

DATE: June 11, 2021

FILE: 5600-01/CVWS

TO: Chair and Directors
Comox Valley Water Committee

FROM: Russell Dyson
Chief Administrative Officer

Supported by Russell Dyson
Chief Administrative Officer

R. Dyson

RE: Comox Valley Water System Water Efficiency Plan – 2021

Purpose

To present the updated Comox Valley Water System (CVWS) Water Efficiency Plan to the Comox Valley Water Committee.

Recommendation from the Chief Administrative Officer:

THAT the updated Comox Valley Water System Water Efficiency Plan be approved;

AND FURTHER THAT funding for the recommended water conservation measures be brought forward for review and approval through the 2022-2026 financial planning process for the Comox Valley Water System.

Executive Summary

- The original Comox Valley Regional District (CVRD) Water Efficiency Plan (WEP) was adopted in September 2009.
- The plan was designed to adhere to criteria set out in federal and provincial infrastructure grant programs.
- The CVRD Regional Growth Strategy (RGS) promotes water conservation and efficiency throughout the Comox Valley. This includes a per capita consumption reduction target of 30 per cent by 2020, 40 per cent by 2030, 45 per cent by 2040, and 50 per cent by 2050 from 2008 levels.
- An update of water efficiency progress for the CVWS was conducted in 2020 and the revised WEP is attached as Appendix A to this report.
- Total daily per capita water consumption has decreased by approximately 23 per cent from 2009 to 2020, and total water consumption has decreased by 6.1 per cent over the same period despite population growth of 14 per cent.
- Continued implementation of water efficiency measures and recommendations in the WEP will allow the CVWS to work towards further cost savings in offsets from decreased water treatment and distribution volumes, and to continue moving toward the water consumption reduction targets in the RGS.

Prepared by:

Z. Norcross-Nu'u

Zoe Norcross-Nu'u
Engineering Analyst

Concurrence:

K. La Rose

Kris La Rose, P.Eng.
Senior Manager of
Water/Wastewater Services

Concurrence:

M. Rutten

Marc Rutten, P.Eng.
General Manager of
Engineering Services

Background/Current Situation

The original Comox Valley Regional District Water Efficiency Plan was adopted in September 2009. The plan was designed to adhere to criteria set out in federal and provincial infrastructure grant programs. Development and board approval of the plan was a condition of grant funding for the East Courtenay reservoir project. The provincial government continues to indicate that water conservation plans, strategies and implementation play important roles in defining capital funding program eligibility criteria, evaluation criteria, and terms and conditions placed on project contracts. The CVRD is growing, and along with it the CVWS. This growth, and changing patterns of water use, require us to undertake periodic updates of the WEP.

The CVWS has 22,141 households, serving a population of approximately 49,350 people. Since the WEP inception in 2009, the CVWS has experienced a reduction in the total daily per capita water consumption of approximately 23 per cent, from 569 litres/capita/person to 437 litres/capita/person. Total water consumption from 2009 to 2020 has been reduced by approximately 6.1 per cent (from 8,396,414 m³ down to 7,886,796 m³) during the same time when populations served has increased by roughly 14 per cent. While climatic factors may have played a part in this reduction, the recent trend of decreasing water consumption is likely due in part to the ongoing successful implementation of the WEP.

The *BC Living Water Smart Plan*, the Comox Valley Sustainability Strategy, and the Comox Valley Regional Growth Strategy (RGS) contain goals, objectives and targets for improving water efficiency. The Comox Valley WEP will assist the CVRD in reaching these benchmarks, helping to ensure continued eligibility for provincial infrastructure funding. As such, the WEP recommends the continuation of water efficiency programs, including the continuation of the Connected by Water communications initiative and branding, along with implementing a new rebate program for supplemental garden improvements to reduce water use, which may include installing drip irrigation systems and/or by improving the water-holding capacity of soil through soil amendments (mulch, nutrient-rich soil amendment products, etc.).

Policy Analysis

Objective 5-A of the Regional Growth Strategy is to promote water conservation and efficiency throughout the Comox Valley. This includes a per capita consumption reduction target of 30 per cent by 2020 and 40 per cent by 2030. In addition to this RGS objective, the WEP for the CVWS highlights a number of water efficiency measures to reduce consumption. As noted within the WEP, it is well established that universal water metering is the most effective way of reducing demand.

Options

1. The Water Committee approve the updated water efficiency plan.
2. The Water Committee provide alternative direction.

The updated WEP highlights the success of water conservation measures to date, and provides recommendations that are in line with the path already set and should allow the region to meet its commitments made through the Regional Growth Strategy. Staff therefore recommend option 1.

Financial Factors

Community understanding and support for water efficiency is essential to reducing water consumption in the Comox Valley. Financial benefits of improved water efficiency include a reduction in the size and cost of capital infrastructure upgrades for both water and sewer; reduction of variable operating costs such as filtration and chlorination, and electricity for pumping; and maintenance of eligibility for provincial funding for water and wastewater capital infrastructure projects, which uniformly require evidence of implementation of water conservation measures.

The proposed budget for implementation of recommended water efficiency measures will be presented separately as part of the overall budget process. The Comox Valley Water System is nearing commissioning of a new water treatment plant in order to comply with the new Island Health drinking water policy.

Legal Factors

Bylaw No. 129 being “Comox Valley Water Conservation Bylaw 2010” regulates water use within the areas serviced by the Comox Valley Water System.

Intergovernmental Factors

The WEP has been developed for implementation in the City of Courtenay, Town of Comox and various CVRD local service areas. Responsibility for successful implementation will be shared by all participants.

Interdepartmental Involvement

The CVRD Engineering Services branch is leading this work with input from the public affairs and information systems branch.

Citizen/Public Relations

The CVRD recognizes the need for public support in order to be successful in reducing water consumption. Public education programs initiated in 2009 included a public awareness campaign and video, displays and low-flow showerhead giveaways at public events, free workshops on water efficiency and classroom sessions at local public schools. In 2018, the Connected by Water project, which includes outreach, communications and education for water conservation and watershed protection, was launched. The goals of this project include working with other local governments to broaden the community’s understanding of the importance of water conservation and to actively engage the community in adopting improved water-conserving behavior and technology.

