



Water Systems

2019-2023 Water Consumption Report

Table of Contents

Table of Contents	2
Chapter 1 Background	4
Chapter 2 : Water System Comparison	4
2.1 Annual Water System Consumption.....	4
2.2 Temperature and Total Precipitation	9
2.1.1 Drought Summary (2019–2023)	10
2.3 Annual Per-Connection Water System Consumption.....	11
2.4 Average Day Demand and Maximum Day Demand	13
2.5 Summer Demand vs Winter Demand	15
2.6 Water System Emergency Capacity vs Maximum Day Demand.....	18
Chapter 3 Systems of Concern.....	19
3.1 Maximum Day Demand and Emergency Capacity.....	19
3.1.1 Arrow Creek	19
3.1.2 Riondel	22
3.2 High Winter Water Demand, Seasonal Peaks and Increasing Water Use	23
3.2.1 Duhamel Creek	23
3.2.2 Burton	24
3.2.3 Edgewood	25
3.2.4 Woodland Heights	26
3.2.5 Erickson.....	27
3.3 Low Per-Connection Water Use.....	28
3.3.1 Woodbury	28
3.3.2 Ymir	29
3.3.3 Lucas Road	31
3.4 Golf Courses	31
3.4.1 Riondel Golf Course	31
3.4.2 Fauquier Golf Course	32
3.4.3 Balfour Golf Course.....	33
3.4.4 Creston Golf Course	33

List of Tables

Table 2-1 Total Consumption All Water Systems	4
Table 2-2 Average Day Demand	12
Table 2-3 Average Day Demand and Maximum Day Demand	13
Table 2-4. January vs August Consumption	16
Table 5: Dates when flows exceeded emergency capacity at Arrow WTP.....	19
Table 6: 2019–2023 Water Consumption Summary Matrix – All RDCK Water Systems.....	35

List of Figures

Figure 2-1 Annual Consumption All Systems	6
Figure 2-2 Annual Consumption Systems less than 50,00m3	7
Figure 2-3 Annual Consumption Systems 50,000 to 300,000 m3	8
Figure 2-4 Precipitation and Temperature Creston.....	9
Figure 2.5: Nelson Temperature and Precipitation	9
Figure 2.6: Consumption per Connection m3 2023.....	12
Figure 2-7 ADD and MDD for Systems with MDD 200 - 1600 m3	14
Figure 2-8 ADD and MDD for Systems with an MDD of less than 200 m3	14
Figure 2-9 Typical Residential End Use for Water	16
Figure 2-10. Summer vs Winter Demand in L/day.....	17
Figure 2-11 MDD and Emergency Capacity L/s.....	18
Figure 3-1 Membrane Filter at Arrow Water Treatment Plant	20
Figure 3-2 Arrow Water Licenses, Peak Demand	20
Figure 3-3 Arrow Creek Stream Flows	21
Figure 3-4 Fish Ladder at Arrow Creek	21
Figure 3-5 Settling Pond Arrow Water Treatment Plant	22
Figure 3-6. Riondel Reservoir	23
Figure 3-7 Duhamel Monthly Consumption m3	24
Figure 3-8 Monthly Consumption in Burton Water System	25
Figure 3-9 Monthly Consumption in Edgewood.....	26
Figure 3-10 Woodland Heights Monthly Consumption.....	27
Figure 3-11 Seasonal Water Use in the Erickson Water System.	28
Figure 3-12 Monthly Consumption Woodbury Village.....	29
Figure 3-13 Ymir Monthly water consumption	30
Figure 3-14 Quartz Creek Intake in Ymir.....	30
Figure 3-15 Quarterly consumption for Lucas Road.....	31

Chapter 1 Background

The Regional District owns 18 water services. The Erickson water service is significantly the largest. Arrow Creek consists of a treatment plant, transmission main and 2.5 million litre steel reservoirs which gravity feeds into the distribution system to supply Erickson and the separate Town of Creston.

McDonald Creek is owned the Regional District but operated under agreement by the Village of Kaslo. McDonald Creek and Sanca water systems are not included in this report as no consumption data is available.

The water consumption information in this report supports the Regional District Drinking Water Conservation Plan including:

- Establishment water reduction targets
- Adoption of a water metering implementation strategy
- Establishment of a water loss control & leak reduction program
- Drought management & water shortage contingency planning

This report documents water consumption and trends for the reporting period of 2019 to 2023.

Chapter 2 : Water System Comparison

2.1 Annual Water System Consumption

Regional District water services vary in size from 6 to 656 connections also with large variations in community form, resulting in a large variation of annual consumption.

Overall, there was an increase in water consumption in most RDCK water systems between 2022 and 2023. Twelve (12) systems saw an overall increase in consumption over the reporting period.

Consumption increased for all systems in 2021 due to the extreme temperatures of the BC Heat Dome and low precipitation that year. Section 3 of this report discusses the systems where consumption increased.

Table 2-1 provides a summary of Regional District and the separate Town of Creston annual water systems consumption from largest to smallest. Data is not available for McDonald Creek and Sanca.

Table 2-1 Total Consumption All Water Systems

Water System	No. Connections	2019 Annual Consumption (m3)	2020 Annual Consumption (m3)	2021 Annual Consumption (m3)	2022 Annual Consumption (m3)	2023 Annual Consumption (m3)	% Change from 2022
Arrow Creek	Assumed total of 3,951 connections (described below)	2,867,634	2,784,728	2,928,342	2,852,008	2,683,623	-6%

Water System	No. Connections	2019 Annual Consumption (m3)	2020 Annual Consumption (m3)	2021 Annual Consumption (m3)	2022 Annual Consumption (m3)	2023 Annual Consumption (m3)	% Change from 2022
	<i>656 in the Erickson System</i> <i>Town of Creston reports 3,056 residential connections plus 239 ICI connections</i>						
Town of Creston	Town of Creston reports 3,056 residential connections plus 239 ICI connections	1,504,383	1,544,230	1,509,794	1,567,173	1,455,540	-7%
Erickson	656	1,363,251	1,240,498	1,418,548	1,284,835	1,228,083	-5%
Duhamel Creek	93	251,863	163,242	95,424	91,063	100,629	9%
Lister	196	241,111	229,660	237,409	204,817	206,673	1%
Balfour	265	145,632	119,760	124,976	109,461	105,932	-3%
Fauquier	93	119,715	124,929	118,904	114,290	119,440	4%
Riondel	198	114,078	111,724	119,880	108,636	167,420	35%
Edgewood	92	82,068	107,445	104,977	112,053	80,545	-39%
West Robson	114	59,876	64,382	71,655	67,527	77,957	13%
South Slocan	50	40,130	35,709	34,580	24,792	29,349	15%
Burton	54	32,106	49,145	54,432	67,564	71,960	6%
Ymir	108	32,012	35,471	42,582	25,455	27,291	7%
Woodland Heights	21	10,849	8,392	8,567	8,173	11,186	27%
Grandview	37	7,743	13,427	11,936	14,414	16,833	14%
Woodbury	41	6,032	6,670	10,254	10,982	7,599	-44%
Rosebery	9	2,627	6,656	8,780	8,218	10,244	20%
Lucas Road	6	1,678	2,158	2,194	1,419	1,493	5%

Figure 2-1 provides a summary of Regional District annual water systems and Town of Creston consumption from largest to smallest.

