

# **A Soft Path Strategy for Fergus-Elora, Ontario: Technical Appendices**

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POLIS Project on Ecological Governance

**watersustainabilityproject**



## APPENDIX A:

# ABOUT THE TOWNSHIP OF CENTRE WELLINGTON

## A River Runs Through It: About the Grand River

The Township of Centre Wellington's (TCW) Official Plan sites the Grand River as, "the single most important physical feature within Centre Wellington." It goes on to say:

Today, the Township of Centre Wellington recognizes the contributions of the Grand River system to the lifestyle its residents enjoy. The river system provides a wide variety of recreational opportunities such as water sports, nature and scenic appreciation, fishing and hunting, trails and corridors and human heritage appreciation. In combination, the heritage resources and recreation opportunities provide the basis for our tourism industry. Several areas of natural heritage significance associated with the Grand River are located in Centre Wellington, including the limestone gorges through Fergus, Elora and Salem...Through its own actions and in its review of development applications, the Township will undertake measures to enhance the rivers' water quality, to enhance the quality of the fishery, to prevent bank and steep slope erosion, and to provide for the filtration of stormwater runoff.

The Grand River is more than a central aesthetic feature of the area; it also supports livelihoods, recreation, and tourism. For example, the development of Shand Dam and Belwood Reservoir in 1942 created a cold-water habitat capable of supporting a trout fishery. The reach was stocked sporadically between 1946 and 1988 with brown trout and rainbow trout. The brown trout grew exceptionally well in the warm, turbid waters, leading to the establishment of a thriving angling industry (Ontario Ministry of Natural Resources, 2004).

The Elora Gorge is one of the most beautiful and spectacular natural areas in the Grand River valley. The Grand River rushes through the gorge, which has 22-metre high cliffs. Riverside trails and scenic overlooks attract many tourists to the area. From the cliffs, tourists enjoy stunning views of the water far below, where kayakers and tubers make their way through the rapids (GRCA, 2011).

## Municipal Infrastructure Expansion Requirements

In Fergus, there are five bedrock wells, each with its own pumphouse, two elevated water towers, and a distribution system. At each pumphouse, the raw water is treated with chlorine and is then distributed or stored. In Elora, there are three bedrock wells and pumphouses, two elevated water towers, and a distribution system. Raw water is treated with chlorine and then discharged directly into the distribution system. The Township is planning to increase the number of wells in coming years to accommodate increases in maximum daily demands (MDD). Wastewater generated by the Town of Fergus is treated at the Fergus Water Pollution Control Plant, upgraded in 2001, with a capacity of 8,000 m<sup>3</sup>/d. The Village of Elora has a separate wastewater treatment facility, the Elora Water Pollution Control Plant, with a capacity of 3,000 m<sup>3</sup>/d. Although both facilities employ conventional activated sludge treatment, the Fergus facility has much more stringent effluent quality standards.

# Altered Water Courses: Water Quantity Stress Assessments

The Grand River Watershed Tier 2 Water Quantity Stress Assessment was prepared to meet the requirements of the Province of Ontario's *Clean Water Act* (Ontario, 2006). A Stress Assessment determines the potential stress that municipal water takings have on the sub-watershed or other assessment area. Percent Water Demand calculations determine the ratio of municipal water demand to the total water inputs to the assessment area. The Irvine River assessment area contains the municipal groundwater supplies for Fergus-Elora in the Township of Centre Wellington.

The Irvine River assessment area was classified as having a *low* potential for stress, with the municipal water takings for Fergus-Elora, resulting in a Percent Water Demand of 5% under average conditions and 6% under maximum demand conditions. If future municipal demands increase the Percent Water Demand to between 8% and 10% of the total watershed budget, additional studies could be triggered by the a *moderate* stress classification. Future average daily demands of 8,813 m<sup>3</sup>/d would trigger a sensitivity analysis, and a demand of 11,405 m<sup>3</sup>/d would trigger a full Tier 3 Assessment. However, it may be prudent to delay a decision on proceeding with a Tier 3 Assessment for Fergus-Elora until population projections are refined, a water conservation plan is in place, or a Water Supply Master Plan has been completed for Centre Wellington (GRCA, 2009).

## References

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## APPENDIX B:

# DEVELOPMENT OF “BUSINESS AS USUAL” SCENARIO

## Water Demands in the Township of Centre Wellington

Total average annual daily water production in the Township of Centre Wellington was 5,159 m<sup>3</sup>/d between 2006 and 2008. TCW is universally metered and the average annual daily water use (ADD) from each sector was determined using bulk meter data. Table B.1 further disaggregates water use in Fergus-Elora into residential, industrial, commercial, institutional (IC&I), and non-revenue water demand for both average and maximum daily demand. The calculation methodology for disaggregating demand is noted in the footnotes.

**Table B.1.** Annual Average Daily Demands by Sector

	Total <sup>1</sup> ADD	% by Sector
IC&I	1220 <sup>2</sup>	24%
Residential	3161	61%
Non-Revenue	778 <sup>3</sup>	15%
Total	5159 <sup>4</sup>	100%

An analysis of average annual water demands is useful for understanding annual trends in operating cost and for benchmarking average per capita daily water use in each sector against other communities. However, average summer demands and maximum daily demands provide a more accurate illustration of the potential for water shortages and system design needs. Both are discussed below.

## Average Annual Daily Demands

### ***Residential Demand***

Residential water use constitutes approximately 61% of the total water demand in the Township. An average daily residential water demand for 2006 to 2008 of 191 litres per capita per day (Lcd) was calculated for TCW by dividing the total metered residential water use (3161 m<sup>3</sup>) by the serviced population (16581).<sup>5</sup> Residential water demand in Ontario averages 260 Lcd; 191 Lcd is considered very low in comparison to other urban municipalities in Ontario (Environment Canada, 2007; City of Guelph, 2009; Region of Peel, 2004).

<sup>1</sup> Embeds non-revenue water in each sector to provide the same basis as PDD

<sup>2</sup> Ratio of IC&I:Residential = 1: 0.39 determined using 2007/2008 billings data

<sup>3</sup> Calculated using the average of 2007/2008 bulk meters less metered billings

<sup>4</sup> Average of 2006-2008 bulk meter readings

<sup>5</sup> The population and water use projections differ by one year. However this error is anticipated to provide lower than actual per capita consumption values, which will result in a conservative estimate of the *potential* for water conservation.

The low per capita residential water demand may be a result of multiple factors including the ongoing conservation efforts in the municipality; a heightened conservation ethic resulting from a community serviced by groundwater supplies; and demographics that lead to lower water use. The per capita demand may also be incorrectly low as a result of an overestimated serviced population. For example, the customer survey completed by the GRCA reported an average of 2.4 persons per household (pph) whereas the serviced population was calculated assuming 2.7 pph in the Master Plan. An assumption of 2.4 pph would result in a higher per capita demand of 213 Lcd.

The results of the customer surveys aligned well with housing information provided by the municipality, each indicating that approximately 80% to 84% of residents occupied single-family homes. The remaining 16% to 20% were assumed to reside in multi-family homes. Given the unexpectedly low residential per capita water use and the uncertainties of housing mix inherent in a long planning horizon, single family and multi family homes were amalgamated in the scenario building analysis.

### **Residential Indoor**

Residential indoor water use was estimated at 96% of average daily demand by analyzing monthly metering data for the lowest three (typically winter) months, the equivalent of 3024 m<sup>3</sup>/d annually or 182 Lcd. This data was available only for 2007 and 2008. It should be noted that 2008 was an exceptionally wet year, which may artificially skew the results to suggest a lower outdoor water use. This value should be monitored and updated as additional data becomes available. This ratio corresponds well with urban communities in Ontario, where indoor water use represents between 90% and 95% of ADD (OWWA, 2008).

