in new residential development).

#### 2.4.2 SEASONAL TRENDS

Figure 5 shows the average day and peak day total per capita demand from 2006-2013.<sup>4</sup> In 2013, the total average daily demand was 301 Lcd. Average day demand has decreased on average by 3% per year, while peak day consumption remains variable in response to annual variations in climate. Higher-than-average peaks reflect hotter, drier summers.

In Leduc, demand on the heaviest water use day has been as much as 1.7 times that of an average day. These peaks are an important consideration for future supply and demand conditions under climate change, where periods of drought may be longer.

<sup>4</sup> Average day and peak day values are based on total demand. Total per capita demand is the amount purchased from CRSWSC divided by the population. It includes water used by commercial, industrial and institutional sectors, as well as amounts that may be lost through leaking infrastructure and other sources of non-revenue water. This is different from total residential per capita demand, which is the amount of water consumed by single and multi-family residences divided by the population. See the Glossary in Appendix 2 for further terminology definitions.

Figure 6: Average Monthly Water Production (2006-2013)

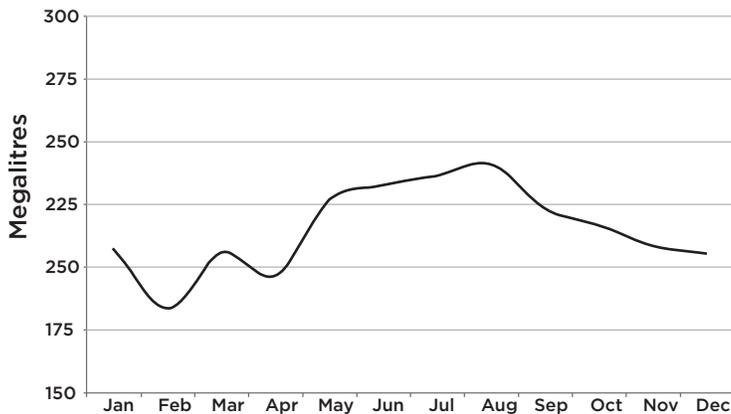


Figure 6 plots average monthly water production from 2006-2013. The underlying data is based on how much water entered the City’s reservoir and therefore cannot be used to directly infer actual demand.

However, in general and as expected, this graph shows that production increases during summer months to meet higher seasonal demands.

### 2.4.3 SECTORAL CONSUMPTION

Typical of most communities, Leduc’s residential consumption accounts for most (61%) of total water production (see Figure 7). Industrial, commercial and institutional (ICI) consumption accounts for just over one-quarter of production, with non-revenue water (NRW) making up the balance (11%). There are more than 20 sources of NRW, including consumptive uses such as leakage throughout the distribution system (“system loss”) and hydrant water taken by municipal public works and fire departments for various maintenance and training purposes (AWWA, 2009). AUMA’s Renewed CEP Plan suggests a goal of 10% NRW or less, which is well within reach for Leduc.

Figure 7: Sectoral Consumption

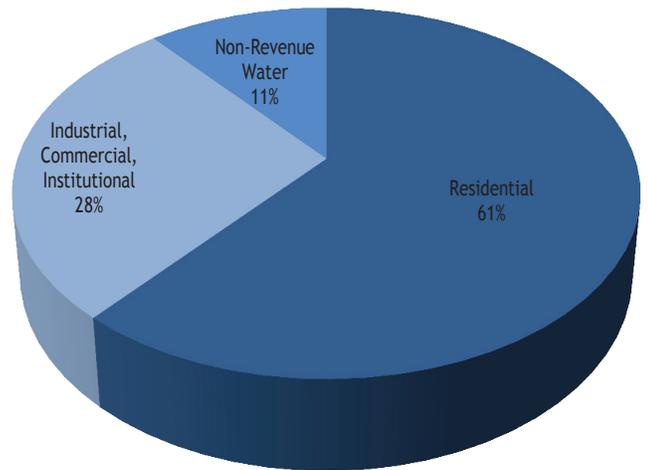
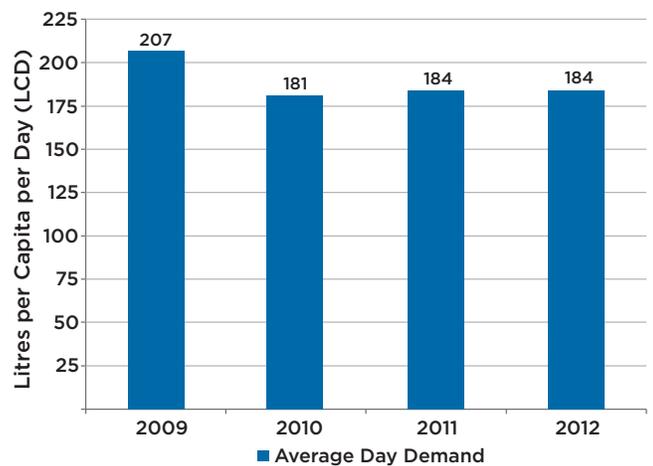


Figure 8: Total Residential Per Capita Demand Based on Billed Consumption, 2009-2012



In 2013, Leduc had 8,546 residential connections and 879 ICI connections. Total residential per capita water demand has decreased since 2009 (see Figure 8).<sup>5</sup> Over the next several years, the newly-implemented automated meter reading technology will enhance data quality and confirm residential consumption estimates. As an interim baseline for planning purposes, the benchmark of 184 Lcd will be used, as this level of consumption has been sustained over several years.

When compared with provincial and national per capita estimates, 184 Lcd is within the expected range of consumption. Based on 2006 data, the Albertan average is 283 Lcd while the Canadian average of metered communities is 263 Lcd (Environment Canada, 2011). However, based on more recent data and a selection of Albertan municipalities similar to Leduc, typical total residential consumption appears to range from 160 Lcd to 210 Lcd (see Background Report, Econics, 2014).

<sup>5</sup> Total residential values include indoor and outdoor use at single and multi-family residences. See the Glossary in Appendix 2 for more definitions of terminology.



# SECTION 3

**Program  
Context**

# 3.0

THIS SECTION DESCRIBES THE CONTEXT FOR THE MEASURES CONTAINED IN THE 2015-2025 CEP PROGRAM.

It is arranged according to the following sections:

- summary of public engagements;
- vision and objectives;
- program history; and
- methodology for selecting future CEP measures.

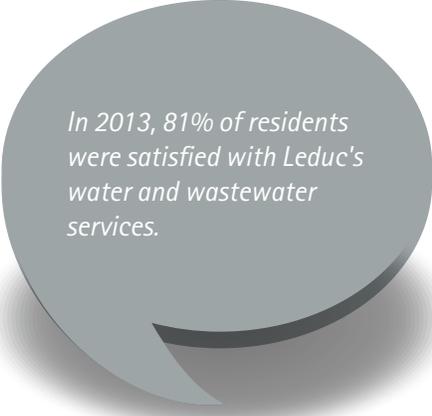
## 3.1 SUMMARY OF PUBLIC ENGAGEMENTS

In 2011, the City collected feedback from residents regarding development of the *Environmental Plan* (City of Leduc, 2012a), which is summarized in the consultation report entitled *What We Heard* (City of Leduc, 2011). This report describes community attitudes, priorities, and concerns related to a variety of environmental issues, including water. Although waste/recycling and trees/natural areas were identified as citizens' top two areas of interest, the importance of addressing water use, along with several other issues, was recognized.

In this respect, Leduc residents indicated they would like the City to encourage conservation. Specific suggestions included a rain barrel program, promoting efficient landscaping, educating on proper outdoor water use, and considering greywater use throughout the community. Water quality and stormwater management initiatives were also mentioned.

Leduc's Citizen Satisfaction Survey (Banister, 2013) explores the perceptions and opinions of residents as they relate to municipal services. In 2013, 81% of residents were satisfied with Leduc's water and sewer services. These services are considered to be a key strength in the City and were rated, on average, at 4.13 out of 5. This is very high and only less than police, emergency medical and fire response services.

Considering this input, the program put forth in this document has a strong education component, particularly around efficient landscaping and seasonal outdoor use.



*In 2013, 81% of residents were satisfied with Leduc's water and wastewater services.*

#### Text Box 4: Demand Management Objectives

The following objectives were established under the development of Leduc's *Environmental Plan* in 2012:

### Outdoor Water Use

- Continue to enhance and educate the public on minimizing outdoor use in summer months to reduce the use of potable water on landscaping;
- Promote the use of native and adaptive landscaping materials to reduce irrigation needs;
- Consider water reduction strategies for existing parks and open spaces (including spray parks);
- Transition community-owned gardens and landscapes to be "water-wise"; and,
- Continue to enhance the leak notification and usage reporting system as new water meters are installed and consider a notification system or voluntary ban if a meter indicates overwatering or watering on the wrong day.

### Fixtures & Source Substitution Technology

- Research and consider a low-flow fixture bylaw for all new residential and commercial buildings;
- Develop resources aimed at homeowners to support the use of low flow fixtures;
- Develop an annual incentive program to help reduce the demands on our water system and minimize impacts from stormwater runoff (e.g., rain barrels); and,
- Explore the use of onsite water reuse technologies and work with Alberta Environment to enable their use in new development.

### Awareness & Education

- Develop a campaign that supports water conservation activities throughout our community.

Source: City of Leduc (2012a)

## 3.2 VISION & OBJECTIVES

The vision and objectives described below were established by residents through the planning process associated with the City's *Environmental Plan*. This CEP plan puts the City well on its way to realizing the following vision:

"Leduc is a more effective steward of water resources by 2020"

The specific objectives related to water conservation established by the *Environmental Plan* are listed in Box 4.

