



TECHNICAL BULLETIN



Smart Growth on the Ground

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Water Consumption in Maple Ridge

1.0 Introduction

Two major factors that influence water consumption are the cost of water and residential density. Little information is available regarding water use in Maple Ridge, but within the Greater Vancouver Regional District (GVRD), the average “resident uses approximately 325 litres (L) of water per day around the home.” This translates to a billion litres of water used every day in the Lower Mainland.¹

From a municipal standpoint, encouraging water conservation measures among residents makes financial sense. By reducing water demand and wastewater generation, it is possible for municipalities to defer expensive capital investment projects for water supply and wastewater treatment infrastructure. Conserving water today builds capacity into the existing infrastructure system, which can accommodate water demand of an increasing population.

This technical bulletin explores how the District of Maple Ridge and its residents can work together to significantly reduce residential and commercial water consumption. Encouraging the installation of efficient fixtures, increasing the percentage of high density multi-family dwellings and apartments and moving towards a metered system that charges for the volume of water used are strategies that can reduce water use within Maple Ridge by 40-60%.

2.0 Indoor Water Use

Residential water use is highly dependent on personal habits. However, installing water efficient appliances can reduce indoor water consumption in the home by as much as 30%. Toilets alone account for 30% of the total water used within the home, and replacing older inefficient models can lead to significant reduction in water use. To encourage residents to make the switch, many municipalities – including the GVRD – offer toilet replacement programs, where residents get a cash incentive if they install a low-flow toilet. Table 1 compares the volume of water used in conventional and efficient appliances.

Appliance	Conventional	Efficient
Toilet	Up to 30L/flush	6L/ flush
Shower	18-27L/minute	9-11L/minute
Bathtub	Up to 190L/tubful	115L/tubful
Washing Machine	Up to 190L/cycle	170L/cycle
Dishwasher	Up to 55L/cycle	40L/cycle
Kitchen Faucet	Up to 11.3L /minute	7.6L/minute
Bathroom Faucet	Up to 11.3L /minute	7.6L/minute

In the Lower Mainland, installing efficient appliances and fixtures equates to reducing water use from 325L per person per day to 230L per person per day.

Case Study

In a 1992 Pilot Program, the Regional Municipality of Waterloo and the City of Kitchener, ON showed that households with ultra low-flow (ULF) toilets saw water use fall between 20 and 30%. The annual savings for homes with ULF toilets was between \$65 and \$135.



Figure 1: A dual flush toilet

Dual flush toilets are 26% more water efficient than single-flush 6 litre toilets. Featuring two flush options, dual flush toilets enable the user to choose a shorter 3 litre flush or a longer 6 litre flush.³



Figure 2: A dry urinal

In commercial and institutional settings, installing dry urinals that do not rely on water for flushing can save approximately 151,000 Litres of water per urinal per year!

Similar reductions are achievable in businesses when efficient fixtures and appliances are installed. Table 2 indicates the potential savings in indoor and outdoor water use for six typical business types as well as schools.

Table 2: Potential Savings in Water by Use Area for Businesses and Schools⁴

Sector	Landscaping	Restrooms	Cooling	Kitchen	Laundry	Process	Other	Total
Office	50%	49%	26%	20%	n/a	n/a	10%	39%
Hotel	50%	31%	26%	20%	54%	n/a	n/a	34%
Hospital	50%	47%	26%	20%	42%	52%	n/a	40%
Restaurant	50%	46%	26%	20%	n/a	n/a	10%	29%
Retail	53%	51%	41%	20%	n/a	n/a	25%	37%
Grocery	50%	51%	26%	20%	n/a	n/a	10%	27%
Schools (K-12)	50%	45%	n/a	20%	n/a	n/a	10%	46%

3.0 Outdoor Water Use

Outdoor water use varies dramatically with local climate, and no information exists on how much water Maple Ridge residents and businesses apply to their landscapes. A major study of 12 North American cities completed by the American Water Works Association, however, has shown that lawn irrigation comprises anywhere from 26% of total household water use in Waterloo, Ontario, to more than 75% in Las Virgenes, California, with an overall average of approximately 40% of total water use. The study also revealed that outdoor irrigation is “based on personal habits rather than irrigation needs of turf,” and that homeowners typically overwater their lawns by 18%⁵.

Changing this habit requires promoting awareness of the amount of water a lawn needs; and developing guidelines and restrictions that limit outdoor water use.

In BC’s Lower Mainland, lawns only need 25mm (one inch) of water per week to stay healthy. this is provided with one hour of sprinkling per week. Ensuring that residents and businesses are aware of this fact requires workshops and advertising campaigns provided by the municipality and the regional district.

In new development, effective tools to reduce the need for outdoor irrigation include creating land development guidelines requiring topsoil conservation and integrating stormwater management into all land development.

The heavy equipment used during construction leaves soil compacted and almost impervious to water. Topsoil conservation, as was practiced in the East Clayton neighbourhood in Surrey, BC, ensures that healthy and absorbent soil is returned to the site after construction. (Figure 3) .



Figure 3: Soil Conservation in East Clayton

Integrating rain water management into land development ensures that lawns are absorbent and retain moisture for long periods after rainfall events. In new development, infiltration devices and lot grading will achieve this, while encouraging homeowners to disconnect their downspouts and divert rain to gardens will reduce outdoor water use in existing neighbourhoods.