Attachments: Appendix A – Comox Valley Water System Water Efficiency Plan, 2021

**Comox Valley Water System
(CVWS)
Water Efficiency Plan**

FINAL – March 2021

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Executive Summary

The Comox Valley Water System (CVWS) Water Efficiency Plan (WEP) was adopted and implemented in 2009, to manage how domestic water is used in the CVWS for the purposes of maintaining a thriving community while balancing water use and minimizing future system construction and operating costs. This report will provide an update on progress to date and provide recommendations for ongoing implementation of a water conservation strategy.

With the pending increase of CVRD's licensed water diversion and associated new water treatment system project currently under construction, the CVWS will be expanding to service a growing community, while aiming to sustain reductions in water consumption. For this reason, periodic updates of the WEP are undertaken.

The CVWS has 22,141 households, serving a population of approximately 49,350 people. Since the WEP inception in 2009, the CVWS has experienced a reduction in the total daily per capita water consumption of approximately 23 percent, to 437 litres/capita/person.

Total water consumption from 2009 to 2020 has been reduced by approximately 6.1 percent (from 8,396,414 m³ down to 7,886,796 m³) during the same time when populations served has increased by roughly 14 percent. While climatic factors may have played a part in this reduction, the recent trend of decreasing water consumption is likely due in part to the ongoing successful implementation of the WEP.

The CVRD, along with the Town of Comox and City of Courtenay, have undertaken numerous streams of water conservation initiatives and programs to encourage reduced water use, particularly in the summertime when demand can more than double. Significant programs currently underway include the:

- *Connected by Water* encompassing water conservation communications, outreach and education components;
- The outdoor water efficiency rebate program (irrigation SMART controllers);
- Maintaining water restrictions with enforcement activities; and
- Ongoing leak detection and pressure reduction efforts.

It is recommended to continue these efforts, including the continuation of the Connected by Water communications initiative and branding, along with implementing a new rebate program for supplemental garden improvements to reduce water use, which may include installing drip irrigation systems and/or by improving the water-holding capacity of soil through soil amendments (mulch, nutrient-rich soil amendment products, etc.).

The ultimate success of this plan will be the shared responsibility of all users including residents, businesses, and local governments to reduce water consumption. The plan's effectiveness will be monitored regularly and modified as needed in order to achieve the desired water consumption reduction targets. Supplemental efforts are also being undertaken by the CVRD, including working toward the creation of a Water Conservation Strategy.

1. Introduction

Since the adoption and implementation of the Comox Valley water efficiency plan (WEP) in 2009, the Comox Valley water system (CVWS) has experienced a significant reduction in water consumption. By the end of 2020, the total daily per capita water consumption had fallen approximately 23 percent. Total water consumption from 2009 to 2020 has decreased by approximately 6.1 percent, during the same time when populations served has increased by roughly 14 percent. While climatic factors may have played a part in this reduction, the recent trend of decreasing water consumption is likely due in part to the ongoing successful implementation of the WEP.

The *BC Living Water Smart Plan*, the Comox Valley Sustainability Strategy, and the Comox Valley Regional Growth Strategy (RGS) contain goals, objectives and targets for improving water efficiency. The relevant sections of these documents can be found in Appendix A. The Comox Valley WEP will assist the CVRD in reaching these benchmarks, helping to ensure continued eligibility for provincial infrastructure funding.

This is considered an evolving document and is periodically reviewed and updated. At the request of the Comox Valley water committee, the 2009 WEP was first updated in 2012, and it has undergone review and update in 2020/21. The plan's effectiveness will be monitored regularly and modified as needed in order to achieve the desired water consumption reduction targets. Final review, approval and publication of this updated report has been delayed by the COVID-19 pandemic.

2. Background

Relying on a combination of glacial capped mountains, snow covered hills and the storage capacity of the Comox Lake and surrounding watershed for its drinking water, the Comox Valley will use its water efficiently in order for the community to continue to thrive in balance with its water resources. The Comox Valley Regional District's (CVRD) WEP has been designed to manage how domestic water is used in the CVWS. Effective and efficient water use will result in numerous cost savings by:

- Reducing variable operating costs (e.g. chlorination chemicals and electricity purchases for pumping) (see Section 5 for system limitations);
- Deferring or potentially eliminating the need to upgrade water supply capital infrastructure upgrades (e.g. reservoirs, pump stations) and avoiding source water expansion projects (e.g. raising the dam) (see Section 6 for future infrastructure cost estimates);
- Maintaining eligibility for provincial water and wastewater infrastructure funding through demonstration of water conservation measures (see Section 6 for future infrastructure cost estimates);
- Reducing the size of future long term capital infrastructure upgrades required after the imminent new water supply and treatment system implementation (e.g. treatment facilities, pump stations, reservoirs) (see Section 7.3 for sizing based on maximum day demand); and,
- Reducing amount of payments to BC Hydro for water use under the terms of the water license (see Section 4).

The plan also recognizes that the water source, Comox Lake, is shared with other users, such as BC Hydro (for electricity generation) and the Department of Fisheries and Oceans (DFO) (for fisheries and conservation purposes), and has numerous ecological values. Efficient use of water will enable the CVRD to better adapt to potential climate change impacts, such as increased frequency and magnitude of droughts, and to reduce greenhouse gases through decreased electricity use (from pumping, water heating, etc.) and from avoiding the need to potentially raise the dam and flood additional surrounding land (resulting in

decomposition and release of methane). Water use reductions will also have positive benefits for the Comox Valley's wastewater system through the reduction of incoming waste water volumes.

2.1 Population Served

As of 2020, the CVWS supplied water to **approximately 49,356 people** including residents of the City of Courtenay, Town of Comox, K'ómoks First Nations, and CVRD electoral areas.

