



Greater Vernon Water (GVW)

Technical Memorandum No. 6 Water Conservation Strategies

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AECOM Job Number:

60224916

Date:


February, 2013

Revision Log

Revision #	Revised By	Date	Issue / Revision Description
1	RTM	May 15, 2012	First Draft
2	RTM	June 28, 2012	Second Draft – Submitted to GVW
3	RTM	August 10, 2012	Third Draft
4	RTM	October 31, 2012	Fourth Draft
5	RTM	December 6, 2012	Fifth Draft
6	RTM	January 31, 2013	Revised Draft
7	RTM	February 26, 2013	Final


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Technical Memorandum No. 6: Water Conservation Strategies

1. Introduction

1.1 Background

Water conservation is one strategy implemented by a water utility to reduce demand. The strategy may take the form of incentives or measures which permanently reduce demand without reducing consumer satisfaction or output. Other measures, such as water use restrictions, reduce short term demand in times of supply scarcity.

By reducing consumption and sustaining unit demands, a community can effectively plan, defer or eliminate the need for new capital works. Water conservation strategies not only affect water supply and distribution budgets, they reduce wastewater treatment volumes and increase environmental awareness and sustainability.

A key goal of the 2012 Master Water Plan is to assure that GVW has a reliable and sustainable water supply to meet demand into the future. So why conserve water? The Okanagan Basin Water Board (2012) states:

“There is only one water in the Okanagan – snow, rain, lakes, streams, groundwater, water for fish or for drinking, wastewater, stormwater, and irrigation are all connected by the hydrologic cycle and by our shared use. The Okanagan has one of the lowest per capita water supplies in Canada. Wide fluctuations in precipitation swing us between extremes of drought and flood.”

1.2 Objectives of Study

This technical memorandum summarizes the process involved in developing a Water Conservation Strategy for GVW as part of the 2012 Master Water Plan. The process addresses Task 5 in the Terms of Reference (Proposal Task Number 3.3.6). The objective of this analysis is consistent with the Terms of Reference of the project, and to:

1. Review the purpose of water conservation in GVW.
2. Review recent trends in water consumption in GVW.
3. Examine water conservation programs and practices by other similar communities.
4. Review and analyze current water conservation practices initiated by Greater Vernon Water since 2001.
5. Provide a comparison of successful strategies and costs associated with these strategies.
6. Analyze the value of reclaimed water as part of the overall conservation strategy.
7. Recommend programs and necessary budget consistent with the goals in the 2012 Master Water Plan.
8. Set a 10 year goal for reduced water consumption.

1.3 GVW Consumption Patterns.

GVW current demand and future consumption estimates are summarized in Table 1-1.

**Table 1-1. Demand Forecast
(Source TM1- Domestic & Agricultural Water Demand Forecast)**

Year	Annual Demand (ML)			Max. Day Demand Consumption (MLD)			
	Domestic	Agricultural (typ.)	Agricultural (allotment)	Total	Domestic	Agricultural	Total
2011	9,670	12,600	17,400	27,100	59.4	213	272
2016	9,880		17,400	27,300	60.1	213	273
2021	10,470		17,400	27,900	63.1	213	276
2026	11,060		17,400	28,500	66.0	213	279
2031	11,550		17,400	29,000	68.1	213	281
2041	12,450		17,400	29,900	73.4	213	286
2052	13,360		17,400	30,800	78.5	213	292

Note: The actual consumption measured by meters in 2011 was 6,359 ML (Domestic) and 7,809 ML (Agricultural). Additional allowance was determined by calculation of treatment plant flows and allowing for "unaccounted" water losses such as fire-fighting, main flushing, and unmetered consumptive uses (Source – GVW).

Since 2001, GVW has consumed, on average, 25,000 ML of water per year. Domestic use, including all commercial, industrial and recreational demands is typically 45 percent of the total annual demand, while 55 percent is for agricultural consumption. These quantities vary by year based on a variety of factors, including weather, population, droughts, economic factors, etc. The domestic consumption is considered relatively stable, but gradually increases as populations increase as described in the Regional Growth Strategy. Most annual fluctuations can be generally attributed to climatic changes resulting in variable agricultural demand requirements.

Of particular note in this exercise is that GVW must be capable of providing the maximum agricultural allotment of 550 mm/yr/ha of irrigable land. This value has been calculated for the agricultural community based on licensing calculation from the BC Ministry of Agriculture. Actual consumptive use figures vary by year, but most research into irrigation practices indicate that most lands are, on average, under-irrigated.

2. Water Conservation Strategies

2.1 General

Water conservation policy should concentrate on reducing consumption practices within the community. Generally speaking, these policies should:

- Encourage long term sustainable water consumption practices while recognizing the utility of short term use reduction measures.
- Encourage reduced consumption rates to reduce operation and maintenance costs.
- To defer costs of development of new water sources and additional capital projects
 - Similarly, to allow growth within the utility while deferring costs of new water source development.
- Reduce wasteful practices and processes
- Reduce unnecessary system losses, such as leakage, seepage or evaporation.
- Manage peak flows within the system, reducing distribution costs.
- Manage water within the watershed, to reduce the impact to fish habitat and wildlife in the watershed.
- Recognize the link between land use and water demands that requires the harmonization of land use bylaws and landscape standards regulations.

Many of the above targets are operational issues within GVW, and require budget and manpower to implement. Other policy targets require change to popular habits that can be encouraged through public education programs or land use regulations.

2.2 Who Benefits?

Water conservation efforts within a community may be initiated to meet a variety of needs. To develop a solid water conservation strategy, it is important to highlight the beneficiaries of such policies. While water conservation strategies within a community raise community awareness and global responsibilities, there are direct beneficiaries as well. Understanding who directly benefits can also provide a source of funding.

- The new resident/business.
 - The community (domestic users) can continue to grow within the existing water allocation determined by the water licences set by the Province.
- The environment.
 - By only extracting water necessary for consumption, the remaining water is either stored or allowed to flow naturally within lakes, streams and rivers.
- GVW (Existing users)
 - Users benefit if global climate changes permanently reduce supply from the existing watershed either through reduced precipitation or changes in forest hydrology.
 - By encouraging reduced consumption, the increasing tax base helps pay for the renewal and operational costs of the existing water system, to increase economic stability.
 - The system becomes more efficient, with operations and maintenance costs decreasing.
 - Saves capital costs due to reduction on peak capacity provisions.

2.3 Who Should Pay for Water Conservation?

- New users?
 - Initially, new users must pay DCCs.
 - Existing users are responsible for a portion of the cost to provide the future water supply expansion projects through the assist factor under the Development Cost Charge Bylaw Legislation.
- Existing Users?
 - Existing users (including new users) pay water rates for conservation projects that reduce the risk of water shortage from drought from their existing supply, or that may extend the life of the existing supply infrastructure due to increased unit consumptive use patterns.
 - To see their water rates remain stable in the future due to increased operations costs to maintain the same supply including water treatment.
 - To reduce the impact on the global environment through reduction of materials and impact of large construction projects and ongoing use of chemicals in treatment and pumping.

2.4 GVW Water Conservation Targets

Technical Memorandum No.1 – Domestic & Agricultural Water Demand Forecast assumes demand projections to 2052 (as summarized in Table 1-1). Notable unit demand projections in this document assume that water conservation strategies are successful. Some key water 10 year conservation targets include:

- The base residential water use (winter) existing average value is currently 271 L/ca/day.
- To meet an average domestic consumption of 10,470 ML/y by 2022 (10 years), per capita consumption will need to drop to 250 L/ca/day. Reaching these values will require conservation strategies targeting domestic use. Individual strategies to reach this goal are addressed in Tables 4.1 and 4.2 later in this report.
- Agricultural use should never exceed its allotment of 17,400 ML/y, based on 550 mm/year on current irrigated area plus some room for expansion.

3. Current Water Conservation Initiatives

3.1 Greater Vernon

There are a number of water conservation initiatives currently being undertaken by GVW. Table 3-1 separates these initiatives into three classes; educational, financial and regulatory. It is important to identify current initiatives to evaluate the effectiveness of these initiatives and for future planning.

GVW has worked closely with the provincial government's BC Living Water Smart program as well as the Water Act modernization process, provincial programs aiming to better define water management practices across B.C. The Water Smart program is also a national initiative. A brief outline of the national program and relevant statistics of usage across Canada are found in Appendix A. GVW staff have analyzed best practices in other jurisdictions for reducing outdoor water consumption, being the driver of summer demand peaks, which has informed the majority of the initiatives listed in Table 3-1. Education programs on more water efficient landscaping methods are favoured, such as an audit or rebate for landscaping services, over an irrigation controller rebate as many jurisdictions have found poor monitoring of irrigation systems to be a major factor in water waste.

**Table 3-1
2001-2011 GVW Conservation Initiatives**

Type	Initiatives
<i>Educational</i>	<ul style="list-style-type: none"> • Public education through the OK Waterwise program – an education and outreach program of the Okanagan Basin Water Board including the “Make Water Work” media campaign. • Tips for reducing indoor and outdoor water use are on the website. • Several annual workshops have been hosted by the RDNO promoting “Waterwise” gardening at the Xerindipity Demonstration Garden. Topics include drip irrigation, xeriscaping and rain barrels. • An auditing program was planned to target high domestic water users and offer tools and advice to reduce excessive consumption practices. • A website (Okanagan Irrigation Management Program (OKIM)) now enables farm property owners to view the recommended irrigation water volume based on the property's soil type, crop, irrigation system and current weather for comparison to their own water consumption. RDNO provides the GVW consumption data to the system, while the website is maintained by an external consultant to allow participation of other water utilities. • Conservation Marketing, including bill-inserts, literature, school and public events, conferences, newsletters, workshops, training, paid TV and radio advertisements.
<i>Financial</i>	<ul style="list-style-type: none"> • Since 2006, GVW has administered a metering program that measures domestic and agricultural uses separately. As of 2012, approximately 90% of the agricultural connections are metered. • A domestic use fee structure using a base fee plus inclining block rates for consumption was implemented in 2011. A flat rate plus consumption fee is charged for non-domestic users. A tiered billing rate for water use over a customer's allocation was approved for agricultural customers in 2012. • A toilet rebate program was offered in the mid-2000's. This program was managed by the City of Vernon and District of Coldstream for their respective jurisdictions primarily to reduce sewage flows.
<i>Regulatory</i>	<ul style="list-style-type: none"> • Implementation of year-round water restrictions. No lawn or garden sprinkling is permitted between 10 am and 7 pm. • Issued a Drought Management Plan (2007, revised in 2011) recommending climate and flow monitoring parameters, a 5 year cycle for Watershed Risk Analysis, restrictions and percentage reduction of allocation at each stage (ie. 20% at Stage 2). • Encouraging the revision of municipal standards (in particular landscaping standards), bylaws and policies to incorporate water conservation.
<i>Drought Response Team</i>	<ul style="list-style-type: none"> • Committee of 26 volunteers from local business, government, schools, industry providing advice on developing the 2011 Drought Management Plan and Water Use Restrictions and the Staff Water Conservation Work Plan for 2011-2017.

