

DISTRICT OF LILLOOET

Water Conservation Strategy

2015-2025

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FINAL



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Glossary and Acronyms

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

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 District.

CII: Refers to all Commercial, Industrial and Institutional (CII) customers that use water in their operations, either as a production input or for domestic-like purposes.

Conservation Measure: A tool used by the District of Lillooet 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).

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.

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. 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 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).

Produced Water: The total volume of water treated by the District of Lillooet, including all water that is consumed by users (revenue water) and non-revenue water.

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.

Executive Summary

Water is a valuable resource that should be used wisely. By working together to use water as efficiently as possible in municipal operations, in private dwellings, and at commercial operations, the District of Lillooet can ensure that supplies are sustainable into the future.

Benefits of Conservation

Promoting efficiency will bring a number of social, ecological and economic benefits to the District. These include saving energy and money on treatment and distribution, upholding grant commitments associated with recent infrastructure projects, and enhancing the District's stewardship of our shared natural environment. Water conservation will not only improve our quality of life today, but will also leave a desirable place to live for future generations.

Lillooet's Consumption Patterns

Since 2006, the District's population has been relatively constant at just over 2,300 people. It is expected that this may grow modestly in the coming years, by 0.5% each year. Even though the amount of water treated by the District between 2002 and 2013 decreased by 3.8% each year on average, demand has increased somewhat in recent years. This is contrary to what is observed in most Canadian communities and can be taken as a sign that it is time to renew our commitment to conservation.

In the summer, water use spikes significantly, by up to three times the average daily demand. This is due primarily to an increase in lawn and garden irrigation. High consumption on hot days places significant pressure on the District's infrastructure and could result in diminished water quality. Reducing summer demand is a key focus in this strategy.

In 2013, residents of Lillooet used 57% of all water treated by the District. On average, this amounts to 686 liters per person each day (Lcd), which is high compared with other communities. Although there are reasons for this - Lillooet is the hottest place in the country and meters have only recently been introduced - there are still opportunities to enhance efficiency.

Commercial, industrial and institutional customers consumed about 11% of treated water. Customers in this category include schools, hotels, retail stores, office buildings, restaurants, hospitals, gas stations, and malls, among others. An estimated 5% of the District's water is delivered to T'it'q'et First Nation.

The remaining 27% of water the District treats is attributed to non-revenue water (NRW).¹ This is also relatively high compared with other communities. There may be legitimate uses of NRW. However, before conclusions can be drawn the individual components of NRW must be identified and quantified. This is also a focus of this strategy.

¹ NRW is water that has been treated and pumped through the distribution system, but is generally not billed and therefore does not contribute to utility revenues. It can include "real losses" such as leaks, overflows, flow tests and fire hydrant testing, or "apparent losses" from errors in meter reading and data handling or other factors.

2015-2025 Conservation Program

The District of Lillooet's vision is to continuously supply safe drinking water to the residents and businesses of Lillooet. In support of this, the following water use targets have been set:

- reduce total residential consumption to 520 litres per capita per day (Lcd) by 2020;
- reach a total residential Lcd of 450 by 2025;
- reduce the amount of water treated by the District each year by 5% of the baseline amount until 2020; and,
- after 2020, reduce the amount of water produced by 2% of the baseline each year.

To achieve these targets, the District will implement a water conservation program comprised of measures that have been proven to achieve results in jurisdictions throughout the province and across the country. These measures can be grouped into four themes:

1. **Outdoor Water Use:** enhance the effectiveness of the existing outdoor watering bylaw primarily through education and outreach, but also enforcement as required.
2. **Water Use Accounting:** enhance understanding of where water ends up throughout the District, including identifying individual components of NRW and controlling them as appropriate.
3. **Municipal Leadership:** lead the way toward sustainability by ensuring municipal facilities are water-efficient.
4. **Residential Water Use Program:** raise awareness of the importance of water conservation, assist residents in reducing their use, and provide a financial incentive for conservation.

Implementation Plan

Implementation will require commitment from staff across all departments at the District, as well as from the residents and businesses of Lillooet. Progress will be reported to Council annually. As well, the plan will be reviewed and updated following five years, half way through the implementation period.

What is documented in this plan is the beginning, not the end, of Lillooet's journey to improved water efficiency. With a strong focus on outdoor water use, municipal and utility operations, and encouraging residential conservation, the District is laying a solid foundation to implement more advanced measures in the future.

1. Introduction

Water is a valuable resource that should be used wisely. It is integral to every aspect of our community. It is used for domestic purposes, such as drinking, cooking, bathing and gardening. It is a requirement for economic pursuits that range from food preparation, to sanitation, to industrial processes, among others. And it is used in community protection and enhancement for activities such as firefighting and irrigation of public green spaces.

As such, the District of Lillooet is committed to providing residents and businesses with sufficient and high quality supplies. By working together to use water as efficiently as possible at municipal facilities, in private dwellings, and at commercial operations, the community can ensure that our water resources are sustainable into the future.

In 2014, the District contracted Econics, a Canadian leader in municipal sustainability planning, to assist with development of this *Water Conservation Strategy*.

The purpose of this document is to put forward a plan to improve the efficiency of water use in the District of Lillooet. 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. Development of this plan followed the process recommended by the provincial *BC Water Conservation Guide* (2013).

This document contains four main sections:

- Section 2 briefly summarizes the benefits of pursuing water conservation;
- Section 3 describes consumption patterns and trends in the District;
- Section 4 describes water use targets and the new program for the next ten years, from 2015-2025; and,
- Section 5 contains an implementation plan.