In April 2018, the CVRD Board approved the merger of their six water local service areas (WLSAs) into one expanded CVWS distribution service, which became effective on January 1, 2019 and includes Comox Valley, Arden, Marsden/Camco Road, Greaves Crescent, Sandwick and England Road.

Estimates for the number of households in Table 1 are based on the CVRD database, and information provided by the City of Courtenay, K'ómoks First Nations, and the Town of Comox. The estimates for service population are based on the 2016 Statistics Canada census reported average ratio of people per household for each of the City of Courtenay (2.19 people per household), the Town of Comox (2.26), Electoral Area 'A' (2.12), Electoral Area 'B' (2.34), Electoral Area 'C' (2.41) and the K'ómoks First Nation (2.18).

Table No. 1: 2020 Water Service Connections & Population Estimates*

Area	2020 Households	2020 Population Served
Comox	6,465	14,611
Comox Valley**	2,598	6,105
Courtenay	12,953	28,367
K'ómoks First Nations	125	273
TOTAL	22,141	48,356

*Estimates are approximate only and deemed sufficiently accurate for water efficiency planning.

**The various CVRD Water Local Service Areas (WLSA) were combined into a single Comox Valley WLSA in 2019.

3. Water Supply

Comox Lake has a 4.53 m vertical operating range within which water extraction is possible. The lower limit of the operating range is defined by the natural base level of the Puntledge River outlet from Comox Lake, while the upper limit is defined by the elevation of the Comox Dam. In theory, if the rate at which water is withdrawn exceeds the total licensed extraction rate, the surface of the lake may fall too low to provide sufficient outflow to the Puntledge River to meet the major licensed uses. This is of particular concern during the summer and early fall when recharge rates to the lake often fall well below licensed water extraction rates. As such, the amount of water available for licensed use will not change with the newly completed intake in Comox Lake for municipal water supply.

Figures 1A and 1B: Available Water Supply from Comox Lake

FIGURE 1A
AVAILABLE WATER OPERATING RANGE AT THE COMOX DAM

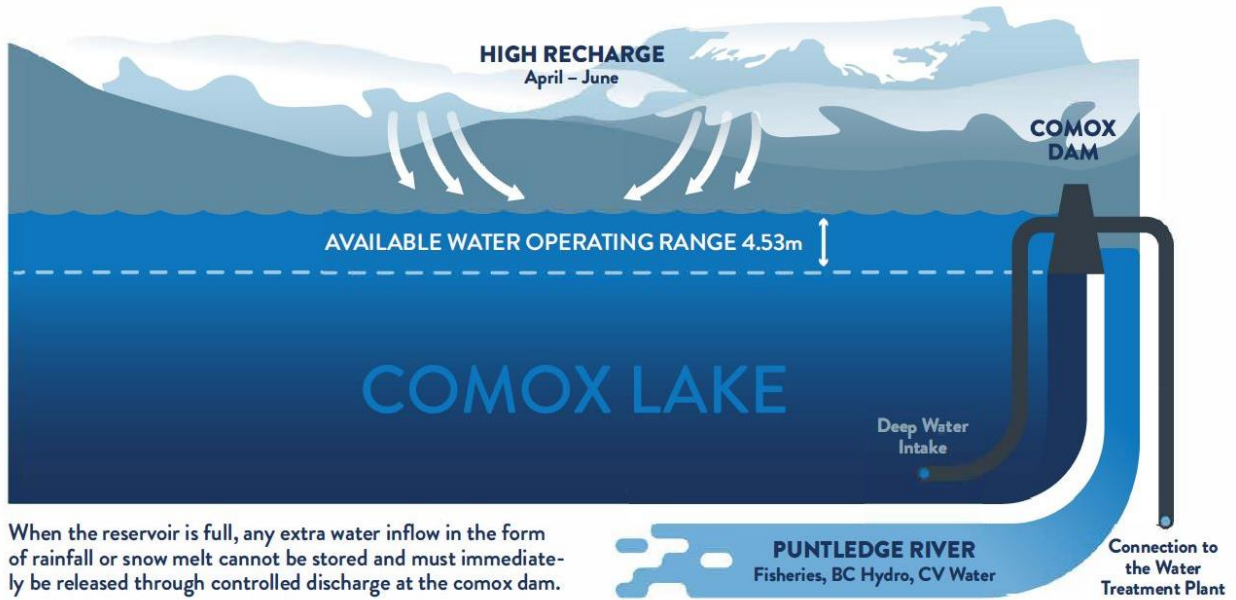
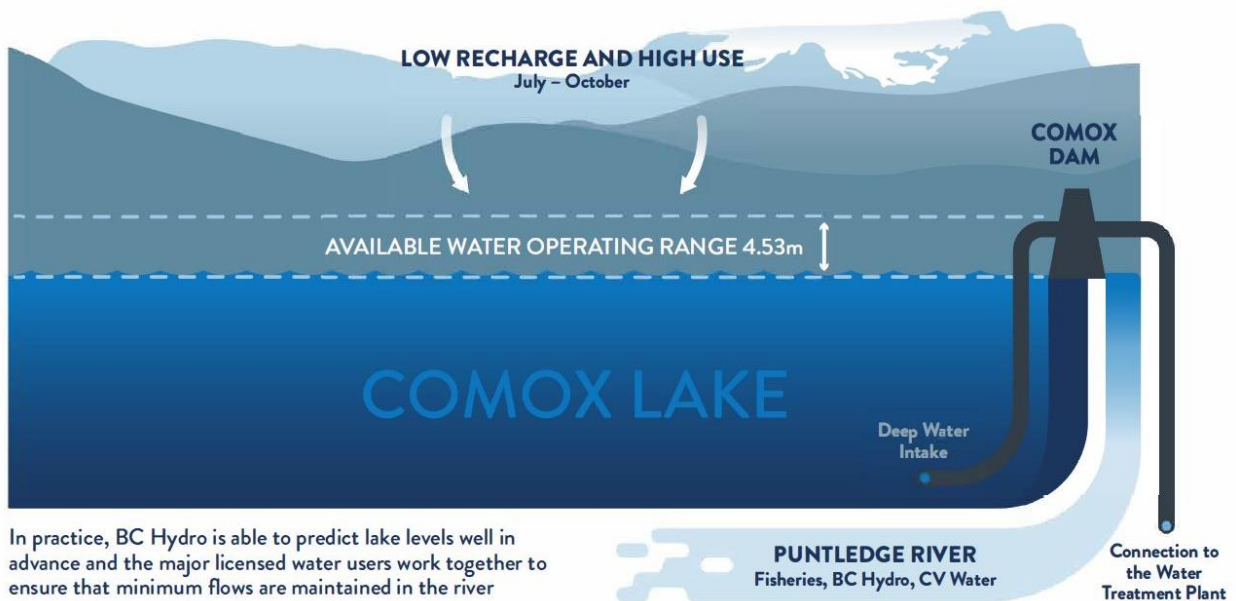