2023 Comparison Chart 2019/2023

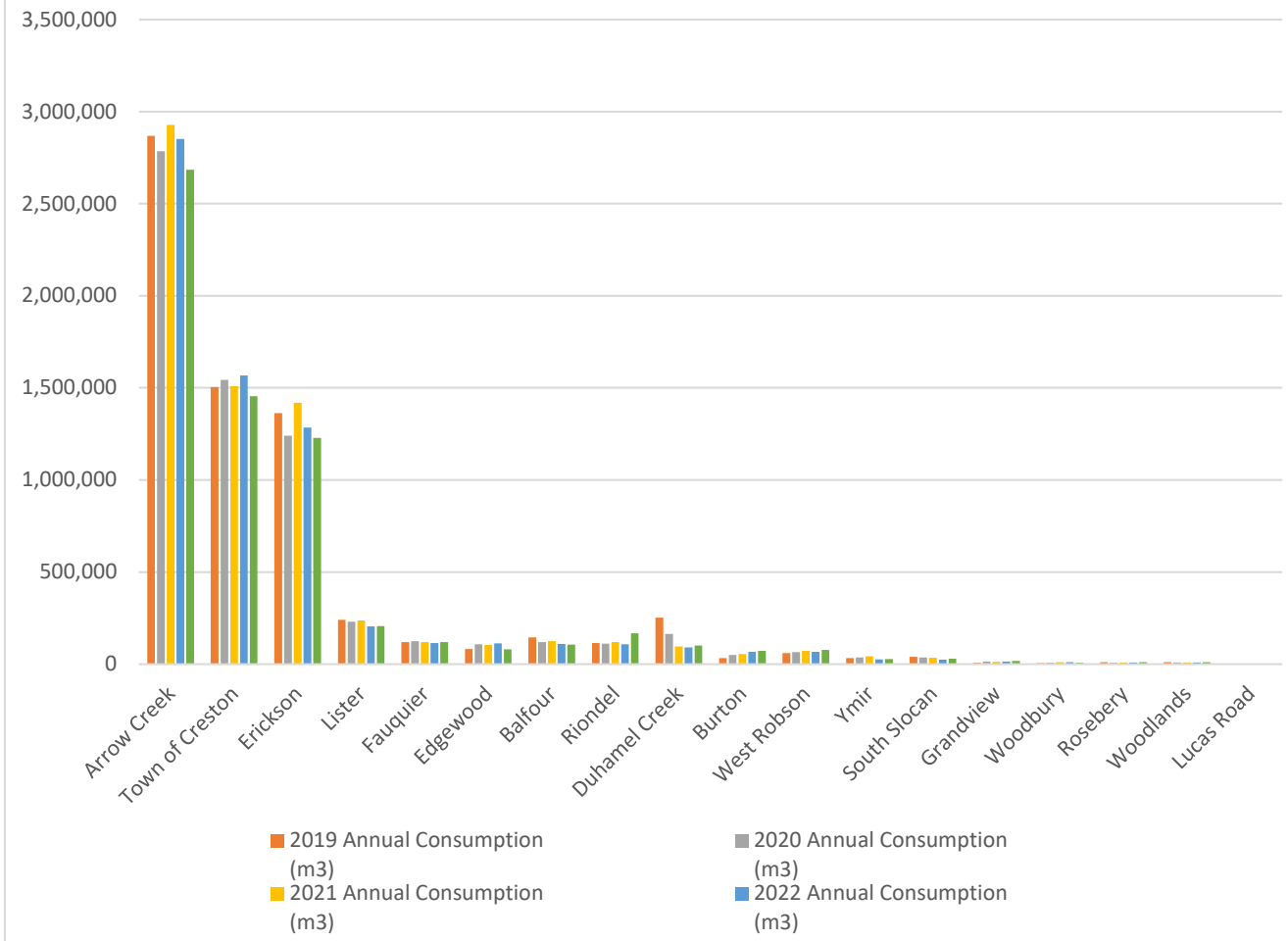


Figure 2-1 Annual Consumption All Systems

Figure 2-2 provides the annual water consumption for Regional District water systems with less than 50,000 cubic meters per year.

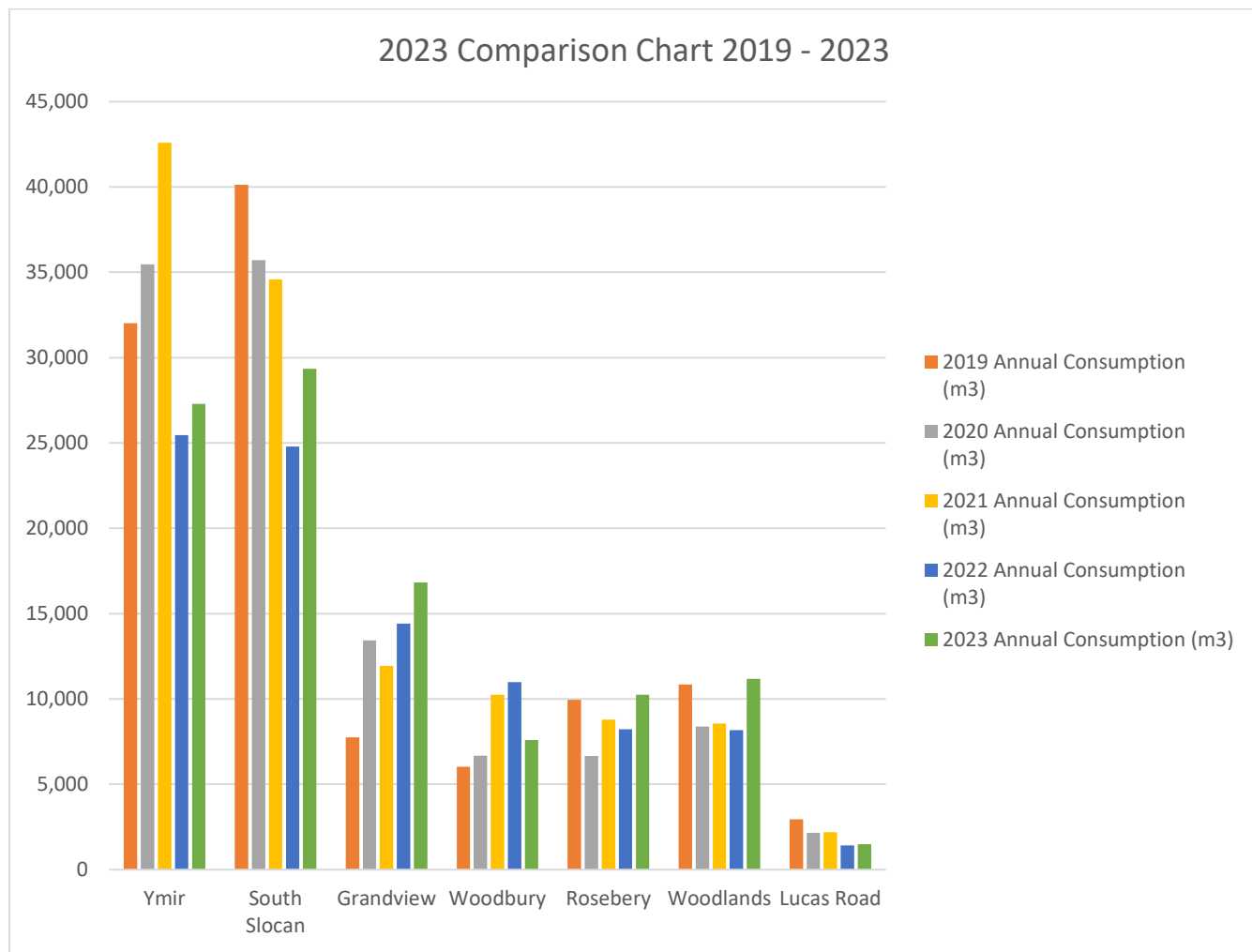


Figure 2-2 Annual Consumption Systems less than 50,00m3

Figure 2-3 provides the annual water consumption for Regional District water systems with consumption between 50,000 and 300,000 cubic meters per year.

