

Columbia Basin
Water
Smart



City of Fernie Water Smart Action Plan

A Water Conservation Strategy

November 2010



www.cbt.org/watersmart

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It is noted that this Water Smart Action Plan is intended to be a living document, continually revised and updated by the local government as their unique local context, data sets, targets, and implementation strategies are refined during the course of this 5 year initiative. Such changes are made by the local government and are not necessarily endorsed by the authors of the original document nor by CBT.

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Executive Summary

As a signatory to the Columbia Basin Water Smart Charter, the City of Fernie has set a target to reduce 2009 gross community water demands by up to 20 per cent by 2015. This target will contribute to Columbia Basin Trust's cumulative reduction target for all participating Water Smart communities of 20 per cent by 2015.

Fernie's 2009 baseline gross consumption was 4,053 ML. Therefore, a 20 per cent reduction from this baseline will be equal to an annual savings of as much as 810.6 ML, or 810,600,000 litres per year.

In order to achieve this reduction target, the City of Fernie will focus their water conservation efforts on the objectives outlined below. It is important to note that these objectives have been developed based on the best available data provided by the community. As the data changes or is refined through enhanced monitoring and analysis or the implementation of improved data gathering technologies, the Action Plan objectives may also need to be changed or refined accordingly.

Objective 1 - *Continue leak detection and repair program, along with installation of pressure reducing stations.* Specific actions recommended include night-time reservoir drawn down monitoring; acoustic leak detection; leak repair; and continuing installation of pressure reducing stations.

Objective 2 - *Implement a staged approach to introducing water meters to utility customers.* Specific recommendations for a phased approach to metering include: installation of meters on city facilities; bylaw amendments pertaining to new construction; initiation of a volunteer metering program; and an evaluation of potential for a universal metering program.

Objective 3 - *Revitalize public education program containing new messages regarding the importance of water conservation, and new approaches to target audiences.* Specific actions include face to face strategies to support residents to reduce peak outdoor water consumption, and to support commercial accommodation operators to reduce indoor water consumption. Additional recommendations focus on reduction of municipal outdoor water consumption.

PROLOGUE A: A Primer on Public Education for Water Conservation

Many communities in the Columbia Basin have implemented water conservation public education programs with varying degrees of success. While public education will raise awareness about the need for water conservation, increased awareness does not necessarily lead to action. This section outlines some basic public education/social marketing concepts fundamental to the development of a more results-oriented communications program.

Motivating Water Conservation

There are two kinds of water use: necessary and discretionary. Showers, cooking, cleaning, laundry and toilet flushing are examples of necessary water use. Car washing and lawn watering are examples of discretionary water use. Necessary water use tends to occur indoors, while discretionary water use tends to occur outdoors.

It is important to make this distinction when planning a public education program as the motivations and related messaging necessary to reduce indoor water use are different than the motivations and related messaging necessary to reduce outdoor water use.

Reducing necessary water use is best accomplished through plumbing retrofits: installing low flow showerheads, low flow toilets, or water efficiency washing machines. No behavior change is required; people continue to use water as they always did. It is the new plumbing fixture that reduces the water use.

Traditional media (advertisements, newsletters, brochures) can be effective in reducing necessary water use provided there is a strong “call to action,” such as a coupon or an offer to install a low flow showerhead at no charge.

Reducing discretionary water use requires behavior change, which is more difficult to accomplish. Behaviors are often tied to belief systems that can be deeply ingrained. Excessive discretionary water use may also be tied to lack of knowledge. For example, many people do not know how to correctly set automatic irrigation system timers.

Traditional media is not as effective in reducing discretionary water use. Brochures containing detailed, technical information are helpful, but one-on-one consultation and expert instruction is the most effective means to help people reduce outdoor water use.

Understanding Target Groups

Although “everybody” uses water, the messaging required to reduce water use can vary from person to person. Generally, women tend to respond better to environmentally themed or community based messages such as “water conservation is the right thing to do,” while men tend to respond better to technical advice from trusted experts or peers.

If the goal is to reduce peak demand due to residential lawn watering (a discretionary water use) it is important to know who is in control of the landscaping and the sprinkler system. Research in Kelowna indicates that, generally, women chose the type of plants for the landscaping while men operate and maintain the sprinkler system.

While each has some influence over the other, this demonstrates that public education designed to encourage Xeriscape gardening will require different messaging and a different target audience than education designed to increase sprinkler system efficiency.

This can create a challenge when developing public education materials, because there is a tendency to produce one brochure, or one series of advertisements to appeal to both target groups. Public education materials that attempt to do too much often end up accomplishing very little because of their lack of appeal to the various target groups.

Advertising vs. Social Marketing

Public education programs that rely solely on traditional advertising such as newspapers, brochures and newsletters are often ineffective. These kinds of programs require little expertise and are the easiest to develop and implement. But when they do not work as well as expected there is the risk that some might draw the conclusion that public education does not work at all.

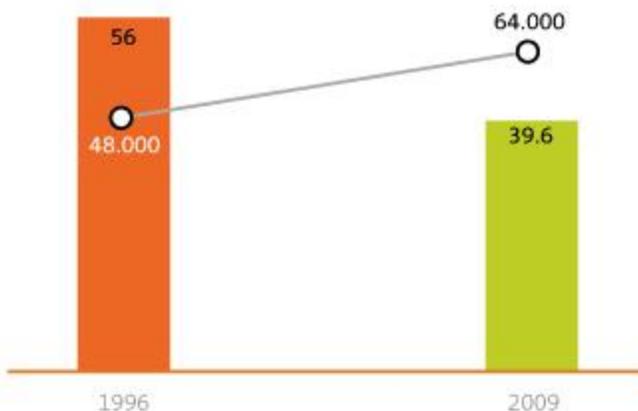
Social marketing is a time-proven method of changing behavior that goes beyond traditional advertising. It utilizes three different “motivators” to change an old, undesirable behavior to a new, desired behavior:

Financial Motivation: Make the old behaviour more expensive or the new behaviour less expensive. With water conservation, the obvious way to do this is through metering. Excessive water users pay more, while those who conserve are rewarded with lower costs. Another example is providing low flow showerheads at no cost to the homeowner.

Convenience Motivation: Make the old behaviour less convenient to engage in or the new behaviour easier to engage in. Studies from California show that when low flow showerheads are simply given away, almost 95 per cent of them are never installed; however when

Average Monthly Residential Water Use (per SFD) City of Kelowna

Consumption (m³) ○ Population



The effect water metering has had on average monthly residential water use in Kelowna, BC.

students are hired to go door-to-door and install them for the homeowner, almost 100 per cent of them are installed.

Social Motivation: Make the old behavior socially unacceptable or make the new behavior more socially acceptable. Getting a fine for not complying with watering restrictions is more of an embarrassment than it is a financial hardship. On the positive side, giving rewards and recognition to people who maintain Xeriscape gardens increases their social status, albeit in a small way.

The upsurge in environmental awareness and the “go green” movement over the last decade has made it less socially acceptable to be a water waster. Even though some people may not believe in climate change and may privately scoff at environmentalists, they may still start to engage in environmentally sustainable behaviors because they don’t want to be perceived as uncaring.

Successful social marketing programs use a combination of all three motivators, but a well-planned program using just two or even only one of the motivators can also be effective. The key is to select the right message and the right motivators for your community and remain consistent.