## 3.3 PROGRAM HISTORY

This section provides an overview of Leduc's current conservation program. Program measures are inventoried in Table 1 according to the categories put forth by AUMA: regulatory, financial, structural and operational, education and outreach, and partnerships and collaboration (see Box 5). For more information about these measures, see the CEP Background Report (Econics, 2014).

*Text Box 5: Demand Management Categories*

The following are categories of water demand management policy tools set out by AUMA under its recommended planning process. They are used throughout this report to organize current and future program measures.

**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.

*Source: AUMA (2013)*

Figure 9: City of Leduc Handout and Rain Gauge

**Water Meter REPLACEMENT / UPGRADE PROJECT**

**Tips to Save Water around Your Home**  
 The City of Leduc is committed to being a wise steward of water. City Council approved an Environmental Plan in 2012 with a vision for reduced per capita water consumption.

**Facts:**  
 Most residential water use happens in the bathroom

**Showers:**

1. Use your new shower timer to shorten your shower by a minute or two, you'll save over 500L per month.
2. Consider a water-efficient showerhead. They're inexpensive, easy to install, and can save you at least 3000 liters a month.

**Toilets:**

1. Use your colour tablet to in your toilet tank. If colour seeps into the toilet bowl without flushing, you have a leak. Fixing it can save more than 4000 liters a month.
2. Upgrade older toilets with water efficient models. You could save over 300 litres per day per household.

**Laundry:**

1. Run your clothes washer and dishwasher only when they are full.
2. When shopping for a new clothes washer, compare resource savings among Energy Star models. Some of these can save at least 75 litres per load, and energy too.

**Kitchens:**

1. Consider upgrading faucets, refrigerators, air conditioners and ice-makers with water-saving aerators and cooling systems.
2. Keep a pitcher of water in the refrigerator instead of running the tap. The City of Leduc has good, clean water for drinking let's make the most of it!

**Lawns:**  
 In the summer, watering lawns is also a significant water use and can increase daily amounts by up to 50%. The City of Leduc currently has a voluntary, alternate day lawn watering program in place from May until September each year. Residents of odd-numbered houses are requested to limit their lawn watering to odd calendar days and residents in homes with even numbers should water on even calendar days.  
 Three centimetres of watering per week is adequate for established lawns. Use a rain gauge, empty tuna can, or upside down Frisbee, to measure rainfall on your lawn.

For more information, contact the Eco-smart Hotline at 780-980-7107 or visit [www.leduc.ca](http://www.leduc.ca)

FACTS were gathered from <http://www3.gov.bc.ca/bc/mwgov/Conservation/residential.cfm> and <http://waterusewately.com/100-ways-to-conserve>

CORIX Utilities CITY OF LEDUC



Table 1: City of Leduc's Current Demand Management Program

Type	Tool	Description	Targeted Sector
Regulatory	The Water Bylaw & Voluntary Program of Lawn Watering	The voluntary program is applicable from 30 May - 31 August each year. It requests that residents with odd-numbered street addresses only use water outside on odd days of the month and that even-numbered addresses water on even days of the month. The bylaw provides the City with the authority to mandatorily restrict usage in the case of shortages and to impose a fine for non-compliance.	All
Financial	Universal Metering	Every residential and commercial connection (about 9,000 units in total) is metered.	All
	Volume-Based Rate Structure	The 2014 combined water and wastewater rate is \$2.80 per cubic meter. There are also fixed monthly water and wastewater charges.	All
	Appliance Rebates	This short-term program ran from 2009 to 2012. Rebates were offered in partnership with Climate Change Central for WaterSense labelled low-flush and dual-flush toilets and Energy Star qualified clothes washers.	Residential
	Rain Barrel Discounts	In May 2014, discounted rain barrel sales were offered in partnership with local retailers and Leduc Environmental Advisory Board. Over 140 units were sold.	Residential
Structural & Operational	Rain Gauge Giveaway	Distributed at community events, along with information about efficient irrigation and the lawn watering program.	Residential
	Toilet Dye Tabs	The tabs can be placed in a toilet tank to determine whether water is leaking into the bowl. They are distributed at events.	Residential
Education & Outreach	Website	Provides indoor and outdoor conservation tips, as well as information about rain barrels.	Residential
	Water Handout	Distributed in association with the Water Meter Replacement and Upgrade project and provides everyday conservation suggestions (see Figure 9).	Residential

### 3.4 METHODOLOGY FOR SELECTING FUTURE CEP MEASURES

Building on what was learned through public consultation, development of this plan involved a three stage process (see Box 6). Work was led by Econics. Analysis was conducted using their proprietary WaterWorth™ software that has been developed and tested with municipalities across the country. More detail on the methodology can be found in Appendix 4.

*Text Box 6: Overview of CEP Planning Methodology*





# SECTION 4

## **Program Overview**

# 4.0

THIS SECTION PROVIDES AN OVERVIEW OF THE MEASURES CONTAINED IN THE CITY'S NEW CONSERVATION, EFFICIENCY AND PRODUCTION PLAN FOR 2015-2025. Following a brief summary of new measures, this section organizes all program measures into three themes:

1) Enhanced community outreach: this involves educating residents about water systems and conservation, with specific attention toward seasonal and outdoor demand, and engaging restaurants and other food preparation facilities in conservation activities;

2) Municipal efficiency and leadership: this is about embedding conservation in municipal procedures, and ensuring municipal facilities and infrastructure are operating efficiently; and,

3) Governance improvements: these involve judiciously modifying or creating regulations to more effectively encourage or require water efficient behaviours. The two enhancements proposed in this plan are high-efficiency plumbing standards and a mandatory seasonal outdoor watering program.

Within each theme, an overall explanation of the suite of measures is provided, ongoing measures are listed, new actions are described, and expected outcomes and indicators are identified.

## 4.1 SUMMARY OF NEW MEASURES

The new measures summarized in Table 2 performed the best in a screening and evaluation process that considered over 150 options. These will form the core of the City's demand management program over the next 10 years, from 2015-2025. In the table, the measures are again organized according to the categories set out by AUMA (2013; refer to Text Box 5).



*Community-based social marketing (CBSM) methodology is increasingly being adopted in environmental programs across the country.*

Modifying Leduc’s volumetric water rate structure was outside the scope of this planning process. However, it is an important water conservation tool and is regularly reviewed to ensure the principles of full-cost accounting and revenue sufficiency are met.

Combined with the new automated meter reading system, this program will create a strong foundation for future advanced and innovative demand management measures. It will foster an informed and engaged population, collect accurate, timely and reliable data, and position the municipality to become a community leader in water conservation, efficiency and productivity.

Table 2: New Conservation Measures, 2015-2025

Type	Tool	Targeted Sector
Regulatory	High-Efficiency Plumbing Fixture Bylaw	All
	Mandatory Seasonal Outdoor Watering Program	All
Structural & Operational	ICI Pre-Rinse Spray Valve Retrofit	ICI
	Municipal Water Efficiency Purchasing Policy	Municipal
	Billing Information System Enhancements	Municipal
	Municipal Facilities Audit and Retrofit	Municipal
	Improved Understanding and Control of Non-Revenue Water	Municipal
Education & Outreach	Website and Social Media Enhancements	Municipal
	Printed Educational Material	Municipal
	Outdoor Community Based Social Marketing Program	Municipal
	Residential Pledge Program	Residential

The next section describes the measures contained in Table 2, as well as the elements of the current program that will continue, in detail.



## 4.2 THEME #1: ENHANCED COMMUNITY OUTREACH

Education, marketing and outreach measures build awareness and lay an important foundation for effective use of other types of tools. Education initiatives can be divided into two categories: general information and targeted programs.

General information encompasses advertising, marketing and outreach activities that disseminate generic messages through various channels, such as websites, newspapers, etc. These tools offer instant, direct contact between the City and residents and can be cost-effective for communication and teaching. Information related to current and future program measures, case studies and overall implementation progress can easily be shared with a wide audience.

Targeted programs are aimed at specific user groups (e.g., residential, high-volume, ICI, etc.) or at specific end uses (e.g., lawn watering, toilet purchases, etc.). The benefits of implementing a targeted program, as opposed to a broad and general one, include addressing the most important problems, streamlined messaging and strategic use of program dollars.

### 4.2.1 ONGOING CEP MEASURES

The City's website is a key source of conservation information. This platform, as well as handouts describing various program measures, will be retained in the new demand management program. As well, the City will continue to provide toilet dye tabs and rain gauges at community events. These giveaways are low-cost, effective at engaging residents in discussions about indoor and outdoor use, and offer simple ways residents can conserve water at home.

Figure 10: City of Leduc Twitter Profile



## 4.2.2 NEW CEP MEASURES

### ◆ WEBSITE AND SOCIAL MEDIA ENHANCEMENTS

The website is often the first point of contact between the public and the City of Leduc. It is an important component of generating awareness and engaging residents. Developing diverse, interesting content that is accessible with a range of devices (i.e., computers, tablets, smart phones, etc.) is a foundational element of Leduc's demand management program. As well, since the City is home to many families (Econics, 2014), interactive content will be created to engage younger, tech-savvy audiences, including children.

Social media allows for quick response times and interaction with residents on current issues. The City will strive to enhance its messaging about conservation on commonly used social media sites, such as Facebook and Twitter. These channels will be used to disseminate information, provide event notices and updates on regulatory measures, and respond to public inquiries.

