REGIONAL DISTRICT OF CENTRAL KOOTENAY

Drinking Water Conservation Plan

May 2019

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1 Introduction

Drinking water is a precious resource that must be conserved.

This plan applies to all Regional District owned water services. The purpose of the Drinking Water Conservation Plan is to promote smart usage of our drinking water and to minimize waste and loss.

Implementation of a drinking water conservation plan will reduce drinking water infrastructure and operating costs, reduce impacts to the environment, and will help keep our resources and water infrastructure sustainable for current and future generations.

1.1 Background on Regional District Water Services

The Regional District of Central Kootenay owns 20 financially independent water services:

- Arrow Creek
- Balfour
- Burton
- Denver Siding
- Duhamel Creek
- Edgewood
- Erickson
- Fauquier
- Grandview
- Lister
- Lucas Road
- McDonald Creek
- Riondel
- Rosebery Highlands
- Sanca
- South Slocan
- West Robson
- Woodbury Village
- Woodland Heights
- Ymir

Kootenay Lake

Source water for Regional District water services includes various wells, springs, creeks and Kootenay Lake with various levels of treatment.

The Regional District's largest water service, Erickson has primarily agricultural usage with additional residential and commercial usage. The Arrow Water Service provides water to Erickson and the Town of Creston. Other Regional District water systems have primarily residential usage.

Historically most of the Regional District water service had water quality issues ranging from re-

occurring Water Quality Advisories to long term Boil Water Notices. Many of these systems have been upgraded in recent years and upgrade plans are in place for the remainder, with the exception of two systems.

Regional District water infrastructure is in various states ranging from in need of immediate replacement to new. Asset management plans have been adopted to aid infrastructure renewal planning, but generally funding renewal projects is challenging.

In recent years water supply capacity has proven to be a concern in the Arrow Creek, Riondel and Balfour water services.

In 2018, water rates including water

parcel or frontage tax ranged from about $456 to $1,452 per year for a single family dwelling. Rate variation can be attributed to the size of the water system, treatment costs, repair costs and infrastructure renewal requirements.

The Regional District has several programs and initiatives in place to promote water conservation including: a WaterSmart Program, bylaw adopted water conservation measures and metering requirements, metering implementation programs, and leak detection and remediation. This Drinking Water Conservation Plan expands on these efforts.

1.2 Why Conserve Water

Water conservation can provide the following benefits:

- Reduced operating costs
- Postponement of capacity upgrades
- Increased asset life expectancy due to decreased wear and tear
- Reduction in energy consumption and greenhouse gas emissions
- Reduction in diversion rates from water sources and conservation for other species
- Reduction in treatment chemical consumption
- Improved water delivery reliability and availability of water stored for emergencies and fire fighting
- Conservation of our critical resources for future generations

Balfour Water, Kootenay Lake Pump Station

Managing water demand is often cheaper and more beneficial than capacity upgrades. Water shortages due to high demands also result in increased costs due to staff response

time, public communication, water conservation enforcement, increased energy costs, and filter and chemical consumption costs.

A water conservation plan and program is a requirement for many senior government grants.

Extend Infrastructure Life Expectancy & Deferred Capacity Upgrades

Operating infrastructure such as pumps and filters near capacity for extended periods of time will decrease the life expectancy and decrease reliable in terms of risk of failure.

Decreased water demands should extend service life, resulting in lower costs. This is particularly beneficial when it comes to water filters. The Regional District has four water treatment plants that use disposable cartridge filtration: Balfour, Grandview, Ymir and South Slocan. Balfour and Grandview plants have proven not economically feasible to operate and our Regulator, Interior Health has agreed to a filtration deferral program where the one micron absolute filters have been decommissioned. One other water system is currently facing unsustainable cartridge filter consumption but Interior Health has not yet agreed to filtration deferral without additional monitoring and study.

Ymir Water Intake

The Arrow Water Treatment Plant and Riondel Water Treatment plant have membrane filtration. The membrane filters have a life expectancy of about 7 to 10 years. Flow rates through membrane filters and changes in water quality can significantly impact life expectancy.

The cost of filter replacement in Riondel is about $25,000 or about $125 per customer. Filters in Riondel are currently 4 years old. The cost of filter replacement in Erickson is about $2.0 million and 2019 will be the end of the current 4 year, phased replacement program. Through careful operation, the final phase of filters will have lasted 14 years. Based on historical demands, under the current Arrow funding agreement the Town of Creston pays 60% of Capital upgrade costs and Erickson pays 40%. 40% of $2.0 million equate to about $1,100 per Erickson water customer. Water demands in recent years have been trending towards 50/50 between the Town of Creston and Erickson largely driven by increased agricultural consumption in Erickson.