### **Residential Outdoor**

Stemming from the analysis of indoor water use, residential outdoor water use for all of TCW was estimated at 4%, or 137 m<sup>3</sup>/d averaged annually.

### ***IC&I Demand***

The IC&I sectors comprise 24% of Average Daily Demand, or 1220 m<sup>3</sup>/d. The top four highest IC&I users were identified as the local hospital, two long-term care facilities, and a manufacturer of polymeric materials that are used in transportation, mining and flooring industries. Fergus also has two laundromats and Fergus-Elora together have upwards of five car dealerships that may use large volumes of water. Industrial consumers in both Fergus and Elora include a biotechnology firm developing egg-derived antibodies, welding and machine shops, and specialty manufacturing. Institutional water demands stem from several nursing and retirement homes, numerous schools and preschools, and a Conestoga College satellite school. Both Fergus and Elora have animal hospitals, and Fergus has a general hospital, which is one of the top water users in the community. Fergus also has a community centre with an indoor swimming pool and ice rinks.

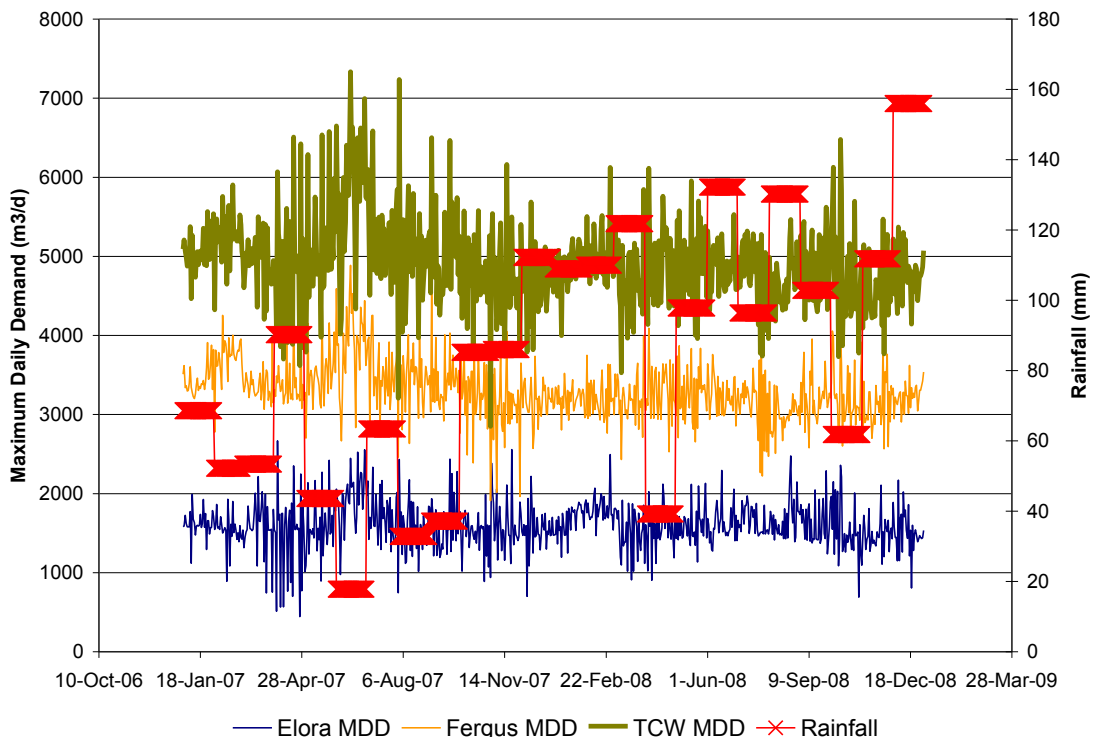
Monthly billed data for the lowest three months of IC&I used indicated that indoor water use was approximately 87% of total average daily IC&I demand; outdoor water use in the IC&I sectors was therefore estimated at 10 m<sup>3</sup>/d.

## Non-Revenue

Non-revenue water includes system leakage, leakage at the end use, fire hydrant use, water system flushing, water meter inaccuracies, and other non-metered water uses. In 2008, the non-revenue water demand in Fergus-Elora was 13% of the average daily demand. This was calculated by subtracting the total water accounted for by individual meter readings from the total volume measured by bulk water meters. Typical non-revenue values in Canada range between 5% and 20%; however, a percentage does not effectively represent the degree of water loss in a system. Water loss is heavily dependent on the volume of water used in individual facilities and the rate of loss within those facilities as, for example, from leaky toilet valves (Environment Canada, 2007). The Infrastructure Leakage Index (ILI) is considered the appropriate benchmark for the degree of water loss in a community. The ILI requires a detailed International Water Association (IWA) Water Balance and is recommended as a best practice to accurately assess the opportunity for leakage reduction.

## Maximum Daily Water Demands

Maximum daily water demands are of particular interest because they dictate water supply capacity. Water demands approximately double during the summer months and are heavily impacted by outdoor water use. Maximum daily demands are much more variable from year to year than base water demands<sup>6</sup> as a result of temperature, rainfall patterns, and the duration of drought periods and hot weather (OWWA, 2008).



**Figure B.1.** Daily water demands and Rainfall Patterns

<sup>6</sup> Base water demands are the demands that remain approximately constant year round, and can be estimated by examining patterns in winter water use.

The Reserve Capacity calculations (2008) reviewed data from 2005 through 2007 and determined the highest daily volume used for Fergus and Elora combined was 7868 m<sup>3</sup>/d; this value was assumed the maximum daily demand (MDD) for this analysis.

An analysis of the maximum daily demands (MDD) for the 2007/2008 period illustrates that peak periods coincided with low precipitation recorded at Shand Dam (see Figure B.1). This increased demand was therefore attributed primarily to outdoor water use in the residential sector and commercial sector. The overall peaking factor was 1.53 which is in line with peaking factors noted in other Ontario municipalities (OWWA, 2008).

Average monthly demands for the residential and IC&I sectors were analyzed to identify the highest three months in 2007 and 2008. During the three months of high demand, the ratio of IC&I:residential demand was found to be 27% : 73% in Fergus, and 33% : 67% in Elora.<sup>7</sup> The average ratio for the entire Township of Centre Wellington was 28% for IC&I and 72% for residential. This relative maximum monthly use was used to estimate peaking factors for each sector (see Table B.2).

**Table B.2.** Maximum Day Demands & Peaking Factors

	Total ADD	Total MDD	Peaking Factor
IC&I	1220 <sup>8</sup>	1985 <sup>9</sup>	1.63
Residential	3161	5105	1.61
Non-Revenue	778 <sup>10</sup>	778	1.0
Total	5159 <sup>11</sup>	7868 <sup>12</sup>	1.53

<sup>7</sup> TCW Peak Water Use Spreadsheet, 2009

<sup>8</sup> Ratio of IC&I:Residential determined using 2007/2008 billings data

<sup>9</sup> Non-Revenue 778 m<sup>3</sup>/d was first subtracted from the MDD of 7868 m<sup>3</sup>/d. The remainder of PDD was then split 28% IC&I and 72% Residential

<sup>10</sup> Calculated using the average of 2007/2008 bulk meters less metered billings

<sup>11</sup> Average of 2006-2008 bulk meter readings

<sup>12</sup> 2008 Reserve Capacity Calculations – average of 2005-2007



## APPENDIX C: FUTURE PROJECTIONS

### Population and Growth

Population and growth projections were adopted from the Township of Centre Wellington Water Servicing Master Plan, and the 2008 Reserve Capacity calculations and are reported in Table C.1.

**Table C.1.** Township of Centre Wellington Population Growth

	Total TCW
Residential Serviced Population 2008	16,581 <sup>13</sup>
Future Serviced Population 2028	26,924 <sup>14</sup>
Future Serviced Population 2040	33,804 <sup>15</sup>

### Future Water Demand

Future average daily and maximum daily water use projections were extrapolated for each sector to create the “Business as Usual” scenario. The following assumptions were applied to forecast current water demand for each sector.