FIGURE 1B
CONCERN WHEN WATER RECHARGE TO THE RESERVOIR IS LOW



4. Water License

The CVRD holds a conditional water licence, issued by the Ministry of Forests, Lands, and Natural Resource Operations (MFLNRO), permitting a maximum annual diversion of 9,092,180 cubic metres (m³) and a maximum daily diversion of up to 68,191m³ from the Puntledge River. This equates annually to only approximately 0.77 percent of the available allocated water with the rest being allocated to BC Hydro (92.92 percent), DFO (6.30 percent) and other uses (0.01 percent).

As part of the Comox Valley Water Treatment Project, the CVRD went through an extensive process to secure additional license capacity from Comox Lake. The new license goes into effect once the treatment plant is completed, and the CVRD will see an increase of the total allowable annual diversion of 4,807,820 m³, and 31,809 m³ per day. Of the diversion increase, approximately 2 million m³ is allocated to KFN as part of the Mutual Benefit Agreement finalized in September 2018. Under the new license, the total maximum annual diversion would increase to 13,900,000 m³, with maximum daily diversion increasing to 100,000 m³. This increased diversion will be sourced from BC Hydro's licensed allocation (with associated fees for use of this water due to lost power), thereby not increasing the total amount of water extracted from the watershed.

As part of the new water treatment plant project and water license increase, the CVRD retained EcoFish Research Ltd. to conduct the Puntledge River Fisheries Habitat Effects Assessment (dated December 11, 2018) to model and assess flow related effects of the new Comox Lake intake and water treatment plant on fish. A summary of this is provided in Appendix B. This report used data collected from the Puntledge Water Use Plan (WUP). Independent of this WEP process, the WUP is anticipated to be updated in 2021.

5. System Limitations

Water is currently drawn from Comox Lake by way of BC Hydro's penstock and intake on the Puntledge River that supplies their hydroelectric generation facility. Water is then treated at a chlorination facility prior to being supplied in bulk to the City of Courtenay, Town of Comox and WLSAs by way of pump stations, storage reservoirs, large supply watermains and other physical infrastructure. This bulk supply is metered and each supply customer is responsible for distribution of the water throughout their service areas. In 2018, the CVRD completed installation of interim ultraviolet (UV) treatment system at its chlorination station to safeguard public health by providing enhanced disinfection to continuously protect against protozoa (parasites), while increasing the allowable turbidity to curb the number of boil water notices.

In 2020 construction began on a new intake and water treatment plant. Once completed in summer 2021, water will be drawn directly from the lake through a new marine intake, and delivered to a new treatment plant by a new raw water pump station on the edge of Comox Lake adjacent to the mouth of the lower Puntledge River. The new treatment plant, located near the intersection of Bevan and Laketrail Roads, will treat the water using direct filtration, UV treatment, and chlorination. Treated water will be stored in a new clear well, and conveyed down a new treated water transmission main to tie into the existing system near the pre-existing chlorination station.

Regardless of intake location, the CVRD requires an agreement with BC Hydro for this use, which includes compensation for lost power sales. A new water use agreement with BC Hydro was approved in 2019 and will go into effect once the new water treatment infrastructure comes online in the summer of 2021.

6. Future Infrastructure Costs Estimates

While the CVRD uses a development cost charge (DCC) bylaw to ensure that future growth and development pays for its fair share of this infrastructure, upgrades will continue to be required in coming years and DCCs will be adjusted to meet the future cost requirements of this infrastructure. Following completion of the Comox Valley's new water treatment plant, future infrastructure upgrades will include the routine repair/replacement/upsizing required to meet increased demand, and to continue to achieve emerging water quality standards from the Vancouver Island Health Authority and the provincial and federal governments.

On November 28, 2018, the Government of Canada and Province of BC committed \$62.8 million in federal-provincial funding for the new \$126 M drinking water treatment system being constructed in the CVRD, marking the first project to be approved under the Green Infrastructure Stream in B.C. Water conservation efforts to date and plans for the future supported the CVRD in receiving this funding from the government.

The significant costs associated with the new water treatment infrastructure highlight the opportunity for millions of dollars in cost savings associated with reduced water demand. Over time as the new water system is implemented and operating over the coming decades, the need for future upgrades and expansion will be reduced through results of continued water conservation efforts.

In September 2018, the CVRD and the K'ómoks First Nation (KFN) finalized a new Mutual Benefit Agreement that confirms KFN support for the new water treatment system project, the water service (south) extension, and support for the CVRD's water license increase (including an allocation for providing bulk water to new KFN development and servicing). The **Water Service (South) Extension Project** will include a new transmission main that extends south from the existing Comox Valley water system to connect with the future water system. This project includes the provision of treated Comox Lake water to K'ómoks lands south of Royston. The estimated costs for the Water Service (South) Extension is **\$14.8 million dollars**¹.