2. Benefits of Conservation

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

Table 1: Benefits of Water Conservation

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 stormwater attenuation during heavy rainfall events
	Enhanced environmental flows for streams, fish and aquatic ecosystems
	Reduced or avoided impacts from construction of new infrastructure
Financial Benefits	Reduced operations and maintenance costs
	Cost savings for the District and for residents from reduced energy use with less water pumping and heating
	Adoption of best practices improves the chances of senior government funding and other grants
	Deferred or avoided capital investment in new major infrastructure
	Reduced maximum day demand can lead to system infrastructure downsizing or deferrals
Community Benefits	Enhanced resilience to prolonged drought and a changing climate
	Stimulation of investment and innovation
	More water retained in reservoirs for firefighting and other emergency needs
	Enhanced aquatic recreation opportunities
	Promotion of a stewardship ethic within the community
Policy and Legislative Benefits	Supports objectives in the District's <i>Official Community Plan</i>
	Contributes to meeting obligations under the Province's <i>Water Act</i> , <i>Environmental Management Act</i> , and <i>Municipal Wastewater Regulation</i>
	Supports the goals put forth in the Province's water plan, <i>Living Water Smart</i>
	Supports the federal Council of the Federation's <i>Water Charter</i>

For the District of Lillooet, benefits that emerge as particularly important include:

◆ **Energy savings and avoided greenhouse gas emissions**

Using water more efficiently can conserve energy and therefore avoid greenhouse gas emissions in a number of ways. At a community level, the District will treat and pump less water through its distribution network. Savings can also result from reductions in the embedded energy associated with manufacturing and shipping for water and wastewater treatment products. At an individual scale, homes and businesses will heat less water for uses such as showering and clothes washing. This supports the District's direction laid out in the Official Community Plan to address energy and emissions management (DoL, 2007, p. 10-7).

◆ **Cost savings from reduced energy use**

The newly-constructed Seton River intake requires more energy to pump water from the source to residents and businesses in Lillooet compared with the old gravity-fed system. Conservation results in less pumping, leading to reduced energy costs and financial savings for the utility, which can be passed on to customers.

◆ **Infrastructure grants encourage conservation**

In recent years, the District of Lillooet has invested significantly in water supply, treatment and distribution infrastructure. Financial assistance from senior levels of government has enabled much of this work to occur. Water conservation is included as a funding condition and the District is committed to fulfilling this requirement.

◆ **Reduced water withdrawals from the environment**

Conservation efforts may result in less water being withdrawn for use, which means that more can be left in the river. Although environmental assessment studies related to construction of the Seton River intake found negligible effects related to pumping by the District, using resources more efficiently is always a desirable objective.

◆ **More accurate water use accounting**

Conservation measures often involve improved tracking of how much water is treated, as well as the amount consumed by residents and businesses. They may also target improved management of real losses throughout the network. Ensuring services are as effective and efficient as possible keeps costs low for everyone. This begins with understanding how water is used throughout our community.

◆ **Improved drinking water quality**

Although it is expected that the Seton River source will meet demands the majority of the time, the capacity of the new treatment system will be tested during the summer months when water use is the highest. Supplementary supply options are available but produce a lower quality of water (DoL, 2013 and 2011). Conservation measures could reduce or eliminate the need to rely upon these alternative sources.

◆ **Promotion of a stewardship ethic**

Stewardship is the responsibility for environmental quality shared by all those whose actions affect the environment. Using water efficiently is one of the ways citizens can directly contribute to reducing their ecological footprint and make a difference in the places where they live and work. The cumulative impacts of individual actions can be great. Water use in Lillooet is high by provincial and Canadian standards, which presents an opportunity for everyone to do their part and to ensure supplies are sustainable into the future.

3. Community Consumption Patterns

This section describes how much water the District treats and how it is used throughout the community. While patterns can be influenced by changes to how many people live in the District, Lillooet has experienced a stable population of just over 2,300 residents since 2006. As such, historic trends can be attributed to changes in water use practices throughout the community. In the future, population is projected to grow by 0.5% each year (DoL staff, 2014).

With the introduction of meters, it is only recently that individuals' consumption can be quantified. As such, the values presented in this report are based on limited data and will be refined over time. However, they can be considered a baseline for planning purposes.

3.1 Community Consumption

From 2002 to 2013, the amount of water treated decreased each year, on average, by 3.8% (see Figure 1). The large decline between 2008 and 2009 is explained by the District's new reservoir, which significantly reduced onsite leakage. When only the years since reservoir replacement are considered, community consumption has actually increased by 2.1% each year, on average. This trend is contrary to the experience of many other Canadian communities, which are typically seeing a decline in overall demand. Declining consumption in most places is due to ongoing installation of new, more efficient appliances and fixtures in homes and businesses, as well as behaviour changes as awareness of water conservation grows.

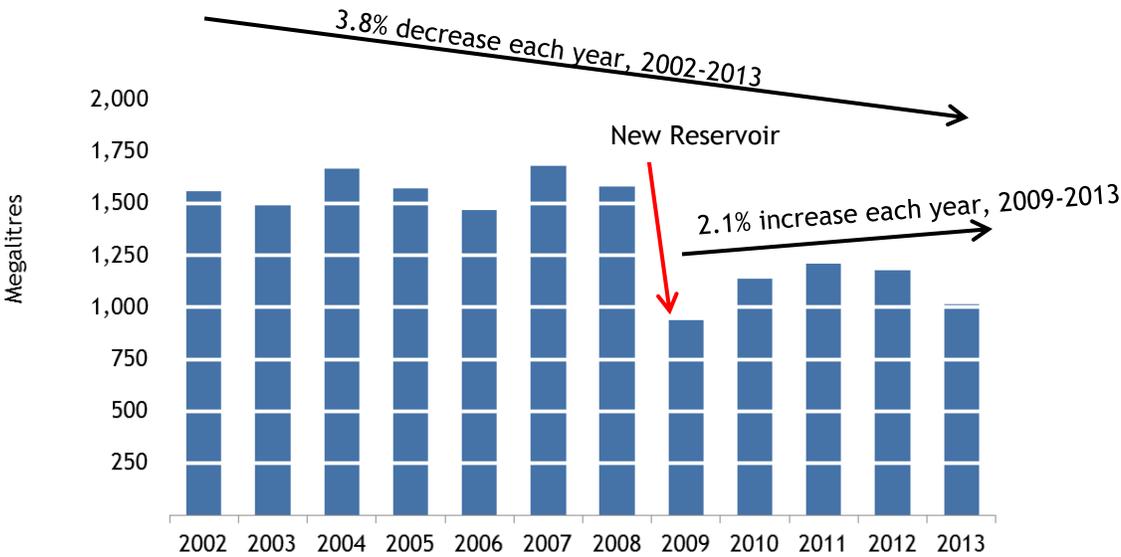


Figure 1: Water Treated by the District Annually (2002-2013)

Figure 2 shows that, as expected, community water demand increases significantly during the summer. This indicates that outdoor irrigation of lawns and gardens continues to be a major contributor to total demand.