The Arrow, Balfour and Riondel water systems have been operated at capacity during periods of high demand in recent years. Capacity upgrades can be very costly as often pump stations, water supply lines, treatment plants and water storage reservoirs must be upgraded or twinned. Water conservation efforts typically cost much less and can defer the requirement for capacity upgrades for many years.

Water conservation programs are a typical requirement for senior grand funding opportunities,

and it is very unlikely that senior government grants would be awarded for capacity upgrades in water services with high water demands and ineffective water conservation programs.

Reduced Environmental Impacts

Reduced water demand and loss through water conservation efforts reduce environmental impacts by reducing source water diversions rates, energy consumption, chemical consumption, disposable filter consumption.

Sanca Creek

During recent drought years, very low flows were experienced in Arrow Creek, and Hendrix and Indian Creek in the Riondel water service. Fish and other aquatic species are very sensitive to water temperature increases resulting from low stream flow levels during warm weather. Water demand and capacity are concerns in the Arrow Creek and Riondel water systems. Water supply in Riondel no longer includes Hendrix Creek and the treatment plant is only supplied from Indian Creek.

Reduced Overall Rates to Our Customers

With inflation, aging infrastructure, water quality concerns and increased Regulatory requirements, it is very unlikely for water rates to be reduced; however, water conversation can lead to lower rate increases.

2 Drinking Water Conservation Plan Goals

The goals of the Drinking Water Conservation Plan are:

1. Reduce water demand by 20%
2. Educate and promote water conservation measures
3. Provide Annual Reporting on Water Consumption & Loss and Demand Forecasts
4. Extend Infrastructure Life Expectancy & Deferred Capacity Upgrades
5. Reduced Environmental Impacts
6. Improved water delivery reliability, including the availability of water stored for fire fighting
7. Reduced Overall Rates to Our Customers

3 Water Conservation Strategy

The water conservation strategy outlines potential water conservation programs, initiatives and work plans. Implementation will however be dependent on available staff resources, available

budgets, and customer and Board of Directors support. Annual work plans and budgets also have to balance other financial and resource challenges associated with water quality, operations, regulatory requirements and infrastructure renewal requirements.

The Regional District water conservation strategy is as follows:

3.1 Water Reduction Targets

The general water conservation target for the Drinking Water Conservation Plan is 20% on average. Actual targets for individual water systems need to be established and might vary based on current usage, water loss and potential cost benefit of water reduction programs. These targets can be established in conjunction with a future Water Metering Strategy. This strategy is targeted to be drafted by year end 2019.

3.2 Water Metering Implementation Strategy

An overall Water Metering Strategy is required that assesses metering feasibility, and provides prioritization and a timeline for potential metering implementation in each individual water system. Metering might not be cost effective or feasible in some water systems. A review is required that includes social, economic and environmental considerations to determine if metering should be or should not be ultimately required in individual water systems. This strategy is targeted to be drafted by year end 2019.

The benefits of metering can include:

- Improved water conservation
- Reduced energy, cartridge filter and treatment chemicals consumption
- Deferment of capacity upgrades
- Improve consumption data
- Improve leak and water loss detection
- Provision of more equitable water rates

The Water Metering Strategy should provide only a high level plan that should be amended from time to time to reflect changes in water supply, demands, operating costs, metering technology, and availability of funding.

Individual water system metering implementation plans should be drafted for water systems assessed a higher priority for metering. A metering implementation plan provides more detailed review of requirements and cost estimates for metering implementation.

A metering implementation plan was drafted for the Balfour water service in 2015 by Diameter Service Ltd. prior to metering implementation in 2018. A metering implementation plan is also currently being drafted for the Erickson water service so that the Regional District might be ready to take advantage of any grant funding opportunities.

The Erickson water service has a mix of residential, business and agricultural usage. Most of the revenue in Erickson comes from residential and business customers but it is believed that agriculture has the highest water demand.

3.3 Water Bylaw Metering Requirements

The existing Regional District Water Bylaw identifies current metering requirements which will need to be updated as the Drinking Water Conservation Plan is being implemented.

The Water Bylaw identifies a current universal metering requirement for Lucas Road, Balfour, Grandview and Rosebery Water Systems.