7. Water Demand

7.1 Annual Demand

Since the inception of the WEP in 2009, water consumption for the CVWS has decreased 6.1 percent overall from 2009 to 2020, or approximately 0.55 percent per year, even while populations served increased approximately 14 percent through the same time period. This reduction in consumption suggests that improved public education and awareness, summer irrigation restrictions, incentive and rebate programs, increased water efficiency requirements in the building code, and implementation of other components of the 2009 Comox Valley WEP have encouraged overall reductions in water usage in the CVWS.

From 1995 to 2006, total annual water demand in the Comox Valley increased by approximately 23 per cent, or two per cent per year, peaking at 9,255,646 m³ in 2006. Annual fluctuations can be attributed to variations in temperature and rainfall as well as previous water conservation efforts. Between 2006 and 2020, a decrease of approximately 16.3 percent, or approximately one per cent per year, has taken place with notable decreases in 2013, 2015 and 2020.

¹ Estimate provided by CVRD Staff, received February 11, 2019.

Total annual water consumption data from 1995 – 2020 collected through the bulk meters, is shown in Table No. 2 below.

Table No. 2: 1995 - 2018 Comox Valley Annual Water Consumption

Year	Volume (m3)	Year	Volume (m3)
1995	7,529,160	2008	8,145,190
1996	7,398,150	2009	8,396,414
1997	6,734,348	2010	7,871,950
1998	8,332,323	2011	7,747,212
1999	7,657,018	2012	8,032,913
2000	7,996,537	2013	7,577,537
2001	7,989,981	2014	7,797,742
2002	8,528,680	2015	7,653,566
2003	9,148,649	2016	8,076,595
2004	9,170,526	2017	8,373,936
2005	8,005,882	2018	8,074,992
2006	9,255,646	2019	8,361,441
2007	7,967,079	2020	7,886,796

A closer look at total annual water consumption reveals a relationship between total annual water consumption with summertime temperature and rainfall. Although annual water consumption in the Comox Valley varies, the trend is generally related to summer temperature and inversely related to summer rainfall (see graphs provided in Appendix E).

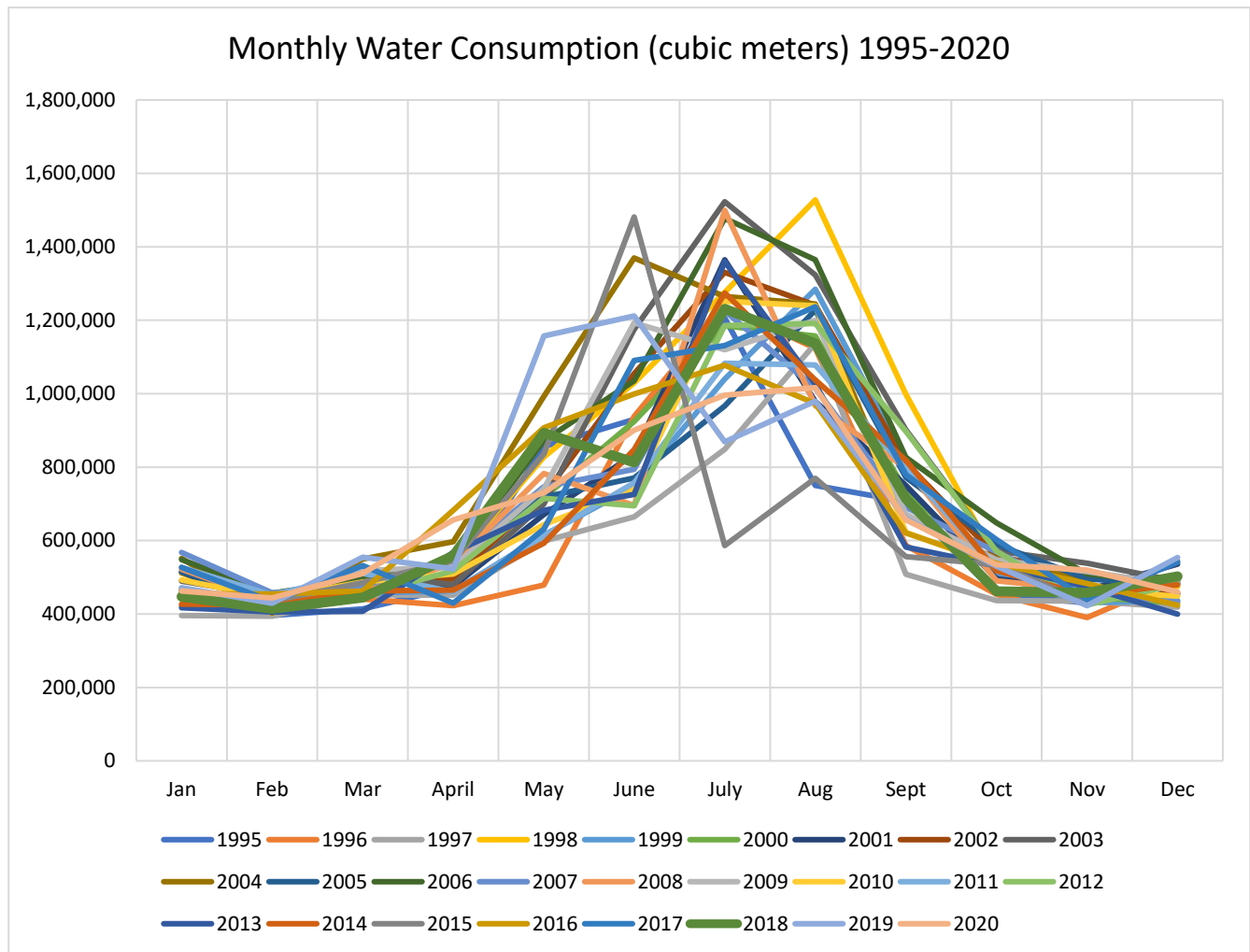
While annual water consumption exceeded CVRD's licensed withdrawal in 2003, 2004 and 2006, overall water consumption has not approached the withdrawal limit in recent years.