Water Metering and Public Education

As more communities in the Columbia Basin consider water metering (which is the number one way to reduce water use), more opportunities for public education arise. While water metering is almost universal in the United States and parts of Canada, British Columbia lags behind. It should come as no surprise that the cities in BC with the most successful water conservation programs are also metered.

There is an often unfounded perception that water meters are politically unpopular and that homeowners reject the idea of meters en masse. However, every year dozens of communities across Canada install water meters and switch to volume based pricing with little or no push-back from residents.

When contracting a company to supply and install meters, it is beneficial to choose one with experience in public education. A series of open houses prior to the installations allows homeowners to express their concerns and ask questions. The ideal time to provide information on water conservation is once the installations are underway and the installer is in the home. After the installations are finished a period of mock billing will give homeowners a chance to see how much water they use while continuing to pay the flat rate.

Mock billing can be the most effective way to reduce water consumption in a single sweep because it embraces all three social marketing motivators:

Financial: it allows homeowners to see how much water they actually use, and what it might cost;

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Convenience: it gives homeowners time to adjust their water use prior to volume based pricing; and

Social: if the mock bill shows the homeowner's water consumption compared to the average of the community they may be pleased to see that they use less water than the average, or shocked to see that they use more.

PROLOGUE B: Watering Restrictions

Watering restrictions, usually in the form of an odd/even sprinkling bylaw, are the most common method to control water use in the absence of water meters and a volume-based water rate. Even metered communities commonly implement some form of watering restrictions during summer months. It is, however, a misconception that odd/even sprinkling regulations are designed to reduce water use, or that they are an integral part of a water conservation program. Anecdotal evidence suggests that in some communities odd/even restrictions reduce water use while in others it actually increases water use. There is little independent, quantitative evidence about the subject.

Odd/Even, and other similar types of watering restrictions are usually implemented in communities where limited storage capacity is stressed by peak day demands. With odd/even, the daily peaks are lowered by spreading out water use more evenly throughout the week. Customers may water for longer periods on “their” day than they would otherwise (resulting in higher total water use) but the overall impact is lower daily demands on the system.

A drought management plan takes watering restrictions to the next level through a series of stages. Odd/Even might be considered “normal” or “Stage 1” where the main goal is to reduce peak day consumption. When drought is anticipated further stages are designed to reduce total water consumption.

There are four challenges associated with having watering restrictions as the primary tool for a water conservation program: peak hour; enforcement; public perception; and soil moisture retention.

Peak Hour:

Watering bylaws usually restrict water use to non-daylight hours. People without automatic irrigation systems tend to water in the evening around dusk. People with automatic irrigation systems tend to set them to run in early morning hours, just as the sun is coming up, at the same time when many people are waking up and getting ready for the day. This combination of increased indoor and outdoor water use time creates peak hour challenges.

Enforcement:

Enforcing a bylaw requires staff time and resources. Reporting bylaw infractions can pit neighbor against neighbor. Giving warnings or fines can create hostile feelings. Residents may also try to get around the bylaw by watering less visible areas on the “wrong” day. While most customers will voluntarily comply with watering restrictions, the small percentage of people who won’t can create public relations problems.

Public Perception:

Odd/even restrictions reinforce behavior that may not be water efficient. Residents feel forced or entitled to water every other day whether or not their landscape requires it. Also, when residents comply with watering restrictions they may believe they are doing their part to conserve water when in fact they aren't conserving water at all.

Soil moisture retention:

Soil moisture retention may be the most difficult challenge to overcome. Odd/even restrictions give no consideration to how much water a landscape actually needs, or how much water the soil can hold at any given time. In large pockets of the BC Interior the soil tends to be sand or glacial till. In other areas, heavy clay is present.

Conventional wisdom suggests that the best way to water is long and deep, allowing the soil to dry out between watering. This is only the case when the soil is of good quality with lots of organic material present. In areas where the soil is heavy with sand, gravel, or clay, it is more efficient to water for short periods on a daily basis, which is in direct conflict with odd/even restrictions.

Any decision on watering restrictions, widening or closing watering windows, and decreasing or increasing allowable watering times should take the four factors outlined above into consideration. Odd/even restrictions may work in theory, but on the ground, where the water consumption actually takes place, other alternatives may work better.

In conjunction with a comprehensive public communications plan for water conservation, watering restrictions may be considered as one part of an effective and comprehensive tool kit. If watering restrictions are used as a standalone tool, they may be ineffective at best, or lead to increased overall water consumption at worst.

1.0 Columbia Basin Water Smart Background and Basin Wide Objectives

Despite the apparent wealth of fresh water in the Columbia Basin, increasing human activities, population growth and climate change are placing pressure on this precious resource. CBT supports a wide variety of education and awareness initiatives to help Basin residents understand the interconnectedness of the supply, uses and demands of this invaluable natural resource.

Domestic water consumption is increasingly being identified as a critical issue for Basin communities and in order to deal with this issue, water conservation measures are needed. In response to this need, **Columbia Basin Water Smart** is a regional water conservation initiative that provides support to participating Regional Districts and Municipalities to assess their local water conservation needs, and then to plan for the most locally effective actions to reduce community wide water consumption.

The goal of Water Smart is to provide capacity and support to communities in the Canadian Columbia Basin to achieve community-specific water conservation targets that contribute to an overall 20 per cent reduction from total gross 2009 community water consumption in participating Columbia Basin Water Smart Communities by 2015.

As of October 2010, participating communities include:

Castlegar	Golden	Radium Hot Springs
Cranbrook	Kaslo	Rossland
Creston	Kimberley	Salmo
Elkford	Montrose	Slocan
Fernie	Nakusp	Sparwood
Fruitvale	Nelson	Trail
		Valemount

Regional District of East Kootenay – Edgewater

Regional District of Central Kootenay - Erickson

Each of these communities will determine their own local water conservation target that will contribute to the overall Basin-wide target.

Included in the definition of community water consumption for the purposes of this initiative is residential, municipal, institutional and commercial water consumption. Wherever possible, industrial and agricultural water consumption are excluded from the target. In some instances, however, it is not feasible to separate consumption by user group and local strategies for addressing these data gathering issues are being developed on a community specific basis.

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Demonstrating commitment to the Water Smart initiative at the political level, Mayors and Board Chairs from all participating communities have signed on to the Water Smart Charter (See Appendix “A”), and will work collaboratively with CBT and Basin communities to address water consumption at the local level.

In order to facilitate the achievement of both community specific and basin-wide targets, CBT will provide participating communities with the following resources:

Water Smart Match Funding up to \$10,000 in a one-third – two-third matching grant for implementation of actions identified in each community’s Water Smart Action Plan;

Water Smart Planning Team to help communities assess their water conservation priorities and develop effective Water Smart Action Plans to achieve their stated water conservation targets;

Water Smart Toolkit, development of a web-based water conservation tool kit for local governments, which will include basin-specific resources and tool for water conservation; and

Water Smart Network, which will support communities to effectively collaborate with and learn from each other and from leading water conservation experts.

For more detailed information on Columbia Basin Water Smart, please go to www.cbt.org/watersmart.

