

**REPORT TO THE SAANICH PENINSULA WATER COMMISSION  
MEETING OF THURSDAY, JUNE 20, 2013**

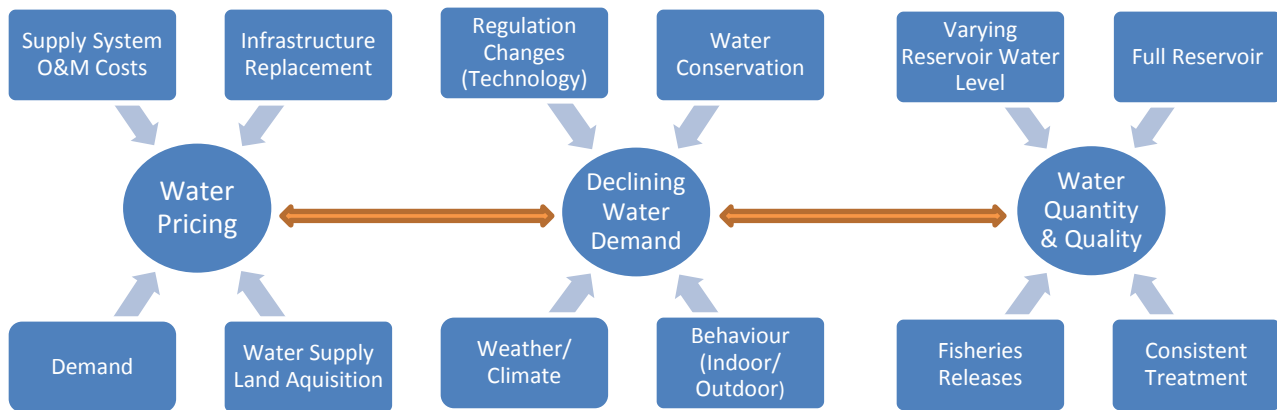
**SUBJECT**      **RELATIONSHIPS BETWEEN WATER PRICING, DECLINING WATER DEMAND AND SOURCE WATER QUANTITY AND QUALITY**

**PURPOSE**

To provide information on the relationships between water pricing, water conservation, declining water demand and source water quantity and quality within the Greater Victoria Drinking Water System.

**BACKGROUND**

The relationships between water pricing, water conservation, declining water demand and source water quantity and quality within the Greater Victoria Drinking Water System are not well understood by our water customers. To foster that understanding, this report describes the relationships between these factors and the variables that influence them. The following illustrates these relationships:



**DISCUSSION**

**WATER PRICING**

**Single Tier Wholesale Water Pricing** - The Capital Regional District (CRD) supplies water to the Greater Victoria retail water suppliers (including municipalities and the CRD Juan de Fuca Water Distribution Service), who in turn distribute water to the individual customers through the systems owned and operated by the suppliers. The CRD uses a single-tier pricing system for wholesale water in the Greater Victoria Water System. This means that the unit cost of water does not increase or decrease relative to the amount of water used. The cost of drinking water is entirely based on the user pay principle (people paying their water bills provides the full cost of the service). All service connections in Greater Victoria are metered.

**Retail Water Supplier Pricing** - Greater Victoria retail water suppliers set the retail water price that customers pay for their drinking water. The retail water price typically incorporates the CRD wholesale price and the retail water suppliers' retail price (may include a fixed charge and a consumption based charge). The wholesale water price accounts for about 40% of the price charged by the retail water suppliers. In addition, some retail water suppliers in Greater Victoria are now incorporating a sewer charge (sometimes based on water consumption), and are referring to the charges for water and sewer as 'utility' charges rather than 'water' charges.

**CRD Wholesale Water Pricing** - All of the revenue that funds the Greater Victoria Regional Water Supply annual operation, maintenance, and capital budget is generated from the sale of water to the retail water suppliers who, in turn, sell the water to individual customers. The annual wholesale water price is set using the following formula:

$$\text{Annual Wholesale Price (per cubic metre)} = \frac{\text{Operation and Maintenance Costs + Debt Expenditure + Reserve Fund Transfers}}{\text{Annual Projected Demand}}$$

The goal is to achieve a sustainable water price that balances the formula variables described further below.