3.2 Other Okanagan Communities

Many other communities in Canada, British Columbia and the Okanagan Valley have initiated water conservation strategies that curtail water use and educate the general public. The City of Kelowna has been one of the more recent public water conservation successes, particularly in getting the message out to ratepayers. Since 1995, overall water consumption in that community has increased by 2 percent, while the population has grown 30 percent. Other communities and water improvement districts in the Okanagan have also initiated similar programs and have claimed success by reduction of water consumption. Most of these programs have included the installation and monitoring of water meters, but not all. Other improvement Districts within Kelowna are implementing consistent accounting for water conservation programs as part of the Kelowna Joint Water Committee.

The most aggressive agricultural water conservation plan is used by the South East Kelowna Irrigation District (SEKID). Since the 1990's, the District was involved in a government program to install water meters on all agricultural connections. Over the past 12 years, SEKID developed a rate policy that was fair to all water users, yet penalized over-consumption. The policy has been modified on a couple of occasions, and still requires modification into the future.

Of interest to GVW is the setting of an initial allotment by the SEKID's Board of Directors each spring. The District establishes the minimum allotment of water allowable to each irrigation connection based on water supply estimates established from reservoir levels, snowpack and precipitation levels. The maximum allotment is 686 mm/year per cropped area (6.86 ML/ha or 2.25 ac-ft/acre). This "drought value" was established as the minimum rate required to successfully irrigate a high water consumption crop under drought conditions (worked out by SEKID and the BC Ministry of Agriculture). If the Board of Directors felt there was risk of water supply shortage prior to the irrigation season, the annual allotment could be reduced across the board (ie. 80% of 686 = , or 50% of 686 = 343 mm, etc.). Any irrigator exceeding this allotment was subjected to a rate penalty based on an inclining block rate system. In the first few years of the program, up to 20% of irrigators exceeded their allotments and paid penalties. However, following the first major drought during the program, nearly all irrigators respected the allotment limitations.

GVW has implemented a similar inclining block rate fee. Agricultural users can irrigate up to their allotment of 550 mm per year. An exception to this is during periods where restrictions have been implemented. See Appendix D for the percentage reduction at each restriction stage for GVW.

Note: The discrepancy between SEKID's 686 mm/year and GVW's 550 mm/year can be attributed mostly to soil type. While cropping and irrigation practices are somewhat similar, the soils in the SEKID area are gravelly to fine gravel in nature, with very high infiltration rates. The actual crop consumption figures are comparable.

To compare performance and note other achievements in the Okanagan, we have compiled a list of current conservation initiatives from similar sized municipalities and water districts since 2001 (see Table B-1 in Appendix B). The RDNO services area has much in common with other Okanagan communities in terms of weather pattern, water use, size and community mindset.

**Table 3-2. Sample Statistics from Comparable Communities to GVW
(Source: Associated Engineering, 2009)**

Community	Population within Utility	Winter Residential Demand (L/ca/d)	July Per Capita Demand (L/ca/d)	Current MDD (ML/d)	Total Demand (ML/y)
City of Kelowna	62,000	208 (260 in 2003)	561 (784 in 2003)	151	14,600 (2010)
City of Penticton	35,000	330 (approx.) ¹	920 (approx.)	389 (53 in 2003)	6,851 (2011) 8,300 (2002)
South East Kelowna ID	6,000	233	1200	104	16,251 (2009)
Glenmore Ellison ID	15,000	277	1155	68	N/A
Black Mountain ID	22,000	343	1415	158	N/A

Note: 1. Values extracted from graph in report in City of Penticton (2011).

3.3 Reclaimed Water System

In 1977, the City of Vernon commenced full-scale land-application of its treated wastewater, and since then the program has grown annually in response to increasing wastewater flows from the community. Following secondary (at times tertiary) treatment, the effluent is pumped to and stored in MacKay Reservoir. When extracted, the reclaimed water is then chlorinated then used to irrigate approximately 950 ha of agricultural and recreational lands within the town limits. The agricultural lands irrigated are zoned agricultural, but are not considered part of the agricultural licensed water supply. Land owners however, who use this water to irrigate pastures and hay, try not to over-irrigate their fields, as this leads to erosion, soil quality and access concerns.

If the reclaimed water system becomes an alternate supply for GVW's separated agricultural system, then water conservation practices and policies can affect the reliability of this supply source.

From a domestic perspective, implementing conservation policies to reduce urban water use should also decrease the resulting effluent quantity. While desirable to the City of Vernon from a waste management perspective, it does potentially affect future irrigation. There is currently not enough agricultural land to take irrigation water according to the 2011 Liquid Waste Management Plan process currently underway.

From an agricultural perspective, urban conservation decreases supply of reclaimed water, however, provides additional supply available from surface water systems.

3.4 Note on Water Meters

Water meter readings for individual services are generally available for all domestic and agricultural supplies. GVW meter data is collected from the City, District of Coldstream and RDNO. The municipal billing

departments collect water meter information through an automated collection system sub-contracted to them from the RDNO. The meter data is processed by the accounting departments of each jurisdiction, which then processes billing.

Each jurisdiction defines their accounts in different ways. Inconsistent data collection, archiving and reporting make comparison of water use statistics difficult. Assumptions are often made in differentiating such issues as Single Family Residents versus Multi-Family residences. For example, water meter records from GVW report that 14,168 ML was consumed in 2011, however flow records compiled from water distribution system measurements show consumption at 22,440 ML. The 22,440 ML value is consistent with measurement trends in the past history of the utility. This unaccounted for water (approximately 8,000 ML) is significant. Some, but not all, of this amount may be attributed to system leakage within the distribution infrastructure, water for fire-fighting or water main flushing. The water meter records may be accurate, but they may be incomplete.

Significant effort is needed by the Master Water Plan partners to coordinate data collection, quality assurance and quality control to successfully measure water, as well as implement consumption based fee systems. Evidence of this problem is the under-reporting and comparison of accounted water through the meter system to measured flows through the distribution system. For this Master Water Plan, the water meter data was cross-referenced with the GVW GIS water connection layer. Several gaps were visibly identified in the analysis (GVW later noted over 20 percent of information was missing or unaccounted for).

When properly functioning, water meter information can provide detailed information on consumptive use practices within the various zones and groupings. It can, if effectively used, assist in leak detection. The meters can also be used to measure individual consumption and potential usage rates.

4. Proposed Water Conservation Initiatives

The proposed Water Conservation Plan in the following tables include water conservation strategies which include current strategies developed by GVW and target two main areas: general operations (Table 4-1) and user consumption (Table 4-2). User consumption has been further detailed in this Master Water Plan to be domestic and agricultural consumption. Each strategy has a budget and is either incorporated into general administration or operations, or as a special capital budget to be included in the capital funding tables. In this analysis we represent an annual staff requirement as an FTE (full time equivalent) in Table 4-1a and 4-2a (ie. 2 FTE = 2 full time staff annually). The conservation strategies presented should be measured and adjusted every 4 years to assure success.

4.1 Notes Concerning Conservation Initiatives Targeting GVW Operations

We have added a significant program to improve both data management and reporting in this Master Water Plan. A key strategy is to improve the Quality Assurance and Quality Control of the data being reported, as well as reporting an accurate water balance. In the long term, this will improve accounting and reporting. The result should be better trust in the data, and a report tool to discuss rate penalties with ratepayers who exceed their allocations. Other programs, such as the AWWA Infrastructure Leakage Index benchmark system, are valuable tools to increasing the effectiveness of water conservation strategies.

4.2 Notes Concerning Conservation Initiatives Targeting GVW Users

Table 4-2 outlines conservation strategies aimed at user education, practices, audits and bylaws. Each strategy has a general purpose and goal. Also included are potential measurables to assess success, as well as anticipated annual budget requirements for the next 10 years. These quantities and strategies should be reviewed during Plan updates or revisions, and should not only be examined every decade.

4.3 Notes Concerning Agricultural Water Conservation

A level of prudence should always be maintained when implementing water conservation policies for agriculture. In the Okanagan, irrigation is required for crop production. Irrigation water usage depends on numerous factors including the crop types, irrigation system types, climate and climate change, prevailing local practices, market forces, and water prices. Developing a conservation policy based on developing low consumptive use crops, for example, may not be a viable strategy, as economics and markets drive crop type. Maintaining a conservative allowance for irrigation should not be ignored. All agricultural operations are businesses, and their survival is based on sound business decision and reliable water supply.

That being said, there are opportunities to conserve water within the operations, and the GVW should promote best practices where possible.