2.0 Community Vision and Water Conservation Objectives

2.1 Community Vision

The City of Fernie's Official Community Plan (Bylaw Number 1923, 2002) provides important context for the evolving water conservation program. This context emerges from the community's vision for the future, which states:

To work towards a sustainable population who will enjoy a quality of life that is planned and managed in a manner compatible with the surrounding natural environment. This quality of life will be based upon employment and social opportunities for all skill levels in all sectors, affordable housing, quality education, a convenient and efficient transportation network, enhanced cultural and heritage amenities, and optimal recreation opportunities.

The Plan also contains a section dealing specifically with water conservation (Section 12.8). This section references a water conservation strategy prepared for the City in 2000, whose purpose was threefold:

- To determine the reasons for the City of Fernie's high per capita water usage;
- To identify methods to reduce the use of water from Fairy Creek, the City's primary water source; and
- To optimize the capacity of existing City of Fernie water infrastructure.

Based upon these broad and specific references, it is evident that efficient water use is an important aspect of the community's vision.

2.2 Water Conservation Objectives

The City of Fernie's Official Community Plan (OCP) also sets out specific objectives regarding water conservation. These include:

- To conserve water recognizing the value of this precious commodity;
- To encourage water conservation measures that are designed to optimize the City of Fernie's existing investment in municipal water infrastructure.

The OCP goes on to articulate a number of specific water conservation policies to advance initiatives in the following areas:

- Developing a public education program;
- Undertaking leak detection program;
- Decommissioning the Ridgemont Reservoir (scheduled completion, Fall 2010);

- Requiring water meters and low flow plumbing fixtures in all new development;
- Encouraging Xeriscape (low water use) landscaping;
- Investigating alternative water sources for Fernie Golf and Country Club irrigation;
- Examining viability of and support for universal water metering.

In terms of a specific target, the City concurs with the Columbia Basin Trust's objective of a 20 per cent reduction in water demands by 2015.

3.0 Community Profile

3.1 Service Population and Demographics

The City of Fernie's permanent population is estimated at approximately 4,200 residents (2006 Census results). There are also many secondary homes in Fernie which are not occupied for portions of the year as they are held by non-resident property owners. It is estimated that there are about 900 such homes, which can accommodate a 'shadow population' estimated at 2,150 residents. On occasions where these homes are fully occupied, the total population of the City of Fernie would therefore swell to about 6,350. A 2009 Survey of Part-Time Fernie residents showed that a portion of this group is always visiting Fernie. It is therefore felt that the community's population (permanent plus part-time shadow) is never less than 4,700. In addition to non-resident property owners, Fernie has a significantly high proportion of commercial accommodation units.

The vast majority of properties within the City of Fernie rely on the municipal water system. Approximately 460 residents of West Fernie, adjacent to the City yet outside its boundaries, are also served by the City system. The service population of the system therefore ranges from about 5,160 to 6,810, depending upon the extent of non-resident property owners visiting the community.

Fernie's population profile is characterized by larger proportions of people in the young adult (ages 15-24) and working group (ages 25-64) categories than the BC average. Furthermore, there are fewer people in the child (ages 0-14) and older (age 65+) age groups. Fernie enjoys higher employment rates than the BC average. In addition, family wages derived through Fernie's major industries – service (accommodations and food), mining and retail – are also higher than the BC average.

3.2 Seasonal Population Variability

As noted above in Section 3.1, there is considerable seasonal population variability in Fernie. Visitors and non-resident property owners are drawn to the community during winter for skiing and snowmobiling, and summer for golf, mountain biking, fishing, and hiking. This can result in temporary population increases of about 50 per cent, with resulting water system service population of over 6,800.

3.3 Community Growth Estimates

Fernie has experienced population growth rates of about 1.5 per cent to 2 per cent annually over the last 4 years (according to BC Stats estimates). Looking forward, projections prepared by the Interior Health Authority envision modest population increases in the range of 0.5 per cent annually for the period 2010 to 2015. This modest level of growth is mirrored in the City's Official Community Plan, which contains estimates of 0.5 per cent to 0.75 per cent annually for the next 20 years.

3.4 Water Use Summary by Sector

There are approximately 2,850 service connections to the City's water distribution system. The breakdown of these connections by land use was provided as part of the Columbia Basin Water Smart program, and showed 2,550 single family and two family (duplex) residences, and 305 commercial, institutional and other services. The bulk of these connections are believed to be residential, principally single family homes and townhouses / row houses.

Additional information regarding major water users is contained in Sections 3.7 and 4.0 of this document.

3.5 Infrastructure Summary

The City of Fernie currently receives all of its water supply from the Fairy Creek Spring, located in the Three Sisters watershed. The catchment structure for this spring water comprises two compartments. Compartment 1 captures the South Spring which provides high quality water year-round, while Compartment 2 secures water from the lesser-quality and intermittent North Spring which is generally discharged separately, unless City demands warrant its use. Raw water is sent via a transmission pipeline to a raw water impoundment, and then to a control building where the water is disinfected using chlorine. Flow is recorded at this point by a meter, and the treated water sent to utility customers via the distribution system. Storage is provided by the Ridgemont Reservoir, an open, concrete-lined facility with capacity of approximately 3,000 cubic metres. The reservoir serves as emergency (i.e. fire protection) storage only and is supplied with a continuous flow of approximately 27 litres per second to prevent stagnation. Overflow from the reservoir runs into Coal Creek.

The City is proposing to construct a supplementary groundwater supply in James White Park.

Water is distributed via approximately 70 kilometres of pipe to utility customers within the City of Fernie, and West Fernie.

3.6 Source Resiliency

Fairy Creek Spring is regarded as a good source of water from a quantitative perspective. It does, however, experience high turbidity under certain conditions. The City of Fernie's publication entitled 'Drinking Water Facts, Questions and Answers' notes that there is very little human activity in the Three Sisters watershed within which the spring is located, thus providing safeguards to this source. Past work has shown in a 'worst case scenario' situation, such as continuous drought or low snow pack, there may not be sufficient flow to supply the needs of the City.

In order to improve the supply, as well as provide a safe alternate back-up supply, the City is developing a groundwater source located in James White Park. This source could also function as the City's primary supply when Fairy Creek spring is impacted by turbidity.

3.7 Major Water Users

Unaccounted-for water places the single largest source of demand on the City of Fernie's water system. This unaccounted-for water is believed to be comprised principally of water overflow from the Ridgemont Reservoir, and the pipe network. It is estimated that approximately 75 per cent of the City's water supply is unaccounted for.

Indoor demand from all land use sectors (residential, commercial, institutional and other) places the second greatest set of demands on the City's water utility. This is followed by outdoor irrigation by all land use sectors.

Additional details regarding calculation of demands by these major water users are provided in Section 4.0.

While outdoor irrigation does not rank as the single largest source of demand, it is important to consider this segment as it causes significant peak use conditions in the summer, and consequently the need for and costs of water utility infrastructure upgrades. One of the City's primary water system objectives is to optimize existing investment in municipal water infrastructure. Reducing peak demands are important in reaching this objective.

3.8 Unique Community Attributes

The extent of water use by the 'shadow population' in Fernie (non-resident property owners and tourists visiting the community), along with the magnitude of unaccounted-for water, are unique attributes of the community and its water system.

3.9 Existing Conservation Approach

There are four primary components of the City of Fernie's existing approach to water conservation.

