CITY OF VICTORIA

Water Conservation Plan

February 2020

A. Introduction

The City of Victoria (the City) is located on the southern tip of Vancouver Island, and is a member of the Capital Regional District (CRD). Incorporated in 1862, Victoria is one of the oldest cities in Western Canada.

The City has been demonstrating leadership in the area of water conservation for many years. Water conservation and environmental stewardship is embraced by the residents of Victoria and is demonstrated by perceived value of this public service, and the continual improvements to water consumption in juxtaposition to the increases to population seen by the City.

The scope of the water conservation plan is to provide an overview of the City's water supply system and future impacts, to outline current conservation efforts, and to identify future initiatives.

B. Importance of Water Conservation

Communities across Canada have increasingly become more aware of the need to reduce volumes of potable water used for their domestic purposes and the impact overuse can have on water supplies. Less water used from our lakes and streams will result in better health for our aquatic environments. Some communities in British Columbia are on important bird migration routes and home to a large variety of fish species. Less water consumption results in less wastewater requiring disposal, both of which result in improved habitat for aquatic species.

An abundance of water used and discarded creates additional energy demand to run the purification process, distribute through the system and treat the wastewater produced. These processes (pumping, distribution and treatment) also require infrastructure development and maintenance, both of which are costly endeavours. In addition, less energy used means less associated greenhouse gas emissions.

The City of Victoria's water supply is managed by the Capital Regional District (CRD). CRD is responsible for the supply, treatment and delivery of bulk drinking water. As well, CRD is responsible for water quality monitoring from source to individual customers throughout Greater Victoria and for demand management programs.

The Sooke Reservoir, formed by the dam on the Sooke River, is the primary source of water. Under Federal and Provincial statutes, the amount of water available for municipal uses under water licenses must take into consideration the potential impacts on ecological values in the river downstream of the dam. CRD has a comprehensive agreement with key stakeholders on a water management strategy to share this precious resource. Therefore, as the source of water is limited, the region must continue to manage water resources wisely and to defer the need to develop new, potentially expensive sources of water. Water conservation is an integral part of the CRD's water management strategy.

C. Water System Information

The City's water is supplied by the Capital Regional District's (CRD) Water Services Department from its Sooke Lake Reservoir. The reservoir is fed from an 11,000 ha. watershed, which is located about 30 km northwest of the City and is protected from public access and industrial activities. Water from the watershed requires no filtration. The Sooke Reservoir is the primary water supply reservoir, providing 90% of the water storage to the CRD system. The reservoir has been in active use since 1915.

In 2019, 14.9 million cubic metres of potable water was delivered to Victoria. All water supplied from Sooke Lake to the City's distribution system is by gravity flow. Water continues by gravity supply to all customers in the distribution system with the exception of one small neighbourhood at higher elevation, where pressures are boosted. All customers in the City are metered.

The City of Victoria also owns, maintains and operates the municipal water distribution system for the Township of Esquimalt. The City purchased the Esquimalt water distribution system in 1925. Approximately 17% of the City water system is in Esquimalt.

The water system consists of approximately:

- 274 kilometres of pipes
- 2,792 system valves
- 1,497 fire hydrants
- 8.5 kilometres of large diameter supply mains.
- 15,401 service connections.
- 700 fire services.
- 8 pressure regulating stations
- 1 pump station.

The water system has been constructed from many different pipe materials. Steel was used in the early years, and on mains larger than 300mm diameter. Cast iron was used until the time of the Second World War, at which point spun cast pipe was introduced. For the two decades spanning 1960 and 1970 asbestos cement was used moderately. There is very little asbestos cement pipe still in use. Since the early 1980s, the City has installed mostly ductile iron pipe, along with some polyvinyl chloride (PVC). Recent rehabilitation projects have also included lining large diameter steel mains with high density polyethylene pipe.

This City currently funds its water capital and operating program as a utility established through bylaw. Funding comes from billing based on metered water consumption and a flat rate service charge based on the size of the service

Since 1990, while the population in the City has increased by approximately 14%, the City has experienced a drop in water consumption of 29%. A significant portion of this decrease can likely be attributed to water conservation programs. The City's population increased from approximately 75,600 in 1990 to 86,000 in 2019. Population is estimated to increase to 106,500 by 2038.

The City has a capital improvement programme which is approximately $5 million per year (2020 budget). The majority of this funding is used to replace water mains and service connections that have reached the end of their service life.