7.2 Monthly Demand

Variations in water use occur throughout the year and are shown in Figure 2 below. Water use is relatively level throughout much of the fall, winter and spring, begins to increase in May and generally peaks in July, then decreases to base levels again by October. The increase in summer water consumption is largely associated with lawn and garden irrigation. The historic (1995-2020) average water consumption for the cooler, wetter months of October-April ($523,500\text{m}^3/\text{month}$) almost doubles during the warmer, drier months of May-September ($1,022,000\text{m}^3/\text{month}$), and increases to over 2.5 times as much in the peak month of July ($1,275,000\text{m}^3/\text{month}$).

Figure 2 below shows water consumption over the timeframe that the WEP has been implemented, from 2009 to 2020.

Figure 2: 2009 – 2020 Monthly Water Consumption



Note that Figure 2 shows the relative shift in water use through the seasons and the large differences between average winter and summer consumption. 2015 shows an unusual drop in use during the month of July, however, this year had a typical summer season with peak months of water consumption in July and August.

7.3 Daily Demand

Maximum day demand, which occurs in summer, is critical to the sizing and design life of the water system’s major infrastructure components and has been tracked annually since 2002 (Table No. 3). The peak summer water demand is used as criteria for the design of new water system infrastructure. The higher the peak demand, the larger the new infrastructure needs to be. By using less water, the size of new infrastructure can be reduced and the service life of existing infrastructure increased.

Table No. 3: Maximum Day Demand (MDD) 2002-2020

MDD (m ³)	Date	MDD (m ³)	Date
57,792	2002 July 24th	54,404	2012 August 15th
62,462	2003 July 30th	52,519	2013 August 8th
59,226	2004 June 29th	48,077	2014 July 14th
48,881	2005 July 29th	50,682	2015 June 30th
55,646	2006 July 26th	43,807	2016 July 28th
53,957	2007 July 12th	47,879	2017 August 2nd
49,854	2008 July 25th	46,063	2018
50,977	2009 July 29th	44,388	2019 Jun 15th
53,676	2010 July 28th	44,046	2020 July 7th
37,389	2011 July 26th		

From the table above, although the Maximum Day Demand varies from year to year, the general trend is a reduction in the daily demand (range of 48,500 to 62,500 from 2002 to 2006; compared with a range of 37,000 to 54,500 from 2007 to 2017).

7.4 Total Per Capita Water Consumption

With approximately 49,356 people served by the water system, the Comox Valley's 2020 daily total per capita water consumption is estimated at approximately **437 litres per capita per day (lcd)** based on annual usage. Total per capita water use is the total volume of water delivered to the water distribution system, divided by the residential population served by the water system. Total water use includes all end-uses of municipal-supplied water (residential, commercial, industries and agricultural operations that obtain their water from a municipal water supply) and water losses.

Between 2008 and 2020, per capita water consumption dropped by 23 percent, or on average just over two percent per year. It is recognized that part of this decline may be attributable to climatic factors, however, new building stock has lower flow fixtures, along with the emergence of more water/energy efficient appliances being lower flow². Per capita consumption increases significantly in summer when daily water use can reach as high as 1,300 litres per person (at its highest since the WEP inception, based on maximum day demand in 2012). The maximum summer per capita demand in 2017 was approximately 1,040 litres.

At this time, National and Provincial average per capita water consumption data is not published to compare average consumption trends, however, historically, daily per capita consumption in the CVWS has been higher than the Canadian average, and approximately on par with the BC average.

These results indicate a likely trend towards more sustainable use of water resources in the Comox Valley. Water efficiency measures implemented within the Comox Valley water supply area including public education programs, rebate programs, summertime outdoor watering restrictions and enforcement, building code updates and increased water metering, have likely contributed to the reduction in total per capita water consumption.

² Source: <http://www.mwra.state.ma.us/04water/html/lctoilet.htm>, accessed January 14, 2019.

8. Water Efficiency Measures

Since 2006, a number of measures have been implemented in the Comox Valley to improve water efficiency. Initially, these included water education through school programs, a communication program utilizing the CVRD website and other media (e.g. newspapers, radio, fleet vehicle stickers) as well as three-stage sprinkling restrictions (Comox Valley Water Conservation Bylaw No. 2867).

With the adoption of the Comox Valley WEP in 2009, a number of additional measures were implemented to improve water efficiency. As we have seen a reduction in total per capita water consumption since 2006 and further reductions since 2009, it appears that these measures have been effective. The following sections outline measures and programs that have been implemented to reduce water consumption. While the most recent and more current measures are discussed here, further details and information on previous programs are provided in Appendix D.

8.1 **Connected by Water – Outreach, Communications and Education for Water Conservation³**

As part of a new multi-year, multi-phase initiative, "Connected by Water," (which includes outreach, communications and education for watershed protection and water conservation), and in consultation with the municipal participants, the CVRD is developing more robust strategies for encouraging water conservation for all CVWS users. The goals of this work are to work with other local governments to broaden the community's understanding of the importance of water conservation, and to actively engage the community in adopting improved water-conserving behavior and technology. This work is supported by the CVRD Water Conservation Bylaw, which includes provisions for water restrictions and fines for overuse.

Progress to date:

Phase One of the project began in June 2018. As part of the Phase One project concept development, the project was named "Connected by Water." Phase One activities included:

- Review of existing resources;
- Engagement with the Outreach and Education sub-committee of the Watershed Advisory Group;
- Identification and engagement of key stakeholders;
- Development and approval of a project vision, initial communications strategy and related materials; and,
- Development of curriculum concepts for schools.

Water conservation was addressed during targeted stakeholder engagement efforts, and as part of curriculum development for schools as part of Phase One. Phase One activities concluded in September 2018 but included developing a work plan for Phase Two and beyond.

Phase Two of Connected by Water commenced in October 2018, and included developing expanded public and stakeholder engagement activities, and curriculum development and delivery for schools (primary and intermediate grades). Communication, outreach and education efforts in Phase Two included tasks and deliverables to promote water conservation.