Table 4-1 Conservation Initiatives Targeting GVW General Operations

Outcome	Targeted Customers					Strategy	Program Detail	Tasks	Target Conservation Measure	Measure of Success	Capital Budget Required	
	SF	MF	ICI	Agr	GVW						Total (10 years)	Average
Better Information					•	Accurate Data and Management	Provide accurate, precise and defensible data processed from water meter data.	1. Develop databases and data quality control processes. 2. Reporting should be completed regularly and timely every year from all constituents. 3. Quality control procedures to be consistent for all GVW. Use GIS applications to note issues with data. Use AWWA standard process. 4. Install remainder of water meters on agricultural supplies. 5. Standardize water measurement procedures.	Complete data set, with proper quality control and consistency across all jurisdictions.	Complete Annual Data Sets.	1.6 FTE + \$330k	
					•	GVW Annual Water Audit	Prove an annual report summarizing all water use practices within GVW. Report all water use statistics by community using quarterly water demand comparisons.	1. Develop systems to analyze the data. Hire professionals to assist with Quality Assurance issues once the data is considered correct (see above). 2. Integrate GIS as a reporting tools to further analyze by neighbourhood/land use type/soils. 3. Report by individual community for internal use.	Defendable quarterly consumption statistics. Reduction of disputes and disparities between users and types based on better understanding of information.	Annual Reports defining quarterly results and broken down by zone type and constituency.	1.7 FTE + \$200k	
					•	Updating OKIM database	OKIM is an irrigation management web tool used by irrigators to compare their actual water use against predicted values. It can assist in determining if excess water is being applied, and providing educational tools to mitigate over-irrigation practices.	1. GVW is responsible for coordinating and managing the database for OKIM. 2. OKIM provides opportunity for additional Quality Control of data. 3. Educational tools can be added as part of the information.	10% reduction from maximum allotment.	Successful implementation of incline block rate system for overuse.	2.0 FTE + \$250k	
Improved Operations					•	Reduction of Unaccounted For Water Losses (UFW)	1. Completion of rehabilitation or replacement projects and accounting for water savings. 2. Identify major leaks using leak detection technologies.	1. Estimation of water leaks for the affected project, and the anticipated measured reduction. 2. Water leaks and seepage are eliminated or effectively reduced.	Reduction in average day demand	1. Measured decrease in UFW by 2022. 2. Number of confirmed leaks identified and repaired per year.	1.0 FTE + \$300k	
Better Policy					•	Revision of standards, bylaws and policies	Landscape standards and land use bylaws are part of each municipality's jurisdiction. Effort is required by all municipal partners to harmonize their bylaws across the region to ensure equitable conservation programs.	1. Update Bylaws	Overall Education, Public Buy-in, Responsibility	Policies that include Water Conservation targets	1 FTE	
					•	Revised Drought Management Plan	Every 3-4 years, revise the GVW Drought Management Plan using the latest information.	1. Last completed in 2011. New bylaw covering restrictions expected to be passed in 2013. 2. Bylaw outlines water restrictions to be implemented should extended drought occur. 3. Drought Response Team: 26 member committee including volunteers from local businesses. Can recall team in periods of drought. Will be doing annual report on conservation initiatives to the team every year to maintain participation.	Ability of GVW to supply water effectively in a severe drought.	Report every 4 years.	0.4 FTE + \$80k	
Environmental Planning	•	•	•	•	•	Support Okanagan Basin Research	Promote local research into water conservation activities and participate in local committee activities.	1. Support Okanagan Basin Water Board, University of British Columbia (Okanagan), Interior Health and other local community organizations 2. Promote agricultural cropping practices that sustain soil structure, nutrients and economic benefits.	Education and awareness. Consistency in reporting.	Participation in committees and provision of leadership.	1 FTE + \$200k	
Totals											8.7 FTE \$1,360k	0.9 FTE + \$136 k/year

Table 4-1a

**Conservation Initiatives Targeting GVW General Operations
Implementation Schedule and Estimated Costs**

Outcome	Targeted Customers					Strategy	Capital Budget Required for Conservation										Capital Budget Required	
	SF	MF	ICI	Agr	GVW		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total (10 years)	Average
Better Information					•	Accurate Data and Management	30% FTE \$50k Software Upgrade \$30k Data QA/QC	30% FTE \$30k Data QA/QC	30% FTE \$30k Data QA/QC	10% FTE \$20k QA/QC	10% FTE \$20k QA/QC	10% FTE \$50k Software Upgrade \$20k QA/QC	10% FTE \$20k QA/QC	10% FTE \$20k QA/QC	10% FTE \$20k QA/QC	10% FTE \$20k QA/QC	1.6 FTE + \$330k	
					•	GVW Annual Water Audit	10% FTE \$10k	10% FTE \$10k	10% FTE \$10k	20% FTE \$30k Data consultant	20% FTE \$30k Data consultant	20% FTE \$30k Data consultant	20% FTE \$20k	20% FTE \$20k	20% FTE \$20k	20% FTE \$20k	1.7 FTE + \$200k	
					•	Updating OKIM database	20% FTE \$25k	20% FTE \$25k	20% FTE \$25k	20% FTE \$25k	20% FTE \$25k	20% FTE \$25k	20% FTE \$25k	20% FTE \$25k	20% FTE \$25k	20% FTE \$25k	2 FTE + \$250k	
Improved Operations					•	Reduction of Unaccounted For Water Losses (UFW)	10% FTE \$30k Leak Detection Program	10% FTE \$30k Leak Detection Program	10% FTE \$30k Leak Detection Program	10% FTE \$30k Leak Detection Program	10% FTE \$30k Leak Detection Program	10% FTE \$30k Leak Detection Program	10% FTE \$30k Leak Detection Program	10% FTE \$30k Leak Detection Program	10% FTE \$30k Leak Detection Program	10% FTE \$30k Leak Detection Program	1.0 FTE + \$300k	
Better Policy					•	Revision of standards, bylaws and policies	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	1 FTE	
					•	Revised Drought Management Plan			20% FTE \$40k				20% FTE \$40k				0.4 FTE + \$80k	
Environmental Planning	•	•	•	•	•	Support Okanagan Basin Research	10% FTE \$20k OBWB Annual fees	10% FTE \$20k OBWB Annual fees	10% FTE \$20k OBWB Annual fees	10% FTE \$20k OBWB Annual fees	10% FTE \$20k OBWB Annual fees	10% FTE \$20k OBWB Annual fees	10% FTE \$20k OBWB Annual fees	10% FTE \$20k OBWB Annual fees	10% FTE \$20k OBWB Annual fees	10% FTE \$20k OBWB Annual fees	1 FTE + \$200k	
Totals							0.9 FTE \$165k	0.9 FTE \$115k	1.1 FTE \$155k	0.8 FTE \$125k	0.8 FTE \$125k	0.8 FTE \$175k	1.0 FTE \$155k	0.8 FTE \$115k	0.8 FTE \$115k	0.8 FTE \$115k	8.7 FTE \$1,360k	0.87 FTE + \$136k /year

Table 4-2. Conservation Initiatives Targeting User Consumption

Outcome	Targeted Customers					Strategy	Program Detail	Tasks	Target Conservation Measure	Measure of Success	Capital Budget Required	
	SF	MF	ICI	Agr	GVW						Total	Average
Public Education				•		Irrigation Management (OKIM)	Work with irrigators to manage their irrigation practices and improve efficiency. Use a web tool to allow self-management of water supplied to farmer.	1. Reduce over-irrigation practices 2. More efficient irrigation maximizing profit and margins. 3. Encourage installation of more efficient irrigation technologies.	Reduce excessive irrigation practices. Use 5.50 ML/ha as an irrigation threshold.	Number of irrigators not paying fines from excessive use.	1 FTE	
	•	•	•	•		Annual workshops on advanced technologies.	Provide resources and professional assistance to educate water users on best management practices and latest technologies.	1. Promote irrigation technology in local conferences. 2. Promote training - Certified Irrigation Designers/ Technicians through BC Irrigation	Reduced peak demands	Number of Workshops	1 FTE \$110k	
	•	•	•	•		Conservation Marketing	Market water conservation to the general public on a continuous and diligent basis.	1. Promote awareness of water conservation practices online with interactive tools (OK Waterwise). 2. Okanagan Basin Water Board tools (ie. BC Water Use Reporting Centre) 3. Water Conservation Calculator. 4. Advertise regularly using bill-inserts, literature, school and public events, conferences, newsletters, workshops, training, paid TV and radio advertisements.	1. Reducing peak demands and per capita consumption. 2. Continuous education to maintain long term water savings	Maintaining reductions on an annual basis. Track years of excessive demand.	1 FTE \$100k	
Audits				•		Agriculture Audits	Target agriculture connections with unusually high water demands using results from OKIM and water metering information.	1. Perform pilot studies on selected agricultural users from OKIM. 2. Investigate for leaks, breaches, problems. 3. Develop audit report and recommendations. 4. Offer rebate for professionals to do audit, help build buy-in by local irrigation businesses, or hire Certified Irrigation Designer/Auditor	Reduce UFW and inefficient irrigation practices.	Measured reduction in water consumption on affected agricultural connections.	1.75 FTE \$175k	
			•			ICI Audits for Landscape Irrigation	Target ICI users with high water use measurements to examine possible changes that promote water conservation. Perform water audit.	1. Perform pilot studies on certain users to audit water use a daily basis (Based on quarterly readings). 2. Identify those connections where excessive water use is expected. Investigate for leaks, breaches, problems. Target customer volunteers based on consumption and analysis of property (airphoto) to suggest high demand features. 3. Develop program materials and determine possible properties in 2012. Contact customers to secure participation.	Reduce UFW and inefficient irrigation practices.	Measured reduction in water consumption on affected ICI connections.	1.75FTE \$175k	
Enforcement of Bylaws	•	•	•			Year-Round Water Restrictions	Continue practice of year-round water use restrictions on domestic outdoor water use.	1. Specifically defined sprinkler schedules. 2. Enforce water use restrictions and couple with education/rebate programs to encourage long term behaviour change.	No landscape irrigation on Mondays (GVW). Simpler implementation of higher stages.	Reduce MDD. Reduction of peak demands. Meet minimum demands during drought year.	1.0 FTE \$40k	
	•	•	•	•		Consumption Fee Structure Review	With sound data, confirm that fees meet the revenue requirements of GVW.	Use annual data and water use reporting. Develop trust in using data for annual flow comparisons. 1. Currently, a flat rate plus consumption fee is charged for non-domestic users. 2. Penalty system - Summer Surcharge 3. Hire consultant to provide analysis to support long term fee structure (projections, maintenance cost cycles, etc).	Water measurement precision and accuracy	Revenue reflects water use statistics and is sustainable.	0.5 FTE \$10k	
				•		Inclined Block Rate Program	Irrigators are allowed to apply up to 550 mm of water per year as per their allotment. A flat rate is applied to this value. An inclined block rate is applied to those who exceed their allotment. The rates increase with increasing exceedence.	1. Use OKIM to manage values and supplies. 2. Staff must charge based on exceedence. 3. Manage feedback from users.	Excessive agricultural demand beyond the allotment and a fair supply accounting system.	Reduce overall agricultural consumption by 10% by 2022.	0.5 FTE	
Rebates	•	•	•			Rebate Programs	Promote landscape changes that promote water conservation. Provide grants and rebates for individual concepts and new technologies that improve water use.	1. Start irrigation timer/tensiometer shut-off program in 2017. 2. Examine possible rebates.	2012-Start. Target top 20 customers in first 2 years, then expand to other customers in 2014+	Measured decrease in base residential use in 2022 for those using the rebate.	1.6 FTE + \$190k	
Totals											10.1 FTE + \$800k	1.0 FTE + \$80k/year