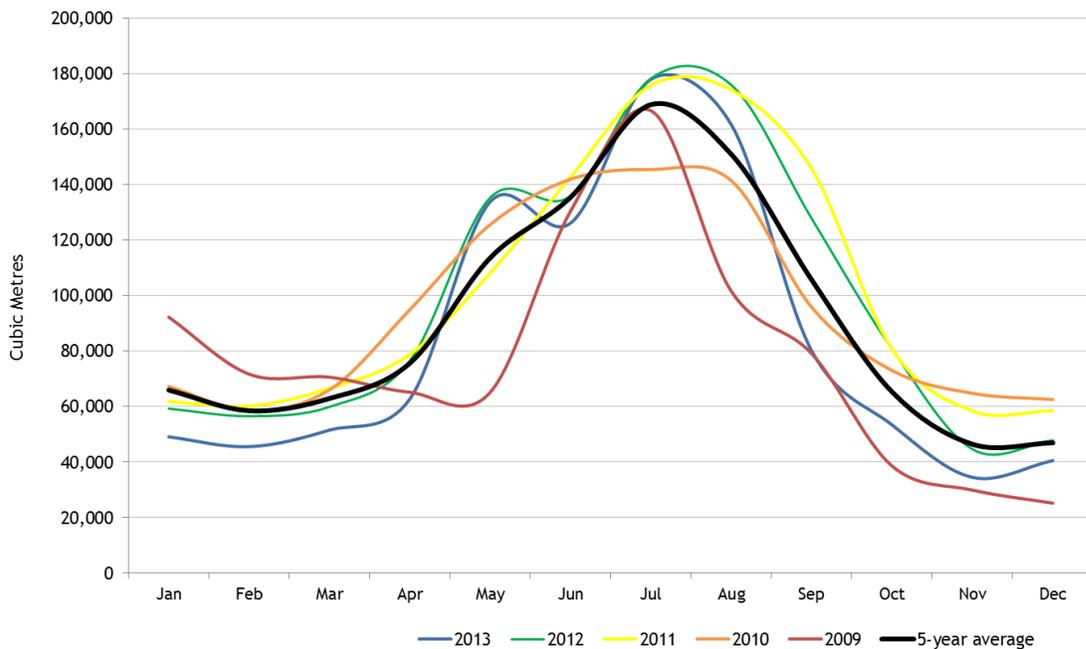


Figure 2: Average Monthly Water Withdrawals (2009-2013)

The extent to which water use increases during the summer is often measured by the peaking factor, which compares use on the day that it was highest with average consumption throughout the year. Figure 3 shows peak and average day demand per person in litres per capita (Lcd) for the District.²

In Lillooet, peak demand is 2.6 to 2.9 times the average, which means that the entire community is drawing approximately 8 ML on the peak day. This significantly stresses the capacity of the District’s infrastructure and costs the community money to treat and distribute all of the water. It also threatens Lillooet’s resilience to drought. If an arid period is prolonged, availability may become a concern. Finally, the new treatment facility is built to handle a maximum capacity of 6 ML per day. Although supplementary supplies are available, their water is of lower quality. As such, it is in everyone’s interest to conserve, particularly on hot and dry summer days.

² Due to data quality constraints, only two years’ worth of data are provided. Although multiple years of data is required to determine whether a trend exists, the recent relationship between peak and average day demand is clear.

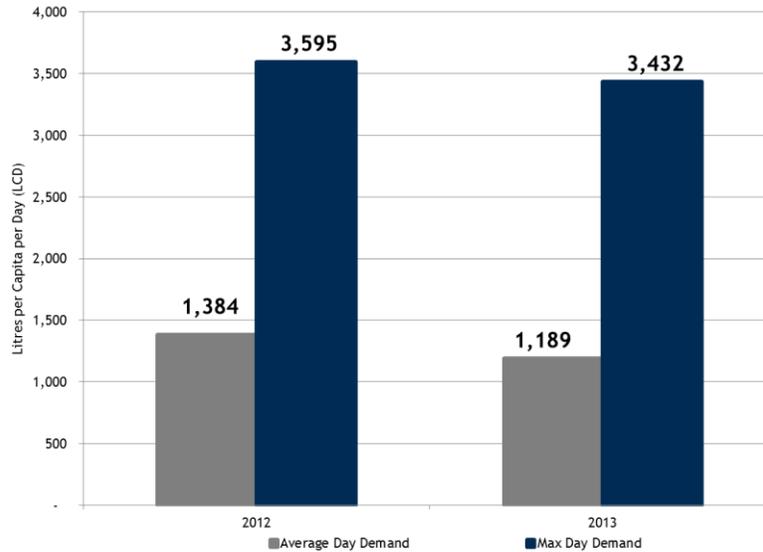


Figure 3: System Peak Day Demand and Average Day Demand (2012-2013)

3.2 Commercial, Industrial and Institutional Water Use

Customers in this category include schools, hotels, retail stores, office buildings, restaurants, hospitals and care facilities, gas stations, and malls, among others.

In Lillooet, there were 124 commercial, industrial and institutional (CII) customers in 2013, collectively consuming 104,979 cubic metres (m³) that year. This equates to 11% of the total water produced. Overall, average consumption was 847 m³ per account, although use ranged from 0 m³ to 5,626 m³ in 2013.

3.3 Residential Water Use

The residential sector includes single family and multi-family dwellings. Data from the District's new meter program allows the amount of water used by this sector to be quantified. In Lillooet, there were 829 residential accounts in 2013, collectively consuming approximately 570,000 m³. This amounts to 57% of all the water produced.

When this amount is divided by the number of people who receive water services from the District, it is estimated that per capita total residential consumption is 686 litres per day (Lcd).³ Typically, demand is greater than average in single-family (SF) homes and less in multi-family (MF) residences. This is mostly due to water use outdoors for lawn and garden irrigation. In Lillooet, it is estimated that SF consumption is closer to 725 Lcd while MF use is nearer 448 Lcd.

