

District of West Kelowna

WATER CONSERVATION PLAN

Taking into consideration peak use, future growth and climate change, this plan provides direction for water conservation initiatives in the District of West Kelowna



Executive Summary

The District of West Kelowna (DWK), located in the Central Okanagan, incorporated as a municipality in December 2007. The District has a current population of approximately 30,900 residents. The District operates five water systems, which serve a total of approximately 10,900 customers and include roughly 407 hectares of irrigation land.

Existing West Kelowna Water Conservation Strategies

- Consumption based metering and billing
- Water restrictions
- Education.

Future DWK Conservation Strategies:

- Water loss management and leak detection
- Residential water conservation initiatives
- water audits and workshops
- water efficiency bylaws
- Customer education programs
- Securing water sources for climate change mitigation.

This *District of West Kelowna Water Conservation Plan* provides direction for water conservation initiatives in the District of West Kelowna.



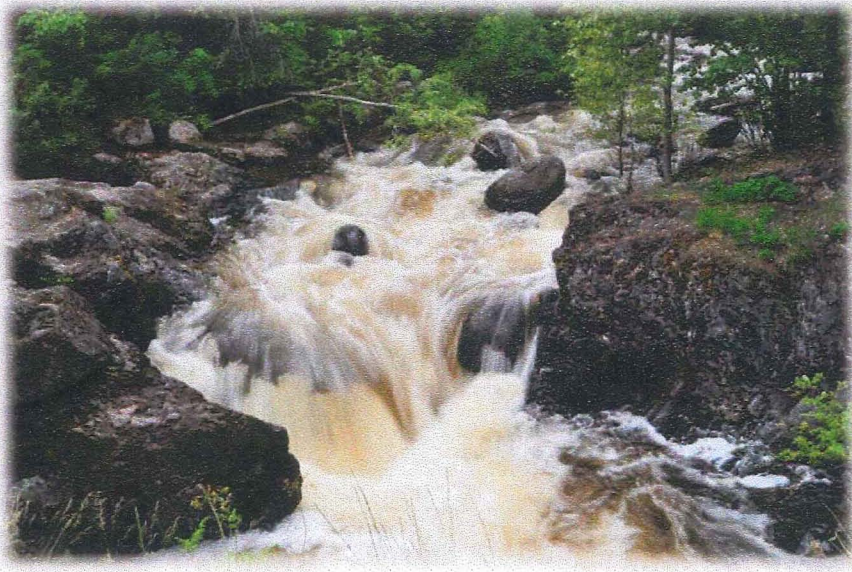
Only one per cent of the world's water supply is available for human consumption.

The other 99 per cent is contained within world's oceans, ice caps and glaciers.

Of the one per cent available for human consumption, the majority is diverted to irrigation and lawn care and to operate household conveniences such as washing machines, dishwashers and toilets.

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Introduction

The District of West Kelowna (DWK) is a growing community located in British Columbia's Okanagan Basin, with a population of approximately 30,900 residents. Prior to incorporation in December 2007, the municipality formed part of the Regional District of Central Okanagan (RDCO).

At the time of incorporation the DWK assumed responsibility for the West Kelowna Estates, Sunnyside and Pritchard water systems from the RDCO. Under the Terms of the Letters Patent for the DWK, the Lakeview Irrigation District and the Westbank Irrigation District, incorporated in 1951 and 1922 respectively, were dissolved and transferred under the jurisdiction of the municipality on December 31, 2010. **Table 1.1** provides a summary of the five water systems within the DWK and some of their key characteristics.

Table 1.1 - Summary of the Existing Water Systems

| Current Water Supply System | Water Source | Customers | Water Supply Availability | Current Treatment |
|-----------------------------|---------------|--|--------------------------------------|--|
| Lakeview | Lambly Creek | Roughly 3,800 customers with 226 Ha of irrigation land | Primarily gravity supply from 598.0m | Chlorination only of a surface water source that is subject to seasonal turbidity and algae events |
| Pritchard | Okanagan Lake | 150 domestic customers | Pumped supply from roughly 340.0m | Chlorination only of a lake intake |
| Sunnyside | Okanagan Lake | 750 domestic customers | Pumped supply from roughly 340.0m | Chlorination only of a lake intake |
| Westbank | Powers Creek | Roughly 5,000 customers with 385 Ha of irrigation land | Primarily gravity supply from 583.0m | Multi-barrier treatment plant that fully meets Interior Health requirements |
| West Kelowna Estates | Okanagan Lake | 1,200 domestic customers | Pumped supply from roughly 340.0m | Chlorination only of a lake intake |

The Okanagan would appear to have an endless supply of water, given its many lakes and streams. In reality, water in the Okanagan is a precious commodity, which must be used wisely and managed strategically.