D. Climate Context

In the future, Victoria will experience hotter and drier summers, warmer and wetter winters, rising sea levels, and more extreme storms. The severity of these changes will depend on the collective actions taken in the years ahead to further mitigate climate change and reduce the impacts from GHGs already in our atmosphere.

The projected increased periods of hot weather in summer and early fall will likely result in increased evapotranspiration, wildfire activity, and increased water demand during the summer and into the fall when water supply is lowest. Water conservation initiatives will continue to be a priority of the City to respond to the potential seasonal reduction in water supply. The City will continue to promote the capture and storage of wet season precipitation to improve wet weather rainwater management, and to improve the efficiency of summer outdoor water use.

E. Demand Profile

Through the City's Water Distribution System Master Plan (2019), population growth and future scenarios are integrated in the planning process. The population and growth data are summarized in Table 1.

Table 1: Population Growth Data

Municipality	2018 Population (Cap)	Future 2038 Population Growth (Cap)	Existing Employment (FTE)	Employment Growth (FTE)
Victoria	87,507	18,957	89,336	+13,113
Esquimalt	18,008	4,493	11,276	+1,435
Total	105,515	23,450	100,612	+14,548

Source: City of Victoria Water Distribution Master Plan (2019)

A water use audit was conducted for the City as part of the 2013 Water Distribution Master Plan using the AWWA methodology. This audit quantified consumption levels and identified system losses. Figure 1 provides an overview of the breakdown of water uses by community and consumption by sector.

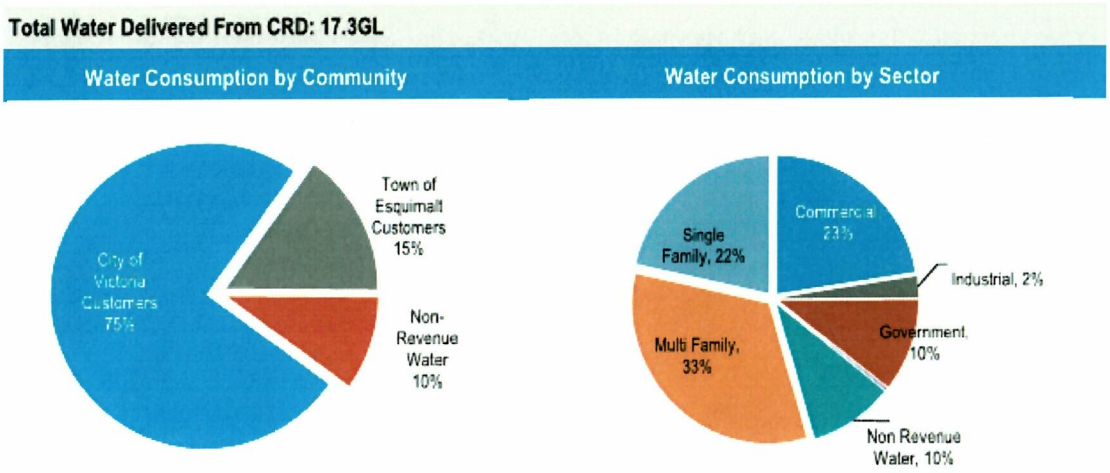

Figure 1: City of Victoria Water Consumption Data (2013)

The City's annual wholesale water consumption has shown a steadily decreasing trend for more than 25 years. This notably contrasts with the increases to the populations of Victoria and Esquimalt over that same timeframe.