- Voluntary watering restrictions implemented during the summer peak use period;
- Public education program, including production and distribution of printed materials;
- Leak detection and mitigation program, including repairing the leaking main which had spilled water into the Elk River in 2007, and a current reservoir construction project (referred to as Northwest Reservoir) which will result in the City being able to decommission the Ridgemont Reservoir that overflows much of the Fairy Spring water directed to it;
- Installation of pressure reduction stations at selected locations to lessen system operating pressures, and correspondingly reduce the volume of water lost as leakage in the distribution system.

4.0 Water Use Profile

4.1 Metered Data Summary

Meter data available from the City of Fernie is limited to that provided from the bulk water meter located downstream of the Fairy Creek Spring catchment structure and raw water dam, and upstream of the distribution system and Ridgemont Reservoir.

4.2 2009 Water Consumption

In 2009, the flow recorded through the City's bulk meter was 4,053,349 cubic metres. The profile of water use through the year is shown on the following graph.

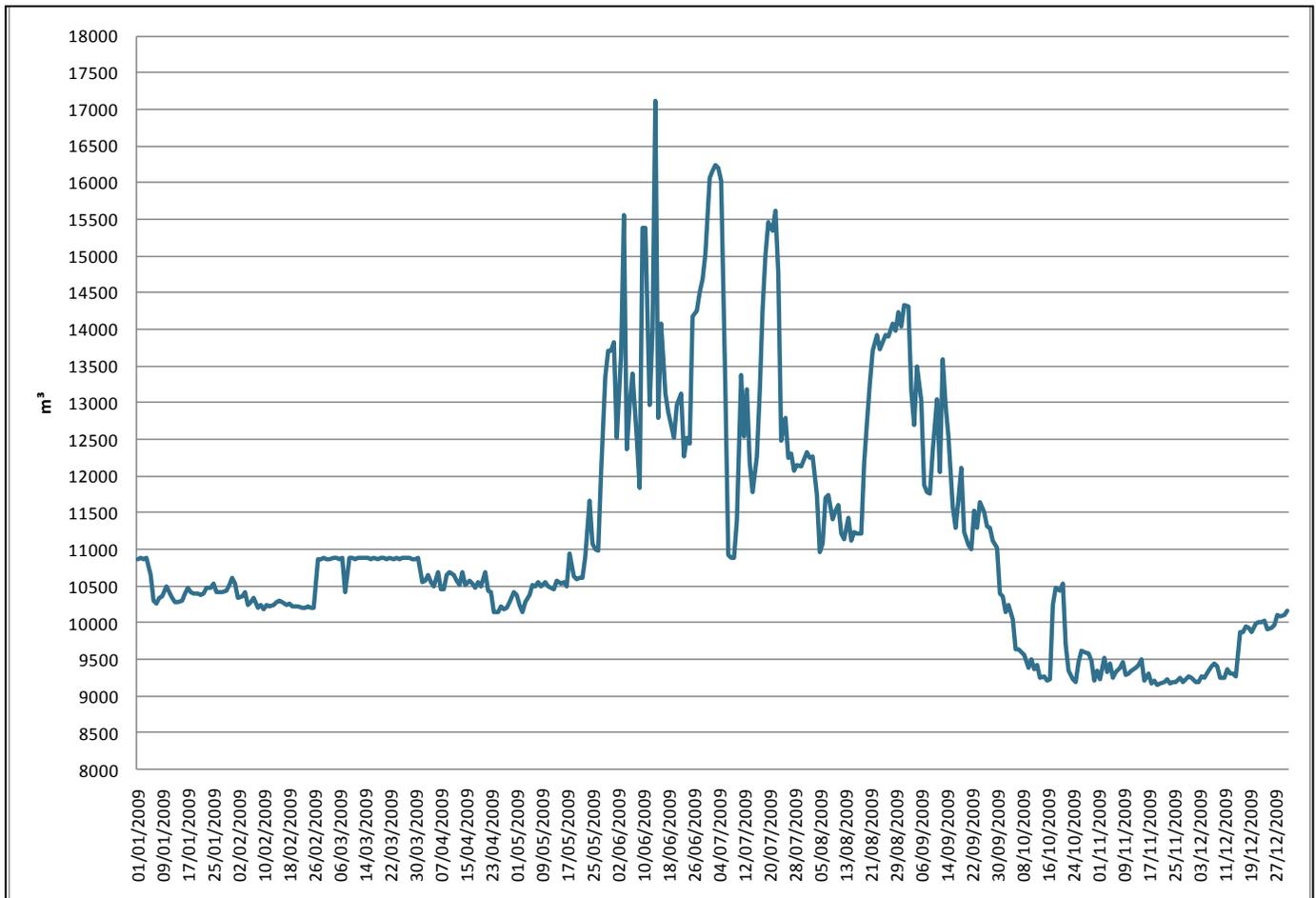


Figure 1 - 2009 Water Consumption

4.3 Major User Information and Estimated Leakage

Due to the absence of individually-metered water connections, detailed statistical data on large water users is not available. Estimates must therefore be prepared. Developing these estimates is itself a challenge given the extent of unaccounted-for water in the City of Fernie system and the fluctuating service population. The following sections describe the methodology applied.

4.3.1 Indoor Residential

Indoor residential use was based on 150 litres per capita per day, a value obtained from the recently completed Okanagan Basin Water Board Water Supply and Demand Study. This value was multiplied by the permanent service population of 4,660 and the number of days in the year, and by an equivalent estimate of the number of days in the year the 'shadow population' resided in Fernie (assumed to be 2,150 people for 25 per cent of the year). The

resulting value of 284,483 m³ was then adjusted to reconcile total water use to 100 per cent (see Table 1).

4.3.2 Industrial, Commercial and Institutional (ICI)

Other indoor use was derived through previous sewer system modeling work undertaken by the City of Fernie. This work identified all retail, institutional, restaurant and other commercial connections discharging to the City's sewer utility, and estimated the volume of discharge from each of these connections. The cumulative volume of 230,000 m³ was assumed to be equivalent to indoor water demands for these activities. This value was then adjusted to reconcile total water use to 100 per cent (see Table 1).

4.3.3 Unaccounted-For Water / Estimated Leakage

The City estimates that approximately 75 per cent of all water supplied by Fairy Creek Spring is not accounted for and lost. This estimate is based on the following:

- Average total daily water demands placed on the City's system during October and November 2009 (excluding Thanksgiving weekend). This period was chosen due to the lack of outdoor irrigation, and the relative absence of shadow population. Daily demands were approximately 9,200 cubic metres per day. Indoor residential use was calculated by multiplying the assumed population (5,160 including both permanent and some shadow) by indoor use (150 litres per capita per day) to yield 774 cubic meters per day. Commercial and institutional water use was assumed to be the same as sewer flows used in prior modeling work – 630 cubic meters per day. Both of these values were deducted from the daily total, leaving 7,796 cubic metres per day of unaccounted-for demand. This represents about 85 per cent of all water supplied.
- Past studies by the City of Fernie. The 2009 Integrated Water Supply Strategy identified unaccounted for water at 73 per cent of the total volume supplied. The 2004 Water Supply and Storage Study estimated this amount at 69 per cent.

Taking all of these factors into consideration, the figure 75 per cent has been used in this document as the current estimate for unaccounted-for water.