Factors that diminish the Okanagan's water supply include:

- *The region's semi-arid climate*
- *Rapid growth*
- *Climate change*

Existing Water Demands

The DWK water customer base consists primarily of single family residential service connections, representing approximately 95% of all connections. While agricultural services comprise only 1.4% of all connections, this customer class represents approximately 23% of the total DWK water consumption. This consumption scenario is typical of Okanagan Valley municipalities where agricultural users, who represent a small portion of the user population, are consuming a significant amount of the total water volume produced. The agricultural users consume this volume during the growing months (April – October), which is also when the domestic users are typically consuming the highest volumes of water. This results in a high maximum day demand, which is a key parameter when sizing water system infrastructure such as transmission mains and treatment and storage facilities.

Table 1.2 provides 2011 water consumption data for the District. **Tables 1.3 and 1.4** show 2012 Average Day Demands and Maximum Day Demands respectively.

Table 1.2 - 2011 Meter Count and Consumption

| Service Type | # of Meters | % of Total | Consumption (ML) | % of Total |
|---------------|-------------|------------|------------------|------------|
| Residential | 9836 | 98.0% | 4,591.29 | 63.0% |
| Multi-Family | 64 | 0.6% | 354.60 | 4.9% |
| Commercial | 236 | 2.3% | 434.18 | 6.0% |
| Institutional | 72 | 0.7% | 227.20 | 3.1% |
| Agricultural | 146 | 1.4% | 1,681.36 | 23.1% |
| Total | 10,354 | | 7,288.63 | |

Table 1.3 - Average Day Demands – 2012 Existing System

| | % Flows | ADD (ML/d) | Units | Unit Demand L/day ADD | |
|------------------|---------|------------|-------|-----------------------|------------|
| Leakage | 19.46 | 7.64 | - | - | |
| Residential - SF | 45.35 | 17.80 | 9,662 | 614 | per capita |
| Residential - MF | 3.46% | 1.36 | 1,794 | 379 | per capita |
| Institutional | 3.56% | 1.40 | 267 | 5,235 | acres |
| Industrial | 0.63% | 0.25 | 488 | 510 | acres |
| Commercial | 5.59% | 2.19 | 239 | 9,178 | acres |
| Agricultural | 21.95% | 2.19 | 1,026 | 8,399 | acres |
| Total | 100% | 39.26 | | | |

Three of West Kelowna's five water systems take their water from Okanagan Lake; Pritchard, Sunnyside and West Kelowna Estates. Westbank draws predominantly from Powers Creek and Lakenew uses water from the Lambly (Bear) Creek watershed.

Existing Water Demands - Continued

Table 1.4 –Maximum Day Demands – 2012 Existing System

| | % Flows | ADD (ML/d) | Units | Unit Demand L/day MDD | |
|---------------------|---------|---------------|-------|-----------------------------|---------------|
| Leakage | 5.79% | 7.64 | - | - | |
| Residential - SF | 45.26% | 59.69 | 9,662 | 2,059 | per capita |
| Residential - MF | 3.45% | 4.55 | 1,794 | 1,269 | per capita |
| Institutional | 3.55% | 4.69 | 267 | 17,554 | acres |
| Industrial | 0.63% | 0.84 | 488 | 1,712 | acres |
| Commercial | 5.58% | 7.35 | 239 | 30,774 | acres |
| Agricultural | 35.73% | 47.12 | 1,026 | 45,930 | acres |
| Total | 100% | 131.88 | | | |

Water Conservation Tip:

*Take a five-minute
shower.*

*Taking a five-minute
shower instead of
a bath will save about
76 litres of water.*

*About 95 litres of water
is used during a five
minute shower compared
to 190 litres for a
10-minute shower.*



Benefits of Water Conservation

The Okanagan region has historically been one of the highest per capita consumers of water in Canada. For example, the water rate study conducted for the former Westbank Irrigation District in 2009 observed that per capita domestic water consumption in the Westbank Irrigation District service area was about 37% higher than the Canadian national average. One of the reasons for this high level of water consumption is that, until recently, the Okanagan has had access to exceptional sources of clean water at a very low cost. As planning advances to expand the use of water treatment facilities, there are considerable potential cost savings should the DWK take an aggressive approach to implementing state of the art water conservation strategies.

Water conservation offers many benefits to a water utility, including delaying or avoiding capital expenditures on source expansion, decreasing operating costs, avoiding environmental impacts and obtaining public recognition and participation.

In addition, water conservation could present certain “co-benefits”, such as reductions in the energy required to treat and distribute drinking water and to collect and treat wastewater.

American Water Works Association (AWWA) Manual No. M52 on Water Conservation Programs provides the following benefits of water conservation:

- Operations and maintenance cost savings by reducing the volume of water treated;
- Future cost savings through deferral of capital investment as a result of population growth and expansion;
- Environmental benefits: less water could be removed from the environment for human purposes;
- Competing beneficial uses: more water could be available for competing beneficial uses such as agriculture, or recreation;
- Stewardship: utilities that conserve water demonstrate leadership in resource management;
- Regulatory compliance: some governmental/regulatory agencies require water conservation plans to qualify for permits, grants and loans;
- Public perception: the public often insists on a demonstration of efficient use of existing water supplies before supporting expansion of supplies to meet new water needs.

Everyday Solutions:

Use water sparingly when brushing teeth, shaving and washing hands.

Leaving the water on while brushing teeth wastes the equivalent of two milk jugs full of water, about 8 litres, per minute.

After cooking or cleaning fruits and veggies, let the water cool and then pour into planters or flower beds.

Install a flow restrictor on faucets to save up to 20 litres of water per day.

Water Conservation Background

Water Loss and Leak Detection

With the recent implementation of universal metering, West Kelowna has estimated water losses occurring throughout its distribution system. Based on source production and metering data, the unaccounted-for water can be calculated at approximately 29% of total flows as seen in **Table 1.5** below.

**Table 1.5 - Source and Meter Flow Volumes
3rd Quarter 2010 to 2nd Quarter 2011**

| Total Flows – Sources (ML) | Total Flows – Meters (ML) | Difference (%) |
|----------------------------|---------------------------|----------------|
| 9,488 | 6,749 | 2,739 (29%) |

Given the apparent high percentage of water loss, the DWK’s next step is to assess the type of losses – apparent or real – and implement programs to reduce these losses.

Leakage in water systems can be difficult to identify or detect. Water system pipelines are generally buried and leaks do not generally appear at the ground surface until they become large or are in poorly draining soils. The following are three recommended steps for the Water Loss Management/Leak Reduction Plan:

- Quantify the losses by completing a more detailed water balance;
- Establish a water loss target based on the value of water that is specific to the DWK;
- Find the leaks and complete the repairs.

Consumption-Based Metering and Billing

All domestic water customers within the DWK are metered and are charged water rates that are based on actual water consumption. This reflects the basis of a “user-pay” system whereby consumers that use more water will pay more than consumers who use less water.

Consumption-based billing was first implemented in the Westbank Service Area after the former Westbank Irrigation District commissioned a water rate study in 2009 prior to increasing water rates. This rate increase was primarily related to the need to pay for the costs of constructing the 54 ML/d Powers Creek Water Treatment Plant. In 2011, DWK council supported implementation of consumption-based rates for the former Lakeview, West Kelowna Estates, Sunnyside, and Pritchard Service Areas.