Developing and enforcing regulations is another tool that can limit outdoor water use. In response to summer water shortages, municipalities have written by-laws to restrict lawn watering. In Maple Ridge, lawn watering during the summer (June 1-September 30) is permitted between 4am and 9am, and between 7pm and 10pm, two days a week.⁶ Initial violations are met with warnings, and subsequent violations are fined. Current research suggests that for homes as well as businesses, these practices can cut the volume of water used outdoors in half.

4.0 Water Use and Density

In the study conducted by the American Water Works Association mentioned above, important connections were made between water use and density. The results show that per person indoor water use in a multi-family dwelling is significantly less than in a single family house. According to that study, average indoor water use in single family residential homes amounts to 318L per person per day. In multi-family dwellings, indoor water use totalled 273L per person per day, and in apartments, indoor water use was 250L per person per day. Table 5 summarizes these findings.

Residence Type	Volume of indoor Water Use (Litres per person per day)	Percent Reduction from Single Family Homes
Single Family Residential	318	n/a
Multi Family Residential	273	14.2%
Apartment	250	21.4%

There are a number of reasons to explain this difference. In general, small homes and rental units are typically fitted with smaller appliances that use less water. In addition, apartments often have shared laundry facilities, which encourages washing full loads all the time. Also, smaller units will require less water for general daily cleaning.

When outdoor water is included in the comparison, the results are more dramatic. The overall gross average water use in multi-family dwellings, including indoor and outdoor water use, is twenty-three percent lower than water use of residents of single family homes. (No number for apartments was available for comparison here).

In Maple Ridge, where single family homes predominate, the results of this research are particularly significant. The commitment to create a more dense urban centre, with a mix of housing types including multi-family dwellings and apartments will have a significant per capita reduction in water use.

5.0 Metering

Residents and businesses in Maple Ridge pay a flat rate for water. Table 4 shows the annual water costs for residential and commercial water use.

Flat rates for water encourage wasteful practices because people do not pay for the volume of water they use. Therefore, there is no financial incentive to conserve water. The alternative to charging a flat rate is to meter water, and charge households and businesses based on the amount used. This simple change has a dramatic effect on water use. For example, in 1994, “metered households used an average of 263L (58 gallons) per person per day, while non-metered households used about 430L (94 gallons) per person per day.”⁸ This suggests that metering water leads to a 38% reduction in water use.

Residential	
Single Family Unit	\$239.20
Additional Unit Within Single Family Structure	\$119.60
Multiple Dwelling Unit	\$237.14
Commercial	
Per Unit	\$239.20

Moving to a metered system where households and businesses pay for the volume of water used creates

Case Study
The town of Port Elgin, ON (pop 6500) avoided a \$5.5 million expansion of its water treatment plant by installing 2400 residential water meters in 1991 at a cost of \$550,000. This reduced summer water use by 50%, and use for all of 1993 by 25%, and dropped the water waterflow by 30%. The town also saved \$12,000 in sewage treatment operating costs.⁷

a demand to save water. The results are behavioural changes such as shorter showers, and investment in efficient fixtures such as low-flow faucets, and appliances that minimize water consumption like dual flush toilets, or sensor controlled faucets and urinals in businesses.

Maple Ridge has initiated water metering for all new residential units, businesses and other non-residential uses such as hobby farms and greenhouses. There are no plans at present to meter existing houses that are currently on a flat rate. As of 2004, a base rate for water consumption has been set to \$0.41 per m³ (1000L), with an additional quarterly charge based on connection size (Table 5).⁹

Connection Size	Base Rate per Quarter
25 mm or less	\$18.41
40mm	\$27.04
50mm	\$43.26
75mm	\$81.12
100mm	\$113.57
150mm	\$167.65
200mm	\$227.14
250mm	\$329.89

6.0 Conclusion

A few simple strategies will go a long way in reducing the amount of water consumed by residents of the Maple Ridge Centre. Encouraging residents and businesses to install water efficient fixtures with rebate programs or through metering can reduce consumption by 30%. Irrigation behaviour can be influenced to achieve a reduction of water used in outdoor applications by 20-50%. If the municipality goes on to develop land development guidelines, households and businesses will save even more outdoor water, as soils will be healthier and more absorbent to water. Lastly, by encouraging higher density development, the municipality will be able to save a predictable amount of water per resident. Together, these strategies can reduce per capita water consumption in Maple Ridge by 40-60%.

Notes:

¹ www.gvrd.bc.ca/water/residential-conservation-initiatives.htm

² CMHC (2000) Household Guide to Water Efficiency, CMHC

³ CMHC. 2002. *Dual Flush Toilet Testing*. <http://www.cmhc-schl.gc.ca/publications/en/rh-pr/tech/02-124-e.html>

⁴ Pacific Institute (2003) *Waste Not Want Not: the Potential For Urban Water Conservation in California* http://www.pacinst.org/reports/urban_usage/index.htm

⁵ Pacific Institute (2003) *Waste Not Want Not: the Potential For Urban Water Conservation in California* http://www.pacinst.org/reports/urban_usage/index.htm

⁶ www.mapleridge.org/services/regulations_bylaws/sprinkling_bylaw.html

⁷ National Action Plan to Encourage Municipal Water Use Efficiency, (2003) http://www.ec.gc.ca/water/en/info/pubs/action/e_action.htm

⁸ CMHC (2000) *Household Guide to Water Efficiency*, CMHC

⁹ http://www.mapleridge.org/services/fees_charges/water_fees.html