Figure 4 shows that total residential per capita consumption in Lillooet is above the Canadian and provincial averages, and is also higher than the average for small communities with a population between 2,001 and 5,000. There are many good reasons for this. Typically, water use is higher in unmetered communities and the 2013 estimate for Lillooet reflects consumption during the transition to universal metering. As well, Lillooet is one of the hottest places in the country and experiences extremely dry summers with average precipitation only

³ The serviced population is estimated to be 2,277 in 2013.

322.5 mm (Environment Canada, 2014). However, even after these facts are considered, use remains high and there is an opportunity for improvement.

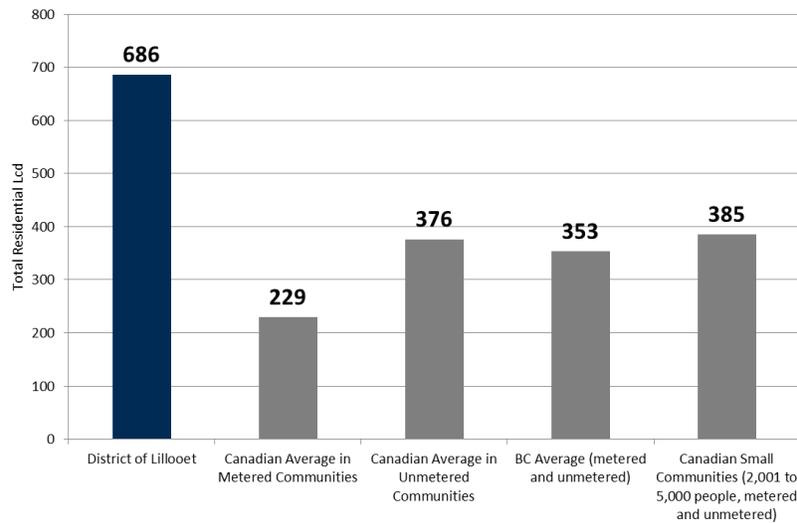


Figure 4: Average Residential Daily Per Capita Water Use⁴

3.4 Non-Revenue Water

Non-revenue water (NRW) is water that has been treated and pumped through the distribution system, but is generally not billed and therefore does not contribute to utility revenues.⁵ It can include “real losses” such as leaks, overflows, flow tests and fire hydrant testing, or “apparent losses” from errors in meter reading and data handling or other factors.

For the District of Lillooet, the amount of NRW is estimated to be 27%. This is the difference between the total quantity of water treated by the District and the amount recorded by customer’s water meters in 2013. Since this is relatively high compared with other communities, a number of measures are planned for the future with the goal of improving understanding of NRW and minimizing real losses.

3.5 Estimated Breakdown of Community Water Demand

Based on the analysis provided above, Figure 5 illustrates an estimated breakdown of water use in the District of Lillooet for 2013. Metering has allowed consumption of the CII sector and the residential sector to be estimated. With additional years of data collection, confidence in these values will be enhanced.

⁴ Average consumption in Canadian metered and unmetered communities is from 2006 data as reported in Environment Canada, 2009. The average for British Columbia and small Canadian communities is from 2009 data as reported in Environment Canada, 2011.

⁵ It is recognized that calculating NRW as a percentage of total production is increasingly seen as an imperfect way to benchmark between utilities or to monitor changes over time. A preferable approach is to investigate individual contributors to NRW, quantify them as accurately as possible, and then calculate an Infrastructure Leakage Index (ILI) using International Water Association (IWA) methodology. However, such analysis was not part of the scope of this investigation.

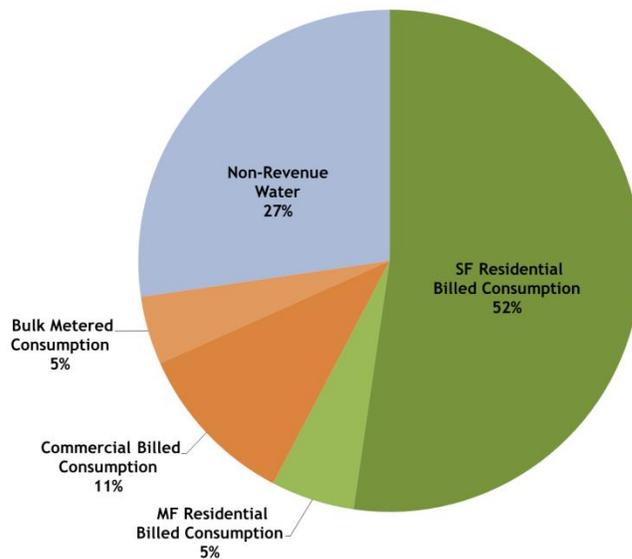


Figure 5: Estimated Sectoral Water Use Breakdown (2013)

3.6 Section Summary

The amount of water treated by the District of Lillooet has actually increased over the past few years in spite of a stable population. This is contrary to the trend seen in most communities across the country, which are experiencing a decline in total water use. In Lillooet, consumption is particularly high during the summer when demand on the peak day can exceed that of an average day by up to three times. This is due to an increase in lawn and garden irrigation and exacerbated by the fact that the climate of Lillooet is hot and dry.

With the introduction of meters, it is only recently that water use by customers can be quantified. The values presented in this report are based on limited data and will be refined over time. However, they can be considered a baseline for planning purposes.

Compared with other communities, the District of Lillooet consumes a large amount of water on a per capita basis. Due to the arid climate and the fact that meters have only recently been installed, this is not surprising. In fact, it is likely that the District's use will remain above average. However, there are still significant opportunities to use water more efficiently.

Non-revenue water is currently a major contributor to Lillooet's total water demand. Over the coming years, understanding and managing this will be a priority for the District.

4. 2015-2025 Conservation Program

4.1 Vision

The District of Lillooet’s vision is based on our commitment in the *Corporate Strategic Plan*:

“To continuously supply safe drinking water to the residents of Lillooet”

4.2 Water Use Targets

The District has set realistic water use targets based on current levels of consumption and implementation of this *Water Conservation Strategy*.