Water Conservation Tip:

*Replace worn washers and seals.
A leaky faucet or shower head can waste about 90 litres of water per day.*

*Leaking pipes or service lines can damage homes and yards in addition to all the water waste.
Water meters have built in detectors which will alert homeowners when there's a leak so they know to call in the plumber to make repairs.*

Water Conservation Background - Continued

Consumption-Based Metering and Billing - continued

While a simple volumetric water billing system will assist water conservation efforts, there are stronger financial incentives available, especially at peak times. If DWK wishes to promote higher levels of water conservation through financial incentives, increasing block water rates that price incremental blocks of water at higher rates than previous blocks have proven highly effective at reducing water consumption, especially at the single family detached household level. Increasing block rates target summer lawn sprinkling and other outdoor water use so that peak demand is reduced. The expanded use of higher block rates is an option for DWK in its efforts to reduce water demand.

Reducing Wasted Water

The reduction of water waste was one of the first methods of water conservation as these initiatives were typically the least expensive and easiest to implement. In the 1970s, this included auto-sensors in factories to turn off water when production lines were not in use, elimination of single-pass cooling, reuse of non-contact cooling water and low-flow toilets. These measures were low-technology and had a short pay-back period. Today, water waste reduction efforts employed in municipalities include:

- Low-flow fixture requirements on new construction;
- Irrigation system requirements on new construction.

Codes and Standards

Many provinces, including British Columbia, have written-in water efficiency strategies in their building code regulations. *Living Water Smart*, the province of British Columbia's Water Plan, sets out principles, targets and actions to support water management in B.C. Part of this Water Plan includes revisions to the B.C. Building Code (Fall 2008), which now mandates minimum water efficiency requirements for fixtures.

Some municipalities are also taking the initiative to adopt water efficiency bylaws. For example, the cities of Edmonton and Calgary have passed by-laws mandating water-efficient toilets and low-flow showerheads in all new residential developments. Additionally, the City of Kelowna currently requires all homes constructed after 1994 to have low flow toilets and requires a Landscape Water Conservation report to be submitted prior to approval on all new residential and commercial irrigation system installations.

The DWK will gather feedback from other municipalities on the effectiveness of this program. If the program has proven successful elsewhere, it may be worth considering within the DWK.

Water Conservation Tip:

Lawns and gardens require no more than 35 millimetres (1-2/5 inch) of water each week during warmer months and much less during spring and fall or periods of cooler summer weather.

Water lawns every three to five days, applying 5 millimetres of water for each day since the last day of watering during warmer weather.

Place a can in the area being irrigated and measure the time it takes for the appropriate amount of water to accumulate. This will establish a time pattern for future sprinkling.

Water Conservation Background - Continued

Public Education

While the financial benefit of public information and education programs are hard to quantify, these programs are critical to building the conservation ethic in water customers. Examples of public education initiatives for the future are outlined below:

- **Towel Use Signs for Hotels/Motels:** Production of a laminated sign requesting patrons to hang towels on racks for re-use or throw them in the tub to request replacement
- **Information Booths at Community Events:** Distribute brochures, fridge magnets, dye tablets for leaking toilets and water-saver kits
- **Water Audit Workshops for Large ICI Water Users:** ICI and Agriculture represents 33% of the DWK's water consumption. Within this water use sector there are often a few large users that have a noticeable impact on overall water demand. Reducing their water use or shifting their water use to lower demand periods can have a meaningful impact on the DWK's maximum day demand. Identify the largest water uses and invite them to a free water audit workshop where they can learn how to reduce their water consumption
- **Information to Local Landscaping and Irrigation Companies:** Distribute information about water-wise gardening and water restrictions to local landscaping and irrigation companies
- **Schools:** Develop programs for schools such as a poster contest, water conservation curriculum guides and videos to promote water conservation to young people



Water Conservation Tip:

Plant trees and shrubs that are indigenous to a semiarid climate such as the Okanagan as opposed to a rainforest-like climate such as the Pacific Coast.

This drought-tolerant method of landscaping is referred to as xeriscaping.

Consider plantings that will provide additional shade and keep lawn-covered areas of the yard a little cooler during hot, dry spells.

Existing DWK Water Conservation Strategies

Consumption-Based Metering and Billing

As discussed, consumption-based billing has been implemented in all DWK Service Areas since 2011. This program will be continued. If water conservation efforts fail to meet expected targets, DWK will examine the expanded use of increasing block rates to provide further incentives for customers to participate in water conservation efforts.