- Residential water demand projections extrapolated the historical per capita demands of 191 Lcd linearly with population growth as illustrated in Table C.1, with a growth factor of 2.04 between 2008 and 2040.
- City planning information indicated the 2008 IC&I employment population of 11,320 in 2008 will increase to 17,690 by 2031 (TCW, 2009:PC), a growth rate of 1.95%/year. This results in an overall growth rate of 1.86 between 2008 and 2040, which is somewhat lower than the population growth factor of 2.04. For simplicity, and to retain the same linear extrapolation methodology as employed in the reserve capacity calculations, a growth rate of 2.04 was utilized for all sectors providing an overestimation of future water demands in the IC&I sector.
- Non-revenue water was assumed to increase linearly and to constitute 15% of future total demands.
- No water conservation and demand management measures were incorporated into the “Business as Usual” projections. However, the Ontario Building Code (OBC) mandates ultra low flow toilets (6 litres per flush) in all new construction and the OBC is currently undergoing a review with the intention to update to more stringent water efficient standards. The OBC is therefore anticipated to significantly reduce the future per capita demands given that the population, and presumably the number of homes, is projected to double.

<sup>13</sup> 2008 Reserve Capacity Calculations

<sup>14</sup> Water Servicing Master Plan population growth projections

Annual average daily water demands for the combined system are projected to reach 8,337 m<sup>3</sup>/d in 2028 and 10,518 m<sup>3</sup>/d in 2040. Projections for each sector are reported in Table C.2. Maximum daily demands of 12,776 m<sup>3</sup>/d in 2028 and 16,041 m<sup>3</sup>/d in 2040 were estimated by assuming that the peaking factors for each sector will remain constant. The maximum daily demands correspond with the projections in the reserve capacity calculations in that the maximum per capita demand was held constant at 475 Lcd; however, these projections were significantly lower than the master plan projections of 15,812 m<sup>3</sup>/d in 2028 and 19,080 m<sup>3</sup>/d in 2040.

**Table C.2.** Future “Business As Usual” Demands

	2008		2028		2040	
	Total ADD	Total PDD	Total ADD	Total PDD	Total ADD	Total PDD
Population	16581		26,924		33,804	
Growth Rate					2.04	
IC&I	1220 <sup>15</sup>	1985 <sup>16</sup>	1981 <sup>17</sup>	3244 <sup>18</sup>	2487 <sup>19</sup>	4047 <sup>20</sup>
Residential	3161	5105	5133 <sup>21</sup>	8289 <sup>22</sup>	6445 <sup>23</sup>	10408
Non-Revenue	778 <sup>24</sup>	778	1263 <sup>25</sup>	1263	1586 <sup>26</sup>	1586
<b>Total</b>	<b>5159<sup>27</sup></b>	<b>7868<sup>28</sup></b>	<b>8377</b>	<b>12776</b>	<b>10518</b>	<b>16041</b>

<sup>15</sup> Ratio of IC&I:Residential determined using 2007/2008 billings data

<sup>16</sup> Non-Revenue 778 m<sup>3</sup>/d was first subtracted from the PDD of 7868 m<sup>3</sup>/d. The remainder of PDD was then split 28% IC&I and 72% Residential

<sup>17</sup> Growth rate of 1.95%/yr

<sup>18</sup> IC&I peaking factor of 1.63 from Table B.2

<sup>19</sup> Ratio of IC&I:Residential determined using 2007/2008 billings data

<sup>20</sup> Analysis of the ratio between IC&I:residential during the highest 3 months in both 2007 and 2008

<sup>21</sup> Growth factor of 1.62 based on population growth to 2028

<sup>22</sup> Residential peaking factor of 1.59 from Table B.2

<sup>23</sup> Growth factor of 2.04 based on population projections

<sup>24</sup> Calculated using the average of 2007/2008 bulk meters less metered billings

<sup>25</sup> Calculated using the average of 2007/2008 bulk meters less metered billings

<sup>26</sup> Calculated using the average of 2007/2008 bulk meters less metered billings

<sup>27</sup> Average of 2006-2008 bulk meter readings

<sup>28</sup> 2008 Reserve Capacity Calculations – average of 2005-2007

## APPENDIX D: RESIDENTIAL WATER EFFICIENCY IN TCW TODAY

The TCW provided information on housing numbers built both before and after the Ontario Building Code was updated to include water efficient fixtures in 1996. These findings were compared with the customer survey response in Table D.1. An estimated 22% to 33% of homes were built after 1996, suggesting that these homes have 6 litres per flush (Lpf) toilets, 9.5 Lpm showerheads and 8.35 Lpm faucets installed, resulting in a typical per capita indoor water use of 200 Lcd.<sup>29</sup>

**Table D.1.** Homes Built after 1996 Water Efficiency Standards were included in Ontario Building Code

Housing Units	TCW Records		Survey Results
Total Homes 2006	9540		
Post-1996 Homes	2136	22%	33%
Pre-1996Homes	7404	78%	67%

As many as 40% to 50% of homes have already installed efficient fixtures as defined in Table C.2, suggesting that half of the homes in the Township utilize 200 Lcd or less indoors. Furthermore, an estimated 63% of homes reported having toilets using 6 Lpf and 10% of homes reported using less than 6 Lpf (Table D.3). This finding supports other evidence that TCW has a low average residential per capita water demand.

The City of Guelph conducted a similar study in 2009 and found that 40% of survey respondents had replaced an old toilet with an efficient model, in addition to those homes that were built after 1996 with 6 Lpf toilets installed (City of Guelph, 2009). This suggests that roughly a third of the population continues to utilize inefficient 13 Lpf to 20 Lpf toilets in TCW.

**Table D.2.** Percentage of homes using fixtures equivalent or better to Ontario Building Code

Fixture	Survey Results
≤ 9.5 Lpm showerheads	53%
≤ 8.5 Lpm faucets	34-40%
≤ 6 Lpf toilets	73% <sup>30</sup>

<sup>29</sup> Refer to the “Soft Path ‘Road Map’ for Indoor Water Use (Residential Sector)” in the report’s main body for further information on benchmarks for water demand.

<sup>30</sup> Value has been adjusted to assume homes where toilet flush volume was unknown, but were built after 1996, had 6 Lpf toilets

**Table D.3.** Summary of Efficient Fixtures Study

Fixture	Survey Results
≤ 9.5 Lpm showerheads	53%
Front loading clothes washers	34%
6 Lpf toilets	63%
< 6 Lpf toilets	10%
≤ 8.5 Lpm faucets	34-40%

34% of respondents reported using front-loading clothes washers, whereas in 2003 a Canadian survey by Natural Resource Canada in reported that only 13% of Canadian households utilized front-loading clothes washers (Office of Energy Efficiency, 2003).

The survey reported the majority of respondents used their clothes washer two to four times per week and their dishwasher two to four times per week, which correlates with the findings of Mayer and deOreo (1999) and, therefore, validates the assumptions used in the WaterSmart Scenario Builder.

80% of respondents indicated the use of a water softener and 7.2% of respondents had an outdoor pool. In comparison, 11% of City of Guelph survey respondents reported owning a pool and 72% used a water softener (Guelph, 2009).

The majority of respondents reported using an automatic irrigation system or manual sprinkler either rarely or once per week during an average summer. This finding corroborated the findings of OWWA (2008) which suggest that odd/even watering bylaws may actually *increase* outdoor water use or have no effect and that a once-weekly or every-other-week bylaw would be much more suitable.

## References

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## APPENDIX E: DEVELOPMENT OF SCENARIOS

Fergus and Elora have been examined as a complete system because the Township of Centre Wellington manages the water systems for both communities and the same Ministry of the Environment Certificate of Approval approves withdrawals.