### ◆ PRINTED EDUCATION MATERIAL

Printed materials provide key messages directly to a broad audience. Although they can be targeted towards specialized audiences (e.g., children, home owners, etc.), they typically contain general information that reinforces key conservation messages. As such, they are a foundational requirement of any program.

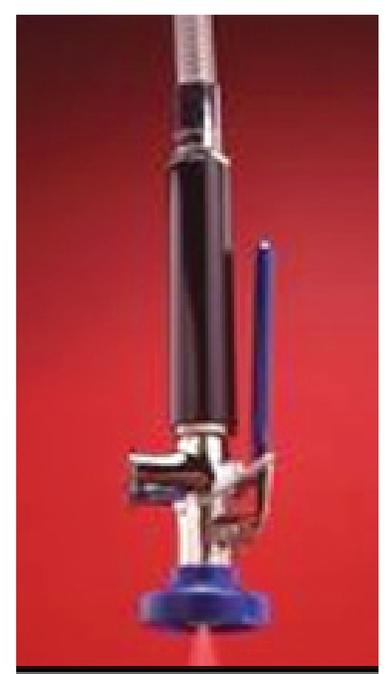
Research contained in the CEP Background Report (Econics, 2014) indicates that there may be low levels of awareness around water use throughout the community. To address this, the City will develop a small number of well-crafted handouts, including a basic conservation guide that provides general and tangible messages about consumption throughout Leduc. Staff at the City will also review the information needs of the 2015-2025 CEP program and develop complementary printed education materials as required.

### ◆ RESIDENTIAL OUTDOOR COMMUNITY-BASED SOCIAL MARKETING PROGRAM

While information-intensive education campaigns can generate awareness around a particular issue, they often do little or nothing to change unsustainable behaviour. Community-based social marketing (CBSM) methodology is increasingly being adopted in environmental programs across the country. It offers a framework to uncover the barriers that prevent people from adopting sustainable behaviours, design programs to address those barriers, and evaluate the results (McKenzie-Mohr and Smith, 1999).

For example, research summarized in the CEP Background Report (Econics, 2014) suggests that one barrier in the City of Leduc may be that residents have low motivation to participate in conservation programs. The CBSM model would take that finding into consideration and figure out a way to influence the conditions that affect motivation.

CBSM encourages sustainable behaviour through the use of a specific set of tools including prompts, social norms, incentives and targeted and personal communication (McKenzie-Mohr and Smith, 1999).



The City of Leduc will develop a CBSM program that targets residential outdoor watering habits. During community engagement for the City's *Environmental Plan*, residents indicated support for measures that addressed irrigation and landscaping. Following the methodology of CBSM, the program will continuously be adapted to respond to changing outdoor behaviour and the advancing knowledge of our community over the duration of the CEP plan.

#### ◆ RESIDENTIAL PLEDGE PROGRAM

Asking residents to commit to a very limited number of specific behaviour changes is one of many specific community-based social marketing tools. The City intends to introduce a public pledge program in conjunction with the new Outdoor Water Use Program (described below in Theme #3). At community events throughout the year, residents would be asked to publicly commit to following the Outdoor Water Use Program by signing a pledge form. There would be no penalties for non-participation, as this measure is solely intended to generate awareness and increase voluntary compliance.

#### ◆ PRE-RINSE SPRAY VALVE RETROFIT FOR COMMERCIAL KITCHENS

A pre-rinse spray-valve is normally located next to the dishwasher in commercial kitchens (e.g., restaurants, health care facilities, senior's housing, food processing facilities, etc.). It uses nozzle technology to pre-rinse dishes, pots and containers prior to putting them in the dishwasher (see Figure 11). Inefficient shower-head style spray-valves can use up to 16 litres per minute (Lpm), which can amount to a large percentage of a facility's annual water demand.

The City of Leduc will work with local restaurants and other commercial kitchens to ensure they are using high-efficiency fixtures. Spray valve retrofit programs are a relatively simple and cost-effective way to reduce potable water demand and have been very successful in other jurisdictions.

*Water efficient spray-valves are relatively inexpensive (\$60 to \$80 per valve), quick to install, and only use between 5 and 7 litres per minute. Efficient models will also result in energy and greenhouse gas emission reductions, since hot water is typically used to rinse dishes.*

Summary of Key Actions under Theme #1 (Enhanced Community Outreach)

Action #	Action
1.1	Continue low cost water saving tool giveaways (e.g. rain gauges)
1.2	Enhance the city's water conservation website and social media presence
1.3	Develop a residential outdoor CBSM program
1.4	Implement a residential pledge program
1.5	Launch a pre-rinse spray valve retrofit for commercial kitchens

### 4.2.3 EXPECTED OUTCOMES

Although it is often difficult to calculate direct water savings from community outreach initiatives, they are foundational to successful demand management and are essential for creating a culture of conservation and efficiency in the City. Outcomes expected from Theme #1 include:

- there is a high level of awareness of the benefits and need for water conservation and efficiency across the community;
- residents and ICI customers are engaged with the City's CEP program; and,
- there are sustainable reductions in residential and ICI water use.

Table 3 describes indicators that will be measured to evaluate progress towards achieving these outcomes.

Table 3: Enhanced Community Outreach Outcomes & Indicators

Indicators	Metric	Method
Community awareness of water conservation practices	% of total population	Citizen Satisfaction Survey (new question)
Measured participant satisfaction with CEP programs	average rating (scale of 1-5)	follow-up questionnaire with participants
Before/after comparison of self-reported behaviour from program participants	% of participants who report behaviour changes	follow-up questionnaire with participants
Number of public pledges	# of pledges; % of population who have taken a pledge	City staff to track
Number of hits on the conservation website	# of hits	City staff to monitor
Number of organizations participating in the retrofit program	% participation of eligible organizations	City staff to track

## 4.3 THEME #2: MUNICIPAL EFFICIENCY & LEADERSHIP

This theme addresses measures that are initiated and implemented by the City and move municipal operations, facilities and infrastructure towards becoming more efficient. Engineering tools that address water loss throughout the distribution system are a primary component of this theme.

### 4.3.1 ONGOING CEP MEASURES

Installation of automated meter reading technology will be complete by 2014. The City will continue to perform tasks related to meter maintenance over the coming years.

### 4.3.2 NEW CEP MEASURES

#### ◆ MUNICIPAL WATER EFFICIENCY PURCHASING POLICY

The City will commit to considering water-efficiency in purchasing decisions. The policy will include fixtures (e.g., faucets, toilets, etc.), appliances (e.g., washing machines, cooling systems, etc.), irrigation systems, and any other water-related item for specific end uses (e.g., swimming pools, ice rinks, etc.). It will be applicable to retrofits, renovations and new construction and will rely on nationally recognized standards and labelling systems including WaterSense and EnergyStar.

#### ◆ MUNICIPAL FACILITIES AUDIT & RETROFIT

Municipally-owned and managed facilities will be audited to determine opportunities for conservation. Auditing is the physical assessment of all water usage in a building. It includes 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 the consumption of each fixture. Audits will also include outdoor water use for landscaping purposes.

Figure 12: Leduc Recreation Centre



Figure 13: City of Leduc Operations Facility



It is known that some municipal buildings are already in very good shape. For example, the Operations Facility was built in 2011 (see Figure 13). It was designed with strategies to conserve energy and water, reduce carbon dioxide emissions and improve indoor environmental quality. Inside, waterless urinals and high-efficiency toilets were installed. Outdoors, landscaping is water-efficient and onsite rainwater collection meets irrigation requirements without relying on municipal supplies.

Buildings that will be part of the municipal water audit program are listed in Text Box 7. Other facilities may be added to the list as the project develops. The City will also develop case studies for publication on the website to share lessons learned and to demonstrate leadership to other institutional and industrial customers.

*Text Box 7: Municipal Facilities to Audit*



- *Leduc Recreation Centre (sections not renovated in 2009)*
- *City of Leduc Civic Centre (sections not renovated in 2014)*
- *City of Leduc Protective Services Building*
- *Other facilities as identified throughout the duration of this plan*

#### 💧 BILLING INFORMATION SYSTEM IMPROVEMENTS

Reliable and accurate data is an essential element in effectively managing Leduc's water systems. Implementation of the new Automated Meter Reading system will significantly improve the quality of data collected. However, there is an opportunity to also enhance internal practices and technology so that the City can make the best use of the new metering system. In particular, the City will review its billing system architecture, including adding appropriate metadata categories to better classify incoming information.

#### 💧 NON-REVENUE WATER MANAGEMENT

Non-revenue water (NRW) is water that has been produced and is "lost" before it reaches the customer. Losses can be real (e.g., system leakage) or apparent (e.g., firefighting use or metering inaccuracies). Managing NRW is often a source of low cost savings for water service providers.

According to the most recent data available from Environment Canada, the average level of NRW across the country is 12.8% of total water produced (Environment Canada, 2010). AUMA has set a goal for Albertan municipalities to achieve levels of 10% or less by 2020 (AUMA, 2014).

Preliminary analysis indicates that NRW levels in Leduc are 11% of total bulk water purchased in 2012, which is only slightly higher than AUMA's suggested 2020 goal. However, it should be noted that this estimate is not based on an ideal metric or methodology to benchmark NRW levels. As such, to confirm these approximations, the City plans to improve our understanding of the sources of NRW, including the portion attributable to real system loss. Accordingly, City of Leduc will undertake the following activities in coming years:

1. **Commission a robust water loss audit** in order to assess the components of NRW and to develop a program for reduction. Following American Water Works Association (AWWA)/International Water Association (IWA) methodology (see AWWA M36), apparent losses, real losses and unbilled authorized consumption will be identified. Additional data inputs into these calculations may be required and could involve reviewing meter calibration, night flow analysis and other field work, and further review of billing data accuracy. The audit outputs will include calculation of an Infrastructure Leakage Index using the IWA methodology.