³ Outreach, Communications and Education for Watershed Protection & Water Conservation Phase One Report & Proposed Phase Two Workplan, January 2019.

Phase Two tasks and results were summarized in a final report, completed in October of 2020. Despite the work being impacted by the COVID-19 Pandemic, significant outreach and stakeholder engagement was still accomplished. Watershed 101 sessions were facilitated with several groups, social media posting continued, and a high school curriculum developed.

Recommendations

Phase 1 and 2 of the Connected by Water initiative laid the ground work for continued communications and outreach by the CVRD. It is recommended that the themes, graphics, strategies and tactics developed be continued by the CVRD via short term contracts to members of the Connected by Water team, and with in-house communications resources.

8.2 Outdoor Water Efficiency Rebates – Irrigation SMART Controller

Despite recent decreases in per capita water consumption, summertime water consumption still represents an increase of 2.5 times over winter water use. Increased efficiency of water application to lawns and gardens during summer months would allow property owners to maintain healthy green lawns and vibrant gardens by applying only as much water as needed and reducing unnecessary overwatering.

As summertime outdoor water use plays such a major factor in overall water consumption in the CVRD, the development of a program directed at improved irrigation efficiency was implemented in the form of the irrigation SMART controller rebate program. Property owners are eligible for up to a \$300 rebate on the purchase of a qualifying smart irrigation controller.

Recommendations

Given that overall consumption is strongly influenced by summertime outdoor water use, it's recommended that the irrigation SMART controller rebate program be continued to promote outdoor water efficiency and summer water conservation.

Further, it is recommended that a new supplemental garden improvements rebate program be developed to reduce water use, which would include emerging techniques and technology for homeowners (such as installing drip irrigation systems, high efficiency matched-precipitation rotator sprinklers, and/or by improving the water-holding capacity of soil through soil amendments - mulch, nutrient-rich soil amendment products, etc.).

8.3 Leak Detection and Pressure Reduction

With unaccounted for water use in the bulk supply system only accounting for an estimated 0.8 per cent of total annual water use, the largest opportunity for reducing water loss through leaks is within the local distribution systems in City of Courtenay, Town of Comox and CVRD WLSAs. As universal water metering is not in place within the City and Town, leak detection opportunities are diminished, as leaks will only be found on the main distribution system and on properties that are metered. The CVRD has assisted member municipalities in undertaking a leak detection program that identified potential losses and developed a pressure reduction strategy. Leakage audits will also be performed at each connection by CVRD, Courtenay and Comox staff.

Recommendations

Continue to conduct leakage audits and make repairs based on high priority/volume leaks and as budgets allow. Report leaks found on private properties to property owners for repair. Also, implement universal water metering to allow more efficient detection and repair to be undertaken earlier.

8.4 Water Restrictions and Bylaw Enforcement

As discussed in Section 7.2, peak summer water demand is over two and a half times the average winter demand. While it is understood that demand increases in the summer, water restrictions, combined with appropriate enforcement activities, can lead to a substantial reduction in summer water demand. As new water infrastructure is sized to meet maximum water demand conditions, reducing summer demand can have a significant impact on future infrastructure costs.

Between the CVRD, Town of Comox and City of Courtenay, water conservation bylaw enforcement activities have identified over 4,750 violations since 2010. From these violations, various actions taken include direct homeowner contact, delivery of bylaw and contact details, written warnings and in rare instances tickets.

Recommendations

It is recommended that staff continue to closely monitor summertime water consumption and the effectiveness of existing watering restrictions. Watering restrictions should be consistent and simple to improve public understanding and buy-in. Improvements to the water use bylaw may be considered going forward in order to improve simplicity and effectiveness.

Further, it is recommended that enforcement of watering restrictions should continue and that continued effort should be made by enforcement personnel to make direct contact with identified water conservation bylaw offenders to improve overall compliance.

8.5 Water Metering

It is well established that water meters are the most effective measure for reducing water demand. Universal metering throughout the Comox Valley would result in an estimated annual reduction of 20-25 per cent in total water consumption over pre-metered consumption levels, based on evidence from neighboring communities that have recently become universally metered.

The following Table 4 shows a summary of metering initiatives and water rates within the CVRD, Town of Comox, City of Courtenay, City of Parksville, City of Nanaimo, and the City of Campbell River.

Table No. 4: Water Metering & Rates Summary

Jurisdiction	Metering	Rate (Residential)
CVRD	Mandatory water metering program for all residences and business within the WLSA's	\$25.30 per month for metered (up to 15 m ³) \$36.25 per month (\$435 per year) unmetered
City of Courtenay	All Commercial, industrial, multi-family and institutional customers require metering. All new residential properties require a meter box and setter.	Min. \$21.09 per month (\$63.26 per quarter) for metered multi-family up to 48 m ³ . \$38.96 per month (\$467.53 per year) for unmetered single family dwelling.
Town of Comox	New residential metering is required, along with all commercial, industrial and multi-family developments.	Min. \$15.00 per month (up to 14 m ³) for metered \$32.45 per month unmetered
City of Parksville	All Properties are metered	Min. \$23.11 per month (up to 10 m ³)
City of Nanaimo	All service connections shall be metered	Approx. \$22.57 per month for up to 16 m ³ .
City of Campbell River	Water meters are required for all properties, however single family and duplex residential pay flat rate.	\$23.35 per month for metered (up to 34 m ³). \$34.00 per month unmetered

CVRD Water Local Service Areas are all now metered. An additional benefit of water meter installation is the ability to detect leaks. Since the implementation of water metering in the CVRD electoral areas, numerous significant leaks on residential properties have been detected and repaired.

The Town of Comox has been requiring new residential subdivisions to be meter ready since 2001 and began installing water meters on all meter ready homes and most residential strata developments in 2010. Currently, approximately 50 per cent of residential properties in the Town of Comox are metered. The Council has adopted metered residential rates and customers with meters now have the option to switch to metered billing.