Future water use scenarios were developed and examined using the **POLIS WaterSmart Scenario Builder**. This Microsoft Excel spreadsheet-based tool follows a number of steps to arrive at total future water demand under a given scenario. At a minimum, the Scenario Builder requires quantitative information about current and projected population and per capita water demand. Based on these values, it calculates current and projected average annual and maximum daily demand.

Current and projected demands are then disaggregated — first into sectors (e.g. residential, institutional and commercial, industrial, agricultural) and then into sub-sectors (e.g. residential is subdivided into indoor and outdoor uses). “Bundles” of water conserving technologies and practices are applied to the disaggregated elements of the projected demand until the desired future water demand target is achieved. For example, the penetration rate of water conservation measures is adjusted by shifting a portion of the future population from current per capita water demands of an average home to “efficient” homes with reduced water demands. The reduced demand values are then re-aggregated into sub-sectors, sectors and total demand for the community. These re-aggregated values can then be compared to **Business as Usual** conditions to determine potential water savings for each of the two water saving scenarios.

The **No Infrastructure Expansion** scenario is an interim target that aims to achieve a reduction in maximum daily demand of 14% by 2028. This scenario was developed using an iterative process of adjusting the penetration rate of different types of water efficient homes, the reduction in demand in the IC&I sector and the intensity of leakage reduction programs. This scenario was deemed to be readily achievable, with anticipated changes to the building code achieving much of the water savings required in the residential sector.

The scenario of **Using the Same Amount of Water Tomorrow We Use Today** was developed using a backcasting approach and exemplifies the soft path for water. It starts with the goal of accommodating all future population and economic growth to 2040 and beyond using the same amount of water used in 2008. This implies an agenda to offset increases in water demand (from growth) through water efficiency, conservation, and alternative sources of supply. In order to meet this goal, re-aggregated total demand in the future must be less than or equal to the current total average daily water demand of 5159 m<sup>3</sup>/d (maximum daily demand of 7868 m<sup>3</sup>/d) which formed the numerical target for the scenario. This scenario targets a considerably more aggressive reduction in water demand than the **No Infrastructure Expansion** scenario and was found to require the use of a number of more innovative measures, including alternative sources of non-potable water (e.g. rainwater or reclaimed water).

A more detailed projection of the future states of water use for each scenario is depicted in the series of Soft Path “Road Maps” in Step 3 of Section 3.3 in the report’s main body.

Appendix F outlines the many water conservation measures that can be used to achieve the water savings required for each sector in each scenario. Table E.1 illustrate the outputs of the WaterSmart Scenario Builder for all scenarios.

**Table E.1.** Summary of scenario results for Average Daily Demand (ADD)

Parameter	Business As Usual Scenarios			Alternatives	
				Scenario 1: No Infra-structure Expansion	Scenario 2: Using the Same Water Tomorrow We Use Today
	2008	2028	2040	2028	2040
Serviced Population	16,581	26,924	33,804	26,924	33,804
Maximum Day Water Use (m <sup>3</sup> /d)	<b>7,868</b>	<b>12,776</b>	<b>16,041</b>	<b>11,041</b> (14% red.)	<b>7,868</b> (51% red.)
Annual Ave. Daily Water Use (m <sup>3</sup> /d)	<b>5,159</b>	<b>8,377</b>	<b>10,518</b>	<b>7809</b> (7% red.)	<b>5,157</b> (50% red.)
Residential Water Use (m <sup>3</sup> /d)	3,161	5,133	6,445	4,719	2,447
<i>Res. Per Capita (LCD)</i>	<i>191</i>	<i>191</i>	<i>191</i>	<i>175</i>	<i>72</i>
IC&I (m <sup>3</sup> /d)	1,220	1,981	2,487	1,879	1,513
Non-Revenue (m <sup>3</sup> /d)	778	1,263	1,586	1,212	1,197

## APPENDIX F:

# FIRST STEPS AND FUTURE ACTIONS

Beyond the sample five-year plan, measures were not prescribed to meet the vision and targets of the soft path plan. It is clear, however, that a wide variety of measures will need to be adopted to achieve the soft path vision. Below is a list of water conservation actions or measures, including the departments likely to be involved in implementation of a particular action and a list of communities who are already putting each measure into practice.

## Developing the Plan

### Action: Hire Water Conservation Coordinator(s)

#### ***Who's Already Doing It?***

- The cities of *Guelph*, *Waterloo* and the *Region of Peel, ON* each employ, on average, five FTE water efficiency staff and additional seasonal staff with annual budgets ranging between \$1 million and \$3 million. Budgets are typically funded through water rates and development charges.
- The *Capital Regional District, B.C.* has a comprehensive demand-side management team with 5.5 FTE as of 2009 and four summer students, plus one winter co-op student, every year with an annual total operating budget in 2008 of \$1.5 million.

### Action: Establish a Multidisciplinary Planning Team

#### ***Who's Already Doing It?***

- The *Cowichan Valley Regional District* on Vancouver Island, B.C. took a multidisciplinary approach when it established a Steering Committee to drive a 28-month watershed planning process. Members of the Committee included municipalities, the Regional District, local First Nations, timber companies, school districts and the public, as well as representatives from provincial and federal levels of government.
- The *Salt Spring Island Water Council, B.C.* — made up of community groups, local government and the public — drove the 18-month planning process for a water soft path plan for the island (see Salt Spring Island's soft path strategy here: [www.poliswaterproject.org/publication/320](http://www.poliswaterproject.org/publication/320)).

## Action: Establish a Vision

### Who's Already Doing It?

- *Vancouver, B.C.* set a goal of providing all new water in perpetuity using existing supplies.
- *Calgary, AB* has set a target of “30-in-30 by 2030” aimed at accommodating Calgary’s future population growth with the same amount of water removed from the Bow River in 2003.
- *York Region, ON* set a goal of “No New Water to 2051” in their recently-released, long-term water conservation strategy.
- *Los Angeles, CA* is targeting 100% of new demand for water to be met through water conservation and water recycling by 2030, with 50% of all new demand being met by recycled water by 2019 and the other 50% being met through additional conservation.
- *Okotoks, AB* is one of the first municipalities in the world to establish population growth limits linked to infrastructure development and the environmental carrying capacity of water source (Sheep River).

## Action: Set Interim Targets

### Who's Already Doing It?

- *Guelph, ON* is targeting a 20% (10,600 m<sup>3</sup>/day) water reduction by 2025 with an explicit goal “to use less water per capita than any comparable Canadian City.”
- *Dawson Creek, B.C.* (population 11,000) has committed to a 50% reduction in new water needs by 2020, a 20% reduction in average daily per capita demand by 2020 and is exploring use of reclaimed water.
- *Cochrane, AB* intends to reduce its per capita residential water consumption volume from the 2004 baseline by 25% by 2009.
- *Castlegar, Cranbrook, Creston, Elkford, Fernie, Fruitvale, Golden, Kaslo, Montrose, Nakusp, Nelson, Radium, Salmo, Slocan, the Regional Districts of Central and East Kootenay, Sparwood, Trail and Valemount, B.C.* have each committed to reduce water use 20% by 2015 (five year duration).
- *Great Lakes St. Lawrence Cities Initiative (GLSLCI)* has 18 member municipalities in Ontario, including smaller communities such as Collingwood, the Town of the Blue Mountains and Goderich, working towards water consumption levels that would, by 2015, be 15% below the volume used in 2000.
- Peaking factors in the *City of Guelph, ON* and the *Region of Waterloo, ON* have been reduced to 1.2.