Following this audit, a water loss control program can be designed and implemented. Focus areas for real loss management may include: active leak detection, speed and quality of repairs, pressure management, and pipeline and asset management. Apparent loss programs may address water used in firefighting training or maintenance activities, ongoing meter calibration, or any other use identified by the audit. Any system loss program should systematically track NRW and incorporate this information into the utility's full-cost accounting models.

2. **Continue with current plans to install zone meters** at various locations in the distribution system in order to improve understanding of how water is being consumed in specific areas of the city.

3. **Investigate the water saving potential of commissioning a District Meter Area in the West End**, where more advanced pressure and leakage management techniques can be trialed on a pilot basis.

Summary of Key Actions under Theme #2 (Municipal Efficiency & Leadership)

Action#	Action
2.1	Complete implementation of the automated meter reading system
2.2	Implement a municipal water efficiency purchasing policy
2.3	Complete audits and retrofits at key municipal facilities
2.4	Implement improvements to billing information system
2.5	Commission a robust water audit of non-revenue water
2.6	Continue with installation of zone meters in distribution network
2.7	Investigate the water saving potential of a District Metered Area in the City's West End

### 4.3.3 EXPECTED OUTCOMES

Although measures in Theme #2 will save water, the value of these initiatives lies in demonstrated municipal leadership and fostering a culture of water efficiency within the community. The outcomes expected include:

- improved information on the level of real and apparent losses and NRW currently occurring in the network;
- improved control of real and apparent losses; and,
- improved credibility among community members.

Table 4 describes the indicators that will be monitored to evaluate the success of measures related to municipal efficiency and leadership.

Table 4: Municipal Efficiency & Leadership Outcomes & Indicators

Indicators	Metric	Method
water loss	Infrastructure Leakage Index	IWA Methodology
volume of water losses (real and apparent)	m <sup>3</sup> /service connection/year	City staff to calculate
volume of NRW	% of System Input Volume	City staff to calculate
community satisfaction with water services	average rank (on a scale of 1-5)	Citizen Satisfaction Survey

m<sup>3</sup> = cubic metre = 1000 litres



## 4.4 THEME #3: GOVERNANCE IMPROVEMENTS

Governance improvements typically involve modifying or creating regulations to more effectively encourage or require water efficient behaviours. The two most common enhancements are related to high-efficiency plumbing standards and seasonal outdoor watering programs, which are included as part of this plan.

### 4.4.1 ONGOING CEP MEASURES

The Water Bylaw will continue to be the primary regulation with respect to water for the City, although it may be amended to accommodate the governance improvements outlined below in section 4.3.2.

### 4.4.2 NEW CEP MEASURES

#### ◆ PLUMBING FIXTURE BYLAW

High efficiency plumbing standards, often implemented through provincial codes and municipal bylaws, are an important tool for conservation and are considered to be best practice by water utility organizations (see for example AWWA, 2013). Similar to energy efficiency standards, water efficiency standards describe a maximum level of consumption for common residential and ICI fixtures such as toilets, showerheads, and faucets.

There is currently no provincial guidance in Alberta on efficiency standards for plumbing fixtures, as Alberta follows the National Plumbing Code (NPC). However, if the proposed adoption of the new 2015 National Energy Code and updates to the National Plumbing Code are passed, these will provide provincial guidance on efficiency standards and would take effect in 2016. Until that time, standards can also be stipulated through a municipal bylaw, which has been done by many communities throughout Alberta, such as Edmonton, Red Deer, Calgary, Airdrie and Okotoks.

Given the rapid growth rate of Leduc, the City intends to pass its own bylaw in 2015 so that savings can be accrued over the next two years. It will use AUMA's Municipal Water Efficiency Bylaw Primer as a model (AUMA, nd), which will reduce the risk that language will conflict with provincial standards if and when they do come into effect.

The City of Leduc will adopt the following standards in all new construction and major renovations requiring a plumbing permit, for both residential and ICI sectors:

*Table 5: Proposed High-Efficiency Plumbing Standards*

Fixture	Standard
Toilet	<4.8 Lpf <6 Lpf if fixture is sub-grade or in the basement
Urinal	<1.9 Lpf
Showerhead	<7.6 Lpm
Faucet	<8.35 Lpm

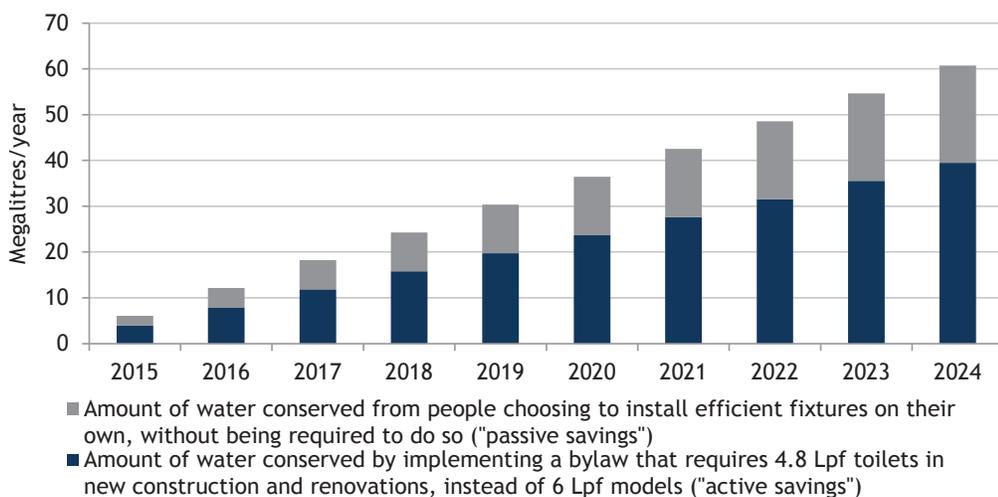
These standards are consistent with the 2012 Ontario Building Code and are considered to reflect the most efficient fixtures widely available in the marketplace. They require higher levels of efficiency than those proposed in the Municipal Water Efficiency Bylaw Primer by AUMA. However, they are also likely to match the standards put forth in the 2015 National Plumbing Code if it comes into effect. In Alberta, the Town of Okotoks has already adopted the above standards, although it exceeded faucet flow requirement in its bylaw.<sup>6</sup>

As well, the City of Leduc will require high efficiency EnergyStar labeled clothes washing machines and dishwashers in new construction and major renovations. This is already occurring in the Town of Okotoks and contributes to conserving both water and energy.

Water savings from a new bylaw are easily measured and expected to be significant. For example, the Town of Okotoks (2011) reports in its Water Management Plan that indoor consumption was reduced by 9.1% as a result of their Low-Flow Plumbing Fixtures Bylaw.

Although many people will choose to install efficient fixtures without being required to do so (this leads to “passive” savings), many more will purchase water smart models as a result of the bylaw. These “active” savings can be estimated and measured. Econics modeled the amount of water that could be conserved through the introduction of a bylaw that requires 4.8 litres per flush (Lpf) toilets instead of 6 Lpf and found that by 2025, approximately 39 ML/year of active savings will be accrued (see Figure 14).

Figure 14: Estimated Water Savings from High-Efficiency Plumbing Fixture Bylaw



### 💧 SEASONAL OUTDOOR WATER USE PROGRAM

A seasonal outdoor watering program is commonly used to reduce water use when stress on the system is highest. During the summer, consumption spikes when people begin irrigating lawns and gardens. The distribution system has to be large enough to accommodate this increased demand. Using less water during the summer months means the City’s existing infrastructure can service more people, operating costs are reduced, and more water is left in the North Saskatchewan River to support recreational activities and natural ecosystems.

<sup>6</sup> Okotok’s faucet standard was developed to more closely align with the US EPA’s WaterSense labelling qualification criteria, as follows: residential bathroom faucet: <5.7 Lpm; ICI bathroom faucet: <1.8 Lpm; kitchen faucet: <6.8 Lpm.



Since 1994, the City's voluntary program has requested that residents irrigate every other day, depending on their house number ("even/odd schedule"). Given that residents may have a relatively low level of motivation to participate in conservation activities (see Econics, 2014), the City will update these guidelines and make it mandatory to follow the even/odd pattern.

As a general guideline, lawns only require about one inch of water per week, including rainfall and irrigation. As such, this schedule provides ample opportunity for residents to maintain vibrant and healthy lawns.

The other component of lawn sprinkling best practices is time-of-day controls. Watering at mid-day dramatically increases wastage due to evaporation. To reduce this, the most effective bylaws stipulate what time irrigation is permissible, for example from 6:00-9:00 a.m. and from 6:00-9:00 p.m. This approach will be adopted by the City.

Similar to many other cities across Canada, Leduc will also implement a tiered approach to restrictions. As water scarcity increases, specific outdoor uses may no longer be permitted. Stage 1 would be in place every year as a baseline level for normal conditions. This stage would be observed from 30 May until 30 September annually. Stages 2 and 3 would only be triggered if necessary when local watershed conditions are stressed, particularly if the City is experiencing dry weather.<sup>7</sup> The decision to start and stop higher level restrictions would be made using the judgment and expertise of City staff in consultation with EPCOR and CRSWSC members.