**On-going Supply System Operation, Maintenance and Repair Costs** – There are on-going supply system operation, maintenance and repair costs (including water supply area, treatment and transmission system). These costs are largely ‘fixed’ costs and account for approximately 30% of the annual wholesale water price. A sustainable operation and maintenance program is essential to safe and reliable delivery of water.

**Increase in Debt Expenditures** - Annual debt servicing obligations have increased 86% from \$7.6 million in 2007 to \$14.1 million in 2013. The primary reason for this increase was the decision by the CRD to purchase future water supply lands in the Leech River watershed in 2007 and 2010 at a total cost of \$65 million. These lands provide a sustainable future water supply area for Greater Victoria. The annual debt expenditures associated with these purchases alone currently accounts for approximately 21% of the wholesale water price.

**Infrastructure Upgrades** - Ongoing replacement and upgrades of water supply infrastructure have also contributed to the increase in debt servicing costs, but, as a result, the system has avoided facing the significant infrastructure deficit that many other water utilities are facing. Infrastructure projects include seismic upgrades, a new water transmission main and treatment facility for the District of Sooke, and transmission main replacements.

## **DECLINING WATER DEMAND**

**Trends in Water Demand** - Wholesale water demand in Greater Victoria is directly related to residential water usage and has been declining for the past 10 years. This trend is expected to slow down but nevertheless, continue for the next ten years or more. While this trend presents a challenge when aligning water rates with the fixed costs of operating and maintaining the system and continuing with a sustainable capital infrastructure upgrade program, the trend is actually beneficial when considering the management of the water supply resource and the supply infrastructure capacity. The rates of decline vary annually, but have typically been in the 2%-5% range in recent years.

**Reasons for the Decline** - Based on industry research, and the CRD’s understanding of the local situation, the primary cause of the decline is the increased use of water efficient appliances and low flow fixtures in households across the region; this driver is not unique to the CRD. The increased efficiency of household appliances and fixtures has been driven by provincial regulatory mandates, such as changes to the BC Building Code that require the installation of 4.8 litre per flush, or less, high efficiency toilets in new residential construction. As a comparison, toilets manufactured in the 1990s typically used 13 litres per flush. As a result of the regulatory changes, manufacturers are only producing high efficiency fixtures and appliances. As older homes are retrofitted with new fixtures and appliances, there is further impact on the overall demand. The expectation that the decline in demand will slow down is based on the opinion that, over the next 10 or more years, all homes will eventually replace older, less efficient appliances and fixtures. The key factor of the impact of indoor water use on annual demand is that the impact has an effect 12 months of the year, as compared to outdoor water use, that typically only has a seasonal impact.

**Customer Behavior** - Outdoor water use is largely considered to be non-essential and can include irrigation, car washing and filling of swimming pools and hot tubs. Customers are often willing to change their behavior related to these types of uses in response to water rates/costs and an increased awareness of water conservation initiatives and the benefits to the supply system and the environment.

**Delay Capital Projects** - Less water being used by the community can delay the need to build new water treatment and transmission infrastructure that would be necessary to provide increased capacity if demand continued to increase. Decreasing demand also results in the ability to defer expansion of the current water supply area into the CRD owned Leech River water supply area for up to 50 years.

**Water Conservation and Demand Management** - A Demand Management Program has been in place in the Greater Victoria Water System since 1999. Since that time, this program has been active in reducing the quantity of drinking water used by Greater Victoria residents, particularly through reductions in outdoor water use. The Demand Management Program also includes water conservation initiatives directed at the institutional, commercial and industrial (ICI) sector, as this sector accounts for approximately 30% of Greater Victoria's water consumption. One of the key elements of the program has been the CRD Water Conservation Bylaw. The bylaw requires that Stage 1 watering restrictions are implemented each year between May 1 and September 30. In addition to changing public behavior related to outdoor water use, the bylaw requirements result in a reduction in demand during the summer months which help reduce the drawdown of the water level in Sooke Lake Reservoir. Precipitation, reservoir level and water demand are monitored continuously during this period to determine if more stringent restrictions are necessary to maintain an adequate reservoir level.