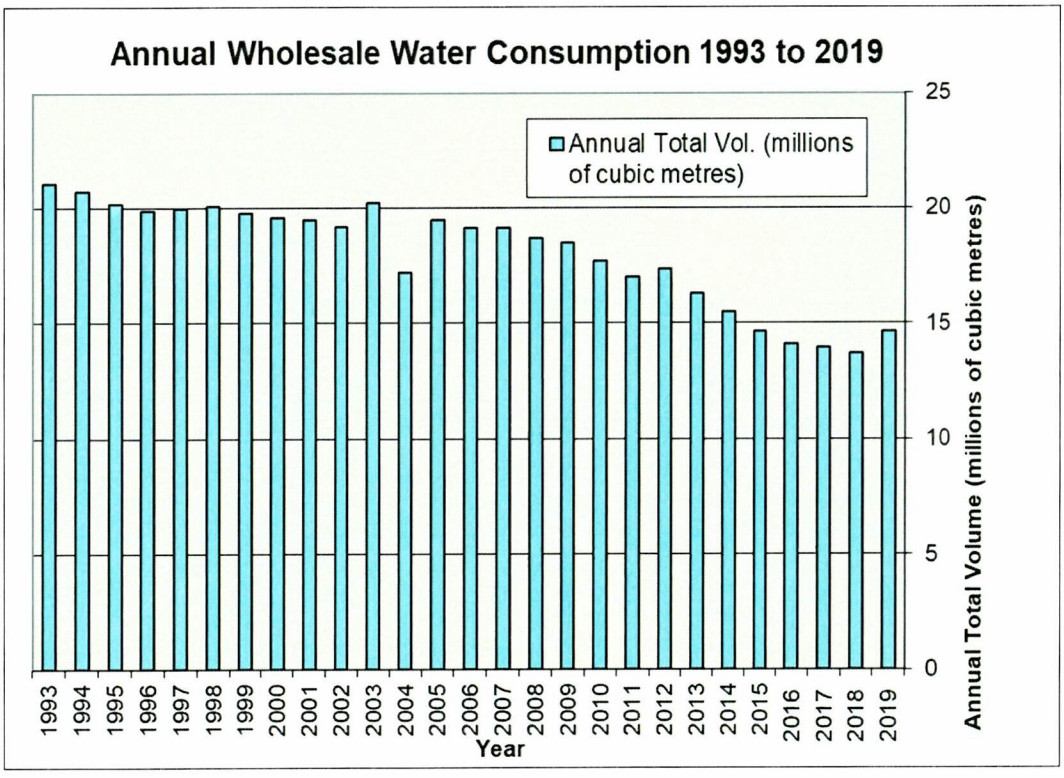

Figure 2: Wholesale water consumption from 1993-2019.

F. Regional Water Conservation Initiatives

The CRD *Water Conservation Bylaw* is enacted under section 796.2 of the Local Government Act where a regional government has authority to regulate water use even though a participating Municipality is responsible for water distribution with that municipality. The CRD *Water Conservation Bylaw 4099* applies to any customers of the regional water supply system receiving drinking water from the Sooke Lake Reservoir in the Greater Victoria area. The City's Waterworks Bylaw No. 07-030 states "a person must not use water contrary to the Capital Regional District's *Water Conservation Bylaw*".

Water use in the City often increases by 75 to 100% in summer months from the average winter usage. Most of this increase is for landscape irrigation. The CRD *Water Conservation Bylaw* is intended to manage this outdoor use.

Stage 1 water use restrictions identified in the CRD bylaw come into effect automatically every year unless more stringent water conservation measures are needed. Stage 2 which reduces irrigation to a single day and Stage 3 which bans outside water use are implemented based on source capacity.

Water Conservation Promotion

CRD's *Water Conservation Bylaw* has been in effect since 2003 and most resident are familiar with the Stage 1 outdoor watering restrictions implemented every year from May 1 through September 30. CRD will typically send out a media advisory and publish advertisements in local newspapers advising residents about the water conservation bylaw. CRD has a website which includes information on water conservation. The site has information on the benefits of water conservation and the top ways to save water at home or for a business. The website also has links to fact sheets, workshops on efficient irrigation, native plant gardening, designing gardens with native plants.

CRD also provides water conservation education programs for the community including residential and Industrial, Commercial and Institutional programs.

The CRD website address is: https://www.crd.bc.ca/education/water-conservation/

G. City of Victoria Conservation Initiatives

While the CRD leads the implementation of water conservation programs across the region, water conservation remains a priority of the City, and as such, has been embedded in City Bylaws, policies and plans, shown in Table 2, below.

Table 2: City of Victoria Water Conservation Actions

City of Victoria Document/Plan/Policy	Water Conservation Context
Official Community Plan (2012)	Section 11 – Infrastructure Victoria's healthy, clean, high-quality drinking water is used in a thrifty way and maintained through generations. Actions: • Continue to work with the CRD and other partners to promote water conservation • Continue to support water demand management through green building practices and sustainable rainwater management
City of Victoria Water System Master Plan (2012)	The City's Water System Master Plan is updated on a regular basis to reflect current conditions in the water system. Included in the 2012 Master Plan: • Water demand projections • Water use audit • Recommendations for enhancements to the City's water conservation efforts
Sanitary Sewer Master Plan (2018)	The plan incorporates forecasted water use decreases in calculation of base sanitary flows.
City of Victoria Sanitary Sewer and Stormwater Utilities Bylaw No. 14-071	• Sanitary Sewer use charge calculation based (in part) on metered water consumption • Rainwater Management credits are offered to reduce the stormwater user fee for properties using cisterns to collect and reuse rainwater
City of Victoria Waterworks Bylaw No. 07-030	• Water charges are based on metered consumption • Use of water meters is mandatory • Waste of water is prohibited
Climate Action Plan (2018)	Climate change mitigation actions include reduction of hot water use, and the City's climate adaptation efforts must include continued support of water conservation efforts to increase resiliency when faced by longer, drier summers.
City of Victoria Rainwater Management Standards and Rainwater Rewards Incentive Program	The City has developed standards for the design and construction of rainwater management systems to support stormwater management and rainwater capture and reuse. The program includes: • Design standards for cisterns to collect rainwater for outdoor water use • Incentives (rebates and/or stormwater credits) for cisterns for outdoor water use, or plumbed for indoor water use