The framework for the Outdoor Water Use Program is outlined in Table 6 on the following page.

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<sup>7</sup> Provisions for drought management contingencies already exist under the City's existing Water Bylaw No. 738-2010 (Section 7). The additional requirements simply provide detail and certainty.

Table 6: Outside Water Use Restrictions if Scarcity of Supply Program

Use	Level 1 Careful Use	Level 2 Reduce Outdoor Use	Level 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 and Garden Ponds	Permitted	Permitted	Even/Odd Schedule
Decorative Fountains	Must Re-Circulate Water	Same As Stage 1	Same As Stage 1
At-Home Vehicle Washing	Must Have A Shut-Off Nozzle On Hose	Same as Stage 1 With Even/Odd Schedule	Not Permitted

The City will use the measures described in Theme #1: Enhanced Community Outreach to support implementation of this program. This will include use of printed newspaper notices and the City website to communicate with residents.

Savings from seasonal watering requirements were also modeled<sup>8</sup>. Each year, as population and demand grow, it is expected that the bylaw will save an increasing amount of water. By 2025, savings are estimated to be 125 ML annually.

*Summary of Key Actions under Theme #3 (Governance Improvements)*

Action #	Action
3.1	Implement a plumbing fixture bylaw
3.2	Implement an improved Outdoor Water Use Program

<sup>8</sup> To calculate water savings, winter and summer total production volumes for the 2006 to 2013 period were compared. Assuming that monthly production in exceedance of the winter average is the result of outdoor uses, the outdoor demand was calculated. A conservative savings rate of 7%, based on literature review, was applied to outdoor demand as a result of the restriction. This was grown for 10 years at 3% per year, as per the trend in 2006 to 2013 total production, and an average was taken for the 10 year period for modelling purposes.

#### 4.4.3 EXPECTED OUTCOMES

From implementation of these governance enhancements, the following outcomes are expected:

- high levels of awareness of Outdoor Water Use Program across the community;
- high levels of compliance with Outdoor Water Use Program, with emphasis on education as the key implementation method; and
- water-efficient new developments and re-development.

Table 7 describes the indicators related to governance improvements.

*Table 7: Governance Improvements Outcomes & Indicators*

Indicators	Metric	Method
awareness of the lawn sprinkling bylaw among residents	% of total population	Client Satisfaction Survey (new question)
number of warnings and fines issued for contravention of the lawn sprinkling bylaw	#	City staff to track
estimated water saved through High Efficiency Plumbing Fixture Bylaw	ML	City staff to track



# SECTION 5

**Program  
Impact**

# 5.0

THIS SECTION OUTLINES THE EXPECTED BENEFITS OF IMPLEMENTING THE CEP PROGRAM DESCRIBED IN SECTION 4, INCLUDING:

- how much water will be saved by conservation measures;
- the estimated impact the CEP plan will have on future community water demand; and,
- the City’s resultant water use targets for the total residential sector and for non-revenue water levels.

## 5.1 PROGRAM WATER SAVINGS

Estimated water savings per day by 2025 from the CEP program, as well as how much can be conserved when the program is combined with natural replacement, are shown in Table 8.<sup>10</sup> Natural replacement savings are driven primarily by old toilets and clothes washers being replaced with new models over time, regardless of program effort. Given the relatively new age of housing stock in Leduc, natural replacement estimates are conservative at 298 m<sup>3</sup>/day.

By the end of the 10-year timeframe of this CEP plan, approximately 474 m<sup>3</sup>/day of water will be conserved. Along with water savings, there are many other benefits the City of Leduc expects to enjoy over the next 10 years from implementation of this plan (see Text Box 2, above).

Table 8: Estimated Program Water Savings

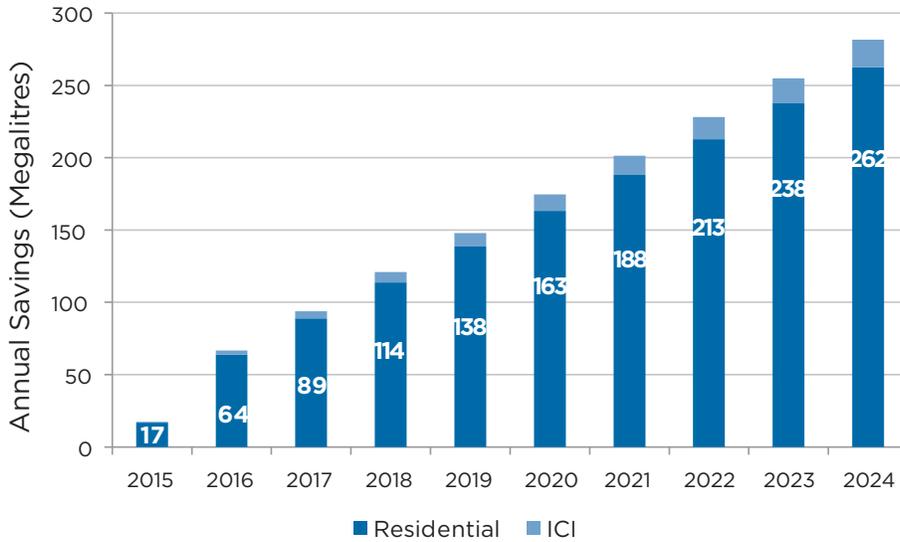
Program Savings (m <sup>3</sup> /day)	Program Plus Natural Replacement (m <sup>3</sup> /day)
474	771

These savings will come primarily from residential customers (see Figure 15). Through the program elements targeted at ICI customers (e.g. volume based pricing and pre-rinse spray valve retrofits), it is anticipated that a culture of sustainability will emerge within this sector as well. In the future, additional conservation measures may be developed to encourage ICI customers to become even more efficient.

<sup>10</sup> Natural replacement savings are derived as residents and businesses gradually replace fixtures and fittings, such as toilets and clothes washers, with newer, more efficient models over time. These savings are independent of the City’s conservation program.



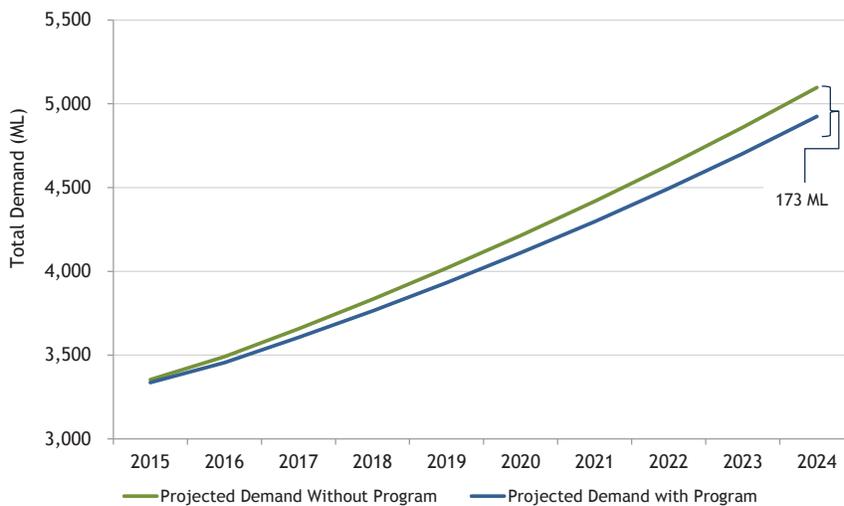
Figure 15: Total Annual Savings by Customer Class



## 5.2 IMPACT ON COMMUNITY DEMAND

Demand in the City of Leduc will continue to increase as the population of our community grows. The upper line in Figure 16 projects how much water Leduc will require in the coming years, after accounting for passive savings.<sup>11</sup> However, with implementation of the measures proposed in this plan, that quantity can be reduced as shown by the lower line.

Figure 16: Projected Impact of Program on Water Demand (2015-2025)

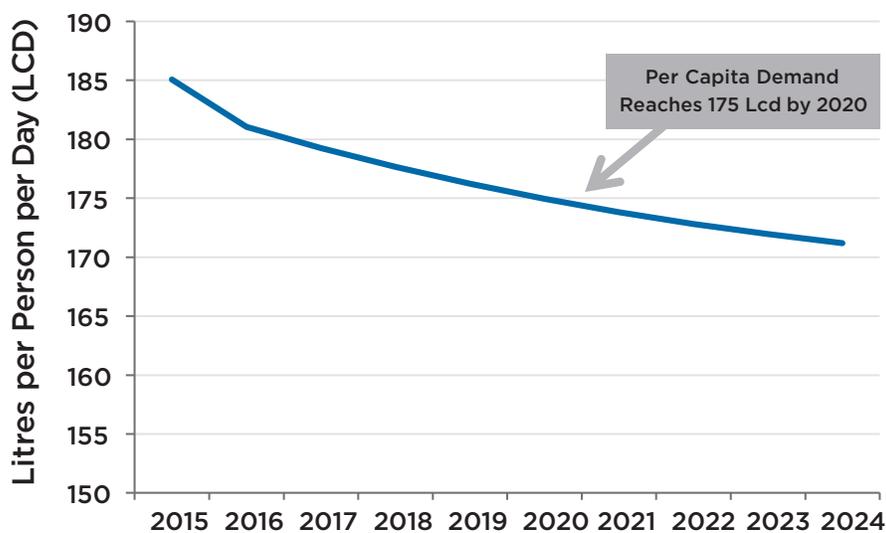


<sup>11</sup> Passive savings are water that would have been conserved anyway, without the City's program, by homeowners and businesses choosing efficient fixtures and behaviours on their own.