# Metering, Full Cost Recovery and Conservation-Based Pricing

## Tried and True:

<i>Actions</i>	<i>Who Implements It?</i>
<ul style="list-style-type: none"> <li>Full cost recovery and conservation-based prices including an increasing block rate.</li> </ul>	Public Works; Finance
<ul style="list-style-type: none"> <li>Mandatory metering for all homes and businesses.</li> </ul>	Public Works; Clerks

## Thinking Outside the Box:

<i>Actions</i>	<i>Who Implements It?</i>
<ul style="list-style-type: none"> <li>Require indoor and outdoor water meters in all new homes and businesses.</li> </ul>	Public Works; Planning; Clerks
<ul style="list-style-type: none"> <li>Provide homeowners and businesses with water bills that clearly indicate their daily water use, which can then be compared to the Township-wide water use per person and to targets established for per capita water use.</li> </ul>	Public Works; Finance
<ul style="list-style-type: none"> <li>Implement a stormwater management fee with a rebate system (or offer a property-tax rebate or credit) for rainwater harvesting and other water-sensitive infrastructure</li> </ul>	Public Works; Finance; Clerks

## Who's Already Doing It?

- Town of Collingwood, ON* has adopted full cost recovery pricing for both water and wastewater and uses an increasing block rate structure. In 2010, the rates were \$0.554/m<sup>3</sup> increasing to \$0.82/m<sup>3</sup> for each cubic meter above 40m<sup>3</sup> during May, June, July, August, September.
- Town of Collingwood, ON* requires water meters for all residences and enforces by charging homeowners without a meter a rate of \$30/month and increases the rate by 50% every month until a meter is installed and operational.
- Cochrane, AB* uses a tiered, increasing block rate structure. In 2008, the rates were \$0.95/m<sup>3</sup> for the first 25 cubic metres per month, \$1.27/m<sup>3</sup> for 26 to 60 cubic metres, and \$1.89/m<sup>3</sup> for any volume over 60 cubic metres.
- Capital Regional District, B.C.* has implemented full-cost pricing so that customers pay the entire cost of the water they use, including the capital costs and maintenance costs.
- City of Calgary, AB* provides a good model in terms of content and format for displaying water consumption and payment information on residential water bills
- Portland, OR* has been using stormwater fees to help recover stormwater management costs since 1977 (Portland Bureau of Environmental Services, 2006). In 2000 the city decided to use the fee system as a vehicle to encourage site-level stormwater management techniques by providing financial rewards to ratepayers who reduce the amount of impervious area and manage runoff from roofs and the ground.

## ***Additional References for Pricing***

- Alliance for Water Efficiency. (2010). *Water Rates and Rate Structures*. Retrieved from [http://www.allianceforwaterefficiency.org/Water\\_Rates\\_and\\_Rate\\_Structures\\_Library\\_Content\\_Listing.aspx](http://www.allianceforwaterefficiency.org/Water_Rates_and_Rate_Structures_Library_Content_Listing.aspx)
- Brandes, O.M., Renzetti, S., & Stinchcombe, K. (2010). *Worth Every Penny: A Primer on Conservation Oriented Water Pricing*. Victoria, Canada: the POLIS Project on Ecological Governance.
- Infraguide. (2006). *Water and Sewer Rates: Full Cost Recovery*. Retrieved from [http://gmf.fcm.ca/infraguide/integrated\\_infrastructure.asp](http://gmf.fcm.ca/infraguide/integrated_infrastructure.asp)
- Want, Y.D., Smith, W.J. Jr., & Byrne, J. (2005). *Water Conservation-Oriented Rates: Strategies to Extend Supply, Promote Equity, and Meet Minimum Flow Levels*. Denver, Colorado: American Water Works Association.

# Controlling Water Loss

## Tried and True:

<i>Actions</i>	<i>Who Implements It?</i>
<ul style="list-style-type: none"><li>• Complete an IWA Water Balance.</li></ul>	Public Works Department
<ul style="list-style-type: none"><li>• Reduce water loss through metering, leak detection &amp; repair, pressure management, speed and quality of repair, etc.</li></ul>	Public Works Department

## ***Who's Already Doing It?***

- *Halifax Regional Municipality, NS* has created 68 district metered areas each capturing data that enables small leaks to be caught quickly. This world-class, water-loss control system has reduced leakage of treated water by 35 million litres per day.

## ***Additional References for Water Loss Control***

Alliance for Water Efficiency. (2010). *AWE Resource Library: Water Loss Control*. Retrieved from [http://www.allianceforwaterefficiency.org/Water\\_Loss\\_Control\\_Library\\_Content\\_Listing.aspx](http://www.allianceforwaterefficiency.org/Water_Loss_Control_Library_Content_Listing.aspx)

Lambert, A. (2003, August). Assessing Non-Revenue Water and Its Components: A Practical Approach. *Water21 Magazine*, 50–51.

National Guide to Sustainable Municipal Infrastructure. (2003, March). *Water Use and Loss in Water Distribution Systems*. Retrieved from [http://gmf.fcm.ca/files/Infraguide/Potable\\_Water/Water\\_Use\\_Loss\\_distrib\\_syst.pdf](http://gmf.fcm.ca/files/Infraguide/Potable_Water/Water_Use_Loss_distrib_syst.pdf)

## Residential Programs: Retrofits

### Tried and True:

<b>Actions</b>	<b>Who Implements It?</b>
<ul style="list-style-type: none"> <li>• Create a comprehensive high-efficiency fixture and appliance retrofit and/or installation program for residences that focuses on toilets, showerheads and clothes washer replacement.</li> </ul>	Public Works
<ul style="list-style-type: none"> <li>• Communicate program through water bills, website, and programs such as Canadian Tire's online directory of rebate programs.</li> </ul>	Public Works; Finance
<ul style="list-style-type: none"> <li>• Offer indoor water audits for high use homes.</li> </ul>	Public Works
<ul style="list-style-type: none"> <li>• Work with retailers to offer in-store rebates or one-day truckload sale programs.</li> </ul>	Public Works; Finance; Economic Development

### Thinking Outside the Box:

<b>Actions</b>	<b>Who Implements It?</b>
<ul style="list-style-type: none"> <li>• Work with realtors to develop and/or offer water efficiency audits and require or encourage water efficient fixtures prior to house sales.</li> </ul>	Public Works Department; Economic Development
<ul style="list-style-type: none"> <li>• Work with energy providers, provincial agencies, retailers, and environmental organizations to enhance a comprehensive rebate program.</li> </ul>	Public Works; Finance; Ontario Ministry of Energy; Gas & Electricity Utilities
<ul style="list-style-type: none"> <li>• Partner with Elora Environment Network to pair indoor water efficiency audits, fixture replacement, and leak detection and repair with existing government funded energy audit programs.</li> </ul>	Public Works Department; Partnership with Elora Environment Network
<ul style="list-style-type: none"> <li>• Work with local businesses and retailers to educate the public on the efficacy of water efficient fixtures, stock high efficiency toilets, and inform customers through labelling and education (e.g. dispel the myth that low-flow toilets don't work).</li> </ul>	Public Works Department; Economic Development

### Who's Already Doing It?

- *Municipal members of the CWWA and OWWA Water Efficiency Committee/Networks* have long-had toilet rebate programs, both in-store rebates and truckload sales. Most are now replacing 6 L rebate programs in favour of rebates for 4.8 L and 3 L toilets.
- *City of Guelph, ON* had a clothes washer rebate program in partnership with Guelph Hydro.
- *Union Gas and Enbridge* offer free pre-rinse spray valve replacements for businesses.
- *North Georgia Water Planning District, GA* completes indoor water-use audits on the top 25% of residential users.

- The *“Target 140” program in Australia* saw residents of Southeast Queensland reduce their per capita water use from 295 Lpd to 140 Lpd through a series of restrictions, rebates, retrofits, education programs, and conservation-based rates. The program attributes the largest reduction in residential water use to its *“Home WaterWise Rebate Scheme,”* an extensive home visit program that had project staff going to each home and replacing all fixtures with high efficiency fixtures as well as rainwater tanks plumbed into internal fixtures at a significantly subsidized cost to homeowners.
- *San Francisco, CA* requires inspection and upgrading to water and energy efficient fixtures including showerheads, faucets, toilets, and leak reduction prior to sale of home.