As noted above, work is underway to decommission the Ridgemont Reservoir. Losses from this reservoir are estimated to account for 25 per cent of the City's water supply. Once this work is completed in the fall of 2010, it is anticipated that unaccounted-for water will fall from 75 per cent to 50 per cent of the City's supply. In addition, pressure-reducing features are being introduced to the City's water system, and these are anticipated to reduce losses through lowering operating pressures. Water is also being lost to leaking pipes, to a presently unknown extent. Beyond the City's water utility, additional system losses are occurring on private property through faulty building plumbing, and continuous water flow / sewer input in the winter in order to stop shallow-buried water connections from freezing.

4.3.4 Outdoor Water Use

Average daily water use during the summer period is approximately 12,700 cubic metres. This is approximately 2,600 cubic metres more than average daily water use at other times of the year (estimated at 10,100 cubic metres). The summer period extends from mid-May through mid-September, and in 2009 comprised an estimated 140 days. Total outdoor water use was calculated by multiplying the average increase in daily use (2,600 cubic metres) by the number of days in the period (140) to yield a total of 364,000 cubic metres. This value was then adjusted to reconcile total water use to 100 per cent (see Table 1).

4.3.5 User Summary by Sector

Table 1 – 2009 User Summary by Sector

User	Volume consumed (m ³)	per cent of Total ^(*)
Unaccounted Water/Leakage	3,040,000	75
Indoor Residential	324,000	8
Indoor Institutional, Commercial and Industrial	284,000	7
Outdoor Irrigation	405,000	10
Totals	4,053,000	100

(*)Indoor and outdoor use percentages adjusted by 1 per cent each to reach total

4.4 Demand Forecast (Business as Usual)

The City of Fernie is anticipating slow rates of growth over the next 5 to 10 years. At an annual rate of 0.5 per cent over the next five years, cumulative growth would amount to 2.53 per cent (or about 100 permanent residents). Given current water consumption rates, this would translate into modest additional water system demands. However, as part of Fernie's 5 year Business as Usual model, certain confirmed water conservation measures must be considered as having the potential to reduce demands to a greater extent than growth will increase demands. An excellent example of this is the decommissioning of the Ridgemont Reservoir, which will reduce demand by some 25 per cent. Consequently, under the Business as Usual Model, a minimum 20 per cent reduction in demand is anticipated from 2010 to 2015.

4.5 Water Profile Summary Table

The following table summarizes the water use profile for the community of Fernie.

Table 2 – Community Water Use Summary (ML)

BC Population Stats.	Service Population Estimate	6,810*
	Relevant Shadow Population	2,150
	Projected Growth	0.5 per cent /year
	Other factors	
Water Use Summary (2009 Data)	Gross Annual Water	4,053 ML
	Winter Monthly Average	276 ML**
	Summer Monthly Peak	485 ML
	System Peaking Factor	1.8
	Total Water Supplied	4,053 ML
	System losses	3,040 ML
	Agricultural Use	0 ML
	Residential Indoor	324 ML
	Outdoor – All Uses	405 ML
Other Indoor	284 ML	
LPD Calculation ¹ (estimate only)	Fernie total average daily flow L/p/d (Total water use/service population)	2,152
	BC total average daily flow L/p/d	649
	Canada total average daily flow L/p/d	609
	Fernie average daily residential flow L/p/d (Residential indoor & outdoor water use/service population)	387
	BC average daily residential flow L/p/d	426
	Canada average daily residential flow L/p/d	329

*includes permanent population (4,660) and shadow population (2,150)

** winter month considered to be November due to influx of shadow population during January through March period in Fernie

¹ BC L/p/d and Canada L/p/d are quoted from Ministry of Environment numbers for 2004 and can be found at: http://www.env.gov.bc.ca/soe/eto7/o3_fresh_water/water_use.html/. A detailed report summarizing the data can be found at <http://www.ec.gc.ca/Publications/default.asp?lang=En&xml=8D951F7A-3866-47AA-98D6-1C49AB04E1BA>. BC and Canadian L/p/d numbers presented by Environment Canada are being refined on an ongoing basis as new and improved water use data is available. **While the community total average daily flow numbers can be compared directly to the BC and Canadian averages, care should be exercised when trying to make a direct comparison to BC and Canadian average daily residential flows given that it is unclear how those numbers were calculated or what data was available to support those calculations.**

5.0 Energy Use Profile

Operation of the City's water utility (Fairy Creek supply catchment) consumed approximately 81,000 kilowatt hours of electricity in 2008 (the last year for which summary data is readily available). Key areas of electrical demand include the control building, and the Alpine Trails booster station. The City is fortunate in that much of the community's water service area is served by a gravity-fed supply.

The City's sewage collection and treatment system used approximately 761,000 kilowatt hours of electricity in 2008. The largest source of demand (589,000 kWh) was the sewage treatment lagoons. Lift stations located in various parts of the community ranked second in terms of electricity demand. There was also natural gas use attributable to the sewage system – 1,434 gigajoules used at the main lift station.

Water conservation efforts could translate into reduced energy demands in two ways. With respect to the water utility, the larger source of energy demand is likely pumping at the booster station to serve the Alpine Trails neighborhood. Reduced water demands in this neighborhood, accomplished through changed behaviours of property owners, would result in some energy savings. While reductions in the amount of system leakage discussed elsewhere in this document are beneficial from various perspectives, there will be limited impact on energy demands due to the largely gravity-fed nature of the water utility. This comment would be less valid should large sources of leakage be found in portions of the system fed by pumping facilities (i.e. Alpine Trails).

Water conservation efforts which resulted in lower indoor water use would also reduce sewage generation. This is the second area of potential energy savings. Less sewer generation would, in turn, reduce energy requirements to operate lift stations and treatment facilities. Work undertaken by the City of Fernie on liquid waste management planning has shown high rates of inflow to the City's sewer treatment plant when measured on a per capita basis. It is believed that these high rates are attributable to inflow and infiltration to the City's sewer infrastructure, and not necessarily to excessive indoor water use. It is therefore difficult to estimate the manner in which water conservation efforts would translate into reduced energy demands in the sewer utility.

6.0 Summary of Primary Community Drivers

Key drivers behind the City of Fernie's efforts to reduce water demands are:

- Deferral of Infrastructure Costs – the City would like to defer and/or avoid the need for spending on capital projects to improve water and sewer systems. If such needs do appear in the future, the City would like to reduce the extent of works required through minimizing demands;
- Reduction of Operating Costs – current operating costs which could be reduced in future as a result of lower water demands / sewer generation rates include electricity and chemical requirements for water / sewer treatment and conveyance;
- Environmental Integrity – reduction of water demands by the City of Fernie will help to assure in-stream flow sufficiency in Fairy Creek and the Elk River. In addition, any energy demand reductions associated with more efficient water use will lead to savings in greenhouse gas emissions;
- Enhance Grant Eligibility – the City recognizes efforts by senior governments to encourage efficient water use, and to use this as a criterion in evaluating submissions from the City for grant funds for water, sewer and other projects.

7.0 Recommended Water Smart Objectives

7.1 Objective 1

Continue leak detection and repair program, along with installation of pressure reducing stations.

7.2 Objective 2

Implement a staged approach to introducing water meters to utility customers.

7.3 Objective 3

Revitalize public education program containing new messages regarding the importance of water conservation, and new approaches to target audiences.