By 2025, it is expected that the City's total demand will be 4,924 ML, 173 ML less than what is projected without a conservation program. Over the next 10 years, enough water to fill 380 Olympic-sized swimming pools will be saved.<sup>12</sup>

Even though total consumption will continue to increase with population growth, it is expected that per capita demand will decrease with implementation of the CEP program. With the strong focus on enhancing community outreach, municipal efficiency and leadership, and governance improvements, it is estimated that total residential consumption will fall to 170 Lcd by 2025 (see Figure 17).

Figure 17: Estimated Residential Per Capita Demand



### 5.3 WATER USE TARGETS

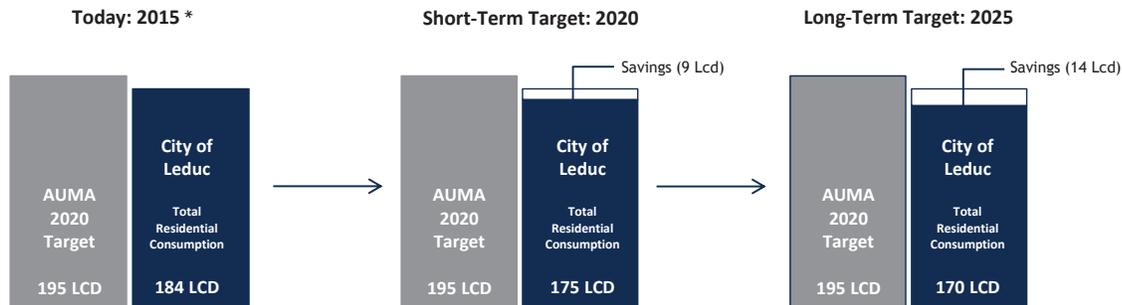
The City already uses water very efficiently, compared with other municipalities in the province and across the country. However, there is always room for improvement and so to advance our environmental stewardship activities, the City has set progressive but realistic targets. Based on the estimated impacts of the program, Leduc will strive to achieve the following two water efficiency targets:

- total residential consumption is reduced to 175 Lcd by 2020 and 170 Lcd by 2025; and,
- non-revenue water levels comprise 9% or less of total water purchased by 2020.

Per capita residential (including single and multi-family residences) consumption is currently estimated to be 184 Lcd. This will be verified by the new metering technology over the next couple of years. This is already less than AUMA's proposed target of 195 Lcd by 2020 (2014). Based on modeling of water savings from the proposed conservation measures, the short-term target of 175 Lcd by 2020 and the long-term target of reaching 170 Lcd by 2025 are achievable (see Figure 18).

<sup>12</sup> It is assumed that one Olympic-size pool takes 2.5 ML to fill.

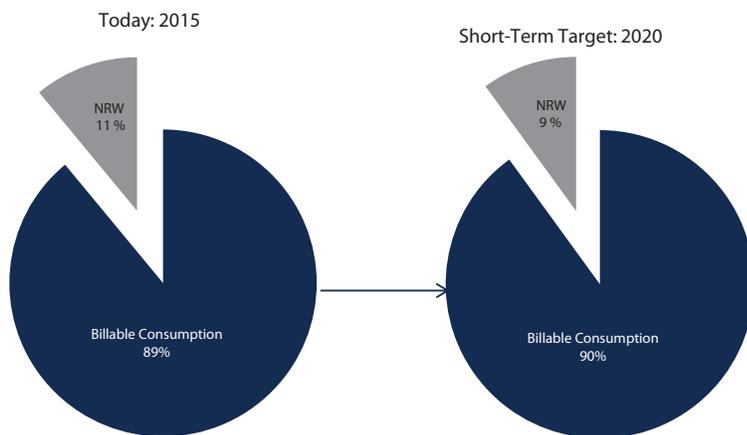
Figure 18: City of Leduc Total Residential Consumption Targets



\* Estimate based on data from 2010-2013

Non-revenue water currently comprises approximately 11% of total water purchased. Along with improving understanding of the components of NRW and confirming the preliminary estimates provided in this document, the City has set the target of reducing NRW to less than 9%, (see Figure 19). This would meet the suggested objective in AUMA's renewed municipal CEP Plan (2014).

Figure 19: City of Leduc Non-Revenue Water Targets





# SECTION 6

## Implementation

# 6.0

THIS SECTION DESCRIBES IMPLEMENTATION OF THE CEP PLAN. It also provides a framework for monitoring and evaluation and continuous adaptation of the program.

Table 9 contains a consolidated list of conservation actions under this plan.

Table 9: Consolidated List of Key Actions under City of Leduc's CEP Plan

Theme #1	Enhanced Community Outreach
1.1	Continue low cost water saving tool giveaways (e.g. rain gauges)
1.2	Enhance the city's water conservation website and social media presence
1.3	Develop a residential outdoor CBSM program
1.4	Implement a residential pledge program
1.5	Launch a pre-rinse spray valve retrofit for commercial kitchens
Theme #2	Municipality Efficiency & Leadership
2.1	Complete implementation of the automated meter reading system
2.2	Implement a municipal water efficiency purchasing policy
2.3	Complete audits and retrofits at key municipal facilities
2.4	Implement improvements to billing information system
2.5	Commission a robust water audit of non-revenue water
2.6	Continue with installation of zone meters in distribution network
2.7	Investigate the water saving potential of a District Metered Area in the City's West End
Theme #3	Governance Improvements
3.1	Implement a plumbing fixture bylaw
3.2	Implement an improved Outdoor Water Use Program

*This plan effectively positions the City of Leduc to become a provincial leader in water conservation and efficiency.*

## 6.1 TIMING AND RESPONSIBILITIES

A summary schedule for implementation of Leduc’s future water conservation program is provided in Table 10 below, along with departmental responsibility. As requirements are more clearly defined, this schedule may be modified.

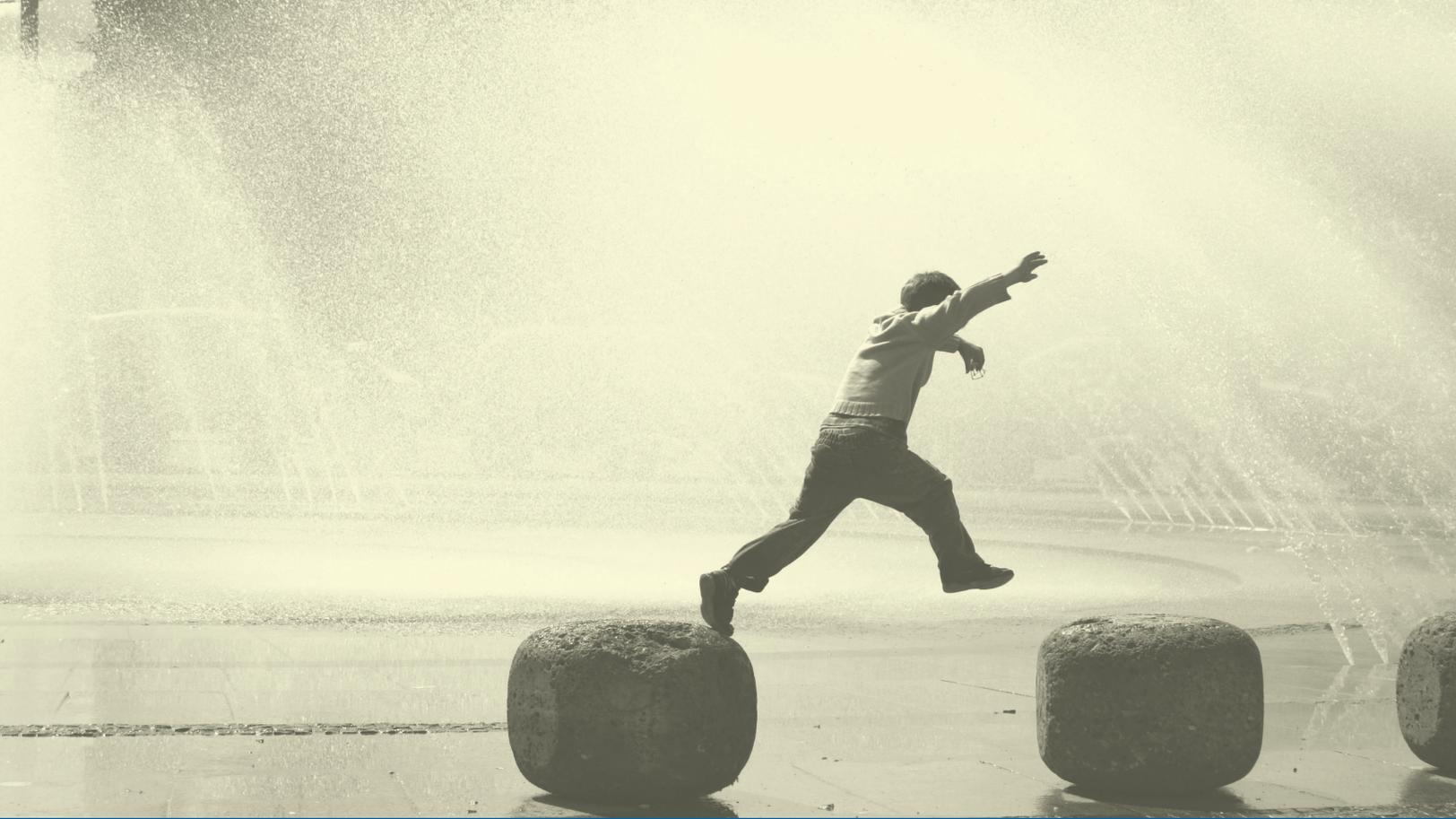
Table 10: 2015-2025 CEP Program Implementation Schedule