The City of Courtenay bylaws currently require all commercial, industrial, multiple family and institutional customers to be metered.

8.6 Other Significant Water Conservation Measures

The following initiatives are also highlighted as significant step the CVRD and member jurisdictions have taken to increase water conservation. Further details on these, and other past measures, are included in Appendix D.

- uHave2kn0w campaign for education on water efficiency

- Toilet Rebate Program (2009 to 2017) – total of 4,114 rebates for residents installing low flow toilets
- Corporate efficiency through the CVRD, Town of Comox and City of Courtenay to enhance water efficiency of municipal buildings, parks and recreation centres
- 1,650 showerhead retrofit kits distributed to reduce water consumption

8.7 Water Conservation Initiative Comparison

The following Table 5 shows water conservation initiatives and rebate programs within the CVRD, Town of Comox, City of Courtenay, City of Parksville, City of Nanaimo, and the City of Campbell River.

Table No. 5: Water Conservation Initiatives

Jurisdiction	Initiatives	Max Rebate
CVRD	<ul style="list-style-type: none"> • Connected by Water Initiative – Education, Outreach & Communications • Smart Controller Irrigation Rebate • Summer watering restrictions 	\$300
City of Courtenay	<ul style="list-style-type: none"> • Smart Controller Irrigation Rebate (offered through CVRD) • Summer watering restrictions 	\$300
Town of Comox	<ul style="list-style-type: none"> • Smart controller irrigation rebate (offered through CVRD) • Summer watering restrictions 	\$300
Cowichan Water Board*	<ul style="list-style-type: none"> • 20% Challenge - Initiative challenging everyone in the region to reduce water use by 20% 	
City of Parksville	<ul style="list-style-type: none"> • RDN Team WaterSmart Initiative ** • WaterSmart Garden Rebate (Irrigation Upgrades & Soil Improvements) Program (offered through RDN) • Rainwater Harvesting Program (offered through RDN) • Watering Restrictions 	\$675 \$750
City of Nanaimo	<ul style="list-style-type: none"> • RDN Team WaterSmart Initiative ** • Toilet Rebate Program • Watering Restrictions 	\$50 each (up to 2)
City of Campbell River	<ul style="list-style-type: none"> • Water Wise Hotline • Toilet Rebate Program • Appliance Rebate Program • Watering restrictions 	\$50 each (up to 2) \$50

*Note: Cowichan Valley Regional District is Co-Chair of the Cowichan Water Board.

**Note: Team WaterSmart is a joint program of Water Conservation, Outreach and Resources undertaken between the Regional District of Nanaimo - Drinking Water and Watershed Protection Program, Town of Qualicum Beach, City of Nanaimo, City of Parksville and District of Lantzville.

9. Implementation Plan

Previous water conservation initiatives and programs have reduced per capita water consumption, indicating that water efficiency measures implemented have been effective. In order to continue to reduce water consumption, the following Table No. 6 shows the implementation plan going forward.

Table No. 6: Implementation Plan

Item	Measure	Implementation Plan
1	Connected by Water Initiative	Phase 1 and 2 of the Connected by Water initiative laid the ground work for continued communications and outreach by the CVRD. It is recommended that the themes, graphics, strategies and tactics developed be continued by the CVRD vis short term contracts to members of the Connected by Water team, and with in-house communications resources.
2	Leak Detection & Pressure Reduction	This program will likely require some ongoing funding in order to address system leaks, broader implementation of water meters will help.
3	Watering Restrictions & Enforcement	Continue enforcement program with a focus on compliance. Continue to monitor summertime water consumption and consider improvements to the water use bylaw going forward.
4	Outdoor Water Efficiency Rebates	Continue the irrigation SMART controller rebate program to promote outdoor water efficiency and summer water conservation, and supplement with new garden rebate program (soil amendments or other irrigation upgrades).
5	Water Conservation Strategy – Stakeholder Engagement and Plan Development	Create water conservation targets, a strategy and implementation plan based on total per capita water consumption reduction targets as outlined by the Comox Valley RGS. This strategy should be developed with a stakeholder engagement process to build consensus and develop goals and targets for water conservation.

10. The Case for Water Efficiency

Water systems are expensive to construct, operate and maintain. By maximizing the efficiency of existing infrastructure and minimizing the need for future infrastructure expansion, the CVRD can keep service and development costs lower for residents. Lower water demand also results in lower energy and chemical costs associated with the treatment and distribution of water.

The Comox Valley sustainability strategy, the Comox Valley RGS, and *BC Living Water Smart* and the *Provincial Water Act* set guidelines, benchmarks and requirements for improved water efficiency. The Comox Valley WEP is in alignment with those guidelines and will allow us to progress towards the outlined goals, objectives and policies. In the case of the provincial government, it has been indicated that eligibility for increased water licences as well as grant funding for water infrastructure projects will be contingent upon evidence of implementation of rigorous water efficiency measures. As such, without a thorough water conservation planning in place, the residents of the Comox Valley would likely be required to pay for 100 per cent of the capital costs associated with infrastructure repair, upgrades and expansion. In this sense, the WEP has led to further financial savings to Comox Valley residents, in the form of existing and future grant funding received for capital improvement projects.

The Comox Valley WEP targets ways of reducing water waste and unnecessary or excessive water consumption without negatively impacting the lifestyle of Comox Valley residents. Benefits in the form of lower costs to users, continued grant eligibility, and reduced impacts on the local environment outweigh the costs associated with implementation of the Comox Valley WEP.

11. Other Related Documents

Much of the information used to develop this plan is derived from other studies and reports, including:

- CVWS universal metering study update, 2007, Koers and Associates Engineering Ltd.;
- Water conservation strategy review, 2009, Koers and Associates Engineering Ltd.;
- Water conservation plan guidelines, US Environmental Protection Agency;
- Various reports by the POLIS water sustainability project located at University of Victoria; and
- Studies conducted as part of the Comox Valley regional water supply strategy.