Arrow Main Line Replacement

The Water Bylaw identifies the requirement for metering by the owner for all existing Multiple Dwelling Properties, Commercial properties, Industrial properties, Institutional properties, golf courses, Agricultural Land, and recreation facilities by December 31, 2019, and all Single Family Dwelling Properties are to be metered by December 31, 2024. It is anticipated that these requirements will be repealed and replaced with implementation of this Drinking Water Conservation Plan and proposed Water Metering Implementation Strategy. Universal metering may not be economically feasible or necessary in some Regional District water services.

3.4 Water Rate Setting

The water rate structure chosen for a water system will depend on the priority of the rate setting objectives. Rate setting objectives might include:

- Full service cost recovery
- Rate and revenue stability and predictability
- Water conservation
- Fairness among different types of water users (residential, commercial, industrial, institutional, low volume users & high volume users)
- Financial ability to respond to changing supply-and-demand patterns
- Economic sustainability (changing operating costs, system expansion & asset renewal)
- Simple and easy to understand and administer

Water user revenue options for the Regional District include:

- Parcel (unit, frontage or area) tax collected through BC Assessment
- Property value taxes collected through BC Assessment

- Flat rate by water use type (non volumetric)
- Volume based billing

New Ymir Reservoir

In 2018, water rates in Regional District water services including water parcel or frontage tax ranged from about $456 to $1,452 per year for a single family dwelling. Rate variation can be attributed to the size of the water system, treatment costs, repair costs and infrastructure renewal requirements.

Most Regional District water services are currently billed on a flat rate by usage type such as single family residential, commercial or agricultural land. Flat rate billing does not help to promote water conservation.

In water systems where per capita water demands are reasonable, supplies are adequate and operating costs are low, metering a water consumption based rate setting may not be feasible or required. In water systems with water demand and supply concerns, rate setting can be one tool that can be used to help conserve water but it needs to be done in conjunction with water metering.

As of 2019, the Grandview water system and Lucas Road water systems have metered billing. The Balfour water system will switch to metered billing in 2020 with meters implemented in 2018. The Rosebery water system has universal metering but does not yet have metered billing because the community is only partially developed, and water demand is low. A dairy in Lister has metered billing and a mobile home park in Erickson is voluntarily switching to metered billing in 2019.

The Lister dairy has only a uniform volume charge. Lucas Road has a water parcel tax, flat rate user fee up to volume limit and then volumetric overages. The Grandview water system has a water parcel tax, flat rate base charge and a volume based rate.

The Regional District uses water taxation collected through BC Assessment to fund contributions to reserves for infrastructure renewal. The rational for using a tax is that a tax is applied to all parcels of land within a service area regardless of water usage because the water infrastructure was built to service all parcels regardless of usage. Vacant properties still need to contribute to asset renewal and upgrades.

The Grandview water system is only partially developed and early water usage was indicating that the water system might not support full community build out as water demand was too high. Grandview had a 43% reduction in water demand in 2018 after metered billing was introduced that can be attributed to changes in customer water usage, and a significant reduction in water wastage and leakage.

Rate setting for Balfour will be done with community consultation starting in 2019. It is anticipated that metered rates will be adopted in spring 2020.

3.5 WaterSmart Program

The existing Regional District WaterSmart Program should be continued. The program is annually reviewed, reported, and improved, as required.

WaterSmart Ambassador

The WaterSmart Ambassador Program was developed by the Columbia Basin Trust (CBT) to address high seasonal outdoor water use and help achieve the basin wide reduction goal of 20% in the Columbia Basin. The Regional District's Erickson Water Service in partnership with the Town of Creston and CBT has participated in the Ambassador Program since 2010. The WaterSmart Program was expanded to a number of other Regional District water services in 2016.

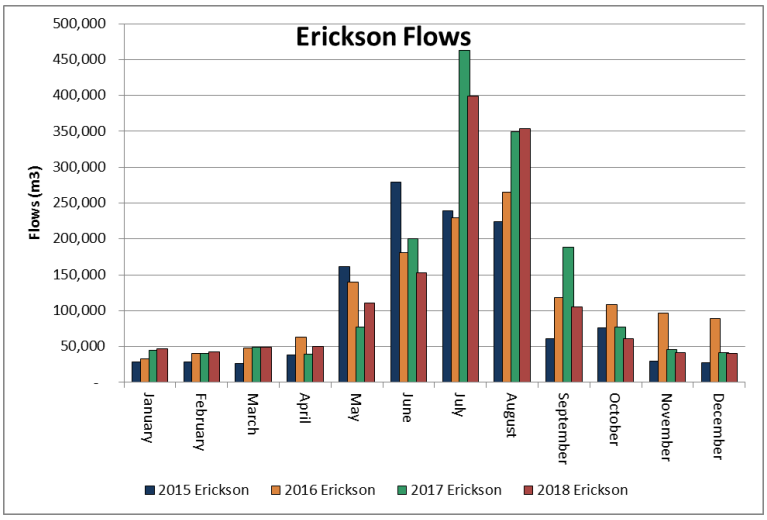
In 2018 the WaterSmart program in Erickson and the Town of Creston was placed on hold for a couple years. The number of participating communities has varied slightly in recent years depending on community support for the program. Ten Regional District water services continued to participate in the program in 2018 and the WaterSmart Ambassador was shared with the City of Castlegar (and the Village of Salmo in 2017). Funding partners for the 2018 WaterSmart program included Columbia Basin Trust, FortisBC, participating Regional District water systems, and the City of Castlegar.