	Program Measure	Status	Responsible Department	Start Date
<b>Theme #1 Enhanced Community Outreach</b>				
1.1	Low Cost Conservation Tool Giveaways	Continuing	Environmental Services	-
1.2	Website and Social Media Enhancements	New	Communications	2015
1.3	Residential Outdoor CBSM Program	New	Environmental Services	2017
1.4	Residential Pledge Program	New	Environmental Services	2016
1.5	Pre-Rinse Spray Valve Retrofit Program	New	Environmental Services	2016
<b>Theme #2 Municipal Efficiency &amp; Leadership</b>				
2.1	Automated Meter Reading	Continuing	Utility Services/Finance	-
2.2	Website and Social Media Enhancements	New	Environmental Services	2015
2.3	Municipal Facilities Audit & Retrofit	New	Environmental Services; Facility & Property Services	2016
2.4	Billing Information System Enhancements	New	Utility Services/Finance	2015
2.5	Water Audit of Non-Revenue Water	New	Utility Services/Finance	2015
2.6	Installation of Zone Meters In Distribution Network	Continuing	Utility Services	2016
2.7	Investigate District Metered Area in City's West End	New	Engineering; Utility Services	2018
<b>Theme #3: Governance Improvements</b>				
3.1	Plumbing Fixture Bylaw	New	Engineering; Environmental Services	2015
3.2	Improved Outdoor Water Use Program	New	Engineering; Public Services	2016

## 6.2 MONITORING, EVALUATION AND REPORTING

Progress on implementation of the measures described above will be reported annually in the Environmental Progress Report. This document is produced every year and is published to show residents the value they receive for the tax dollars they contribute to the City.

The plan itself will be reviewed and updated following five years, half way through the implementation period. At this time, many of the measures will have begun and demand savings estimates can be compared with actual observations. Performance against the indicators described for each theme in Section 4 will be measured through observation, participant surveys, and market research. If required, targets and timelines may be adapted based on findings from this mid-term evaluation.



# SECTION 7

## Conclusion

# 7.0

THROUGH ADOPTION OF THIS PLAN, THE CITY OF LEDUC HAS CHARTED A PROGRESSIVE AND AMBITIOUS PATH FORWARD ON OUR COLLECTIVE JOURNEY TO IMPROVED WATER EFFICIENCY. By the year 2025, the City aims to be among the most water-wise municipalities in Alberta. As such, the following targets have been set:

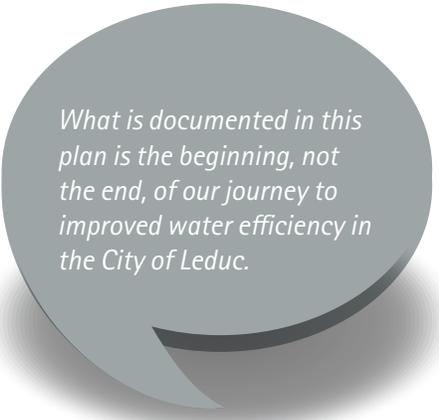
- total residential consumption is reduced from 184 Lcd today to 175 Lcd by 2020 and 170 Lcd by 2025. This exceeds AUMA's proposed target of 195 Lcd by 2020.
- non-revenue water levels are confirmed and controlled so as to comprise 9% or less of total water purchased by 2020.

With a strong focus on education and outreach, efficient municipal infrastructure, and a comprehensive governance framework, the City has committed to a suite of actions that will move the community steadily towards our targets. Activities and progress will be reported annually in the Environmental Progress Report. Following five years, indicators and trends will be reviewed and, if required, the plan will be modified to reflect ever-changing circumstances.

Through implementation of the program described in this plan, it is estimated that the City will conserve 474 m<sup>3</sup> of water per day by the end of the 10-year implementation period. As well, over the duration of this plan, enough water to fill 380 Olympic-sized swimming pools will be saved.

Other benefits the City of Leduc expects to enjoy as a result of conservation efforts include reduced pressure on infrastructure, enhanced environmental quality, and a stronger culture of sustainability within our community.

By using water as efficiently as possible, we can ensure that residents and businesses will continue to enjoy a high quality of life in the City for years to come.



*What is documented in this plan is the beginning, not the end, of our journey to improved water efficiency in the City of Leduc.*

# appendix 1:

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# appendix 2:

## GLOSSARY

**Annual Savings Rate vs. Cumulative Total Savings:** The volume saved in a single year based on the change of technology, appliances, and behavior in preceding years is the annual savings rate. This is different from cumulative total savings for a given period, which is the sum of the annual savings rates for the period.

**Average Day Demand:** Average daily production for a year divided by total serviced population, reported in Lcd.

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

**ICI:** Refers to all industrial, commercial and institutional (ICI) customers that use water in their operations, either as a production input or for domestic-like purposes.

**Conservation Measure:** A conservation measure is a tool used by City of Leduc to generate water savings in the community. These tools can be financial (e.g., fixture rebates), educational (e.g., websites), technical (e.g., leak detection) or regulatory (e.g., water use bylaw).

**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 is typically decreasing as water efficiencies are gained. This may be expressed as Residential Billed Consumption Lcd, which is based on residential consumption volumes and residential serviced population, or Total Production Lcd, which is based on total production and total serviced population.

**Natural Replacement:** Inefficient appliances that are old or broken are often replaced with efficient models because the market share of the latter has grown significantly over time, leaving only efficient models available for purchase. These are called "natural replacement savings" and are different from "code savings" because the purchase of efficient appliances in some cases is not required by regulations.

**Non-Revenue Water:** Non-revenue water is 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. Sources can include legitimate but non-billed uses such as mains flushing and fire hydrant use, and real water loss such as leaks.

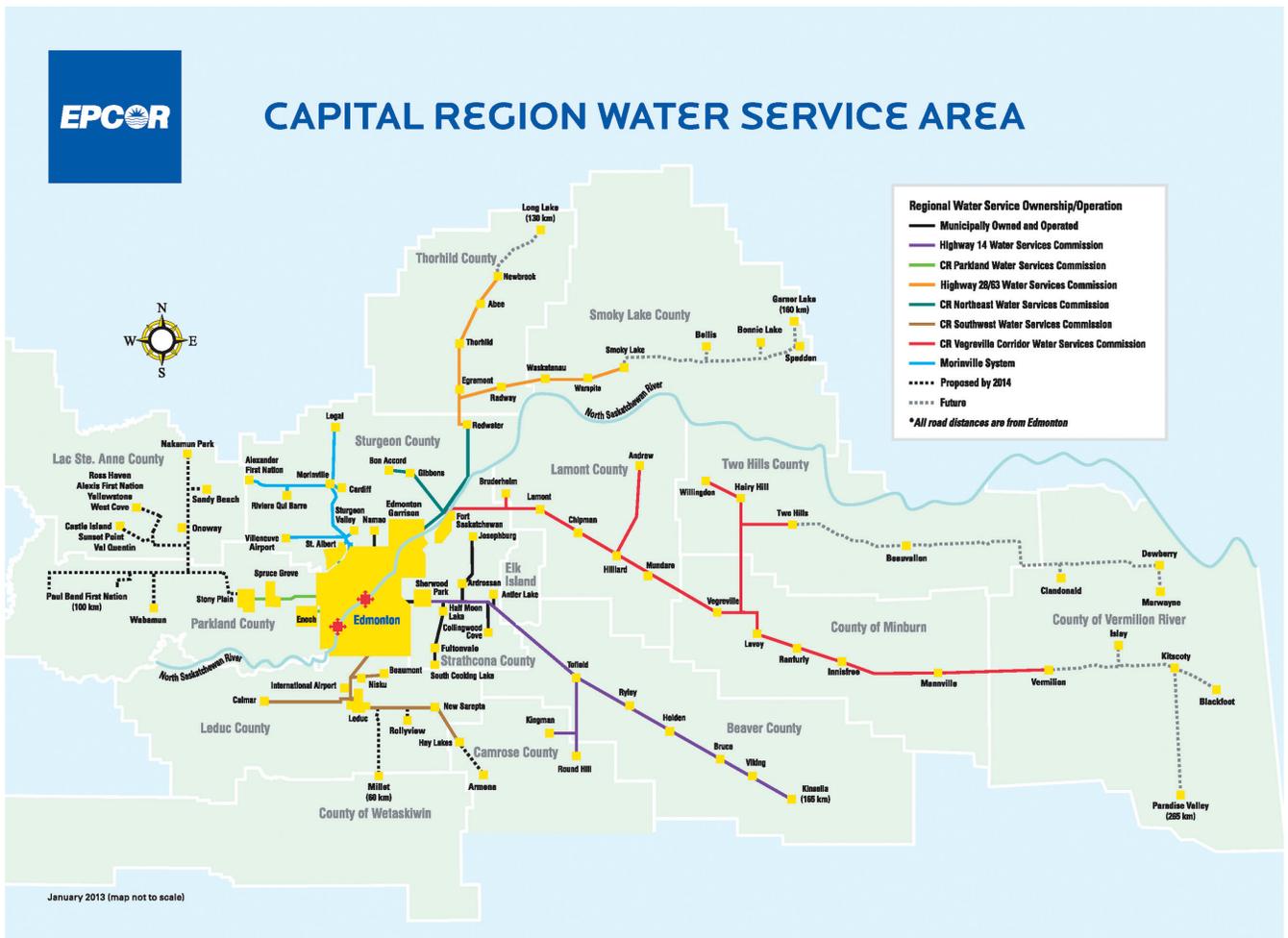
**Peak Day Demand:** Peak day production divided by total serviced population, reported in Lcd.