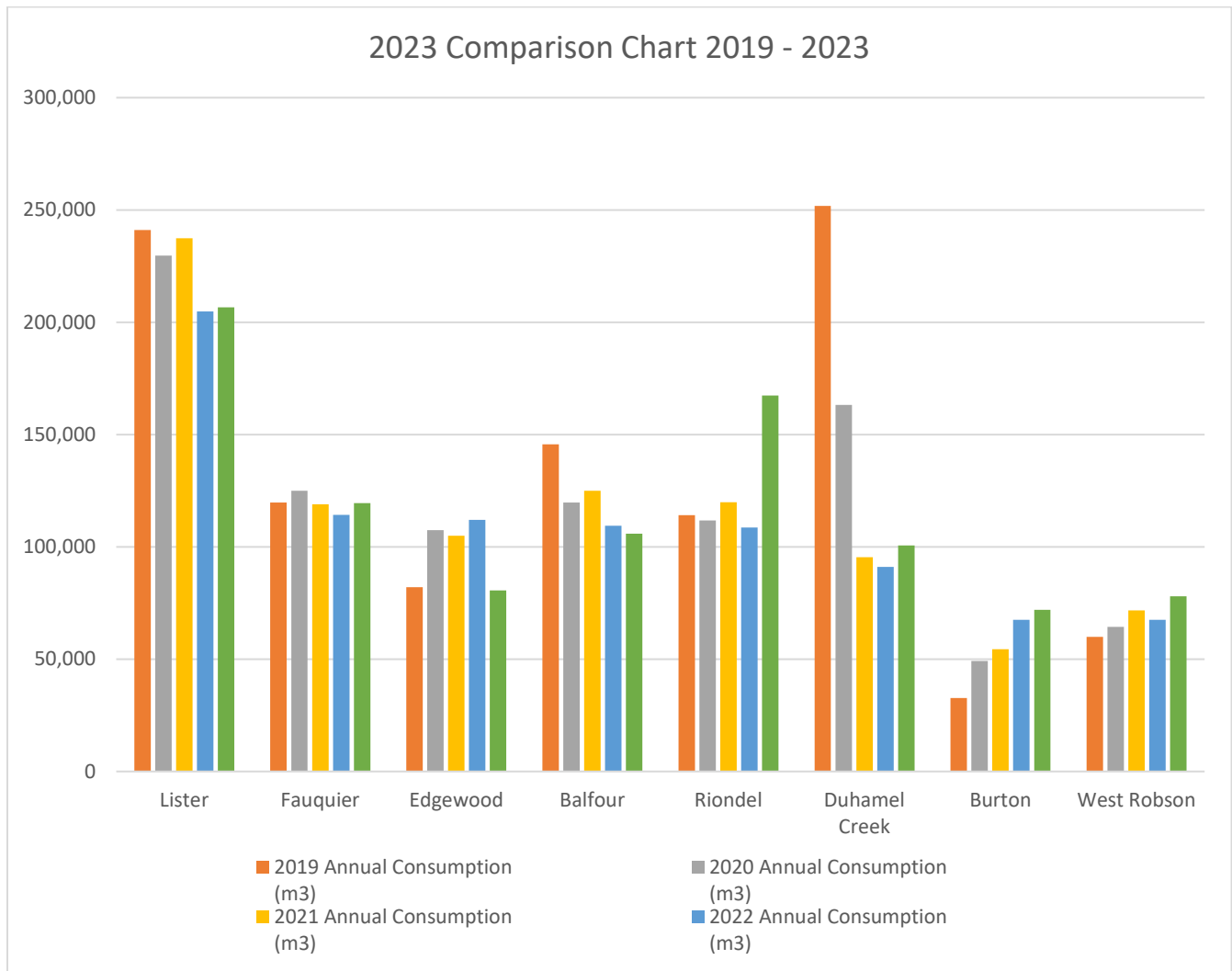


Figure 2-3 Annual Consumption Systems 50,000 to 300,000 m3

2.2 Temperature and Total Precipitation

Figures 2-4 provides the monthly average minimum and maximum temperatures; and total precipitation for Environment Canada’s weather stations in Creston and Nelson BC. General trends in weather include record high temperatures in the year 2021 and low precipitation during the years 2021 and 2022. The temperature graph for the Nelson area is very similar.