The WaterSmart Ambassador Program has included free assessments of outdoor watering needs, promotion and education on water conservation and xeriscaping, provision of free low flow shower heads, water irrigation timers, drip irrigation kits, and water saving grass seeds.

Education is a key component of the WaterSmart program. With many lakes, rivers and streams in the district, there is often a historical public perception that water supply should be nearly unlimited and the cost of supply low.

In the future, the WaterSmart Program will be updated and expanded in Erickson to include more focus on water for agricultural production and food security as these are becoming more significant issues in recent years.

3.6 Agricultural Water Demand Review



The majority of water demand in Erickson is used for agricultural purposes. Despite WaterSmart Ambassador initiatives and significant water loss reductions from the recent Arrow Main Line replacement, water demand in Erickson has been increasing in recent years. It is suspected that much of the new demand could be the result of new lateral leakage, and agricultural water usage and in particular new or changing agricultural crops.

In 2007, FarmQuest Consulting Ltd. was commissioned to provide a Water Conservation Pilot Project study with focus on agricultural water demands.

In 2017, the Partnership for Water Sustainability in BC, and the BC Ministry of Agriculture provided an Agriculture Water Demand Model and report for the district. The report provides a summary of district level demands but is not specific to the individual Regional District water service areas. The GIS model data provided has higher resolution but additional review is required to establish water service area level demands.

In 2019, FarmQuest has been commissioned to provide update on the Erickson agricultural inventory with the following goals:

1. To review and update as necessary the current acreage of agricultural crop groups (tree fruit commodities, vegetables, others) within the Erickson Water District.
2. To project potential agricultural water demand within the service area boundary through a build-out scenario of potential agricultural expansion.
3. To evaluate farm irrigation management through the analysis of metered water use data in conjunction with the agriculture water calculator and water demand model for specific agricultural crops produced within the district.
4. To identify areas of information or data shortfall and look at possible methods to address them.

There has also been resent requests to expand the Arrow Creek water service area. Due to current supply and demand concerns, the decision to allow expansion has been placed on hold until the Regional District can review potential future demands within the existing Arrow Creek water service area that currently includes the Erickson water system and the Town of Creston.

Arrow Mainline Replacement

3.7 Water Loss Control & Leak Reduction Program

A formal Water Loss Control & Leak Reduction Program will be established. Water loss and control programs consist of three steps: Water Audit, Intervention and Evaluation.

An Audit consists of assessing water usage and demand within a water system to identify and quantify potential water loss and leakage. Intervention consists of metering programs, leak detection, repairing and replacement, operational changes and administrative and policy changes. Evaluation measures the effectiveness of the program and identifies areas of improvement.

Detection of water loss and leakage can be a challenge, expensive and time consuming, particularly in water systems without metering. The Regional District conducts water audits and interventions typically when time permitted or as issues arise, but limited staff resources and potential costs has hindered delivery of a formal program. Leak detection equipment is expensive and the Regional District currently has to contract these services.

Specific budgets are not currently established for leak detection work. The RDCK has increasingly included leak detection in work plans and future budget will include water audits and leak detection in all Regional District water services. Since it is not likely feasible to conduct audits and leak detection work in all Regional District water systems annually, a schedule will be established on a rotational basis.

3.8 Bylaw Adopted Water Conservation Requirements

Water conservation requirements should be regularly reviewed and revised as required.

The existing Regional District Water Bylaw addresses water usage, water wastage, metering, staged water conservation measures, and penalties and enforcement. Without metering in all water systems and with limited resources, monitoring these requirements has been challenging to date.