**Table 4-2a. Conservation Initiatives Targeting User Consumption
Implementation Schedule and Estimated Costs**

Outcome	Targeted Customers					Strategy	Capital Budget Required for Conservation										Capital Budget Required	
	SF	MF	ICI	Agr	GVW		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total	Average
Public Education				•		Irrigation Management (OKIM)	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	1 FTE		
	•	•	•	•		Annual workshops on advanced technologies.	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	1 FTE		
						\$20k <i>Detailed user survey</i>	\$10k	\$10k	\$10k	\$10k	\$10k	\$10k	\$10k	\$10k	\$10k	\$10k	\$110k	
	•	•	•	•		Conservation Marketing	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	1 FTE		
						\$10k <i>Materials + Adverts</i>	\$10k	\$10k	\$10k	\$10k	\$10k	\$10k	\$10k	\$10k	\$10k	\$10k	\$100k	
Audits				•		Agriculture Audits	25% FTE	25% FTE	25% FTE	25% FTE	25% FTE	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	1.75 FTE	
						\$25k <i>5 Agr audits per year</i>	\$25k	\$25k	\$25k	\$25k	\$25k	\$10k	\$10k	\$10k	\$10k	\$10k	\$175k	
			•			ICI Audits for Landscape Irrigation	25% FTE	25% FTE	25% FTE	25% FTE	25% FTE	10% FTE	10% FTE	10% FTE	10% FTE	10% FTE	1.75 FTE	
						\$25k <i>5 ICI audits at \$1,000 per audit + final report</i>	\$25k	\$25k	\$25k	\$25k	\$25k	\$10k	\$10k	\$10k	\$10k	\$10k	\$175k	
Enforcement of Bylaws	•	•	•			Year-Round Water Restrictions				50% FTE	50% FTE		Note: Depends on year of drought			1.0 FTE		
						\$20k				\$20k	\$20k					\$40k		
	•	•	•	•		Consumption Fee Structure Review	5% FTE	5% FTE	5% FTE	5% FTE	5% FTE	5% FTE	5% FTE	5% FTE	5% FTE	0.5 FTE		
						\$10k						\$10k				\$10k		
				•		Inclined Block Rate Program	5% FTE	5% FTE	5% FTE	5% FTE	5% FTE	5% FTE	5% FTE	5% FTE	5% FTE	0.5 FTE		
Rebates	•	•	•			Rebate Programs			20% FTE	20% FTE	20% FTE	20% FTE	20% FTE	20% FTE	20% FTE	1.6 FTE		
						\$50k <i>Irrigation Timer Rebate</i>			\$30k <i>Irrigation Timer Rebate</i>	\$20k <i>Irrigation Timer Rebate</i>	\$20k <i>Irrigation Timer Rebate</i>	\$10k <i>Irrigation Timer Rebate</i>	\$20k <i>Rain Barrel Program</i>	\$20k <i>Rain Barrel Program</i>	\$20k <i>Rain Barrel Program</i>	1.6 FTE + \$190k		
Totals							0.9 FTE	0.9 FTE	1.1 FTE	1.6 FTE	1.6 FTE	0.8 FTE	0.8 FTE	0.8 FTE	0.8 FTE	10.1 FTE	1.0 FTE	
							\$80k	\$70k	\$120k	\$120k	\$110k	\$60k	\$60k	\$60k	\$60k	\$800k	\$80k/year	

5. Conclusions and Recommendations

Greater Vernon Water has invested significant effort in developing a water conservation policy with the goal of reducing daily water consumption, thereby reducing operational losses and mitigating impacts in times of drought. The water system is similar to other Okanagan valley water systems unique to British Columbia which are required to deliver water to an urban and agricultural community. Because of this unique delivery structure, it has been difficult to identify whether water conservation efforts are indeed effective, as the main water measurable remains total water used. Further detail into domestic and agricultural demands will require analysis using the available water meter information as it becomes available from the municipal billing partners.

Water conservation strategies have been developed to target two main areas: general GVW operations and user consumption, which includes all domestic, agricultural and ICI consumption. Each strategy has a suggested budget. We have identified that GVW would need to include a complement of 1.9 FTE (full time equivalent staff) and a project budget of \$215,000 per year to implement all the water conservation strategies identified in this plan. These costs will be incorporated into a later technical memoranda involving rate structure analysis.

Based on the above conclusions, we recommend the following:

- GVW implement the water conservation plan identified in Tables 4-1 and 4-2 with a complement of 1.90 FTE (full time equivalent staff) and a capital budget of \$215,000 per year.
 - The priority is to establish a sound data collection and annual water balance report process that accumulates, compiles and scrutinizes the water meter data from the various jurisdiction.
 - Other strategies that target GVW operations include:
 - Maintaining and updating the OKIM database
 - Reducing Unaccounted For Water Losses (UFW)
 - Coordinating with applicable municipal and provincial jurisdictions to encourage revision of standards, bylaws and policies affecting water demand such as the Building Code and Landscape Standards bylaws
 - Revising the Drought Management Plan as per recommended 5 year cycle.
 - Supporting Okanagan Basin research
 - Strategies that target GVW Water Users
 - Assisting with irrigation management using OKIM
 - Promoting annual workshops on irrigation technologies
 - Promoting conservation marketing
 - Recommending agriculture irrigation audits
 - Performing ICI Audits for Landscape Irrigation
 - Continuing year-round water restriction education and implement more stringent restrictions as determined by climate and operational triggers set out in the Drought Management Plan
 - Annual consumption fee structure reviews
 - Continue Incentive Block Rate Program and review its structure to maximize effectiveness
 - Implement other rebate programs
- GVW track their water use using a web based tools developed in British Columbia such as the BC Water User Reporting Centre or Water Conservation Calculator.
- That GVW review and revise, if necessary, water conservation strategies at least every 5 years.

6. References

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11. City of Penticton. 2011. 2011 Annual Report – Water Treatment.

Appendix A. WaterSmart Order

Department of the Interior. WaterSmart Order

Conference Board of Canada. 2012. Website. <http://www.conferenceboard.ca/hcp/details/environment/water-consumption.aspx>

1. How does Canada's water consumption compare to that of other countries?

Canada's water consumption was 1,494 cubic metres per capita (1.494 ML/y/capita) in 2000. In their homes alone, Canadians used over 300 litres of water per person per day. Canada's water consumption per capita was over nine times greater than that of the U.K., the best performer, and more than double that of the 16-country average. Only the U.S. consumes more water per person, at 1,682 cubic metres (1.682 ML/y/capita).

2. Why does Canada use so much water?

Industry is Canada's largest water user, using 68 per cent of the total water used in Canada in 2000. Industry use includes cooling machinery and equipment, producing energy, cleaning goods for manufactured items, and acting as a solvent. Of the industrial water users, thermal-electric power producers withdraw almost 80 per cent. Manufacturing industries take just over 19 per cent—where water is mainly used in the pulp and paper products industry, primary metals industry, and chemicals and chemical products industry. Mining industries are responsible for 1 per cent of total industrial withdrawals.

Domestic water use - which includes water used in commercial establishments and public services such as schools and hospitals—accounted for 20 per cent of total water use in Canada in 2000, although average residential water use per person dropped slightly from 335 litres per day in 2001 to 329 litres per day in 2004. Domestic water use includes drinking water, as well as all water withdrawn for homes, municipalities, commercial establishments, and public services like hospitals.

Residential water use per capita is generally lower in cities and larger communities than in smaller communities. This may be linked to water metering and volume-based pricing. Homes, institutions, and businesses in cities and larger communities are more likely to have water meters than those in smaller communities. Municipalities that charge according to the volume of water used have a lower average daily consumption rate.

Agricultural water use accounted for 12 per cent of total water consumption in Canada in 2000. Main agriculture water uses include irrigation (85 per cent) and livestock watering (15 per cent). Irrigation needs differ among the various regions of Canada. Some areas, such as southern Alberta, have a relatively large portion of land under irrigation. Other regions, such as Quebec, have a very small portion of the arable land under irrigation. Irrigation is needed mainly in the drier parts of Canada, such as the southern regions of Alberta, British Columbia, and Saskatchewan. These regions account for 85 per cent of all irrigation in Canada.

Some water users are more efficient than others. When the amount of water returned to the environment is taken into account, the proportions change considerably. Water use in agriculture is particularly inefficient, returning less than 30 per cent of water consumption.⁸ Thus agriculture represents the largest consumer of water in Canada.

Appendix B. Water Conservation in Comparable Communities

Table B-1. Recent Conservation Initiatives by Other Okanagan Communities.

Area	Conservation Initiatives	Trends
<p>City of Kelowna</p>	<ul style="list-style-type: none"> • Demand Side Management (DSM). Current goal is to reduce the maximum day demand by 15% from 2007 to 2012. • Work with all other water purveyors within Kelowna to ensure a consistent approach is applied throughout the community. • Public Communication Program and Customer Education – Use social marketing and customer education. Work with high water user to develop reduction strategies. • Link Water Conservation to Development Approvals. • Effective Full Cost Pricing with Volume based pricing structures. Promote revenue neutrality and provide incentives by penalizing heavy users and rewarding low users. • Reduce water system leakage – identify priority areas and complete leak detection surveys. • Promote and ensure the use of water efficient fixtures. Review existing fixture bylaws to ensure latest technology. • Water re-use opportunities. • Successful program in significantly reducing water requirements for City gardens. • Indoor and outdoor conservation tips listed on the City of Kelowna website. • An educational program called “Living Water Smart” is currently being promoted by the City. • Water restrictions are implemented when required. • Public Communication program has been expensive, but very effective. 	<ul style="list-style-type: none"> • SFU – Per Capita water use decreasing steadily since 1998. Average monthly water use 56 m³/month in 1995 is now 37.3 m³/month in 2010. • Total water use has increased by 2 percent since 1995, while population has grown 30 percent. • Average monthly use reduced from 56 m³ to 40 m³ from 1996 to 2009 while population increased from 48,000 to 64,000. • The City of Kelowna water utility uses a flat base rate plus a variable consumption charge for residential customers. For agricultural customers a rate of \$104/acre/year is charged. • Population = 65,600 (2010) <ul style="list-style-type: none"> ○ Average Residential Demand = 394 L/ca/d (595 in 2003) ○ Winter Residential Demand = 208 L/ca/d (260 in 2003) ○ July per capita Demand = 561 L/ca/d (784 in 2003)
<p>Black Mountain ID</p>	<ul style="list-style-type: none"> • BMID is partially metered. All larger irrigators = 600 residential (12%) • Irrigation Sprinkling Policy – Odd/Even Days • Drought Stage Sprinkling Regulations • BMID Staged plan for water conservation is based on economics, supplying appropriate quality water and education. <ul style="list-style-type: none"> ○ Meter installation for large irrigation parcels \$500/ML saved ○ Construct additional storage \$600-1500/ML stored ○ Domestic Water Meter Installation \$2,500/ML saved • Kelowna Joint Water Committee (KJWC) recommendations <ul style="list-style-type: none"> ○ Bylaw 7900 reduced MDD from 3,000 L/ca/d to 2,400 L/ca/d. ○ MDD <ul style="list-style-type: none"> ▪ Use 1,800 L/ca/d for SFU ▪ Use 900 L/ca/d for MFU ▪ Use 675 mm/y for Agriculture ○ ADD = 700 l/ca/d ○ Leakage Reduction <ul style="list-style-type: none"> ▪ Leakage represents 9.1% of annual demand (Low, but trend is seasonal use). 	<ul style="list-style-type: none"> • Population = 22,000 • Current MDD = 158.0 ML/d • Leakage is noted at 30 lps, or 80 ML/month. • Summer demands are 15 times base winter demand (Agriculture & Domestic). • Winter Residential Demand = 343.3 L/ca/d • July per capita Demand = 1415.7 L/ca/d • MDD <ul style="list-style-type: none"> ○ SF Lot (Base) = 0.0076 lps/unit ○ SF Lot (seasonal) = 0.075 lps/unit ○ Grade “A” irrigation= 0.725 lps/ha