8.0 Recommended Community Specific Actions and Implementation Strategy

To effectively implement the top three community objectives in a manner that achieves the community specific water conservation target of 20 per cent by 2015 a set of actions is outlined in Section 8.1-8.3 including implementation strategies, available resources, and approximate water reduction projections. Where relevant, timelines have been suggested to identify a path that will support the necessary water reductions to meet the stated community target of 20 per cent by 2015.

8.1 Objective 1 Background and Recommended Actions

Continue leak detection and repair program, along with installation of pressure reducing stations.

Background

Approximately 75 per cent of the water supplied by Fairy Creek Springs to the City of Fernie's water utility is unaccounted for. It is believed that the majority of this water is lost through leaks in the system. One such significant leak, which discharged water to the Elk River, was repaired in 2007. A second source of water loss – overflow at the Ridgemont Reservoir – is being remedied through the construction of another enclosed reservoir, and decommissioning of Ridgemont. These efforts will reduce unaccounted-for water volumes to about 50 per cent of that supplied by Fairy Creek Springs. There remains opportunity to go further.

Recommended Actions

The recommended actions are generally in keeping with those sanctioned by national agencies in Canada and the United States. They comprise the steps set out below, and should be implemented as an on-going basis.

1. Determine water use during a period when there should be none. Once the new reservoir has been completed and the Ridgemont Reservoir decommissioned, the City should record the amount of water being drawn from a main supply point (i.e. control building) at a time when there should be very limited or no demand (i.e. between 12 midnight and 4:00 am). If water use is occurring during this time, it can be attributed to system losses through leakage or other unaccounted-for water (i.e. cooling units, plumbing losses, etc.). Fall 2010
2. Perform acoustic leak detection on selected portions of the water system. Timing on-going.
3. Where leaks are detected, determine the optimum approach for repair. There are two general methods which are available to the City. The first is excavation and replacement, and the second lining of the leaking pipe. Factors including pipe accessibility, status of surrounding / adjacent infrastructure (i.e. wastewater

collection line), condition of overlying road and pavement structure (i.e. require concurrent upgrading), and contractor availability should all be taken into account in determining the optimum approach. On-going.

4. Repair leaks. On-going.
5. Publicize results of leak detection and repair program. The City is demonstrating leadership in undertaking this program, and not placing the onus entirely on water utility customers to conserve water through other means. On-going.
6. Install pressure reducing stations at selected points in the City's water distribution system. On-going.

Expected Water Use Reductions

Once fully implemented, it is anticipated that the City's leak detection and repair program will result in water use reductions in the range of 50 per cent of water supplied through Fairy Creek Springs (and potentially James White Park Well in future).

Supporting Tools and Resources

- Water Use and Loss in Water Distribution Systems – A Best Practice by the National Guide to Sustainable Municipal Infrastructure – Federation of Canadian Municipalities (FCM) and National Research Council. This is available online through the FCM's Sustainable Communities website;
- Water Audits and Loss Control Programs, Third Edition, American Water Works Association (AWWA). This is available through the AWWA's online bookstore;
- Should the City decide to proceed with an acoustic leak detection program, there may be an opportunity to join the collaborative effort underway amongst several communities in the Columbia Basin.

8.2 Objective 2 Background and Recommended Actions

Implement a staged approach to introducing water meters to utility customers.

Background

There are currently very few meters installed on water connections served by the City's utility, and these are not read or monitored on a regular basis. Given the City's focus on managing other aspects of water demands (particularly reduction of unaccounted-for losses through efforts such as repairing the pipe leaking water into the Elk River, and decommissioning the Ridgemont Reservoir), along with other factors, there has been limited attention focused on metering. There is an opportunity to gradually introduce metering to the community as a means to better understand and measure water demands, and potentially move towards a volume-based system for charging for water use.

Recommended Actions

1. Install meters on City facilities and buildings. This initiative will demonstrate the City's leadership in introducing meters to the community, as well as allow monitoring of water use for reference to other non-City facilities (i.e. private offices). Schedule to begin in 2011.
2. Require, by bylaw, the installation of water meter horns in all new residential building construction, and in the case of substantial plumbing renovations. The actual meter could be installed at a later date should the City decide to move to a residential metering program. Schedule to begin in Spring 2011.
3. Initiate voluntary metering program. The objectives of this program are three-fold – to develop a residential water use profile, to identify installation challenges the City may face if a universal metering program were advanced, and to provide interested residents opportunities to track water use (as well as potential financial savings under a volume-based billing system).

As a starting point, the City could identify a budget allocation for voluntary installation of meters in residential buildings. In considering this budget, an allowance of \$1,000 to supply and install a meter provides a reference point². Once the budget allocation has been determined, the number of voluntary meters should be apportioned to different segments of the community. Factors including geographic location (i.e. Maintown, Mountview, Alpine Trails), occupancy type (i.e. full-time, seasonal), demographics (i.e. large and small family units) and property size could be used in defining these segments. Applications could then be invited from the community, candidates chosen, and meters installed. During installation special attention should be paid to the location (i.e. inside home, or outside in pit necessitated by irrigation line diverging from connection between City's distribution main and building), orientation (horizontal or vertical), and other challenges. A monthly meter reading program should be instituted. Participants should be offered the opportunity to continue to pay for water on the current flat-rate basis, or move to a volume-based system. The results of the program will allow the City to better understand water use behavior in Fernie, and communicate the experiences of volunteers with the rest of the community. Schedule for 2011-2012.

4. Evaluate potential for universal water metering program. Such a program would involve the installation of water meters on the approximately 2,855 connections served by the City's water utility. An important basis for evaluation of such a program is the extent of water use savings which could be achieved. There are two sources of information which would be helpful in this regard – the results of the aforementioned voluntary metering program, and the experiences of other communities that have moved from non-metered to fully-metered systems. The economic benefits and costs are an important component of this evaluation. From this perspective, benefits typically include deferral / avoidance and downsizing of water and sewer system capital project costs, as well as operating cost savings.

² There may be an opportunity to realize improved economies of scale through a collaborative regional or multi-community approach to the procurement of meters and meter installation services.

The cost portions of the analysis generally include supply and installation of meters (with costs influenced by meter technology selection, and meter location – indoor vs. pit), reading systems, and any additional staff requirements.

In addition to this economic rationale, environmental and social factors are also important in the evaluation. These include considerations such as reduction of greenhouse gas emissions associated through reduced energy use, lessening of need for water withdrawal, establishment of a fair and equitable means of charging for water use based upon volume consumed, and inconveniences caused to residents from meter installation.

Once completed, the results of the evaluation can be shared with the community, and a decision made regarding whether to move ahead with a full universal water metering program. Schedule for 2013, with decision by fall of that year.

In completing this evaluation, the City should consider the potential availability of grants from senior governments, such as the Province's Towns for Tomorrow program.

5. Should the decision be taken to proceed with universal water metering, subsequent steps involve confirmation of program requirements (i.e. number of meters of different sizes, reading system, scope of private sector involvement, education preferences), preparing and circulating a request for proposals, awarding the contract and proceeding with installation. Associated efforts involve public engagement, and revisions to the City's water rate structure. If meter program advances, the target date for installation would be 2014.

Expected Water Use Reductions

Universal metering programs typically result in reductions of 10 per cent to 15 per cent of indoor water use, and 20 per cent to 25 per cent of peak summer outdoor water use. It should be noted that consumption rates at residences that opt for voluntary meter installation should not be considered a reliable basis for determining current average consumption rates. This is because "Early Adopters" for water meters tend to exhibit significantly lower water consumption rates than the average.