Watering Restrictions

Currently, the DWK limits outdoor water use through sprinkling regulations. Stage 1 Sprinkling Regulations are in effect throughout the irrigation season, permitting outdoor sprinkling at non-agricultural properties based on property address and odd/even calendar days. Subsequent sprinkling regulations from Stage 2 – 4 are imposed when deemed necessary, with Stage 4 prohibiting outdoor water use for any purpose. Since the implementation of these regulations, the DWK has seen a reduction in peak flows and overall consumption.

Education

Okanagan Basin Water Board – WaterWise Initiative

The DWK is a partner in the Okanagan Basin Water Board's (OBWB) WaterWise Initiative. This initiative aims primarily to educate residents of the Okanagan Valley about water issues in the region. This includes promoting water conservation and protecting water quality. There are also tips on how to conserve water in the home, yard and business. The WaterWise website is easily accessed through a link on the DWK website.

DWK Website

The DWK's website includes a "Conservation" section, which provides water conservation tips for residents in the home and yard, and also provides details on reading residential water meters.

Marketing/ Public Information

The District places advertisements in local newspapers, distributes a water conservation brochure to all residents and produces public service announcements as needed to augment water conservation efforts.

Water Conservation Tip:

Reduce your lawn cover to as little as 1/4 of your yard. Conversely, expand mulched beds, trees, vines and other ground cover.

Use mulch! Mulch retains moisture, cools the ground, and reduces watering requirements.

Future Water Conservation Strategies

This section describes water conservation measures that the DWK is planning on employing in the future.

Water Loss Management & Leak Reduction

- Complete a water balance assessment based upon Best Practices standards by the AWWA and the International Water Association (IWA). With all domestic water accounts metered, the data is available to support this effort. The output of the water balance assessment will quantify real and apparent water losses within the system in order to ascertain the actual volume of water leakage;
- Identify the acceptable level of leakage in the DWK water system (based on economic level of leakage or water demand management criteria) and move forward with a leak detection program if the acceptable level is being exceeded;
- Repair identified leaks as soon as they are identified; and
- Implementation of pressure management within the DWK as a means to reduce overall leakage volumes.

Residential Water Conservation Initiatives

- Implementation of rebate programs for residents to replace existing low-efficiency fixtures low-flow models; and
- Developing bylaws mandating water-efficient toilets and low-flow showerheads in all new residential developments.

Industrial, Commercial, Institutional and Agricultural Audits and Workshops

- Identify the largest ICI and Agricultural water users by using metering data;
- Hold a free water audit workshop where these users can learn how to reduce their water consumption; and
- Communicate to these customers how much they have historically spent on water, their impact on overall municipal water demand and how they can take steps to reduce their water consumption and reduce total peak demands.

Water Efficiency Bylaws

- Implementing bylaws mandating water-efficient fixtures in all new developments including low-flow fixtures.

Customer Education Programs

- Customer education programs at schools, community events, and commercial users (landscape companies, hotels/motels).

The District of West Kelowna is committed to water conservation and is a partner in the Okanagan Basin Water Board (OBWB).

OBWB promotes conservation through its Okanagan Waterwise website and its Make Water Work campaign.

OKANAGAN
waterwise



Future Water Conservation Strategies

Water Demand Reduction Target

The DWK will target a 10 per cent reduction in water demands over 10 years. This target can be achieved largely by the use of low-flow fixtures in homes, hotels and businesses. This 10 per cent reduction would reduce the residential Multi-Family use of 379 L/capita/day to 341 L/capita/day and the Residential Single Family use of 614 L/capita/day to 553 L/capita/day.

By instituting a water loss management and leak protection program, the District is intending to reduce water loss throughout the distribution system. This will not only conserve water, but provide cost savings measures for treating water as well. Further information and operational procedures are being developed in conjunction with the Master Water Plan, which is currently being developed for The District of West Kelowna.



*On Target
The DWK will
strive for a
10% reduction
in water demands
over 10 years.*

Climate Change Mitigation Plans

As part of climate change mitigation, West Kelowna not only plans on implementing water conservation initiatives, but securing water sources for long term sustainable yields.