Area	Conservation Initiatives	Trends
<p>Glenmore Ellison ID</p>	<ul style="list-style-type: none"> • Irrigation Sprinkling Policy – Odd/Even Days • Drought Stage Sprinkling Regulations • Metering program since 2005. Large water use and new customers are metered. • Kelowna Joint Water Committee (KJWC) recommendations <ul style="list-style-type: none"> ○ Bylaw 7900 reduced MDD from 3,000 L/ca/d to 2,400 L/ca/d. ○ MDD <ul style="list-style-type: none"> ▪ Use 1,800 L/ca/d for SFU ▪ Use 900 L/ca/d for MFU ▪ Use 675 mm/y for Agriculture ○ ADD = 700 l/ca/d ○ Leakage Reduction <ul style="list-style-type: none"> ▪ Leakage represents 9.1% of annual demand (Low, but trend is seasonal use). 	<ul style="list-style-type: none"> • Population = 15,000 • Current MDD = 68.3 ML/d • Leakage is noted at 15 lps, or 1.32 MDD. • Winter Residential Demand = 277.3 L/ca/d • July per capita Demand = 1155 L/ca/day • MDD <ul style="list-style-type: none"> ○ SF Lot (Base) = 0.0095 lps/unit ○ SF Lot (seasonal) = 0.0456 lps/unit ○ Grade “A” irrigation= 0.520 lps/ha
<p>South East Kelowna ID</p>	<p><u>Metering program implemented prior to 2001.</u></p> <ul style="list-style-type: none"> • Establish drought year requirement equal to 686 mm of water applied to all agricultural land (6.86 ML/ha or 2.25 acre feet of water per acre of irrigated land – Average of all soil types). • Meters measure excess water use (above the drought year requirement). Drought year entitlement can be modified slightly depending on soil type. • Inclined block rate system used to determine excess rate structure (penalties). Trustees retain the authority to discontinue water service at its discretion. <p>400 irrigation meters - \$784 over 4 years (\$1,960/meter). 10% reduction = 1660 ML, or \$470/ML</p> <p><u>Cost benefit analysis</u></p> <p>Phase 1 of the program resulted in a net financial gain for the district based on the value of the water surplus identified. One hectare of land has a drought year water requirement of 6.86 ML/ha (2.25 acre-feet/acre) of water. In 1998 water rights for one hectare of land could be purchased from the district for \$4,942 (\$2,000 per acre). The water surplus created through metering and other water use efficiencies is adequate to supply 242 hectares (600 acres) of land and the total revenue potential from the sale of these water rights amounts to \$1,200,000. The total cost of the metering program amounted to \$784,000. The benefit to cost ratio through Phase 1 of the program can be calculated as follows:</p> <ul style="list-style-type: none"> • Program Benefit (value of water rights freed up) = \$1,200,000 • Program Cost = \$784,000 • Benefit/Cost Ratio = 1.53 <p>SEKID believes the allotment system is an effective method for managing agricultural water.</p> <ul style="list-style-type: none"> • The allotment provides an adequate volume of water under drought year conditions • The inclined block rate for water use in excess of the allotment deters significant excess water use, without severely penalizing those who exceed their allotment by a minor amount. • The system is designed to eliminate water waste, not beneficial use. <ul style="list-style-type: none"> • Also, 2011 <ul style="list-style-type: none"> ○ Sprinkling will permitted on an odd/even basis depending on your address: ○ Odd numbered addresses will water on odd numbered dates and even numbered addresses will water on even dates. 	<ul style="list-style-type: none"> • Population = 6,000 • Current MDD = 103.9 ML/d • Leakage is noted at 23.8 lps, or 2.1 MDD. • Winter Residential Demand = 232.7 L/ca/d • July per capita Demand = 1199.5 L/ca/day • MDD <ul style="list-style-type: none"> ○ SF Lot (Base) = 0.008 lps/unit ○ SF Lot (seasonal) = 0.082 lps/unit ○ Grade “A” irrigation= 0.575 lps/ha • Agricultural demand reduction of 10 percent. • 22% reduction in demand under drought conditions (2003), significantly reducing water use while maintaining adequate supply for agricultural use. • Annually, success in reducing excess water consumption based on comparison to drought water requirement (established annually by the Board). • Budget required to maintain all meters in good operation.

Area	Conservation Initiatives	Trends
District of West Kelowna	<ul style="list-style-type: none"> • Water tips on website – address indoor water use, lawn and garden, household leaks. • Stage 1 sprinkling restriction in place for all irrigation season. • In 2003 set up sprinkling regulations which resulted in a 15% reduction in average summer demand over the next three years. • A universal water metering program was implemented between 2006 and 2010. • Irrigation: From 2007 to 2009 the WID studied the use of agricultural water. With input from an Agricultural Water metering Advisory Committee a bylaw was setup to allow a maximum of 24 inches of water per acre from June to the end of the irrigation season. 	<ul style="list-style-type: none"> • Consumption billing is incorporated within West Kelowna. • Combined result has been an annual water demand reduction of 24% and a MDD decrease of 26% since 2002.
City of Penticton	<p>2011 Outcomes</p> <ol style="list-style-type: none"> 1. Expand Water Smart Initiative - to develop and implement demand management initiatives aimed at benefiting residential and small business water users. 2. School Presentations - to promote conservation to the younger generation <p>2012 Water Conservation Goal and Objectives</p> <ol style="list-style-type: none"> 1. Reduce Peak Day Demand and Average Daily Demand. <ul style="list-style-type: none"> o Purpose – minimize the implication of our growing community on water resources. Effectively develop programs which aim at reducing Peak Day Demand and Average Daily Demand. 2. Update Water Conservation Webpage <ul style="list-style-type: none"> o Purpose – provide relevant solutions to reducing water waste as well as timely information on water consumption in order to promote the cause and effect of turning off the tap. Every drop counts! 3. Promote Canadian Drinking Water Week and BC Drinking Water Week <ul style="list-style-type: none"> o Purpose – distribute posters and information regarding local activities including contests thru OBWB and BCWWA. 4. Collaborate with OBWB and RDOS regarding public messaging <ul style="list-style-type: none"> o Purpose – cost sharing initiative promoting similar messages 5. Participate in Farmer's Market and other Community Events 6. Water System Understanding: <ul style="list-style-type: none"> o Identify Unaccounted for Water – leakage, errors in recording and accounting, illegal connections, malfunctioning meters, leakage at open reservoirs, reservoir or creek diversion overflow and theft. o Reducing UFW – Using leak detection equipment like portable strap on flow meters with data loggers 	<p>Status -</p> <ul style="list-style-type: none"> • Environmental Ambassador pilot project was extended to February in order to allow for measurable results. Overall, businesses were far more driven to adopt electrical suggestions over water conservation measures. In fact the goal of reaching 100 small to medium sized businesses was not met, though approximately 80 businesses did participate. • No water restriction fines served to residents or businesses • Participate and promote BC Drinking Water Week with bus shelter ads. • Focus on where our water comes from, the costs and processes required to provide safe drinking water and the importance of turning off the tap • Create activities to engage students as well as adhere to prescribed learning outcomes <ul style="list-style-type: none"> • MDD has been reduced from 53MLD in 2003 to 39 MLD in 2010. • ADD reduced from 23MLD in 2003 to 18 MLD in 2010. • Irrigation water: (Non treated): \$133/acre/year • Domestic: Flat rate based on meter size, plus consumption \$1.46/hundred cu.ft.

Appendix C. Water Conservation Calculator



WATER CONSERVATION CALCULATOR

- 1** What Is the Water Conservation Calculator?
- 2** Why Incorporate Water Conservation into Community Planning?
- 3** Provincial Commitment to Water Conservation
- 4** Using the Water Conservation Calculator
- 5** Benefits of the Water Conservation Calculator

1 What Is the Water Conservation Calculator?

The Water Conservation Calculator (WCC) is a free, web-based decision-support tool used to illustrate how specific water conservation measures can yield both fiscal and physical water savings for communities.

The WCC produces charts and a printed report intended to support the case for water conservation when presented to decision makers.

Other key functions of the WCC include:

- providing useful information on the current state of the water system;
- offering a “snap shot” of future demands and the positive impacts of conservation on those demands;
- assisting in more accurately targeting conservation efforts, thereby increasing the cost effectiveness of conservation initiatives; and
- assisting in decision making around new infrastructure by illustrating the possibility of capital deferral.

The WCC is designed for use by small to mid-size communities; however the WCC may be useful to any community wanting to conserve water.

2 Why Incorporate Water Conservation into Community Planning?

Water is an essential resource that sustains not only human health and well-being, but the health of the natural environment.

A changing climate, increasing urbanization and population growth present significant challenges to community water supplies and infrastructure.

Water conservation plays an important role in protecting and preserving water resources by helping communities adapt to changing conditions. Conservation allows communities to provide safe and clean water more quickly, economically and with less impact on the environment than traditional source development or infrastructure upgrade projects.

Incorporating water conservation into community planning can:

- extend the life of both drinking water and wastewater infrastructure;
- reduce operation and maintenance costs;
- increase resource use efficiency;
- reduce greenhouse gas emissions from decreased energy consumption;
- reduce water source degradation;
- preserve aquatic ecosystem health and functionality; and
- help communities adapt to climate change.

3 Provincial Commitment to Water Conservation

The government of British Columbia (Province) is committed to supporting sustainable and integrated water resource management.