Regional District water systems are predominantly rural with a significant number of large parcels. The Water Bylaw limits irrigation to 0.70 litres per second per hectare (0.28 litres per second per acre or 4.5 United States gallons per minute per acre) on Agricultural Land, or for unmetered irrigation on Single Family Dwelling or Multiple Dwelling Properties. Irrigation of more than 0.40 Hectares (1 acre) of land is prohibited on non-metered account unless the account has been classified as Agricultural Land, Golf Course, Institutional or Recreational, and assigned irrigation privileges by the Manager.

Staged water conservation measures provide limits for time of day watering and prohibit types of water usage depending on the stage. Stage 1 Water Conservation Measures are mandatory in all Regional District water services from June 1st to September 30th each year. Stages 2 to 4 may also be implemented by the Manager on a specific water system based on water supply and demand. Stage 2 is routine in some water services and Stage 3 has also been implemented when required.

Regional District water conservation measures do not apply to commercial agricultural and large commercial water users due to the potential to harm business. Conservation measures can be applied to commercial agricultural and large commercial water users by Board of Directors' Resolution or by an Emergency Response Center, if a state of local emergency has been declared.

Wetland Construction at Old Lister Intake

Stage 3 Water Conservation Measures prohibits watering of all lawns. Due to business concerns raised by one golf course, Staff has been reluctant to enforce Stage 3 Water Conservation measure to golf courses in the past while Stage 3 was enforced for all other users within a community. There has been recent community support to apply the same water conservation measure to all users in this community. There are four golf courses within Regional District water service areas. Two golf courses only use potable water for their clubhouse and two also use potable water for irrigation.

3.9 Provide Annual Reporting on Water Consumption & Loss and Demand Forecasts

Improved annual water consumption and loss, and demand forecasts reporting will be implemented. Due to busy work schedules, staff has typically only provided limited annual water system assessment, review and reporting to meet customer and regulatory expectations. This does not provide a good technical understanding or overview of annual water consumption, usage and loss.

Ideally annual reporting would include information on current and potential future annual water

demand, maximum day demand, peak hour demand, potential water loss and leakage, per connection or capita demand, and costs per cubic meter for all Regional District water services.

Having a good understanding of water usage and loss can help prioritize, funding opportunities, infrastructure renewal, water conservation efforts, water loss control and metering implementation.

3.10 Drought Management & Water Shortage Contingency Planning

Climate change appears to be impacting water demands and available stream flow in the district in recent years. This could lead to additional costs and loss of business if water supplies are disrupted. Interface fires are also becoming a much higher risk in the district. Water supply or water storage shortages can impact the ability to suppress fires.

Drought management and water shortage contingency planning may become a more significant issue in the near future if water conservation measures are not effective.

3.11 Watershed Management Plan Strategy

Watershed plans are outstanding for Regional District water systems. Prior to drafting individual watershed plans, a watershed management plan strategy needs to be developed to establish the process, stakeholders, plan goals and objectives, plan contents, and prioritization.

4 Drinking Water Conservation Plan Review & Reporting

The Drinking Water Conservation Strategy items will be reviewed and revised at a minimum every 2 years or earlier, if required, and the Drinking Water Conservation Plan will be updated on a five year cycle.

An important part of reporting is to establish and report on program key performance indicators and metrics. A key performance indicator is a measurable value that demonstrates how effective program objective is. An example might be a water demand reduction percentage in a particular water service. Metrics are broader than key performance indicators and might include the effectiveness of a public education program.

5 Summary of Drinking Water Plan Action Items

No.	Item	Anticipated Delivery Date
1	Establishment of water conservation targets for individual water systems.	December 2019
2	Water Meter Implementation Strategy	December 2019
3	Erickson Metering Implementation Plan	December 2019
4	Metering Implementation Plan for other water systems	To be determined
5	Water Bylaw metering requirements update	February 2020
6	Balfour rate setting and community consultation	Summer 2019 to Spring 2020
7	WaterSmart Program review, reporting, improvement and implementation	Annually
8	FarmQuest Erickson agricultural inventory update	Fall 2019
9	Arrow future potential water demand review	Fall 2019
10	Establish Water Loss Control & Leak Reduction Program schedule on a rotational water system basis	December 2019
11	Implement Water Loss Control and Leak Reduction Program	Annually
12	Review Water Conservation Requirements	Annually
13	Review water conservation measures for golf course irrigation.	Annually
14	Provide annual water consumption, usage and loss reporting for all water systems	Annually
15	Drinking Water Conservation Strategy Items	2021 and every 2 years
16	Watershed Management Plans Strategy	To be determined
17	Review and Revise Water Conservation Plan	2024 and every 5 years