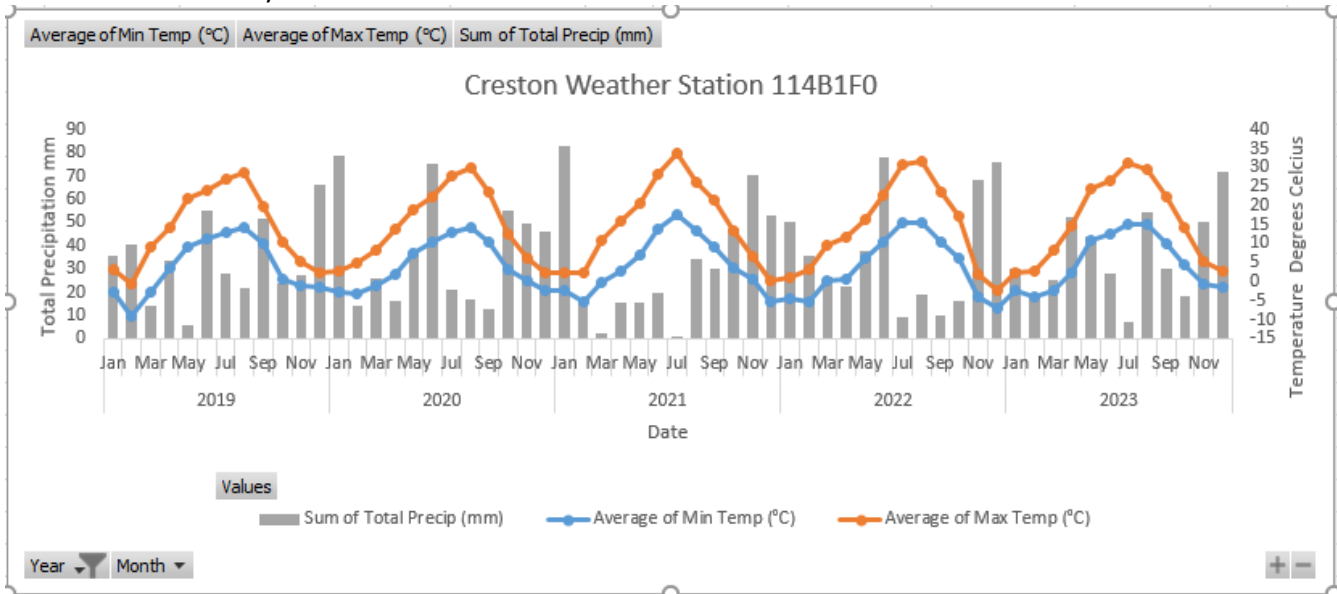


Figure 2-4 Precipitation and Temperature Creston

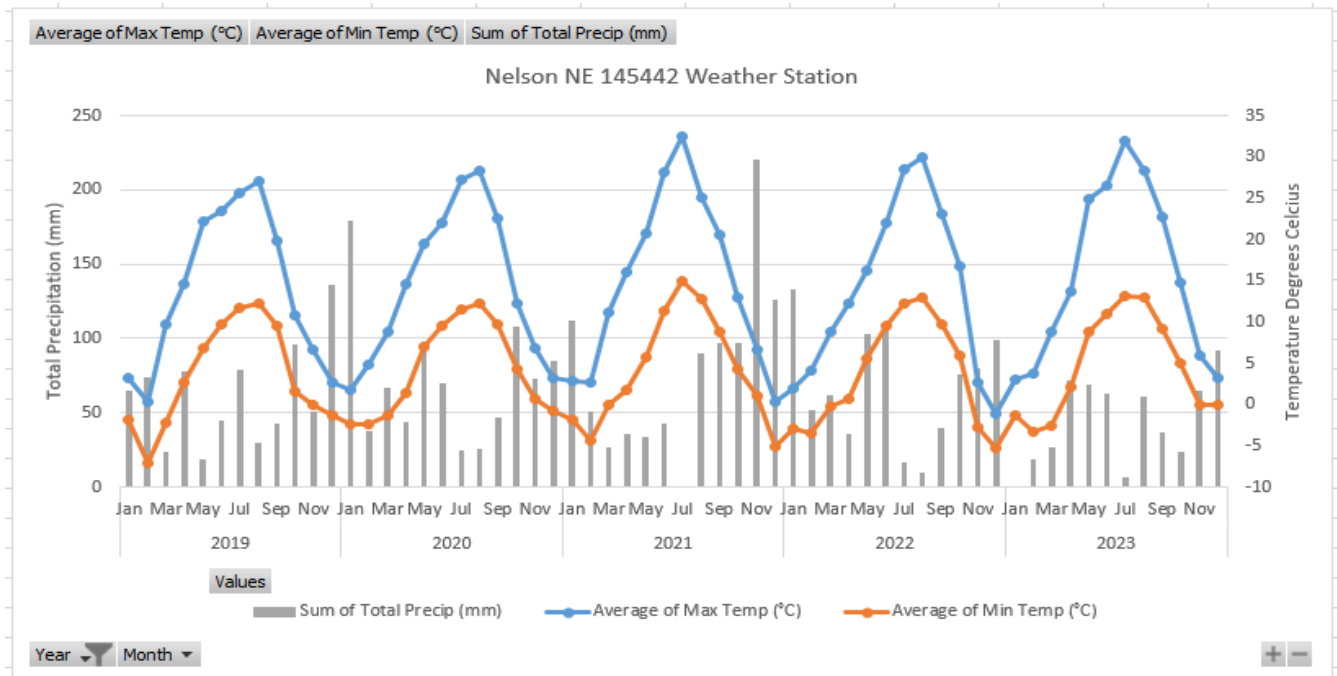


Figure 2.5: Nelson Temperature and Precipitation

Drought

2.1.1 Drought Summary (2019–2023)

The 2019–2023 period was marked by recurring drought conditions in the West Kootenay, with multiple years reaching high drought levels and significantly impacting streamflows and water availability in RDCK water systems. British Columbia uses a standardized six-level drought classification system (0 to 5) to communicate water scarcity and guide conservation and regulatory measures. Each level reflects increasing severity of drought conditions and the likelihood of negative impacts on water users and aquatic ecosystems:

- **Level 0 – Normal**
No Adverse Impacts Expected
Conditions are within the normal range for the time of year; no drought-related concerns.
- **Level 1 – Very Low Drought**
Adverse Impacts Rare
Slightly drier than normal. Monitoring is increased, but impacts on water users or ecosystems are unlikely.
- **Level 2 – Low Drought**
Adverse Impacts Possible
Continued dry conditions may begin to affect some water users or sensitive ecosystems. Voluntary conservation is encouraged.
- **Level 3 – Moderate Drought**
Adverse Impacts Probable
Water shortages are more evident, and impacts on aquatic ecosystems and community water supplies are likely without conservation efforts. Strongly encourage water conservation measures.
- **Level 4 – Severe Drought**
Adverse Impacts Likely
Water supply is insufficient to meet all needs. Significant negative impacts are occurring or imminent. Regulatory restrictions are typically implemented.
- **Level 5 – Extreme Drought**
Adverse Impacts Almost Certain
Critical water shortages threaten communities and ecosystems. Emergency measures may be necessary to manage severe impacts.

In **2019**, drought conditions were moderate, peaking at Level 3 in August due to a warm summer, though impacts were less severe than in preceding years. **2020** saw worsening conditions, with drought reaching Level 4 in August amid hot, dry weather and low snowpack.

2021 was among the most extreme drought years on record, driven by the historic "heat dome" event. West Kootenay experienced sustained Level 4 drought through much of the summer, resulting in elevated water demand and pressure on water systems, particularly those dependent on surface sources.

While **2022** was milder, the region still experienced Level 3 drought by late summer. The cumulative effect of preceding dry years contributed to reduced resilience in aquatic systems and water sources.

2023 brought prolonged and province-wide drought conditions, with West Kootenay again reaching Level 4 from July through September. Record-breaking May heat caused rapid snowmelt, followed by below-normal precipitation in June and July, which led to historically low streamflows. By mid-July, one-third of B.C.'s streamflow stations were reporting new record lows, including streams in the RDCK.

These ongoing drought conditions emphasize the need for wise outdoor water use, water conservation education and outreach, and infrastructure resilience to manage climate-induced hydrologic variability.

Year	Drought Level					Drought Summaries
	May	June	July	August	September	
2015	1	2	2	4	3	Significant drought, early snowmelt, high temperatures, peak in late August before rain mitigated.
2016	1	1	2	2	2	Moderate drought, less severe than 2015.
2017	1	1	2	4	3	Prolonged dry conditions, exacerbated by wildfires.
2018	1	2	3	3	2	Hot, dry summer with near-record drought levels in some areas.
2019	1	1	2	3	2	Milder but still faced dry spells during summer months.
2020	2	2	3	4	3	Persistent dry conditions, southern BC faced water restrictions.
2021	1	2	3	4	3	Widespread drought due to record heat waves and minimal rainfall.
2022	1	2	2	3	2	Moderate drought, less severe but dry summer conditions persisted.
2023	3	4	4	4	3	Prolonged, severe, impactful, and province-wide. Existing drought conditions from the year before were exacerbated by extreme, record-breaking heat in May which led to the fastest melt of snowpack on record, together with warm weather and far below normal precipitation through June and July for most of the province. This led to extended, multi-year drought conditions unique to the past century in both duration and severity, and resulted in historically low flows in numerous river systems
2024	1	1	1	3	3	In 2024, the West Kootenay began the year with record low snowpack levels—63% of normal on April 1st—raising early concerns about water supply. Although cooler temperatures and widespread precipitation in late May and early June helped moderate melt rates and provided temporary relief, a summer heatwave and variable rainfall led to renewed drought stress. By August and September, drought conditions in the region intensified to Level 3. Despite fall storms in mid-September bringing above-normal precipitation to parts of B.C., long-term deficits in groundwater and streamflow persisted in many interior regions, including parts of the Kootenays.

2.3 Annual Per-Connection Water System Consumption

Per-capita per day water consumption is typically used to review water consumption. According to Statistics Canada the Canadian average daily water use in 2021 was about 223 Liters per person per day (<https://www.statcan.gc.ca/o1/en/plus/5814-world-water-day-eh>). This is generally not considered representative for Regional District water services as rural properties are typically large. In addition, population data is not available for Regional District water service areas to make a comparison. The estimated population below is simply based on 2.2 persons per water account which is the Canadian Census data for the average number of residents per household [this assumption aligns well with 2021 Census profile person per-household (pph) data for RDCK urban centres of Creston 2.0 pph; Nelson 2.2 pph and Castlegar 2.3 pph]. Given this, an average per connection consumption would be 490 L/Day. Table 2-2 provides a summary of annual per connection water system consumption.