For the residential sector, the District aims to reduce consumption by 7% each year for the next three years and 3% per year thereafter. Much of this will occur naturally as people read their meters and become aware of how much they consume. Also, as new fixtures such as toilets, washing machines and showerheads replace older ones, water use will decline. As such, the District’s targets are (see Figure 6):

- to reduce total residential Lcd to 520 by 2020; and,
- to reach a total residential Lcd of 450 by 2025.

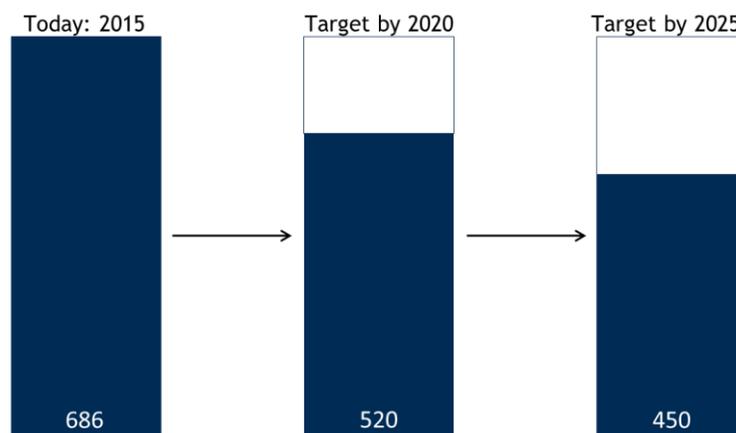


Figure 6: District of Lillooet Total Residential Water Use Target

The District has also set ambitious targets to reduce its non-revenue water (NRW). This will be measured as a reduction in produced water, which is the total amount that passes through the treatment facility. By 2025, our goal is to have NRW comprise less than 25% of produced water. To achieve this, the District will strive to meet the following targets:⁶

- to reduce the amount of water produced each year by 5% of the baseline amount⁷ until 2020; and,
- after 2020, to reduce the amount of produced water by 2% of the baseline each year.

⁶ These are targets for planning purposes. As part of this strategy, the District will calculate the level of leakage that makes economic sense to control. Following this exercise, these targets may be updated accordingly.

⁷ Baseline is 2013, which is the last full year of data available for this analysis.

4.3 Summary of Program Measures

This section describes the District of Lillooet’s approach to water conservation over the next 10 years, from 2015 to 2025. The new program places a strong emphasis on helping residents becoming more water efficient and positioning the District to make better-informed decisions around water management in the future. In many cases, the measures are simply enhancements of tools that are already in place. The actions in this strategy are organized around four themes:

1. **Outdoor Water Use:** enhance the effectiveness of the existing outdoor watering bylaw primarily through education and outreach, but also enforcement as required;
2. **Water Use Accounting:** enhance understanding of where water ends up throughout the District, including identifying individual components of NRW and controlling them as appropriate;
3. **Municipal Leadership:** lead the way toward sustainability by ensuring municipal facilities are water-efficient; and,
4. **Residential Water Use Program:** raise awareness of the importance of water conservation, assist residents in reducing their use, and provide a financial incentive for conservation.

Specific program measures are included in Table 2 below, which also indicates whether the item is new or part of the District’s current program that will be continued or enhanced. Each measure is elaborated upon in the following pages.

Table 2: Demand Management Program Overview, 2015-2025

Theme	Code	Program Measure	Status
#1 Outdoor Irrigation	T1.1	Seasonal outdoor watering bylaw	Continue
	T1.2	Advertise outdoor watering bylaw and distribute collateral to prompt participation	Enhance
	T1.3	Education and outreach around outdoor watering	Enhance
#2 Water Use Accounting	T2.1	Utility water audit	New
	T2.2	System leak detection program	Enhance
	T2.3	Investigate pressure management and other more advanced system loss control measures	New
#3 Municipal Leadership	T3.1	Landscaping best practices in parks and common areas	Enhance
	T3.2	Audits and retrofits at municipal facilities	New
#4 Residential Efficiency Program	T4.1	Drinking Water Week promotion	Continue
	T4.2	Printed education materials	Enhance
	T4.3	Water conservation website	Enhance
	T4.4	Household water use efficiency program	New
	T4.5	Volumetric rates for water services	New

4.4 Theme # 1: Outdoor Irrigation

Outdoor water use creates demands on the system that can be up to three times greater than average. Using less water on hot summer days ensures our supply has the highest quality possible and will also save individuals money on their bills.

The District currently has a seasonal outdoor watering bylaw in effect annually from 1 May to 30 September (see Text Box 1). This is to ensure the District has the capacity to meet the community’s demands and to protect our environment when flows are typically lower.

TEXT BOX 1: Summary of District of Lillooet’s Seasonal Outdoor Watering Bylaw

Stage 1 allows odd-numbered civic addresses to irrigate on odd-numbered calendar days and even addresses on even days. Hose-supplied sprinklers can be used between 8 p.m. and 11 p.m. and automated systems can operate between midnight and 4 a.m. As the duration of a drought becomes longer, permitted uses may be restricted.

Each year the District announces that the bylaw is coming into effect with a public notice that is posted on the District’s main webpage and in the local paper. These channels will continue to be used to generate awareness that the seasonal bylaw is in effect.

To help residents and businesses remember to reduce their water use during the summer, collateral that contains the watering schedule will be created. Examples of collateral might include fridge magnets, hose tap hangers and rack cards. As well, a fact sheet or brochure about water-efficient care for lawns and gardens will be provided.

Staff may also travel throughout the District during the summer to distribute these items and engage with residents one-on-one. They will be trained in water conservation and will primarily focus on supporting residents in modifying their irrigation practices. Through in-person interactions, general information can be tailored to individuals’ unique circumstances.

Table 3 summarizes the core actions under this theme. Table 4 describes the expected outcomes and monitoring metrics.