## Residential Programs: New Construction

Actions	Who Implements It?
<ul style="list-style-type: none"> <li>Encourage or mandate best available efficient fixtures in all new construction that meet or exceed existing international standards.</li> </ul>	Building; Clerks; Ontario Ministry of Municipal Affairs and Housing
<ul style="list-style-type: none"> <li>Review all land-use decisions for watershed impacts and seek opportunities for optimization of water infrastructure.</li> </ul>	Planning
<ul style="list-style-type: none"> <li>Encourage densification, including multi-unit housing.</li> </ul>	Building; Planning; Economic Development
<ul style="list-style-type: none"> <li>Offer incentives to builders/homeowners for water efficient development consisting of, for example, expedited development approvals, reduction in development charges, tax rebates to homeowners, and/or servicing allocation credits.</li> </ul>	Building; Finance
<ul style="list-style-type: none"> <li>Where appropriate and applicable, offer incentives to developers to develop “closed loop” communities that use rainwater harvesting for indoor and outdoor use and supply their own “off the grid” wastewater and recycling systems.</li> </ul>	Building; Finance

### Who's Already Doing It?

- Dockside Green* is a 1.3 million square foot development comprised of mixed residential, office, retail, and industrial space in downtown Victoria, B.C. The development uses a “triple bottom line” approach to integrate a closed-loop water system featuring cutting-edge conservation technologies, alternative sources, drought-resistant landscaping, and water reuse and recycling to minimize municipal water demands and water impacts, including 100% onsite sewage treatment.
- Pimpama Coomera* housing development in Southeast Queensland, Australia (2500 homes, growing by 120 homes/month) has a Class A+ Recycled Water Treatment Plant that supplies toilets & outdoor water use. Each home also has mandatory rainwater tanks used for laundry cold water and outdoor use.
- The City of Toronto’s Green Standard* includes the mandatory requirements for site-level stormwater management along with a more progressive, voluntary, Tier 2 standard. New developments meeting the Tier 2 standard receive a 20 percent refund on the development charges paid to the municipality.
- York Region’s Sustainable Home Incentive Program and Sustainable Development through LEED* offers tiered servicing development credits, which allow developers to build additional units if multi-unit residential buildings are LEED certified and achieve a 20% to 30% reduction in water use, and if low-density homes feature water efficient fixtures, including hot water recirculation systems.
- Chicago’s Green Permit Program* has reduced the permitting process to less than 30 working days for developers and homeowners who “build green.”

- *The City of Asheville, NC* discounts plan review fees by 50% for buildings seeking LEED certification, and waives building permit fees for buildings that contain certain energy efficient technologies.
- *Region of Durham, ON* partnered with the residential developer Tribute Communities to create a demonstration community consisting of 100 homes that have been fitted with energy saving fixtures and appliances and drought tolerant landscaping.<sup>31</sup>
- *City of Kelowna, B.C.* implemented development Permit Area Guidelines that provides prescriptive water conservation guidelines and requirements for private lands where Development Permits are required.

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<sup>31</sup> The study also calculated that the payback period associated with upgrading the water efficient study homes is approximately 3.4 years, which is reasonable considering that the retrofitted fixtures and appliances installed will last much longer than 3.4 years. It was also projected that after the 3.4 year period, the homeowner will start to save more than \$200 per year in water and energy costs (Veritec 2008, p.22).

## Residential Programs: Behaviour

### Tried and True:

<i>Actions</i>	<i>Who Implements It?</i>
Develop school curriculum.	Public Works
Children's water festival.	Public Works
Deliver educational materials through bill inserts and online resources.	Public Works; Finance
Ensure water bills are received monthly or online to ensure pricing incentives can be acted on in a timely manner.	Finance

### Thinking Outside the Box:

<i>Actions</i>	<i>Who Implements It?</i>
<ul style="list-style-type: none"> <li>Mandate smart water meters.</li> </ul>	Public Works; Building; Clerks
<ul style="list-style-type: none"> <li>Develop and deliver a targeted education, social-marketing program that encourages residents to conserve. Consider working with other communities to develop standardized program components.</li> </ul>	Public Works
<ul style="list-style-type: none"> <li>Partner with outreach groups (e.g. Engineers without Borders, Elora Environment Network) to deliver water conservation education to schools.</li> </ul>	Public Works; School Board

### Who's Already Doing It?

- Many communities in Ontario hold a Children's Water Festival or Groundwater Festival each summer. For example, see *Waterloo Wellington's Groundwater Festival*.
- City of Hamilton, ON* encourages residents to be "Water Wise" or "Use Only What You Need" for things like brushing teeth, dishwashing, showering, and running clothes washers and dishwashers.
- Region of Peel, ON* has a comprehensive water curriculum program for schools including home and school water auditing exercises.
- Brazil's "pee in the shower" campaign* was a humorous endeavour to encourage residents to flush less. See for yourself at: <http://adweek.blogs.com/adfreak/2009/08/ads-urge-brazilians-to-urinate-in-the-shower.html>
- An innovative ad campaign in *Denver, CO* encouraged residents to "Use Only What You Need," particularly geared towards reducing lawn watering.



## ***Additional References for Residential Programming***

Canadian Water and Wastewater Association (CWWA). (2009). *CWWA Toilet Replacement Program Guidebook*. Retrieved from:

[http://www.cwwa.ca/pdf\\_files/TRP%20Guideline\\_no%20picture.pdf](http://www.cwwa.ca/pdf_files/TRP%20Guideline_no%20picture.pdf)

Ontario Water Works Association (OWWA). (1999). *Water Efficiency: A Guidebook for Small and Medium Sized Utilities*.

Ontario Water Works Association (OWWA). (2005). *Water Efficiency Best Management Practices Manual*. Retrieved from <http://www.owwa.com/hm/inside.php?sid=35&id=765>

Wolfe, S., & Hedriks E. (2009). *Building Towards Water Efficiency: Policy Innovation and Education in New and Existing Homes*. Retrieved from

<http://www.aref.ab.ca/resourcelibrary/documents/Waterloo%20research.pdf>

## IC&I Programs

### Tried and True:

<b>Actions</b>	<b>Who Implements It?</b>
<ul style="list-style-type: none"> <li>Rebate and replacement programs for pre-rinse spray valves, toilet, clothes washer rebates, and/or education programs.</li> </ul>	Public Works; Finance
<ul style="list-style-type: none"> <li>Identify and audit the top 10 to 20 water users.</li> </ul>	Public Works
<ul style="list-style-type: none"> <li>Offer a capacity buyback program or reduced water rate for industrial users that submit a viable water conservation plan.</li> </ul>	Finance
<ul style="list-style-type: none"> <li>Educate businesses about their water use and encourage them to implement water conservation programs.</li> </ul>	Public Works; Economic Development
<ul style="list-style-type: none"> <li>Offer financial incentives to reduce once through cooling.</li> </ul>	Finance

### Thinking Outside the Box:

<b>Actions</b>	<b>Who Implements It?</b>
All businesses using more than a specified volume annually must prepare, submit, and comply with a Water Efficiency Management Plan (WEMP). Under the WEMP the business must achieve a 10% to 20% reduction in total water consumption or comply with best practice in an agreed upon timeframe.	Public Works; Clerks
Develop water efficiency guidelines to assist businesses in implementing WEMP as an ongoing priority.	Public Works; Economic Development
Partner with local gas companies to offer hot water efficiency audits, pre-rinse spray valve retrofits, and other rebates and education for local businesses.	Public Works; Gas Utilities
Offer grants to places like schools, churches, and libraries for retrofit projects and use projects as an educational tool.	Finance
Evaluate opportunities to use recycled wastewater for things such as new industrial plants and road cleaning.	Public Works; Economic Development

### Who's Already Doing It?

- Several communities in Ontario including the Region of Waterloo, the Region of Peel and the City of Guelph offer free water use reviews to businesses and have capacity buyback programs to “buy back” water savings from IC&I users. A one-time capacity buyback incentive is offered to each facility, paid once the water savings have been confirmed by onsite metering data.
- City of Toronto, ON instituted a reduced water rate for industrial customers (28% lower rate) that complete a water audit, submit a water conservation plan, and implement measures. For projects with a payback of less than one year, construction must be completed in two years; for projects with a payback of more than 1 year but less than 2 years, construction must be

completed in less than 3 years; for projects with a payback between two and five years, construction must be completed within five years.