Table 2-2 Average Day Demand

Water System	No of Active Connections	2023 ADD (m3)	2023 ADD Consumption per Connection per Day (L)
Grandview	37	46	1243
Ymir	108	74	685
Lucas Road	6	4	667
Woodbury	41	28	683
Rosebery	9	31	3444
Balfour	265	290	1094
Riondel	198	459	2318
Woodland Heights	21	31	1476
West Robson	114	214	1877
South Slocan	50	110	1600
Duhamel Creek	93	611	6570
Lister	196	566	2888
Edgewood	92	221	2402
Fauquier	93	327	3516
Burton	54	197	3648
Erickson	653	3365	5137

Water systems with high per connection consumption could have a high amount of leakage or high outdoor water usage. Erickson has a large agricultural water demand, and Fauquier and Riondel have golf course irrigation.

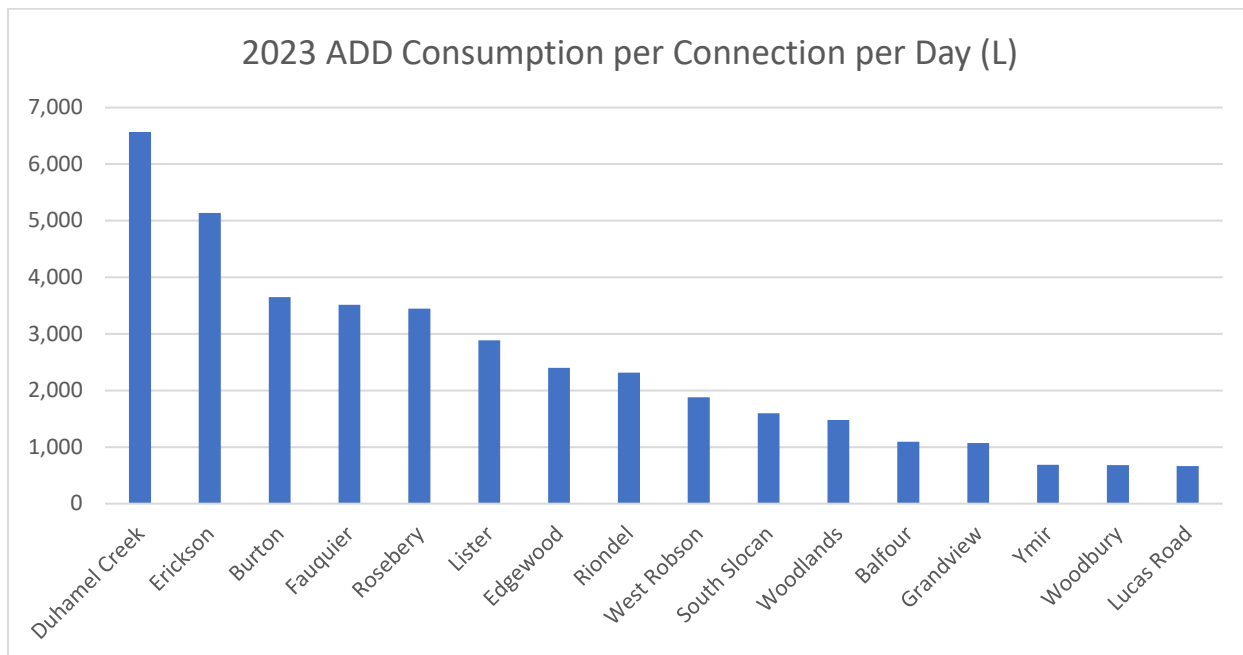


Figure 2.6: Consumption per Connection 2023

2.4 Average Day Demand and Maximum Day Demand

Average day demand (ADD) represents annual average daily demand and is determined by establishing total annual water consumption for the given year and dividing it by the number of days in that year.

Maximum day demand (MDD) represents the maximum single day water consumption for the data available. Short-term spikes in data were ignored as these were likely attributed to large short term water breaks, or maintenance events such as flushing or reservoir filling. 2023 MDD in Table 2-3 represents the highest consumption day for 2023.

Table 2-3 Average Day Demand and Maximum Day Demand

Water System	No. of Water Connections	2023 ADD (m3)	2023 MDD (m3)	Peaking Factor MDD/ADD
Arrow Creek		7,352		0.0
Balfour	265	290	747	2.6
Burton	54	197	461	2.3
Duhamel Creek	93	276	611	2.2
Edgewood	92	221	435	2.0
Erickson	656	3,365	15,500	4.6
Fauquier	93	327	795	2.4
Grandview	37	46	85	1.8
Lister	196	566	1,544	2.7
Lucas Road	6	4	6	1.5
Riondel	198	459	1,281	2.8
Rosebery	9	31	237	7.6
South Slocan	50	80	459	5.7
West Robson	114	214	713	3.3
Woodbury	41	28	72	2.6
Woodlands	21	31	101	3.3
Ymir	108	74	118	1.6

Figure 2-6 provides the ADD & MDD for water systems with an MDD of 200 to 1,600 cubic meters.

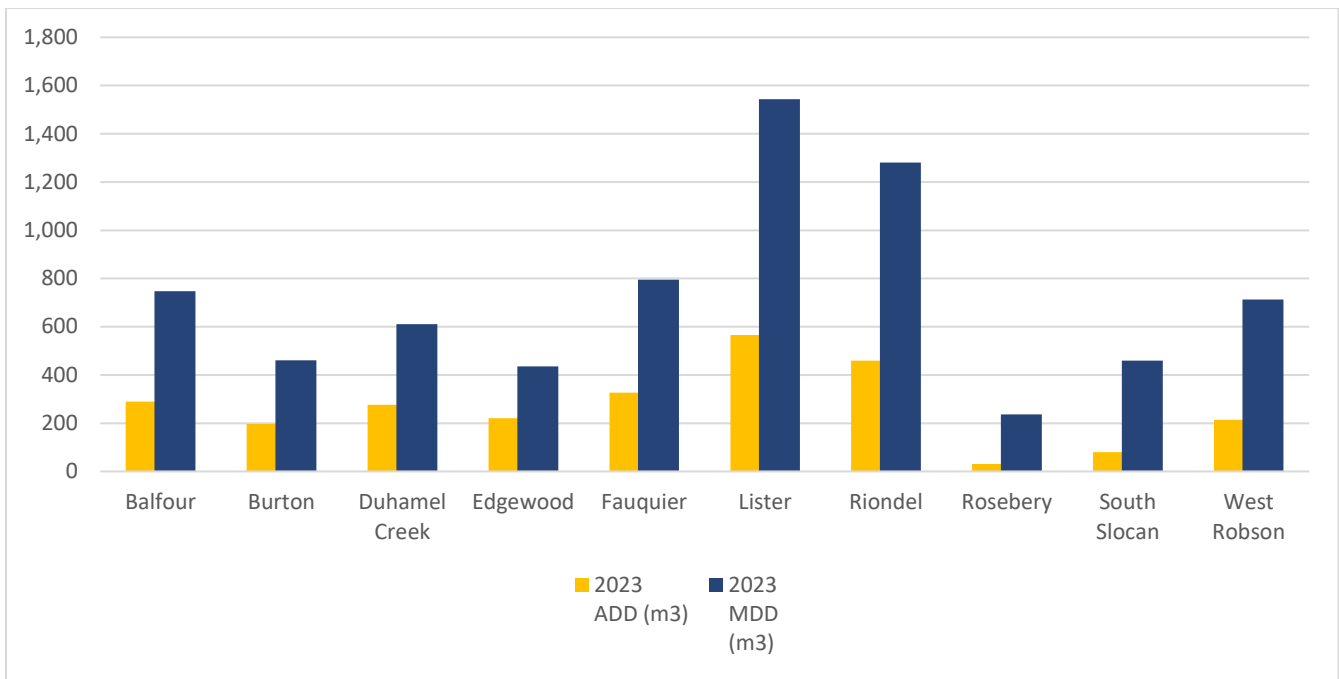


Figure 2-7 ADD and MDD for Systems with MDD 200 - 1600 m3

Figure 2-7 provides the ADD & MDD for water systems with an MDD of less than 200 cubic meters.