**Total Residential (TR):** Describes the sector of the serviced population that uses water for domestic purposes, both indoor and outdoor. It includes single and multi-family dwellings.

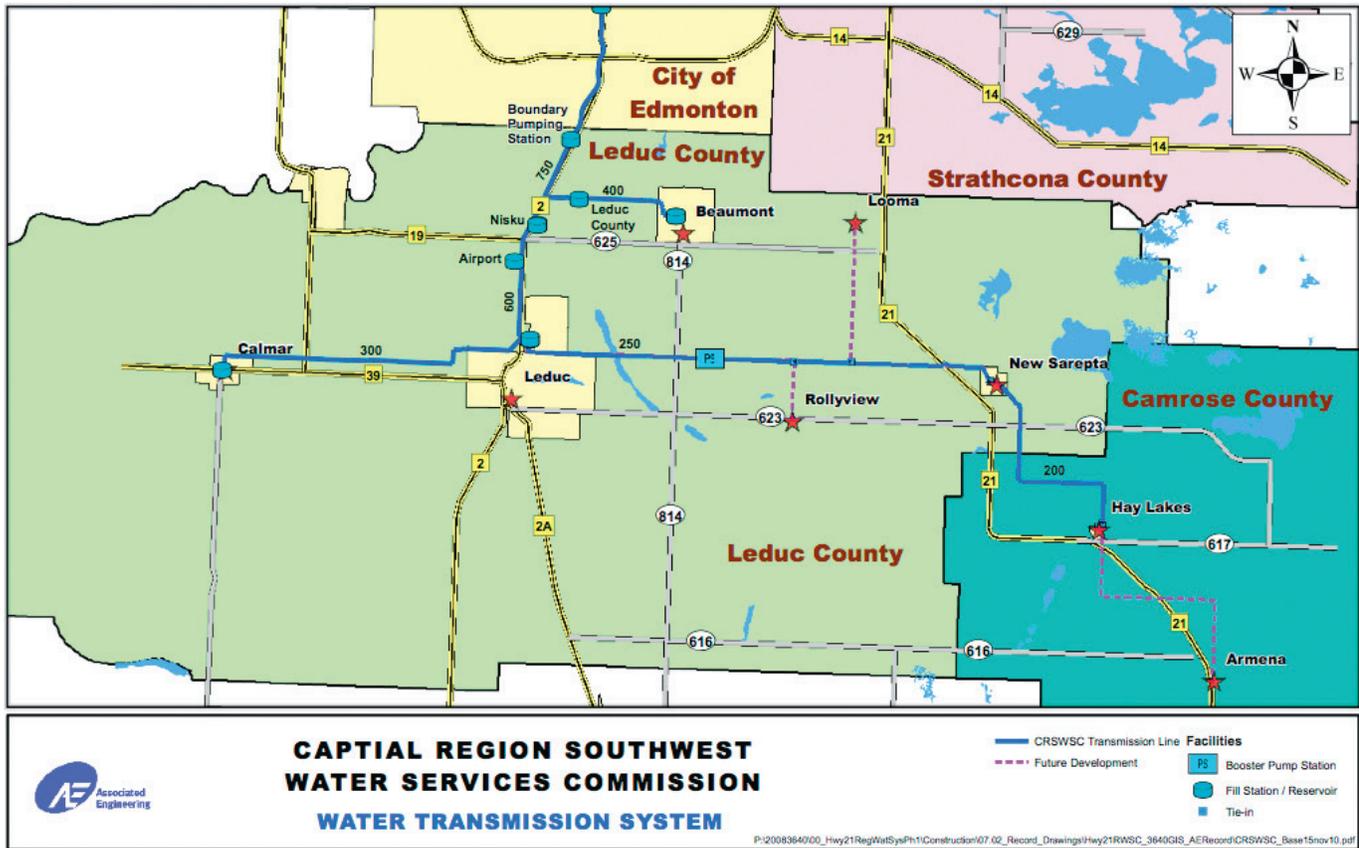
**Total Water Production:** The total volume purchased from EPCOR by the City, including all water that is consumed by users (revenue water) and non-revenue water.

# appendix 3:

## MAPS



Source: EPCOR ([www.epcor.com](http://www.epcor.com))



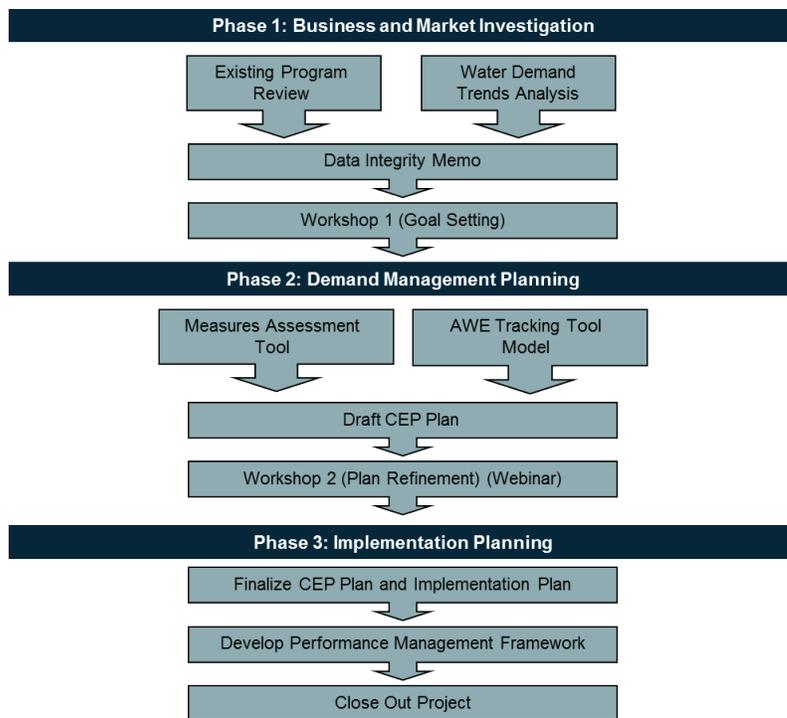
Source: CRSWSC (nd)

# appendix 4:

## CEP PLANNING METHODOLOGY

Building on what was learned through public consultation, development of this plan involved a three stage process. Each stage was comprised of multiple steps (see Figure 20). Each step is explained below.

Figure 20: Project Work Flow Diagram



### Phase 1: Business and Market Investigation

This phase established where the City is now. Engineering, planning and financial data were reviewed to determine water use patterns and trends. As well, the existing program was evaluated and possible future opportunities identified (see Econics, 2014).

#### Existing Program Review

Past and current water conservation program components were inventoried and assessed for comprehensiveness using Econics' WaterWorth™ "5E Framework". Measures were categorized by the type of tool: education, engineering, encouragement, enforcement, and economics.

#### Water Demand Trends Analysis

Historical system and sector consumption data for the past five years was reviewed to create a baseline analysis, including water use trends. WaterWorth™ summary outputs included: system demand by month, sector demand, non-revenue water use, and per capita demand.

## **Data Integrity Memo**

A memo was produced to report on the data review and quality control processes. It outlined data sources, assumptions, and ratings on data quality. This document, and therefore the data underlying this plan, was reviewed and approved by City staff.

## **Workshop 1**

This workshop reviewed findings from Phase 1 work. Staff confirmed current and historic conservation measures and discussed possible future program directions.

## **Phase 2: Demand Management Planning**

During Phase 2, conservation measures were evaluated to discern the best value for the City. Highly-ranked measures were combined in various configurations to form program packages that were assessed based on the City's budget and implementation capacity.

## **Measures Assessment Tool**

Evaluation criteria for choosing certain conservation measures were selected and weighted in collaboration with City of Leduc staff. Criteria included environmental, financial, and community objectives. Econics' WaterWorth™ Measures Assessment Tool was then used to systematically evaluate 154 unique conservation measures, generate a score and rank them, resulting in a shortlist of potential new measures.

## **AWE Tracking Tool Model**

A combination of WaterWorth™ tools and the Alliance for Water Efficiency (AWE) Conservation Tracking Tool were used to forecast the effects of various conservation program scenarios on utility and customer costs and water savings. Different program approaches were compared, and the most cost-effective option was further refined.

## **Draft CEP Plan**

Based on background information from Phase 1 and forecasts established during Phase 2, a draft CEP plan was created. This plan was modeled after the framework recommended by AUMA. The draft was reviewed by municipal and provincial staff and feedback incorporated into finalization of the plan, which occurred during Phase 3.

## **Workshop 2**

This workshop reviewed the draft plan, refined selected measures and established hypothetical budgets for program scenarios (for Phase 3).

## **Phase 3: Implementation Planning**

The final steps determined how the recommended program will be put into action and completed necessary approval processes. Roles and responsibilities, schedules, and a performance management framework were determined.

## **Finalize CEP Plan; Develop Performance Management Framework; Close Out Project**

Organizational capacity, roles and responsibilities, and project timing were evaluated. A step-by-step plan for implementing the selected measures from the chosen program scenario was developed. The draft CEP plan was also reviewed by City staff and other key stakeholders before being finalized and taken to City Council for approval.



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