Victoria Sustainability Framework	The framework incorporates the water conservation as a required component of ecological integrity

In addition to the aforementioned water conservation policies, plans and programs, the Victoria Parks division has taken significant steps to reduce reliance on supplemental irrigation, detailed in Table 3.

Table 3: City of Victoria Parks Division Water Conservation Actions

City Parks Division Water Conservation Actions	**Water Conservation Details**
Certified irrigation designs	All new irrigation systems are designed by IIABC certified designers to meet strict design standards to ensure high-efficiency systems are being installed
Permanent underground systems with automated controllers	Improves ability to program irrigation run times, improves efficiency of application by pre-allocating run times to provide only the amount of water the plants need
Centralized control technology	(In Progress) implementing hardware/software that utilizes cellular technology to 'communicate' in-field irrigation system performance issues to staff, who can review system status 'at-at-glance', adjust controller schedules and reduce water waste through prioritized work plans
Innovation	Experimenting with new irrigation products that promote water conservation (e.g. bubbler sleeves, rain sensors)
Maintenance	Regular inspection of irrigation systems to identify and correct problems and deficiencies, also to reduce water waste;
Call for service	Use of a 'Calls for Service' work order system that documents reports of irrigation problems (e.g. broken sprinklers), creating work orders and assisting staff to prioritize daily work plans in effort to address system problems first, reducing water waste due to broken infrastructure
Targeted irrigation	Drip irrigation is used to provide irrigation to trees and shrubs; targets specific areas/plants to water reducing waste, also less water loss to evaporation using this method.

Scheduling irrigation	Compliance with CRD watering bylaws, watering at night to reduce loss due to evaporation
Staff education and certification	All staff who work directly on irrigation systems are IIABC Certified irrigation Technicians, have thorough experience and knowledge of designing, installing and maintaining efficient irrigation systems; internal staff education in water conservation methods and practices.
Improved plant selection and management	• Carefully reviewing plant species and ensuring they are best suited to the conditions present. • Increase use of native and adaptive species • Implementation of a 'naturalization' project, in which staff changed out seasonal plant displays with native and adaptive species • Amending soils and mulching to increase retention capacity,
Irrigation metering	All new irrigation connections are equipped with water meters

H. Future Water Conservation Initiatives

The City in conjunction with CRD has had great success with the water conservation measures to date. In the last ten years annual water consumption has dropped 14% even with a population increase of 4%. Victoria has a residential water use of 200 litres per person per day. In comparison, the regional rate for Greater Victoria is 232 litres per person per day and the British Columbia average is about 490 litres. To continue future conservation efforts the City has the following initiatives that are currently underway or planned for the near future.

Water Meter Replacement

The City's first water meter was installed in 1906. The City was among the first in the Province to meter all water customers. As part of an effort to modernize the current metering technology, the City will be replacing all current manual read meters with new meters using automatic meter reading (AMR) technology. The City currently bills water consumption on a four-month cycle. It is expected that AMR technology will allow the City to increase the billing frequency to monthly or bi-monthly. More frequent billing will allow homeowners and businesses a clearer picture of their water use so they can look for ways to conserve. The new meters will help to identify customer leaks sooner resulting in cost savings to the customer and conservation of the water supply. The accuracy of the new meters will also be significantly improved over current meters which will provide more equitable billing to all customers. It is expected that new meters and AMR technology will reduce overall water consumption by two to five percent.

Water System Master Plan Update

The City of Victoria completed a Water System Master Plan in 2011. An update to the plan is currently in progress. The master plan allows for ongoing updates to water loss audits, water conservation planning and prioritization of capital expenditures.