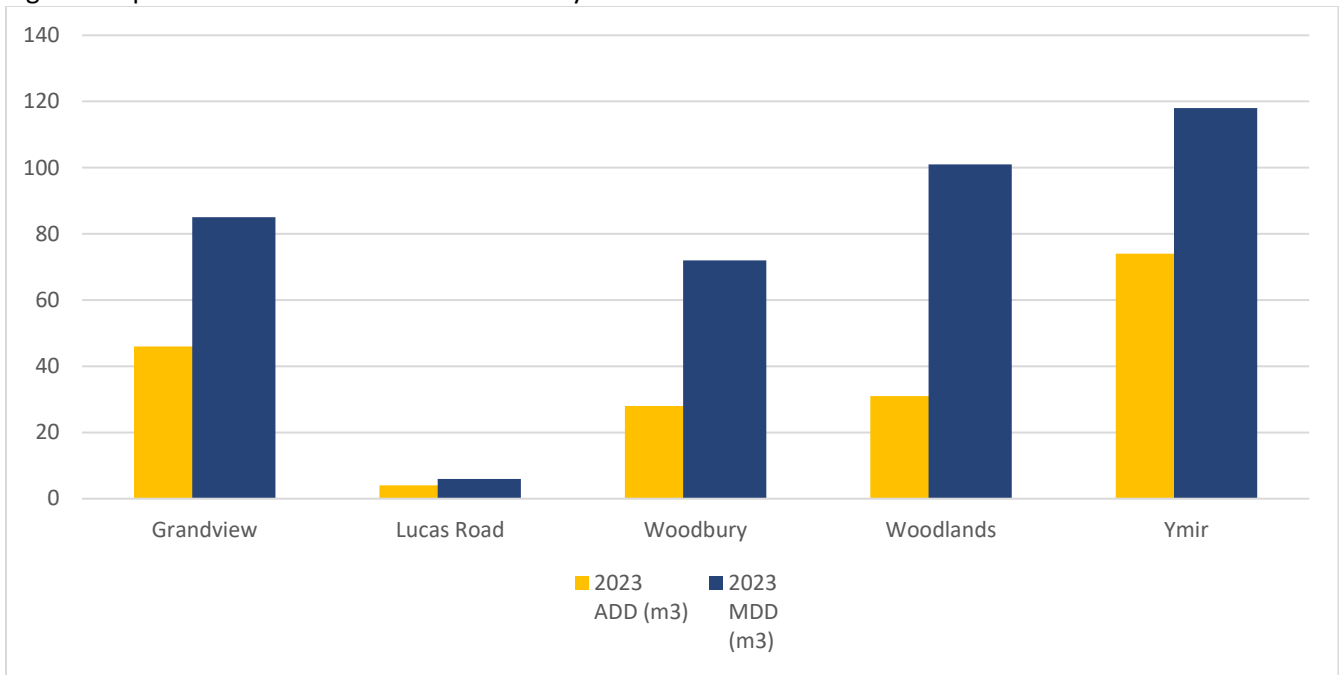


Figure 2-8 ADD and MDD for Systems with an MDD of less than 200 m3

2.5 Summer Demand vs Winter Demand

Reviewing summer demand vs winter demand can provide an indication of outdoor water use or potential leakage. Winter consumption can be used to typically represent indoor water consumption. Summer consumption represents both indoor and outdoor water consumption. Of note here compared to past RDCK Water Systems Consumption Reports is the update source reference for Residential End Uses of Water produced by the Water Research Foundation. The Residential End Uses of Water study was first published in 1999 and previous RDCK reporting referenced this older study. This current report leverages the updated 2016 Version 2 Report that leverages data and input from regions across North America, including Canada (Region of Waterloo and Peel Region among others are participants). The most notable data trend from this report is a reduction in the percentage of water used by single family residences for outdoor uses- this has trended down, from a reported 59% in the 1999 study to 50% in 2016.

Indoor domestic water use habits can be considered consistent throughout North America. Differences in indoor water consumption between water systems would be primarily attributed to the age of water fixtures. Old shower heads and toilets in particular use much more water than modern fixtures; therefore, older water systems could be expected to have higher indoor water consumption.

Figure 2-8 provides the typical residential end usages percentages using a tabulation of data from the updated Water Research Foundation Residential End Uses of Water Study, Version 2 (2016)

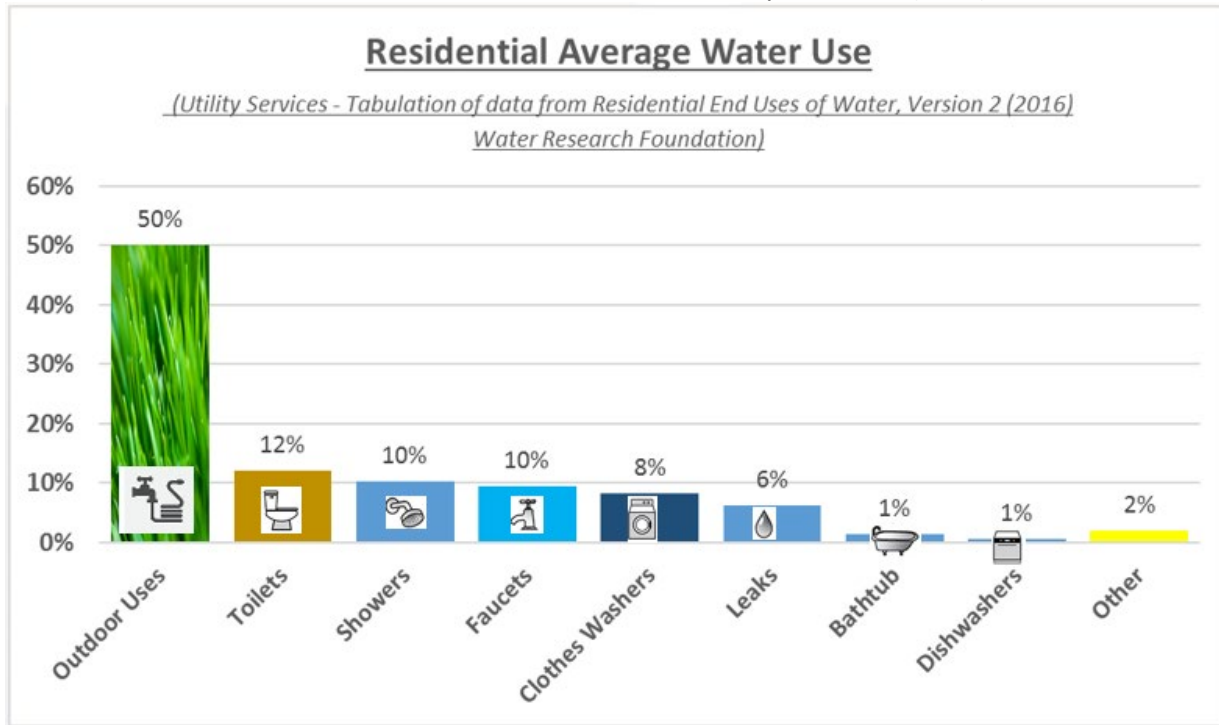


Figure 2-9 Typical Residential End Use for Water

Winter water consumption can be reviewed to represent indoor water usage and potential system leakage. The lowest and highest water demand months do vary by water system and by year. In addition, many Regional District water system have significant differences in seasonal occupation. For consistency, January 2023 and August 2023 consumption were chosen for comparison in Table 2-5.