Table 3: Summary of Key Actions under Theme #1: Outdoor Irrigation

Code	Program Measure	Status
T1.1	Seasonal outdoor watering bylaw	Continue
T1.2	Advertise seasonal outdoor watering bylaw and distribute collateral to prompt participation	Enhance
T1.3	Education and outreach around outdoor watering	Enhance

Table 4: Outdoor Irrigation Outcomes & Indicators

Outcomes	Indicators	Metrics	Methods
Sustainable reductions in summer water use are achieved.	Peaking factor reduction	Maximum Day Demand / Average Day Demand	District staff to calculate
	High levels of compliance with the outdoor watering bylaw	# of outdoor watering bylaw warnings issued	District staff to track
	Level of engagement with the enhanced education program	# of conversations with residents	

4.5 Theme #2: Improve Water Use Accounting

To effectively manage water it is important to know how and where it is used throughout the District. The recent metering project is a large step towards improving accounting of the resource. However, in Lillooet non-revenue water (NRW) accounts for a major portion of the water that is treated. As mentioned above, there are many components of NRW. Some are legitimate uses, such as main flushing, fire hydrant testing, and irrigation of public parks. Others are sources of waste, such as easily repairable leaks and overflows. The District strives to use water as efficiently as possible and is committed to identifying and reducing, as appropriate, these components.

Management of NRW is often one of the most cost-effective conservation measures available. The District already has a number of pressure reducing valve stations across the network, which have the added benefit of decreasing system loss. As well, there is a program in place to ensure that leaks are identified and repaired in a timely manner.

As part of this strategy, the District will conduct a utility water audit. This is a robust process that breaks down the components of NRW and develops a program for reduction. It also includes a calculation of an *Infrastructure Leakage Index* and a determination of the costs and benefits of controlling NRW. The District will use the International Water Association or American Water Works Association methodologies (see, for example, AWWA, 2009), which are considered to be industry best practice.

In the future, the leak detection program will be enhanced and informed by the results of this process. The District will also investigate opportunities to control system loss through pressure management and other advanced measures. By conducting an audit, priority areas for action will be identified. These will be implemented as resources become available and will be the key mechanisms to achieve the target of consistently reducing the amount of water produced by the District.

Table 5, below, summarizes the actions under this theme. Expected outcomes and monitoring metrics are described in Table 6.

Table 5: Summary of Key Actions under Theme #2: Improve Water Use Accounting

Code	Program Measure	Status
T2.1	Utility water audit	New
T2.2	System leak detection program	Enhance
T2.3	Investigate pressure management and other more advanced system loss control measures	New

Table 6: Water Use Accounting Outcomes & Indicators

Outcomes	Indicators	Metrics	Methods
The District of Lillooet has improved information on NRW and control of the level of losses currently occurring in the network. This leads to enhanced credibility among community members.	Infrastructure Leakage Index	ILI	Utility water audit
	Volume of water losses (real and apparent)	m ³ /service connection/year	District staff to calculate
		# of leaks on private property repaired	
Volume of NRW	% of system input volume		

4.6 Theme #3: Municipal Leadership

The District is committed to ensuring water is used as efficiently as possible at municipal facilities and in public spaces. It will model conservation practices that could also be implemented by residents and businesses throughout the community.

There are already a number of excellent examples of efficiency in place that will be continued as part of this strategy. For example, the District endeavours to incorporate conservation into its construction and renovation projects. This not only includes using high-efficiency fixtures and fittings but also minimizing onsite consumption throughout the entire process.

As well, automatic irrigation systems on public property are set to irrigate based on weather and soil conditions. These systems are regularly maintained to optimize the settings and fix any leaks. In the future, the District will review its landscaping choices to ensure that public spaces exemplify water efficient design. This includes choosing native or drought-tolerant vegetation, considering landscape characteristics when planning a garden, and watering based on plant needs.

The District will also undertake audits and retrofits at its facilities, including:

- Lillooet City Hall;
- District of Lillooet Recreation, Education, and Cultural Centre;
- Lillooet Hospital and Health Centre;
- Lillooet Museum and Visitor Centre; and,
- Lillooet Fire Hall.

Auditing is the physical assessment of all water usage in a facility. It includes gathering information on fixtures (e.g., toilets, sinks, faucets, showers, water-cooled equipment, air conditioning units, etc.) and determining possible water savings. Next, a cost and benefit analysis is conducted and replacements are prioritized based on the highest return on investment.

Below, Table 7 summarizes the actions under this theme and Table 8 outlines expected outcomes and monitoring metrics.

Table 7: Summary of Key Actions under Theme #3: Municipal Leadership

Code	Program Measure	Status
T3.1	Landscaping best practices in parks and common areas	Enhance
T3.2	Audits and retrofits at municipal facilities	New

Table 8: Municipal Leadership Outcomes & Indicators

Outcomes	Indicators	Metrics	Methods
The District of Lillooet exemplifies sustainable water use actions.	# of inefficient fixtures and fittings remaining in municipal buildings	# of fixtures retrofitted	District staff to monitor
		# of fixtures remaining	

4.7 Theme #4: Residential Efficiency Program

Water consumption in Lillooet has actually increased over the past few years. The District intends to offer additional educational materials and incentives to residents with the goal of encouraging everyone to use water as efficiently as possible.

These measures will build on the District's current initiatives, such as conservation information in the monthly newsletter and billing inserts mailed directly to customers, as well as the provincial BC Building Code that requires high-efficiency fixtures in new construction (see Text Box 2).

TEXT BOX 2: Fixture Efficiency Requirements in the BC Building Code

Beginning in October 2011, the BC Building Code required 4.8 litres per flush (Lpf) toilets or 4.1/6 Lpf dual-flush toilets in all new residential construction and renovations. For the CII sector, the toilet efficiency requirement is 6 Lpf and 1.9 Lpf for urinals. These changes promise to deliver water savings to the community at very low cost.

The District will also continue to set up a booth at the Farmers' Market during Drinking Water Week in support of BC Water and Wastewater Association (BCWWA). Each year BCWWA provides handouts related to conservation and runs a Community Water Challenge, which encourages residents to make a personal pledge to reduce their consumption.