There have been numerous assessments and reports completed in the past that have assessed the volume of water that can be generated from the Powers Creek, Lambly Creek and the McDougall Creek watersheds.

McDougall and Powers Creek are essentially fully-licensed. The Powers Creek licensed amount is very similar to the total estimated volume of water that the watershed can generate during an average year. There is a significant volume of water available from the Lambly Creek watershed.

When the DWK requires more water licence from an upland water source it has been recommended that efforts be focused on Lambly Creek as the reliability of the flow is expected to be higher during drought conditions. The typical municipal customer expects to have a sufficient volume of water available throughout the year, meaning careful consideration is necessary when calculating the capacity of an upland watershed.

The volume of water available from an upland watershed varies every year based on snowpack, rain temperature and many other climatic impacts that the DWK cannot control. To reduce some of this variability and raw water supply risk, the supply scenario used to determine the sustainable water yield from the upland watersheds is an average year followed by the 50 year drought condition. This condition was selected as it statistically provides an acceptable balance of reliability while not being overly conservative. Another key consideration when determining the sustainable yield from a watershed are the losses. Based on anecdotal input from the DWK it is assumed that there will be 30% losses in the upland watershed due to evaporation, infiltration during the conveyance through nature channels and creeks.

Review of the upland watershed shows that both the Powers and Lamby Creek watersheds can generate sufficient water to meet the ultimate water demands during an average run-off year; but during a drought there are challenges. During a 50-year drought the Powers Creek watershed generates less water than required meaning, in the future, an alternate water source will be required. During a 50-year drought the Lambly Creek watershed is predicted to be able to generate sufficient water proportional to the demand, assuming there is additional storage constructed in the future.

Further information on long term water supply recommendations is being developed in the Master Water Plan.



Relevant Policies and Plans

West Kelowna provides customers with information and tips to improve water conservation which is available on the District's website. West Kelowna is a partner in the Okanagan Basin Water Board, which is linked to the District's website along with the Okanagan Waterwise initiative by the Okanagan Basin Water Board.

- West Kelowna Water Conservation
 - <http://www.districtofwestkelowna.ca/index.aspx?page=520>
- Okanagan Basin Water Board
 - <http://www.obwb.ca/index/>
- Okanagan Waterwise
 - <http://www.okwaterwise.ca/>

The District is in the process of developing a Master Water Plan for West Kelowna. The document, which is scheduled to be adopted in 2013, has recommendations to improve water conservation through watershed management, operational improvements, bylaw recommendations, and capital improvement projects. This document used the Official Community Plan as the basis for growth modeling, the BC Living Water Smart guidelines for water efficiency, and the BC Climate Action Plan to mitigate and adapt to the consequences related to climate change.

- Master Water Plan
 - <http://www.districtofwestkelowna.ca/index.aspx?page=636>
- DWK Official Community Plan Bylaw 2011 #0100
 - <http://www.districtofwestkelowna.ca/index.aspx?page=672>
- BC Living Water Smart
 - <http://www.livingwatersmart.ca/>
- BC Climate Action Plan
 - <http://www.livesmartbc.ca/government/plan.html>



Program Implementation

Previously, the District of West Kelowna Council has approved \$300,000.00 towards the Master Water Plan. This plan, to be adopted in 2013, also addresses water conservation.

Further budgeting and implementation plans will be incorporated from the Master Plan.

Upon completion of the master plan, the District intends on pursuing the following water conservation measures. Budgeting and implementation timelines are shown in the table below.

Table 1.6 – Program Implementation

| Water Conservation Strategy | Budget Requirement | Implementation Year |
|---|--------------------|---|
| Completion of Master Water Plan | \$300,000 | Initiated in 2011 Completion in 2013 |
| District of West Kelowna Sewer Servicing Strategy – Services to 1450 properties | \$14,900,000 | Completed in 2012 |
| Develop Water Loss Management/Leak Reduction Plan | \$10,000 | 2014/2015 |
| Develop Residential Water Conservation Initiatives and Water Efficiency Recommendations | - | 2013/2014 |
| Customer Education | - | Ongoing |