Table 2-4. January vs August Consumption

Water System	No of Active Connections	August 2023 Consumption (m3)	January 2023 Consumption (m3)	August 2022 Consumption per Connection (L/day)	January 2023 Consumption per Connection (L/day)	Peaking Factor (Aug 2022 / Dec 2023)
Erickson	656	256,502	28,677	12,671	1,417	8.9
Lister	196	37,368	13,651	6,150	2,247	2.7
Riondel	198	25,402	12,354	4,138	2,013	2.1
Fauquier	93	22,175	8,313	7,692	2,883	2.7
Duhamel Creek	93	18,291	5,098	6,344	1,768	3.6
West Robson	114	18,205	6,284	5,151	1,778	2.9
Balfour	265	15,303	6,465	1,863	787	2.4
Edgewood	92	12,300	5,092	4,313	1,785	2.4
Burton	54	10,906	3,888	6,515	2,323	2.8
South Slokan	50	4,002	3,782	1,370	2,440	1.1

Water System	No of Active Connections	August 2023 Consumption (m3)	January 2023 Consumption (m3)	August 2022 Consumption per Connection (L/day)	January 2023 Consumption per Connection (L/day)	Peaking Factor (Aug 2022 / Dec 2023)
Ymir	108	3,275	2,460	978	735	1.3
Woodlands	21	3,135	462	4,816	710	6.8
Grandview	37	2,888	1,120	1,370	531	2.6
Rosebery	9	2,178	266	3,513	429	8.2
Woodbury	41	2,172	465	1,709	366	4.7

Figure 2.9 provides the January 2023 and August 2023 per connection per day water consumption for the Regional District water systems.

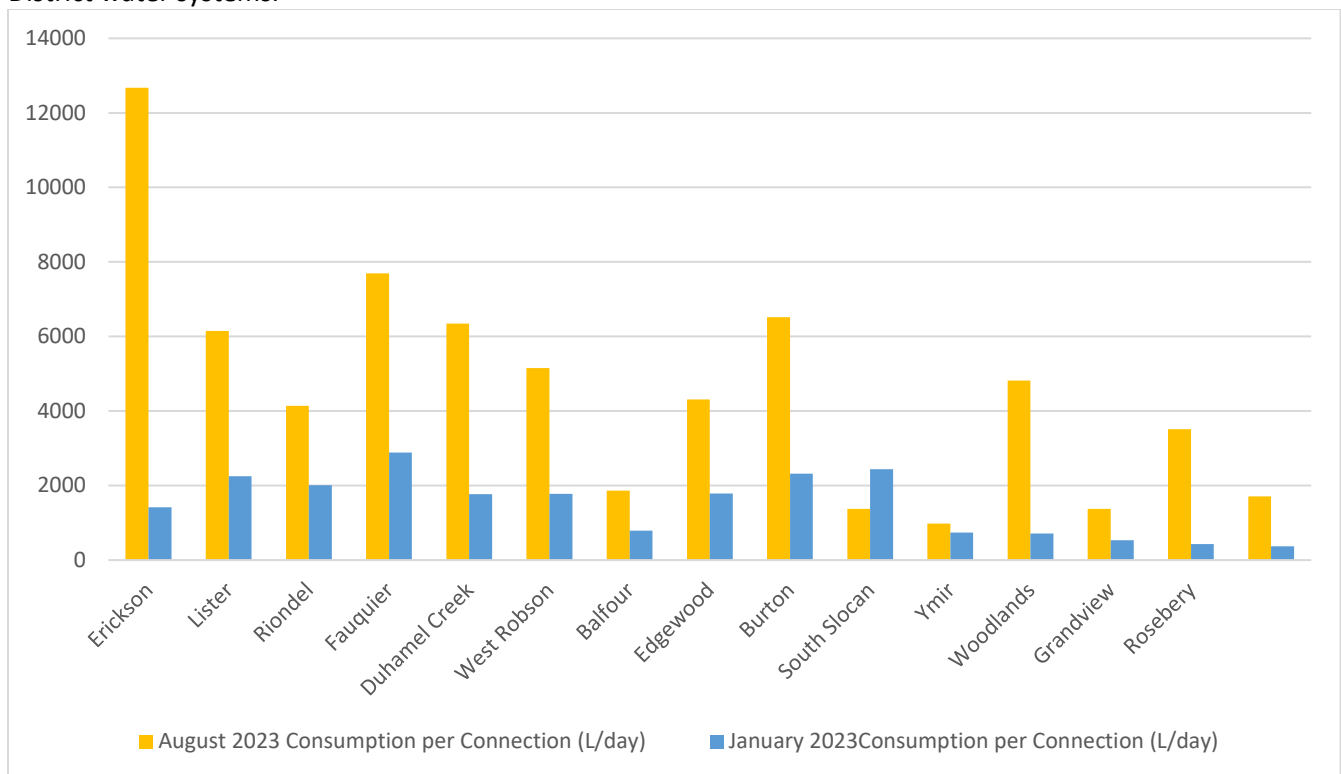


Figure 2-10. Summer vs Winter Demand in L/connection/day

2.6 Water System Emergency Capacity vs Maximum Day Demand

Water systems' pumping and treatment capacity are typically designed to meet maximum day demand (MDD). MDD represents the maximum water consumption for a single day of the year. MDD in the following data represents the highest consumption day for which data was available. Future MDD, not presented, is usually used when designing new systems or upgrade existing systems.

Pumping and treatment systems should be provided with redundant major components in the event that one of the components fails, such as pumps, filters, and disinfection systems. Emergency capacity includes operation of backup systems to increase capacity.

Figure 2-9 provides a comparison of water system capacity vs MDD. Systems with a MDD that is higher than emergency or rated capacity have a capacity concern. This includes Riondel and Arrow Creek.