In the future, additional education materials will be created. Specifically, the following items will be developed:

- a. A general brochure about conservation and consumption in Lillooet. These will describe water sources, District services, how to identify and repair leaks on private property, and conservation tips. This handout will also encourage residents to adopt efficient indoor fixtures.
- b. A factsheet about water-wise gardening in the District. This will be developed by a local horticulturalist and contain gardening advice, information on local plants, and xeriscaping best practices for the region.
- c. A handout that describes the seasonal outdoor watering bylaw. This will be a "bylaw at-a-glance" document with everything you need to know to be in compliance and where to find additional information; and,
- d. A fridge magnet with the summer watering schedule to remind residents of the appropriate time to irrigate.

These materials will be updated every few years to address different aspects of conservation and community priorities as they evolve.

The District also plans to update its website. Currently there is a "Water Information" page that includes: bylaws, notices and bylaws; plans; turbidity ratings and weekly water quality test results; and basic information on water testing and supply. There are also links to provincial and federal water conservation resources.

The conservation portion of the website will also be updated. It will be separated and enhanced to provide easily-accessible tips on reducing consumption, as well as progress

towards the District’s targets. To begin with, the following categories will be included: indoor efficiency, high-efficiency toilets, outdoor watering, and residential leak detection and repair. Other topics may be added as community knowledge and interest grows.

As well, the District will implement an interactive household water use efficiency program that offers residents advice specific to their situation. It will contain the following components:

- a. In-person home visits: interested residents can schedule a visit from a staff person who is trained in conservation to discuss indoor and outdoor water use at their home. During the visit, water-efficient models of common household fixtures such as showerheads and faucet aerators will be installed. As well, toilet dye tabs will be used to identify leaks.
- b. Meter testing (if required): if there is uncertainty around whether a meter is accurately recording consumption, the staff member will perform onsite testing to verify the accuracy of the equipment;
- c. Printed materials: staff will distribute the printed materials described above during their home visit; and,

Finally, to encourage conservation and participation in the program measures described above, volumetric rates will be implemented. Since it is fairer that those who use less water pay less, the District will introduce a portion of the utility bill that is based on consumption. This also allows individuals to take control of their own costs.

Residents and businesses will be given a full year of personal consumption information before this occurs, which provides an opportunity to invest in high-efficiency fixtures and modify water use practices. During this time period, the District will issue mock bills that describe charges under the volumetric rate structure to make sure that there are no surprises when implementation occurs.

The scope of this theme demonstrates the District’s commitment to helping residents use water as wisely as possible, which will also save them money on their utility bills.

Key actions are summarized in Table 9 and expected outcomes and metrics are described in Table 10.

Table 9: Summary of Key Actions under Theme #4: Residential Efficiency Program

Code	Program Measure	Status
T4.1	Drinking Water Week promotion	Continue
T4.2	Printed education materials	Enhance
T4.3	Water conservation website	Enhance
T4.4	Household water use efficiency program	New
T4.5	Volumetric rates for water services	New

Table 10: Residential Efficiency Program Outcomes & Indicators

Outcomes	Indicators	Metrics	Methods
Residents are engaged with the District’s conservation program.	Interaction with the conservation portion of the District’s website	# of hits	District staff to track and calculate
	Inquiries into the conservation program	# of phone calls	
	Participation in the household water use efficiency program	# of kits	
		# of home visits	
Total residential water use	Average TR Lcd		

This 2015-2025 conservation program equips residents with the knowledge, tools, and incentives required to sustainably reduce consumption without adversely impacting well-being. It also positions the District to lead the way to water efficiency by including measures that will identify opportunities for improvement at the utility and at public facilities.

5. Implementation Plan

This section describes how the water conservation program will be implemented. It also provides a framework for monitoring, evaluation and continuous improvement.

5.1 Timing and Responsibilities

Table 11 associates the list of actions with the division responsible for implementation. It also indicates the anticipated start date and whether the measure is new, enhanced or continuing. Additional schedule details can be found in Table 11.

Table 11: Program Responsibilities

Program Measure		Status	Responsible Division	Sector
Theme #1: Outdoor Irrigation				
T1.1	Seasonal outdoor watering bylaw	Continue	Planning	All
T1.2	Advertise seasonal outdoor watering bylaw and distribute collateral to prompt participation	Enhance	Communications / Public Works	All
T1.3	Education and outreach around outdoor watering	Enhance	Communications / Public Works	Residential
Theme #2: Improve Water Use Accounting				
T2.1	Utility water audit	New	Public Works	Municipal
T2.2	System leak detection program	Enhance	Public Works	Municipal
T2.3	Investigate pressure management and other more advanced system loss control measures	New	Public Works	Municipal
Theme #3: Municipal Leadership				
T3.1	Landscaping best practices in parks and common areas	Enhance	Public Works	Municipal
T3.2	Audits and retrofits at municipal facilities	New	Public Works	Municipal
Theme #4: Residential Efficiency Program				
T4.1	Drinking Water Week promotion	Continue	Communications / Public Works	All
T4.2	Printed education materials	Enhance	Communications	Residential
T4.3	Water conservation website	Enhance	Communications	Residential
T4.4	Household water use efficiency program	New	Public Works	Residential
T4.5	Volumetric rates for water services	New	Finance	All

5.2 Implementation Schedule

A summary schedule for implementation of the District's conservation program is outlined in Table 12 below. As requirements are more clearly defined this schedule may be modified.

In the short-term, efforts in 2015 will concentrate on developing printed materials to support residential water use efficiency. The household program will also kickoff and the District will issue mock volumetric pricing. 2016 will focus on audits of municipal facilities and the water utility. Volumetric rates for all customers will also take effect.

Table 12: Implementation Schedule (Start Dates)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
#1: Outdoor Irrigation										
Seasonal outdoor watering bylaw										
Advertise seasonal outdoor watering bylaw and distribute collateral to prompt participation										
Education and outreach around outdoor watering										
#2: Improve Water Use Accounting										
Utility water audit										
System leak detection program										
Investigate pressure management and other more advanced system loss control measures										
#3: Municipal Leadership										
Landscaping best practices in parks and common areas										
Audits and retrofits at municipal facilities										
#4: Residential Efficiency Program										
Drinking Water Week promotion										
Printed education materials										
Water conservation website										
Household water efficiency program										
Volumetric rates for water services										
Monitoring & Evaluation										
Evaluate indicators and performance metrics										
Revise Water Conservation Strategy										

Legend

-  Measure that is beginning or has a defined timeframe
-  Measure that is continuous

5.3 Monitoring and Evaluation

Expected outcomes and indicators from each program theme are compiled in Table 13. An overall outcome has also been added. Performance will primarily be measured through staff tracking.