- *City of Toronto partnered with Enbridge Gas* to offer free water efficient pre-rinse spray valves to restaurants.
- *Region of Waterloo, ON* offers rebates for toilets and front-loading clothes washer and free pre-rinse spray valves, showerheads, and faucet aerators for businesses.
- *Capital Regional District, B.C.* offers rebates of \$1,200 per ton to eliminate once-through cooled condensers and \$2,400 per ton to eliminate once-through cooled ice makers; up to a maximum of \$5,000 per account.
- All businesses in *South East Queensland, Australia* using more than 10ML/year must prepare and comply with a Water Efficiency Management Plan.
- *Capital Regional District, B.C.* offers annual grants to Greater Victoria schools for water conservation retrofits. Previous retrofits include the installation of low-flow toilets, retrofits of continuous flow urinals with activation sensors, removal of water-cooled equipment, and installation of 365-day irrigation controllers.
- In *Dawson Creek, B.C.* Shell Oil invested \$10 million in the city's wastewater treatment plant to enable use of recycled wastewater and reducing potable water consumption by 20%.

### ***Additional References for IC&I Programming***

East Bay Municipal Utility District. (2008). *WaterSmart Guidebook: A Water Use Efficiency Plan and Review Guide for New Businesses*. Retrieved from [http://www.allianceforwaterefficiency.org/WaterSmart\\_Guidebook\\_for\\_Businesses.aspx](http://www.allianceforwaterefficiency.org/WaterSmart_Guidebook_for_Businesses.aspx)

Vickers, A. (2001). *Handbook of Water Use and Conservation: Homes, Landscapes, Businesses, Industries, Farms*. Amherst, MA: WaterPlow Press.

## Outdoor Programs

### Tried and True:

<i>Actions</i>	<i>Who Implements It?</i>
<ul style="list-style-type: none"> <li>Residential landscape water audits and home visits that deliver rain gauges, hose timers and automatic irrigation system tuning services.</li> </ul>	Public Works
<ul style="list-style-type: none"> <li>Free or discounted rain barrels can be used as an education tool.</li> </ul>	Public Works; Finance
<ul style="list-style-type: none"> <li>“Go Golden” social marketing campaign that encourages letting lawns go golden in times of decreased precipitation and water shortages.</li> </ul>	Public Works
<ul style="list-style-type: none"> <li>Outdoor residential watering bylaw limiting watering to one day per week and using a tiered system of increasingly stringent requirements based on the level of water stress. Provide a communications/outreach program and enforcement to ensure compliance.</li> </ul>	Public Works; Clerks

### Thinking Outside the Box:

<i>Actions</i>	<i>Who Implements It?</i>
<ul style="list-style-type: none"> <li>Mandate water efficient landscapes in all new homes.</li> </ul>	Building; Clerks
<ul style="list-style-type: none"> <li>Offer incentives to builders and homeowners who install rainwater harvesting systems or water-sensitive landscaping.</li> </ul>	Building; Clerks; Finance; Planning
<ul style="list-style-type: none"> <li>Educate local landscape irrigation professionals and encourage them to become WaterSense certified; work with local plumbers to ensure they are informed and trained in installation and monitoring of rainwater harvesting and grey water reuse systems.</li> </ul>	Public Works
<ul style="list-style-type: none"> <li>Offer xeriscaping workshops to local businesses, builders, landscapers and irrigation installers.</li> </ul>	Public Works

### Who's Already Doing It?

- Region of Waterloo, ON* reported an 8% to 12% reduction in peak demands from shifting from a odd/even day water restriction to a one day a week watering restriction in 2005 (OWWA, 2008).
- Region of Waterloo, ON* offered naturescaping seminars to local businesses.
- Capital Regional District, B.C.* delivered a “Go Golden” campaign encouraging residents to let their lawns brown during times of water stress.
- City of Kelowna, B.C.* adopted several measures to reduce outdoor water use including restricting water use in a landscaped area; requirements for new irrigation systems included smart controllers and irrigation system tuning services.

- *Durham, ON and Halton, ON* offered seasonal residential landscape water audits and home visits, resulting in an average maximum day savings of about 200 litres per single-family household. The pilot programs involved distributing water efficiency items such as rain gauges and hose washers and information pamphlets to households.
- *Dawson Creek, B.C. and Region of Waterloo, ON* have adopted a staged water conservation bylaw that limits watering to between early morning and early evening on two days a week in Stage 1, one day a week in Stage 2, and no lawn watering at all in Stage 3.
- *Vernon, B.C.* (population 36,000) limits lawn coverage to 30% of multi-residential, commercial and institutional property and requires the remaining landscaped area to be xeriscaped.
- *Cochrane, AB* requires 100% of all non-residential developments, 50% of all multi-unit residential developments, and 25% of all other residential developments to be naturescaped.

### ***Additional References for Outdoor Programming***

McKenzie-Mohr, D. (2006). *Quick Reference: Community Based Social Marketing*. Retrieved from [www.cbsm.com](http://www.cbsm.com)

Ontario Water Works Association (OWWA). (2008). *Outdoor Water Use Reduction Manual*. Retrieved from [http://www.owwa.com/hm/download.php?id=763&client\\_id=32](http://www.owwa.com/hm/download.php?id=763&client_id=32)

## Building Non-Potable Sources of Supply

### Thinking Outside the Box:

<b>Actions</b>	<b>Who Implements It?</b>
<ul style="list-style-type: none"> <li>Inform and enable designers, builders, and building inspectors to encourage their clients to consider including some degree of rainwater catchment.</li> </ul>	Building
<ul style="list-style-type: none"> <li>Post practical guidelines and specifications to assist homeowners in the proper installation of rainwater and grey water collection systems and the installation of composting toilets on the Township's website. Partner with neighbouring communities or the province to develop the guidelines, or make use of existing resources.</li> </ul>	Public Works; Ministry of the Environment; Ministry of Municipal Affairs and Housing; CMHC
<ul style="list-style-type: none"> <li>Implement rebate and installation programs to encourage uptake of onsite rainwater harvesting and grey water reuse for homeowners.</li> </ul>	Public Works; Finance
<ul style="list-style-type: none"> <li>Initiate a rainwater harvesting or reuse pilot project in new homes or partner with the City of Guelph or Waterloo to learn from their pilot programs.</li> </ul>	Public Works
<ul style="list-style-type: none"> <li>Require plumbing rough-ins in new construction that enable future water collection and use of alternative sources for toilet flushing, clothes washing, and lawn watering (e.g. purple pipes).</li> </ul>	Building; Clerks
<ul style="list-style-type: none"> <li>Work with laundromats, hotels, seniors' homes, industrial buildings, schools, libraries, and recreation facilities to investigate opportunities to use rainwater harvesting for services not requiring potable water quality (e.g. clothes washing) and that may benefit from a reduction in water softening or other treatment requirements.</li> </ul>	Economic Development; Building; Public Works

### Who's Already Doing It?

- *City of Guelph, ON* is piloting rainwater harvesting cisterns and reuse.
- *Ontario* has developed rainwater harvesting design guidelines (provincial) and Dalhousie University has modelling software to create custom RWH designs for residences.
- In *Santa Fe County, New Mexico* residences with 2,500 sq ft or more area must install an active rainwater catchment system comprised of cisterns. All commercial developments are required to collect all roof drainage into cisterns to be reused for landscape irrigation.