Supporting Tools and Resources

- Establishing a Metering Plan to Account for Water Use and Loss – A Best Practice by the National Guide to Sustainable Municipal Infrastructure – Federation of Canadian Municipalities (FCM) and National Research Council. This is available online through the FCM's Sustainable Communities website;
- 2007 Municipal Water Use Report – Environment Canada. This document is available through the Environment Canada website.

8.3 Objective 3 Background and Recommended Actions

Revitalize public education program containing new messages regarding the importance of water conservation, and new approaches to target audiences.

Background

The City has undertaken public education programs regarding water conservation in the past, including the production and distribution of printed materials, and encouragement of voluntary outdoor water restrictions during the summer period. There is an opportunity to revitalize and re-focus this program.

In communities with limited staff and financial resources it is easier to set one clear water conservation priority and focus all efforts on that goal, rather than attempting to create a wide-ranging plan that spreads resources too thin. While Fernie has a distinct advantage in this regard due to the presence of communications consultants and staff, it is recommended that a deliberately phased approach will tend to deliver better learning and tangible, lasting results, than a program that tries to focus in all areas from the outset. It is important that the recommended actions outlined below are reviewed in conjunction with Appendix A to this action plan, which outlines the fundamental elements and considerations of a successful water conservation campaign.

Recommended Actions

8.3.1 Priority One: Reduce Outdoor Water Use

Residential outdoor irrigation presents an opportunity for water reductions in Fernie. Summer water use almost doubles over winter consumption. Outdoor irrigation drives peak demand and increases pumping costs.

Currently the City imposes voluntary watering restrictions. While is a good start, odd/even restrictions often program residents to water every other day. When people comply with the restrictions they may believe that they are doing their part to conserve water and that nothing more is necessary (see Appendix B for a background on watering restrictions).

Voluntary watering restrictions may have limited compliance, especially among Fernie's large number on non-residents. Residents who live in the City on a part-time basis have little incentive to comply because there are no penalties. On other hand, their desire to maintain landscapes with automatic irrigation systems during extended periods of absence is a strong incentive for non-compliance.

To get beyond water reductions achieved through sprinkling regulations, a social marketing program focused on behavior change is required. Past publication education efforts have been information based. Future efforts should utilize incentive-based education instead of information and penalty-based regulation.

Because of the large number of commercial accommodation rooms in Fernie, reducing indoor/outdoor use in the accommodations sector is a secondary goal.

8.3.2 Summer Student: The Bridge Between Information and Action

In Penticton they are called “Water Ambassadors” while in Kelowna they are known as “Water Spotters.” These are personable summer students hired to positively encourage compliance with watering restrictions and trained in methods of outdoor water conservation. They spend their time in one-on-one consultation with homeowners, showing them how to set their irrigation timers and offering advice on landscape watering efficiency.

While it is important to ensure that water regulation restrictions are voluntarily met, consideration should be given to the fact that many people do not break regulations willfully. Often a malfunction in a sprinkler system will cause it to run at the wrong times without the homeowner’s knowledge. Giving a fine in these situations causes resentment. Even the word “warning” has a confrontational sound to it.

A summer student who is a helpful resource in Fernie will help create positive awareness about water conservation and help facilitate actual behavior change.

8.3.3 Free Landscape & Irrigation System Assessments

In ground automatic sprinklers systems are the main cause of excessive water use – both in a residential and a commercial setting. Studies by the irrigation industry in the United States indicate that the majority of homeowners do not know how to set their timers or how to properly maintain the system. Once installed, the systems are rarely inspected and malfunctions create inefficiencies over time.

A typical example of a system malfunction that creates excessive water use is a damaged sprinkler head. A sprinkler covered in snow might get run over by a car during the winter, resulting in a malfunction during the summer. This will create a brown spot on the lawn which the homeowner will attempt to rectify by boosting the timing of the entire system. As more malfunctions occur within the system over time, the homeowner will continue to increase the sprinkler run times to compensate.

Sprinkler system inefficiencies are compounded by the fact that they typically operate during early morning hours, so broken or misaligned sprinklers heads can go unnoticed and un-repaired for years, wasting increasing amounts of water as time goes on.

An inefficient sprinkler system will use 25 – 30 per cent more water than an efficient one. Therefore, ensuring efficient residential sprinkler systems should be a top priority for Fernie. It will have a significant impact on reducing peak day and peak hour demand. The summer student could offer free landscape and irrigation system assessments as a part of their duties. They would be trained on how to conduct a basic irrigation system audit and how to recognize and recommend plants that use less water. This is an action-oriented

program that will generate real, measurable results. These assessments would be offered to both single-family residential, multi-family residential and commercial customers.

Home owners with manual (surface) irrigation systems can also be wasteful. The student would patrol neighborhoods on bicycle during primary surface irrigation times (early morning and evening). Wearing a clearly identifiable Water Smart uniform, the student would knock on doors of houses where watering regulations are not being followed, or wasteful water use is observed. If the homeowner does not answer, the student would leave a “doorknocker” to serve as a friendly reminder of watering regulations (as opposed to a serious warning). If the homeowner does answer, the student would engage them in conversation about watering regulations, and watering efficiency in general.

In cases where a home owner continues to break regulations, Fernie should be prepared to enforce water regulations bylaw with fines.

8.3.4 Free Hotel/Motel Assessments

A secondary project for the summer student would be indoor/outdoor audits of local hotels and motels. The summer student would inspect every room at each hotel to identify leaky plumbing fixtures. At the same time, the student would do an inventory of the flow rates for showers and toilets. This information would help determine if a low-flow fixture rebate program targeted specifically to the accommodations industry should be considered.

8.3.5 Advertising & Communications

If reducing outdoor irrigation is the priority for Fernie, all public education efforts should be initially focused in that direction. Newsletters, brochures, and advertisements containing water conservation tips are helpful, but their impact may be minimal and there is no mechanism to track results.

From a social marketing perspective, it makes more sense to develop a program for assessing irrigation systems and use the advertising budget to promote that program.

The program could be launched in the spring (May/June) at the home of a well-known citizen, perhaps the Mayor or a City Councillor, or a high-profile commercial location. Local media could be invited to the launch, and the resulting publicity combined with advertising (direct mail might be the best option) would generate requests from the public.

Soon after the first several irrigation audits have been completed, the focus of the advertising and communications could shift to a testimonial approach, featuring the homeowners and businesses who have either actually saved water through the program based on their existing meters (businesses), or who have realized other landscape benefits from the program. This kind of public recognition reinforces positive behavior and results in more requests for irrigation system assessments.

8.3.6 Parks & Public Spaces

When a community sets outdoor water conservation as a priority, their own water use comes under a critical spotlight. Parks and open spaces are a major user for many water suppliers. In fact, a 2005 study found that the largest single irrigation customer for most urban municipalities in British Columbia is their own Parks Department.

Before embarking on a comprehensive program to reduce outdoor water use, Fernie should make every attempt to ensure that they are using water as efficiently as possible in parks and public spaces. This can be a challenge because communities have not yet been able, for a variety of reasons, to address system leakage and often don't have the financial or human resources to maintain and operate sprinkler systems at optimum efficiency. In addition, the public often expects parks to be lush and green.

However, if Fernie is perceived as “not practicing what they preach” credibility is damaged and the commitment to water conservation is questioned.