Table 13: Outcomes, Indicators and Metrics

Theme	Outcomes	Indicators	Metrics	Methods
1	Sustainable reductions in summer water use are achieved.	Peaking factor reduction	Maximum Day Demand / Average Day Demand	District staff to track
		High levels of compliance with the outdoor watering bylaw	# of watering bylaw warnings issued	District staff to track
		Level of engagement with the enhanced education program	# of conversations with residents	
2	The District of Lillooet has improved information on NRW and control of the level of losses currently occurring in the network. This leads to enhanced credibility among community members.	Infrastructure Leakage Index	ILI	Utility water audit
		Volume of water losses (real and apparent)	m ³ /service connection/year	District staff to track
			# of leaks on private property repaired	
Volume of NRW	% of system input volume			
3	The District of Lillooet exemplifies sustainable water use actions.	# of inefficient fixtures and fittings remaining in municipal buildings	# of fixtures retrofitted	District staff to track
			# of fixtures remaining	
4	Residents are engaged with the District's conservation program.	Interaction with the conservation portion of the District's website	# of hits	District staff to track
		Inquiries into the conservation program	# of phone calls	
		Participation in the household water use efficiency program	# of kits	
		Total residential water use	Average TR Lcd	
Overall	The water conservation program provides good value to the District and to the community.	Change in residential per capita water use per program dollar invested	Lcd/\$	District staff to track

Progress on implementation of the measures described in this plan will be tracked. The status of indicators and progress towards water use targets will be reported to Council annually.

As well, this plan will be reviewed and updated after five years, half way through the implementation period. If required, targets and timelines may be adapted based on findings from this mid-term evaluation.

6. Conclusion

Through adoption of this plan the District of Lillooet is working towards its commitment to provide sustainable and safe water to the community today and into the future. The District will implement tried and tested conservation measures that have been proven to reduce consumption in communities throughout the province and across the country.

Residential water use in the District of Lillooet is currently higher than most similar communities, at 686 litres per person each day, and has been increasing in the past years. As such, practical milestones and targets to reduce consumption have been set as follows:

- reduce total residential Lcd to 520 by 2020;
- reach a total residential Lcd of 450 by 2025;
- reduce the amount of water produced each year by 5% of the baseline amount until 2020; and,
- after 2020, reduce the amount of produced water by 2% of the baseline each year.

These targets will be achieved through implementation of conservation measures that can be categorized into four themes:

- Theme #1: Outdoor irrigation;
- Theme #2: Improved water use accounting;
- Theme #3: Municipal leadership; and,
- Theme #4: Residential efficiency program.

Conserving water has many advantages for the District. Most importantly, it saves energy and money for treatment and distribution, it fulfills external infrastructure funding commitments, and it enhances the District's stewardship of our shared natural environment. Using water as efficiently as possible is the responsibility of each and every individual. Only if everyone does their part can these benefits can be enjoyed by the community.

This strategy is considered to be 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 10 years, staff will continue to explore up-and-coming areas of water efficiency. By 2025, the District of Lillooet will have solid data and be able to build on this foundational program to design new measures that address emerging issues of the next decade.

7. References

- American Water Works Association (2013). Water Conservation Program Operation and Management. Manual G480-13. Denver CO, January 2013.
- American Water Works Association (2009) Water Audits and Loss Control Programs. American Water Works Association Manual of Water Supply Practices M36. 3rd Ed. Denver CO.
- Council of the Federation (2010). Water Charter. August 2010.
- Government of British Columbia (2008). Living Water Smart: British Columbia's Water Plan, Victoria, BC.
- District of Lillooet (2007). Corporate Strategic Plan 2007-2017. January, 2007.
- District of Lillooet (2008). Master Water Plan. Prepared by TRUE Consulting Group. April, 2008.
- District of Lillooet (2009). Official Community Plan: The Path to the Future. Bylaw No. 320 - Schedule A. February, 2009.
- District of Lillooet (2009b). Water Conservation Plan. Prepared by TRUE Consulting Group. March, 2009.
- District of Lillooet (2011). Water System Source Replacement: Detailed Project Description. Prepared by TRUE Consulting Group. February, 2011.
- District of Lillooet (2013). Water Source Replacement Project: Final Value Engineering Report. Prepared by TRUE Consulting Group and Value Management Consulting, Inc. November, 2013.
- Econics (2014). Baseline Usage Analysis. October, 2014.
- Environment Canada (2014). Canadian Climate Normals 1981-2010 Station Data. Accessed at http://climate.weather.gc.ca/climate_normals/results_1981_2010_e.html?stnID=960&lang=e&StationName=Lillooet&SearchType=Contains&stnNameSubmit=go&dCode=5&dispBack=1. Accessed on 9 December 2014.
- Government of British Columbia (2011). New Plumbing Fixture Requirements. Minister of Energy Mines and Natural Gas. Website. Accessed at <http://www.housing.gov.bc.ca/building/green/het/index.htm>. Accessed on 15 August 2014.
- Government of British Columbia, POLIS Project on Ecological Governance, and Okanagan Basin Water Board (2013). Water Conservation Guide for British Columbia, prepared by Belzile, J. with M. Martin, L. Edwards, G. Brown, L. Brandes, A. Warwick Sears, Victoria, December 2013.
- Maas, C. (2009). Greenhouse gas and energy co-benefits of water conservation. Accessed 19 September 2013 at: http://poliswaterproject.org/sites/default/files/maas_ghg_.pdf
- Ontario Water Works Association (2005). Water Efficiency Best Management Practices.
- PAGI (2008). Ontario Municipalities: An Electricity Profile. Accessed 15 September 2013 at: http://www.amo.on.ca/AM/Template.cfm?Section=Conservation_and_Demand_Management&Template=/CM/ContentDisplay.cfm&ContentID=150110