In Living Water Smart: B.C.'s Water Plan, the Province outlines its targets for water conservation, including:

- water use in B.C. will be 33% more efficient by 2020;
- 50% of new municipal water needs will be acquired through conservation by 2020;
- water laws will provide incentives to be water efficient by 2012; and
- new approaches to water management will address the impacts from a changing water cycle, increased drought risk, and other impacts on water caused by climate change by 2012.

The Ministry of Community and Rural Development (MCD) capital grant programs play an important role in supporting water conservation and meeting the targets of the Living Water Smart plan.

Water conservation plans are a conditional requirement for those local governments receiving funding from MCD for drinking water or wastewater projects.

The WCC can assist communities in meeting the conditional requirements of MCD capital grant programs while meeting both local and provincial commitments to water sustainability.

4 Using the Water Conservation Calculator

The WCC is easy to navigate, with instructional text to help guide the user through each of the five modules. Technical support is also available through the 'help' function.

A basic understanding of the community water system is necessary to use the WCC. Before beginning, community and water system data will need to be collected. Data requirements have been categorized as mandatory and optional.

The WCC is designed to provide value using only mandatory data, however including optional data will improve results. Some mandatory data fields include:

- service population;
- projected annual population growth rate;
- total annual water supply capacity;
- maximum daily supply capacity;
- total annual water demand; and
- annual water system budget.

The time required to gather data will depend on the level of detail and the availability of the data being collected. Once the selected data have been collected, approximately half an hour should be reserved to complete the existing system profile in the WCC.

Once the existing system profile is complete, users have the option to examine a variety of conservation measures. The WCC includes cost-effective conservation measures for the residential, commercial, institutional and industrial sectors.

The WCC provides the opportunity to create multiple reports, allowing the user to compare and contrast the savings gained from a combination of different conservation measures.

Water system data is entered into Module 1: Existing System Profile

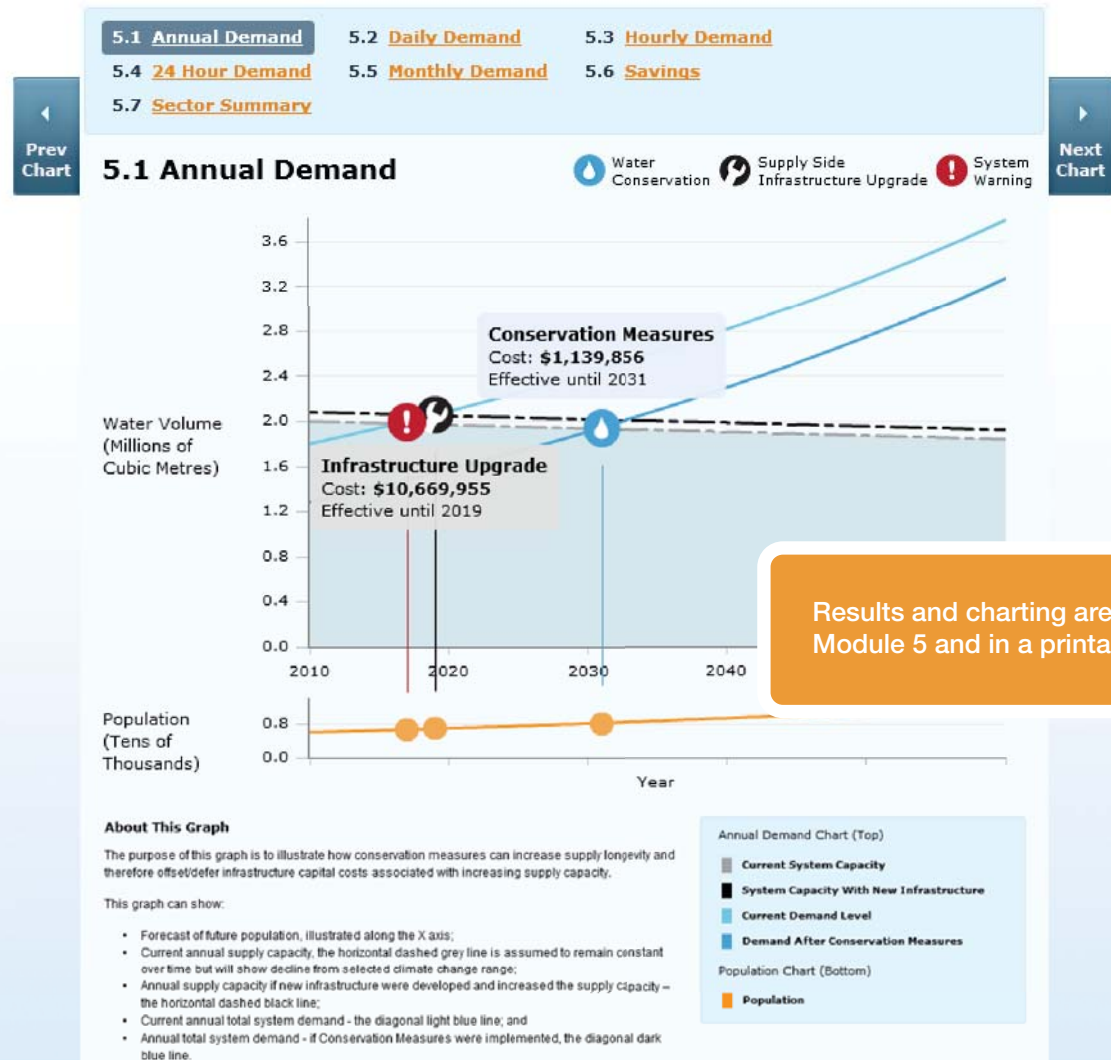
The screenshot displays the 'Water Conservation Calculator' web application. The interface is divided into five main modules: 1. Existing System Profile, 2. Conservation Savings, 3. Conservation Savings Finances, 4. Infrastructure Upgraded, and 5. Results & Charting. The user is currently in Module 1, Step 1.1: Service Characteristics. The page title is 'Step 1.1 Service Characteristics'. A yellow banner at the top of the form says 'Save, and Go Back to Existing System Profile'. The form contains several input fields for population data: 'Permanent Population' (5,000 people), 'Seasonal Population' (1,000 people), and 'Predicted Annual Population Growth Rate' (1.5 %). Below these is a 'Current Service Population' field set to 6,000 people. A 'Forecast Service Population' table shows values for 5, 10, 20, and 50 years: 6,463, 6,963, 8,081, and 12,631 respectively. A 'This form is complete.' message is visible. At the bottom, there are buttons for 'Project & Reports Browser', 'Save Report', 'Download PDF', and 'Edit Benchmarks'. The project name is 'Demonstration Project' and the report is 'Demonstration Report'.

5 Benefits of the Water Conservation Calculator

Water conservation plays a critical role in managing water resources. The WCC is designed to help B.C. communities take positive action towards conservation.

Using the WCC will allow users to:

- collect and record community water system data;
- prepare useful information about the current state of the water system and future demands;
- compare the water savings from water conservation to supply-side upgrade options;
- compare the costs of water conservation to supply-side upgrade options;
- assist in decision making around new infrastructure by illustrating the possibility of capital deferral;
- more accurately target conservation efforts, thereby increasing the cost effectiveness of conservation initiatives;
- forecast future population and water supply scenarios to assist with community climate change planning and overall growth management; and
- generate up to seven charts and a printed PDF report to help present the case for water conservation to decision makers.



**WATER CONSERVATION
CALCULATOR**

Try it Now!