The summer student could perform irrigation system audits/inventories at all parks, schools, and other major public facilities with high irrigation needs. The audits would identify immediate system deficiencies such as misaligned or broken sprinkler heads. The inventory would help parks management develop a parks water management plan for the future.

The audit/inventory would consist of:

- determining the distribution uniformity (DU) of existing systems
- identifying every sprinkler head by type (rotor or fixed), manufacturer, and flow rate
- noting where master valves are or are not present
- creating a site map of each system for future reference

When parks are maintained by different people over many years, inefficiencies may be created inadvertently. Broken sprinkler heads might be replaced by whatever happens to be in the inventory, rather than with the proper head. Maintenance practices and plans for future parks differ, resulting in a mix of products that may not be compatible with each other. Knowledge of each system's intricacies may be lost when experienced staff move or retire.

Following the inventory we recommend that staff develop a plan that consists of standards for new parks, and a purchasing/maintenance policy that will allow for the gradual replacement of existing stand alone irrigation timers to timers that can be connected to a weather-based centrally controlled system at some point in the future.

8.3.7 Share Resources

With Sparwood (Phase 1 Water Smart community) and Elkford (Phase 2) relatively close by, Fernie may want to consider sharing resources with its neighbor(s). These communities

could share the cost of hiring and training a summer student who could serve both areas. Pooling resources would also help each community reduce the cost of producing advertising and brochures.

8.3.8 Expectations

Given Fernie's modest budget it is not possible to implement a water conservation program on the same level as larger municipalities. However, the City's high water users are easily identified, making it easier to focus efforts and resources on one key priority and make it a community effort. If the population sees significant reductions in water use it helps the idea of water conservation gain momentum. This in turn makes it easier to take on the next priority.

It is important to keep in mind that Fernie has established a five-year water conservation target, and that water conservation will likely be an ongoing area of action for the town. As such, a strategic and phased approach to water conservation education will ensure that each barrier and opportunity is addressed in order of highest priority and most significant potential results.

Expected Water Use Reductions

As a stand-alone measure, public education programs can reduce water use by approximately 5 per cent. The United States Environmental Protection Agency's Water Conservation Plan Guidelines use a range of 2 per cent to 5 per cent as a benchmark.

Supporting Tools and Resources

- CBT Water Smart Ads (customizable)
- South East Kelowna Irrigation District (public education was part of this work)
- CBT Water Smart Action Plan (useful for educating the public <http://www.sekid.ca/>)
- <http://www.waterbucket.ca/> (Education and consultation tools available)
- Water use calculators located at www.irrigationbc.com
- Castlegar and Rossland Metering Program example
- Inclining rate block structures to support metering program.

8.4 Total Expected Water Savings

Total estimated savings through implementing this action plan will be in the range of 50 per cent. The bulk of these savings – likely 35 per cent to 40 per cent - will stem from the City's efforts to reduce unaccounted for water and leakage. Few systems, however, can account for 100 per cent of water delivered. The remaining savings to reach this 50 per cent total would be attributed to gradual introduction of water meters, and a revitalized public education program.

9.0 Monitoring and Reporting Protocol

CBT has finalized the following monitoring and reporting protocol after consultation with participating Water Smart Communities.

Baseline Measurement Protocol

CBT Basin wide target of 20 per cent reduction in community water consumption by 2015 is defined as:

20 per cent reduction from total gross 2009 community water consumption in participating Columbia Basin Water Smart Communities by 2015.

Points of Clarification

CBT's 20 per cent target will be evaluated against the aggregate result of participating Water Smart communities' change in gross consumption. The individual community targets will be based on the change in their own gross consumption.

Population change is not factored into achievement of this target but reporting BC census data for your community is included in the monitoring and reporting protocol so as to allow for calculation of estimated litres per capita per day (lpcd) figures. CBT will not report publicly on lpcd estimates due to lack of reliability of existing data. The exception to this is communities that are metered or become metered during the course of the Columbia Basin Water Smart initiative.

Reporting Frequency

Annual reports for the preceding year are due on January 30 beginning in January of 2011 through to January 2016 for a total of 6 reports for all participating Water Smart communities. 2009 baseline data has been established in the Water Smart Action Plans and need not be reported by each community.

Required Data

- Annual Gross Consumption.
- Monthly Gross Consumption.
- BC census data for your community for 2006, 2011, and 2016.
- Metering data summary if and when it becomes available.
- Number of connections by class including residential, commercial, Institutional.
- Notable climate event summary.

CBT Public Information Releases

CBT will report publicly on the aggregate percent change in gross consumption for the participating communities as well as individual community percent changes. Communities may choose to report additional information publically if desired such as litres per capita per day changes.



The Columbia Basin Water Smart Charter represents the commitment of communities in the Basin to work collectively to achieve water conservation goals. By signing the charter, your community has the opportunity to be part of a Basin-wide network of leaders, innovators and champions working toward local and regional water conservation efforts.

We, the undersigned, agree to the following objectives, key elements and commitments:

Basin-Wide Objectives

- Aim to achieve a 20 per cent Basin-wide reduction in community water consumption by 2015;
- Share our water conservation knowledge through the Water Smart Network; and
- Partner with Basin communities to cultivate and develop a water conservation legacy in the Columbia Basin.

Charter Key Elements

- Water is the foundation of our social, cultural, environmental and economic well being in the Columbia Basin;
- Water conservation is a collective responsibility to ensure healthy and sustainable communities;
- Basin residents and the communities they represent are important participants in water conservation; and
- Basin communities work together to create active and diverse partnerships of residents and organizations working on water conservation to improve and protect water resources in the Columbia Basin.

Charter Commitments

- Encourage and educate Basin residents in your community on the need for and importance of water conservation;
- Develop a Water Smart Action Plan or water conservation measures for your community with support from CBT;
- Implement a Water Smart Action Plan or water conservation measures and monitor and report the outcomes to CBT; and
- Collaborate and share information with Basin communities through the Water Smart Network.

APPENDIX A: Columbia Basin Water Smart Charter

APPENDIX B: Glossary of Acronyms

AWWA	American Water Works Association
CBT	Columbia Basin Trust
CWWA	Canadian Water Works Association
FCM GMF	Federation of Canadian Municipalities Green Municipal Fund
ICI	Institutional, Commercial, and Industrial
I&I	Infiltration and Inflow – Extraneous flows in a sewage collection system such as groundwater or surface water that enters the sanitary sewer system through defective pipes, leaking service connections, pipe joints, access port walls and/or manhole covers. Improper connections such as building foundation or cellar drains, yard and area drains, roof leaders or rainwater downspouts, cooling water discharge, and drains from springs/swampy areas are also typically included in I&I numbers.
Lpd	Litres per capita per day
m ³	Cubic metres
ML	Megalitre = 1,000,000 litres. For reference, an Olympic sized swimming pool holds 2.5 ML
OCP	Official Community Plan
SFD	Single Family Dwelling
UFW	Unaccounted For Water is also known as Non Revenue Water and is typically defined as water that is produced but is “lost” before it reaches the consumer. These identified losses can be real or perceived. Real losses (also referred to as physical losses) can be listed as leakage or unmetered flushing, testing, and fire fighting. Perceived or apparent losses are largely due to metering inaccuracies, metering bypass or illegal connections
USL	Urban Systems Ltd.