## ***Additional References for Non-Potable Sources***

Canadian Mortgage and Housing Corporation (CMHC). (2005). *Rainwater Harvesting Workshop Proceedings*. Toronto, Ontario.

Connect the Drops Website. (2010). Retrieved from <http://www.connectthedrops.ca>

Despins, C. (2010). *Ontario Guidelines for Residential Rainwater Harvesting Systems*. Retrieved from [http://www.sustainabletechnologies.ca/Portals/\\_Rainbow/Documents/ONTARIO\\_RWH\\_HANDBOOK\\_2010.pdf](http://www.sustainabletechnologies.ca/Portals/_Rainbow/Documents/ONTARIO_RWH_HANDBOOK_2010.pdf)

Health Canada. (2007). *Canadian Guidelines for Household Reclaimed Water Use in Toilet and Urinal Flushing*. Retrieved from [http://www.hc-sc.gc.ca/ewh-semt/consult/\\_2007/reclaim-recycle/toc-tdm-draft-ebauche-eng.php](http://www.hc-sc.gc.ca/ewh-semt/consult/_2007/reclaim-recycle/toc-tdm-draft-ebauche-eng.php)

Municipality	ULF Toilets	ICI & Multi-Unit	Dual Flush Toilets	Toilet Flappers	Showerheads	and Aerator	Water Efficient Dishwasher	Water Efficient Clothes washer	Water Efficient Washer	Water Softeners	Humidifiers	Rain Bars	Residential Indoor Audits	Residential Outdoor Audits	Naturescaping	ICI Audits	ICI Capacity Buyback	Pre-Rinse Spray Valve	Children's Water Festival	Outdoor Water	Legend
York Region	\$60R	Ed	\$75R	Free	Free	Ed	Ed	Ed	Ed	Ed	Ed	\$300S	Residential Indoor Audits	Free	35% discount coupon	Free	Pending	Free	Yes	Yes	Ed – denotes a municipality which promotes a measure through education but does not provide product or rebates.
Peel Region	\$60R	\$60- \$100R	\$100R	\$50S	\$50S	Ed	Ed	Ed	Ed	Ed	Ed	\$500S	Free	Free	\$150S	Free	\$-25/L	Free	Yes	No	
Durham Region	Ed	Ed	Ed	Ed	Ed	Ed	Ed	Ed	Ed	Ed	Ed	Ed	Residential Indoor Audits	Free	Ed	Ed	Ed	Ed	Yes	Yes	
Toronto	\$60R	\$60- \$150R	\$75R		\$100S			\$60R	\$125R			\$700S	Residential Indoor Audits	Free	Ed	Free	Ed 1/1/09	Free	No	No	R – denotes a municipality which provides a rebate to a customer that purchases and installs a water saving product. Amount of rebate is indicated in dollars per product installed.
Niagara													Residential Indoor Audits	Not Ed	Ed			Free	Yes	No	
Waterloo	\$40R	\$40- \$60R	\$40R		Ed	Ed	Ed	Ed	Ed	Ed	Ed	\$800S	Residential Indoor Audits	Not Ed	Ed			Free	Yes	Yes	
Hilton	\$60R	\$60R	\$75R	Ed	Ed	Ed	Ed	Ed	Ed	Ed	Ed	Ed	Residential Indoor Audits	Free	Ed				Yes	Yes	
Guelph	\$40R	\$60R	\$60R	Ed	Ed	Ed	Ed	\$100	Ed	Ed	Ed	Ed	Residential Indoor Audits	Free	Ed		\$-50/L		Yes	Yes	
Ottawa	\$60R	\$60R	\$75R	Ed	Ed	Ed	Ed	Ed	Ed	Ed	Ed	Ed	Residential Indoor Audits	Free	Ed				Yes	No	
Peterborough	Ed		Ed	Ed	Ed	Ed	Ed	Ed	Ed	Ed	Ed	\$710S	Residential Indoor Audits	Free	Ed				Yes	Yes	
London												Unlimited	Residential Indoor Audits	Not Ed	Ed			Free	Yes	Yes	
Welland	\$60R		Ed		Ed	Ed	Ed	\$100R					Residential Indoor Audits	Not Ed	Ed				No	No	DS – denotes a municipality which purchases a supply of a product and sells it to their customers at a discounted price.
Hamilton	\$50R		\$60R		Ed	Ed	Ed	Ed	Ed			\$40- \$1150S	Residential Indoor Audits	Not Ed	Ed				Yes	Yes	
Barrie	\$70R		Ed		Ed	Ed	Ed	Ed	Ed			Ed	Residential Indoor Audits	Not Ed	Ed				Yes	Yes	
Kingston	Ed		Ed		Ed	Ed	Ed	Ed	Ed			\$32	Residential Indoor Audits	Not Ed	Ed				Yes	Yes	
Brantford	Ed		Ed		Free	Ed	Ed	Ed	Ed			\$25	Residential Indoor Audits	Not Ed	Ed				Yes	Yes	
Denver	\$25R	\$25- \$125R	\$125R	Ed	Ed	Ed	Ed	\$150R	\$150R			Ed	Residential Indoor Audits	Ed	\$150R	Free	Yes	Free	Yes	Yes	
San Francisco		\$125- \$200R	\$125- \$300R	Free	Free	Ed	Ed	\$125- 200R	\$200R	Ed		Ed	Residential Indoor Audits	Free	Ed	Free	Yes	Free	No	No	Free – denotes a municipality that offers a free service to its customers.
Austin, TX	Free- \$200R	Free- \$200R	\$50- 200R	Free	Free	Ed	Ed	\$150R	\$250R			\$600S	Residential Indoor Audits	Free	Free	Free	Yes	Free	Yes	Yes	
Southern Nevada				Ed	Free	Ed	Ed	Ed					Residential Indoor Audits	Free	Ed				Free	No	Yes
Calgary	\$50R	\$50R			\$15	Ed	Ed	Ed	Ed			\$600S	Residential Indoor Audits	Free	Ed	Free			Free	Yes	

**Figure F.1.** Overview of Municipal Water Conservation Programs excerpted, with permission, from the City of Guelph; City of Guelph (2009) *City of Guelph Water Conservation and Efficiency Strategy Update*. Prepared by RMSi. February 18, 2009. Retrieved from [http://guelph.ca/uploads/ET\\_Group/waterworks/WCE%20Study/WCES%20Final%20Draft%20Report.pdf](http://guelph.ca/uploads/ET_Group/waterworks/WCE%20Study/WCES%20Final%20Draft%20Report.pdf)





## POLIS PROJECT ON ECOLOGICAL GOVERNANCE

Created in 2000, the POLIS Project on Ecological Governance is a research-based organization housed at the University of Victoria in British Columbia. Researchers who are also community activists work at POLIS to dismantle the notion that the environment is merely another sector. They work to make ecological thinking and practice a core value in all aspects of society. Among the many research centres worldwide that are investigating and promoting sustainability, POLIS represents a unique blend of multidisciplinary academic research and community action.

[www.polisproject.org](http://www.polisproject.org)



**POLIS Project**  
on  
**Ecological Governance**  
University of Victoria

## WATER SUSTAINABILITY PROJECT

The Water Sustainability Project (WSP) is an action-based research group that recognizes water scarcity is a social dilemma that cannot be addressed by technical solutions alone. The project focuses on four themes crucial to a sustainable water future:

- Water Conservation and the Water Soft Path,
- The Water-Energy Nexus,
- Watershed Governance, and
- Water Law and Policy Reform.

The WSP works with industry, government, civil society, and individuals to develop and embed water conservation strategies that benefit the economy, communities, and the environment. The WSP is an initiative of the POLIS Project on Ecological Governance at the University of Victoria.

[www.poliswaterproject.org](http://www.poliswaterproject.org)



POLIS Project on Ecological Governance  
**watersustainabilityproject**

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