## **WATER QUANTITY AND QUALITY**

There are a number of supply system benefits related to overall lower demand, from both the water quantity and water quality perspectives.

**Fisheries Releases** - In addition to water used by customers, water from Sooke Lake Reservoir is released by the CRD to enhance fish and fish habitat in the Sooke River and Charters River. These water releases are carried out under the terms of an agreement with the T'Sou-ke First Nation, Fisheries and Oceans Canada and the Province of British Columbia. With less drawdown in Sooke Lake Reservoir, there is a greater opportunity to release the designated quantities of water for fisheries purposes. The water level of Sooke Lake Reservoir was raised an additional metre during the last expansion of the reservoir to accommodate these fisheries releases.

**Distribution System Flushing** - Typically, virtually all large water systems in North America that use surface water sources to supply their drinking water systems, filter their water. However, the Greater Victoria Water System does not. It is an unfiltered drinking water system. This means that small particulates (primarily algae) from Sooke Lake Reservoir enter the intake, pass through the disinfection process and settle out in the distribution system water mains. This is not harmful to public health. Nevertheless, to ensure that these fine sediments do not accumulate and adversely impact the carriage of the chloramine disinfectant to the extremities of the water system, all of the seven retail water suppliers (CRD, Central Saanich, North Saanich, Saanich, Sidney, Oak Bay, and Victoria) in Greater Victoria carry out an annual unidirectional flushing of their distribution system water mains.

**Buffers Against the Unknown** - Having a full reservoir provides the assurance that not only will there be a sufficient quantity of drinking water for the year, but it also provides additional flexibility to deal with any unknowns that may arise over the course of the year or the following year. It is also anticipated that climate change will have an effect on reservoir levels, such as potential increases in winter rainfall and summer drought, including the effects of increases in the time before the onset of fall rains.

**Varying Reservoir Water Levels** - The Greater Victoria Drinking Water System uses Sooke Lake Reservoir as its primary source of drinking water. Each summer, the water level in this reservoir falls an average of 4.5 metres (14.7 feet) and rises to full pool (normally) when the winter rains fill the reservoir. The greater the drawdown in water level, the greater the amount of shoreline exposed. Typically, each year, about 100 ha of barren shoreline are exposed during the drawdown.

**Biologically Stable Reservoir** - It has been observed that, in general, lakes are more biologically stable than reservoirs primarily because the water level in reservoirs varies more widely than in lakes. The rise and fall of water levels in reservoirs means that foreshore areas are exposed each year. This provides a greater opportunity for sediment re-suspension due to wave action and for more shoreline erosion by wind and rain washing particulates and nutrients into the water. Varying nutrient levels can result in algal blooms and changes in the natural rhythms of the entire food chain within the reservoir.

**Source Water Quality** - Sooke Lake Reservoir is one of the most stable source water reservoirs that supply the large drinking water systems in the Pacific Northwest (Vancouver, Seattle, Portland and Tacoma). Water in Sooke Lake Reservoir has a long detention time within the reservoir and, as a result, has low turbidity (cloudiness), low colour, neutral pH, low solids, low bacteria, and low parasites. The source water in Sooke Lake Reservoir requires only disinfection to make it safe to drink. Nevertheless, given sufficient input of nutrients, Sooke Lake Reservoir can be prone to algal blooms.

**Consistent Treatment Process** - Of course, a very stable source water body provides for the easiest and most consistent water treatment process with less opportunity for treatment lapses and the need for public advisories.

**RECOMMENDATION**

That the Saanich Peninsula Water Commission receive the staff report for information.



Ted Robbins, B.Sc., C.Tech  
General Manager, Integrated Water Services

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