www.waterconservationcalculator.ca

Appendix D. GVW Water Restrictions

		NORMAL	STAGE 1	STAGE 2	STAGE 3	STAGE 4	
	Residential Water Use Restrictions	DESCRIPTION: Represents normal (i.e. average) conditions for local area. Water use restrictions focus on water use efficiencies and drought awareness.	DESCRIPTION: Represents below normal conditions for local area. Water use restrictions focus on water use efficiencies intended to reduce water use by roughly 10%. If triggered by drought, represents early drought (drier than average) conditions for local area.	DESCRIPTION: Represents low water supply conditions for local area. Water use restrictions are necessary to sufficiently reduce water demand. Intended to reduce water use by roughly 20%. If triggered by drought, represents moderate drought conditions.	DESCRIPTION: Represents very low water supply conditions. Water use restrictions are necessary to maintain supplies during a period of critical water shortage. Intended to reduce water use by roughly 50%. If triggered by drought, represents severe drought conditions for local area.	DESCRIPTION: Strict water use restrictions are necessary to maintain critical supply. Intended to reduce water use by 90%. Represents an emergency loss of supply during which water is spared for consumptive and sanitary purposes only.	
	ACTIVITY	RESTRICTION DETAILS*	RESTRICTION DETAILS*	RESTRICTION DETAILS*	RESTRICTION DETAILS*	RESTRICTION DETAILS*	
A	Lawn and Aesthetic Garden Watering - Manual Sprinklers	Watering allowed between 6am-10am and 7pm-12am up to 3 days per week.	Watering allowed between 6am-10am and 7pm-12am up to 3 days per week.	Watering allowed between 6am-10am and 7pm-12am, up to 2 days per week.	Watering allowed between 6am-10am and 7pm-12am, 1 day per week.	Use of GVW supplied water for all forms of aesthetic lawn and garden watering is prohibited.	
	Odd Address Schedule	Tuesday, Thursday, Saturday	Tuesday, Thursday, Saturday	Tuesday & Saturday	Saturday		
	Even Address Schedule	Wednesday, Friday, Sunday	Wednesday, Friday, Sunday	Wednesday & Sunday	Sunday		
B	Lawn and Aesthetic Garden Watering - Automatic Timer Sprinkler Systems	Watering allowed between 12am-6am up to 3 days per week.	Watering allowed between 12am -6am up to 3 days per week.	Watering allowed between 12am -6am, up to 2 days per week.	Watering allowed between 12am -6am, 1 day per week.		
	Odd Address Schedule	Tuesday, Thursday, Saturday	Tuesday, Thursday, Saturday	Tuesday & Saturday	Saturday		
	Even Address Schedule	Wednesday, Friday, Sunday	Wednesday, Friday, Sunday	Wednesday & Sunday	Sunday		
C	Lawn and Aesthetic Garden Watering - Micro Jet or Drip Irrigation	Anytime	Watering allowed any day between 7pm-10am .	Watering allowed up to 3 days a week as per Stage 1 odd/even Lawn Sprinkling restriction days (Line A) between 7pm-10am.	Watering allowed Tuesdays & Fridays between 7pm-10am.		
D	Lawn and Aesthetic Garden Watering - Handheld Sprinkling (spring-loaded nozzle on hose or watering can)	Anytime	Anytime	Watering allowed up to 3 days a week as per Stage 1 odd/even Manual Sprinkler restrictions (Line A) between 6am-10am & 5pm-12am.	Watering allowed Wednesdays & Sundays between 6am-10am & 7pm-12am.		
E	New (non-established) Lawns and Landscaping Sprinkling	Follow supplier recommended watering schedule. After installation (2 weeks for Sod or 6 weeks for Seeded Lawns) resume watering as per Lawn & Aesthetic Garden Watering restrictions for your irrigation system (Lines A-D).	Follow supplier recommended watering schedule. Recommended that seeding start no later than <u>May 31</u> or after <u>Sept. 1</u> . After installation (2 weeks for Sod or 6 weeks for Seeded Lawns) resume watering as per Stage 1 Lawn & Aesthetic Garden Watering restrictions for your irrigation system (Lines A-D).	RDNO sprinkling permit required. Sod requires 2 week permit to be displayed on lawn. Seeding must start before <u>April 30</u> or after <u>Sept. 1</u> and requires a 6 week permit to be displayed on lawn. After permit period, resume watering as per Stage 2 Lawn & Aesthetic Garden Sprinkling restrictions for your irrigation system (Lines A-D).	No new permits issued for seeded lawns. Placement of sod may take place with sprinkling permit not to exceed 2 week period. After permit period, resume watering as per Stage 3 Lawn & Aesthetic Garden Sprinkling restrictions for your irrigation system (Lines A-D).		No new permits issued or renewed. Use of water supplied by GVW prohibited.
F	Food Gardens and Fruit Trees/Shrubs	Follow Lawn and Aesthetic Garden Watering restrictions, as noted above (Lines A-D), for the irrigation system in use.	Follow Stage 1Lawn and Aesthetic Garden Watering restrictions (Lines A-D above) for the irrigation system in use.	Follow Stage 1Lawn and Aesthetic Garden Watering restrictions (Lines A-D above) for the irrigation system in use.	Watering allowed Tuesdays & Fridays between 6am – 10am and 7pm to 12am, as required to maintain plant health.		Use of water supplied by GVW prohibited.
G	Garden Ponds, Aesthetic Fountains, and Water Features	Filling and refilling is permitted on days and times specified for Lawn & Aesthetic Garden Watering-Manual Sprinkling (Line A).	Filling and refilling is permitted on days and times specified for Stage 1 Lawn & Aesthetic Garden Watering-Manual Sprinkling (Line A).	Filling and refilling is permitted on days and times specified for Stage 2 Lawn & Aesthetic Garden Watering-Manual Sprinkling (Line A).	Filling and refilling with water supplied by GVW is prohibited.	Filling and refilling with water supplied by GVW is prohibited.	
H	Pools	Filling and refilling is permitted on days and times specified for Lawn & Aesthetic Garden Watering-Manual Sprinkling (Line A).	Filling and refilling is permitted on days and times specified for Stage 1 Lawn & Aesthetic Garden Watering-Manual Sprinkling (Line A).	Filling and refilling is permitted on days specified for Stage 2 Lawn & Aesthetic Garden Watering-Manual Sprinkling (Line A). Topping up only from June 15-Aug. 31 unless pool has cartridge filter.	Topping up allowed once per week on Wednesday. Filling and refilling are prohibited unless pool has cartridge filter - then filling/re-filling allowed on Wednesdays.	Filling, topping up, and refilling with water supplied by GVW is prohibited.	
I	Cleaning Outdoor Surfaces (driveways, sidewalks, decks, artificial turf, patios)	Use a broom, device or hose with a spring-loaded nozzle, or mop and bucket.	Use a broom, device or hose with a spring-loaded nozzle, or mop and bucket.	Washing with spring-loaded nozzle for health and safety purposes or to prepare a surface for painting or similar treatment. Washing for aesthetic purposes is prohibited.	Washing with spring-loaded nozzle for health and safety reasons only. Washing for aesthetic purposes is prohibited.	All forms of cleaning of outdoor surfaces with GVW water are prohibited unless ordered by a regulatory authority (i.e. WCB, public health inspector, etc.).	
J	Vehicle (boat/ automobile/ATV/ etc.) Washing	Use a bucket with cloth or sponge, or visit a water wise commercial car wash.	Use a bucket with cloth or sponge, or visit a water wise commercial car wash.	Use a bucket with cloth or sponge, or visit a water wise commercial car wash.	No washing or rinsing except for safety purposes (windows, lights, licenses).	No washing or rinsing with GVW water except for safety purposes (windows, lights, licenses).	

* These restrictions are for water supplied by GVWU only. They do not apply to the use of reclaimed or recycled water, greywater, rainwater harvested by the customer, or any other sources of water not supplied by GVWU. Customers are encouraged to utilize rainwater for appropriate uses such as garden irrigation.

		NORMAL	STAGE 1	STAGE 2	STAGE 3	STAGE 4	
	Commercial Water Use Restrictions**	DESCRIPTION: Represents normal (i.e. average) conditions for local area. Water use restrictions focus on water use efficiencies and drought awareness.	DESCRIPTION: Represents below normal conditions for local area. Water use restrictions focus on water use efficiencies intended to reduce water use by roughly 10%. If triggered by drought, represents early drought (drier than average) conditions for local area.	DESCRIPTION: Represents low water supply conditions for local area. Water use restrictions are necessary to sufficiently reduce water demand. Intended to reduce water use by roughly 20%. If triggered by drought, represents moderate drought conditions.	DESCRIPTION: Represents very low water supply conditions. Water use restrictions are necessary to maintain supplies during a period of critical water shortage. Intended to reduce water use by roughly 50%. If triggered by drought, represents severe drought conditions for local area.	DESCRIPTION: Strict water use restrictions are necessary to maintain critical supply. Intended to reduce water use by 90%. Represents an emergency loss of supply during which water is spared for consumptive and sanitary purposes only.	
	ACTIVITY	RESTRICTION DETAILS*	RESTRICTION DETAILS*	RESTRICTION DETAILS*	RESTRICTION DETAILS*	RESTRICTION DETAILS*	
A	Lawn, Aesthetic Garden, and Plants for Sale - Manual Sprinkling	Watering allowed between 6am-10am and 7pm-12am up to 3 days per week.	Watering allowed between 6am-10am and 7pm-12am up to 3 days per week.	Watering allowed between 6am-10am and 7pm-12am, up to 2 days per week.	Watering allowed between 6am-10am and 7pm-12am, 1 day per week.	Use of GVW supplied water for all forms of aesthetic lawn and garden watering is prohibited.	
	Odd Address Schedule	Tuesday, Thursday, Saturday	Tuesday, Thursday, Saturday	Tuesday & Saturday	Saturday		
	Even Address Schedule	Wednesday, Friday, Sunday	Wednesday, Friday, Sunday	Wednesday & Sunday	Sunday		
B	Lawn, Aesthetic Garden, and Plants for Sale -Automatic Timer Sprinkler Systems	Watering allowed between 12am-6am up to 3 days per week.	Watering allowed between 12am -6am up to 3 days per week.	Watering allowed between 12am -6am, up to 2 days per week.	Watering allowed between 12am -6am, 1 day per week.		
	Odd Address Schedule	Tuesday, Thursday, Saturday	Tuesday, Thursday, Saturday	Tuesday & Saturday	Saturday		
	Even Address Schedule	Wednesday, Friday, Sunday	Wednesday, Friday, Sunday	Wednesday & Sunday	Sunday		
C	Lawn, Aesthetic Garden, and Plants for Sale - Micro Jet or Drip Irrigation	Anytime	Watering allowed any day between 7pm-10am .	Watering allowed up to 3 days a week as per Stage 1 odd/even Lawn Sprinkling restriction days between 7pm-10am (Line A).	Watering allowed Wednesday & Friday between 7pm-10am.		
D	Lawn, Aesthetic Garden, and Plants for Sale - Handheld Sprinkling (spring-loaded nozzle on hose or watering can)	Anytime	Anytime	Hand watering of potted plants can be done any day between 6am-10am & 5pm-12am. In-ground plant watering is allowed up to 3 days per week as per Stage 1 Manual Sprinkling restrictions (Line A).	Hand watering of potted plants is allowed on Tuesday, Thursday, & Sunday between 6am-10am & 7pm-12am. In-ground plant watering is allowed up to 2 days per week as per Stage 2 Manual Sprinkling restrictions (Line A).		
E	New (non-established) Lawns and Landscaping Sprinkling	Follow supplier recommended watering schedule. After installation (2 weeks for Sod or 6 weeks for Seeded Lawns) resume watering as per Lawn & Aesthetic Garden Watering restrictions for your irrigation system (Lines A-D).	Follow supplier recommended watering schedule. Recommended that seeding start no later than <u>May 31</u> or after <u>Sept. 1</u> . After installation (2 weeks for Sod or 6 weeks for Seeded Lawns) resume watering as per Stage 1 Lawn & Aesthetic Garden Watering restrictions for your irrigation system (Lines A-D).	RDNO sprinkling permit required. Sod requires 2 week permit to be displayed on lawn. Seeding must start before <u>April 30</u> or after <u>Sept. 1</u> and requires a 6 week permit to be displayed on lawn. After permit period, resume watering as per Stage 2 Lawn & Aesthetic Garden Sprinkling restrictions for your irrigation system (Lines A-D).	No new permits issued for seeded lawns. Placement of sod may take place with sprinkling permit not to exceed 2 week period. After permit period, resume watering as per Stage 3 Lawn & Aesthetic Garden Sprinkling restrictions for your irrigation system (Lines A-D).		No new permits issued or renewed. Use of water supplied by GVW prohibited.
F	Garden Ponds, Aesthetic Fountains, and Water Features	Filling and refilling is permitted on days and times specified for Lawn & Aesthetic Garden Watering-Manual Sprinkling (Line A).	Filling and refilling is permitted on days and times specified for Stage 1 Lawn & Aesthetic Garden Watering-Manual Sprinkling (Line A).	Filling and refilling is permitted on days and times specified for Stage 2 Lawn & Aesthetic Garden Watering-Manual Sprinkling (Line A).	Filling and refilling with water supplied by GVW is prohibited.		Filling and refilling with water supplied by GVW is prohibited.
G	Pools	Filling and refilling is permitted on days and times specified for Lawn & Aesthetic Garden Watering-Manual Sprinkling (Line A).	Filling and refilling is permitted on days and times specified for Stage 1 Lawn & Aesthetic Garden Watering-Manual Sprinkling (Line A).	Filling and refilling is permitted on days specified for Stage 2 Lawn & Aesthetic Garden Watering-Manual Sprinkling (Line A). Topping up only from June 15-Aug. 31 unless pool has cartridge filter.	Topping up allowed once per week on Wednesday. Filling and refilling are prohibited unless pool has cartridge filter - then filling/re-filling allowed on Wednesdays.	Filling, topping up, and refilling with water supplied by GVW is prohibited.	
H	Cleaning Outdoor Surfaces (driveways, sidewalks, decks, artificial turf, patios)	Use a broom, device or hose with a spring-loaded nozzle, or mop and bucket.	Use a broom, device or hose with a spring-loaded nozzle, or mop and bucket.	Hosing with spring-loaded nozzle for health and safety purposes or to prepare a surface for painting or similar treatment. Washing for aesthetic purposes is prohibited.	Hosing with spring-loaded nozzle for health and safety reasons only. Washing for aesthetic purposes is prohibited.	All forms of hosing of outdoor surfaces with GVW water are prohibited unless ordered by a regulatory authority (i.e. WCB, public health inspector, etc.).	
I	Vehicle Washing - including commercial operations, dealerships, fleets	Use a commercial car wash or hose equipped with spring-loaded nozzle.	Use a commercial car wash or hose equipped with spring-loaded nozzle. Conveyorized/automatic car wash facilities should strive to be water wise as per industry standards.	Car washes using recycled water systems may continue to operate with no restrictions. Conveyorized/automatic car wash facilities should strive to be water wise as per industry standards- shorten wash times. Wand wash or washing with spring-loaded nozzle is permitted.	Spring-loaded nozzle or wand wash permitted for health and safety purposes only. Car washes using recycled water systems may continue to operate if wash times are shortened.	No washing or rinsing of vehicles and pleasure crafts, except spot cleaning with sponge and bucket for health and safety reasons (windows, lights, license plates).	
J	Golf courses	Irrigation should only occur between 7pm-6am.	Reduce watering of fairways to three days per week as per Line B restriction times.	Reduce watering of greens and tees. Fairway watering limited to two days per week as per Line B restriction times.	No watering permitted for fairways. Minimal watering only for tees and greens.	All forms of watering are prohibited.	
K	Artificial turf and outdoor tracks (i.e. Bicycle, motorcycle, and running tracks)	Cleaning, with a hose or sprinkler, permitted for health and safety only. Use spring-loaded nozzle.	Cleaning, with a hose or sprinkler, permitted for health and safety only. Use spring-loaded nozzle.	Cleaning, with a hose or sprinkler, permitted for health and safety only. Use spring-loaded nozzle.	Cleaning, with a hose or sprinkler, permitted for health and safety only. Use spring-loaded nozzle.	All forms of cleaning of outdoor surfaces with GVW water are prohibited unless ordered by a regulatory authority (i.e. WCB, public health inspector, etc.).	

* These restrictions are for water supplied by GVWU only. They do not apply to the use of reclaimed or recycled water, greywater, rainwater harvested by the customer, or any other sources of water not supplied by GVWU. Customers are encouraged to utilize rainwater for appropriate uses such as garden irrigation.

** These restrictions apply to all businesses supplied by the RDNO-GVW. Any activity relating to irrigation, including the watering of plants for sale (nursery stock) or cemeteries, is required to adhere to the restrictions as they apply to the type of irrigation used by the business.

		NORMAL	STAGE 1	STAGE 2	STAGE 3	STAGE 4
Public Institutional Water Use Restrictions		DESCRIPTION: Represents normal (i.e. average) conditions for local area. Water use restrictions focus on water use efficiencies and drought awareness.	DESCRIPTION: Represents below normal conditions for local area. Water use restrictions focus on water use efficiencies intended to reduce water use by roughly 10%. If triggered by drought, represents early drought (drier than average) conditions for local area.	DESCRIPTION: Represents low water supply conditions for local area. Water use restrictions are necessary to sufficiently reduce water demand. Intended to reduce water use by roughly 20%. If triggered by drought, represents moderate drought conditions.	DESCRIPTION: Represents very low water supply conditions. Water use restrictions are necessary to maintain supplies during a period of critical water shortage. Intended to reduce water use by roughly 50%. If triggered by drought, represents severe drought conditions for local area.	DESCRIPTION: Strict water use restrictions are necessary to maintain critical supply. Intended to reduce water use by 90%. Represents an emergency loss of supply during which water is spared for consumptive and sanitary purposes only.
ACTIVITY		RESTRICTION DETAILS*	RESTRICTION DETAILS*	RESTRICTION DETAILS*	RESTRICTION DETAILS*	RESTRICTION DETAILS*
A	School Yards, Sports Fields, and Sand-based Playing Fields	Avoid irrigation between 10am-7pm.	Limit irrigation to 3 times per week (Tuesday, Thursday, Saturday) and avoid irrigation between 10am-7pm.	Limit irrigation to 2 times per week (Tuesday & Saturday) and avoid irrigation between 10am-7pm.	Irrigate 1 day/week at minimum levels permitted to maintain areas in useable condition.	All forms of irrigation are prohibited.
B	Water Spray Parks and Indoor/Outdoor Pools		Recirculating pool water only.	No restrictions on spray parks with user-activated switches. Other spray parks must be turned off from 8pm-9am. Filling, refilling and topping is permitted two days per week (Tuesday & Thursday) between 6am-10am & 7pm-12am.	No restrictions on spray parks with user-activated switches. Other spray parks must be turned off from 8pm-9am. Filling and refilling is not permitted. Topping is permitted one day per week between 6am-10am & 7pm-12am.	Water parks shut down. Municipal outdoor pools closed.
C	Aesthetic Fountains and Water Features	Recirculating water only.	Recirculating water only.	No filling or refilling permitted unless using recycled/reclaimed water or rainwater. To avoid health and safety problems drain and use water to irrigate landscaping.	Filling and refilling are prohibited. To avoid health and safety problems drain and use water to irrigate landscaping.	Filling and refilling are prohibited. To avoid health and safety problems drain and use water to irrigate landscaping.
D	Municipal Parks and Cemeteries	Avoid irrigation between 10am-7pm.	Limit irrigation to 3 times per week and avoid irrigation between 10am-7pm.	Irrigation allowed 2 days per week, (Tuesday & Thursday) between 7pm-6am.	Irrigate 1 day/week - minimum levels permitted to maintain areas in useable condition.	All forms of irrigation are prohibited.
E	Municipal Ornamental Lawns and Grassed Boulevards	Avoid irrigation between 10am-7pm.	Limit irrigation to 3 times per week (Tuesday, Thursday, Saturday), between 7pm-6am, except where Parks Department is authorized for safety and security reasons.	Two days per week, (Tuesday & Thursday) between 7 pm and 6 am.	Irrigate 1 day/week - minimum levels permitted to maintain areas in useable condition.	All forms of irrigation are prohibited.
F	Municipal Water Main Flushing and Hydrant Maintenance	No restrictions.	No restrictions.	Only for unscheduled safety or public health reasons. No routine flushing.	Only for unscheduled safety or public health reasons. No routine flushing.	Only for unscheduled safety or public health reason. No routine flushing.
G	Artificial Turf and Outdoor Tracks (i.e. bicycle, motorcycle and running tracks)	Cleaning, with a hose or sprinkler, permitted for health and safety only. Use spring-loaded nozzle.	Cleaning, with a hose or sprinkler, permitted for health and safety only. Use spring-loaded nozzle.	Cleaning, with a hose or sprinkler, permitted for health and safety only. Use spring-loaded nozzle.	Cleaning, with a hose or sprinkler, permitted for health and safety only. Use spring-loaded nozzle.	All forms of cleaning of outdoor surfaces with GVW water are prohibited unless ordered by a regulatory authority (i.e. WCB, public health inspector, etc.).

* These restrictions are for water supplied by GVWU only. They do not apply to the use of reclaimed or recycled water, greywater, rainwater harvested by the customer, or any other sources of water not supplied by GVWU. Customers are encouraged to utilize rainwater for appropriate uses such as garden irrigation.

	NORMAL	STAGE 1	STAGE 2	STAGE 3	STAGE 4
Agricultural Water Use Restrictions	DESCRIPTION: Represents normal (i.e. average) conditions for local area. Water use restrictions focus on water use efficiencies and drought awareness.	DESCRIPTION: Represents below normal conditions for local area. Water use restrictions focus on water use efficiencies intended to reduce water use by roughly 10%. If triggered by drought, represents early drought (drier than average) conditions for local area.	DESCRIPTION: Represents low water supply conditions for local area. Water use restrictions are necessary to sufficiently reduce water demand. Intended to reduce water use by roughly 20%. If triggered by drought, represents moderate drought conditions.	DESCRIPTION: Represents very low water supply conditions. Water use restrictions are necessary to maintain supplies during a period of critical water shortage. Intended to reduce water use by roughly 50%. If triggered by drought, represents severe drought conditions for local area.	DESCRIPTION: Strict water use restrictions are necessary to maintain critical supply. Intended to reduce water use by 90%. Represents an emergency loss of supply during which water is spared for consumptive and sanitary purposes only.
ACTIVITY	RESTRICTION DETAILS*	RESTRICTION DETAILS*	RESTRICTION DETAILS*	RESTRICTION DETAILS*	RESTRICTION DETAILS*
Crop Irrigation**	Maximum water use permitted: 5500 m ³ /ha for season	Maximum water use permitted: 5500 m ³ /ha for season Increased surveillance of allocation compliance and communication to encourage users to take voluntary conservation measures.	Mandatory reduction of maximum water use by 20%: 4400 m ³ /ha for season GVW may decide to implement late turn on or early turn off of agricultural water.	Mandatory reduction of maximum water use by 50%: 2750 m ³ /ha for season GVW may decide to implement late turn on or early turn off of agricultural water.	Mandatory water restrictions. Outdoor water use prohibited except water for livestock and minimal maintenance of perennial fruit trees. (80% reduction of allowable water use) GVW may decide to implement late turn on or early turn off of agricultural water.

* These restrictions are for water supplied by GVWU only. They do not apply to the use of reclaimed or recycled water, greywater, rainwater harvested by the customer, or any other sources of water not supplied by GVWU.

** Typical irrigation season is April 15 - September 15. The GVWU reserves the right to change turn on and turn off dates, thereby affecting irrigation season duration, based on current water supply availability and drought forecasts. If the restriction stage is reduced during the growing season, customer allocation would be prorated based on the number of days the higher restriction level was instituted.