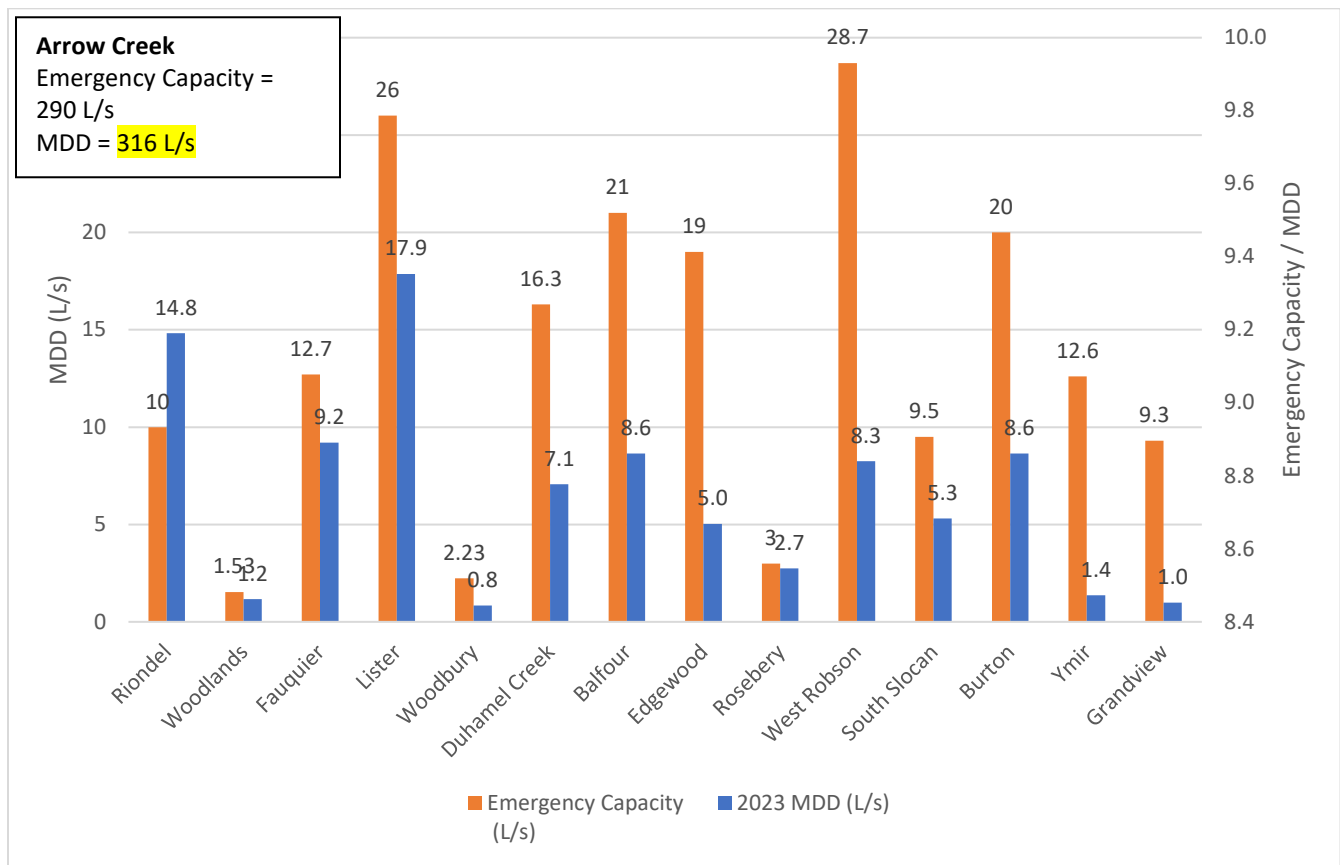


Figure 2-11 MDD and Emergency Capacity L/s

Chapter 3 Systems of Concern

3.1 Maximum Day Demand and Emergency Capacity

Section 2.6 of this report discussed emergency capacity. Emergency capacity includes operation of backup systems to increase capacity. Systems with a Maximum Day Demand (MDD) that is higher than emergency or rated capacity have a capacity concern.

3.1.1 Arrow Creek

The Arrow treatment plant capacity is assumed to be about **290 L/s** taking into account filter backwash. This capacity is with all four filter trains in operation, leaving no maintenance or emergency redundant train. Emergency capacity is not available for the later part of the year (typically past August) because low creek flow doesn't allow access to full emergency capacity.

MDD exceeded emergency capacity three times in 2023:

Table 5: Dates when flows exceeded emergency capacity at Arrow WTP

Date	Water Treatment Plant Flow L/S
July 19, 2023	316
July 30, 2023	300
August 6, 2023	296

The use of Arrow Creek as source water is dependent upon nine (9) water licenses, five (5) of which are held by the Erickson distribution system and four (4) held by the Town of Creston (see Figure 3-1).

The year 2021 was the highest consumption year for the reporting period. License diversion limits were not exceeded (see Figure 3-1). This was an improvement from the last reporting period when diversion limits were almost exceeded in the year 2017. Both consumption and main line leakage have decreased significantly since 2017.

In recent years, the Town of Creston brings their back up wells online when the Arrow Treatment plant nears capacity. This ensures that the membrane filters in the plant are not overused, which shortens their useful life. Extending the life of filter membranes is important due to their high cost.

The period from mid-July to mid-September each year is the biggest concern for maintenance of stream base flows below the Arrow water treatment plant intake diversion. Maintenance of stream base flows are required for the health of fish and other aquatic species. Figure 3-3 provides annual Arrow Creek stream flows from Environment Canada’s Weather Office website for monitoring station 08NH084, located immediately upstream of the Arrow water treatment plant intake diversion. Arrow Creek has experienced both record high and record low stream flows in recent years for the 1945 to 2018 data set. The high fluctuation in stream flows is indicative of the vulnerability of Arrow Creek as a reliable source of water. Notably, historic low flows were exceeded in both March and June of 2023.



Figure 3-1 Membrane Filter at Arrow Water Treatment Plant

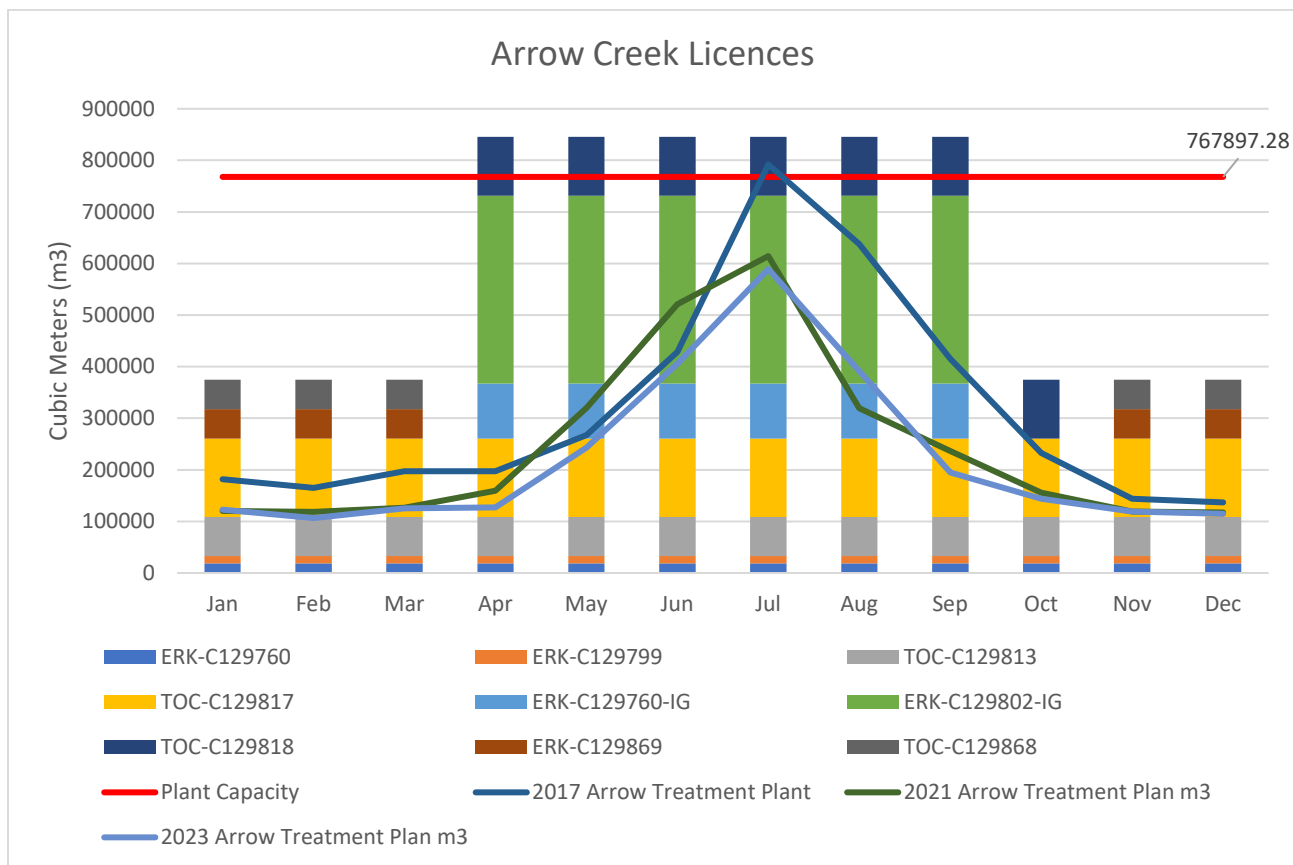


Figure 3-2 Arrow Water Licenses, Peak Demand

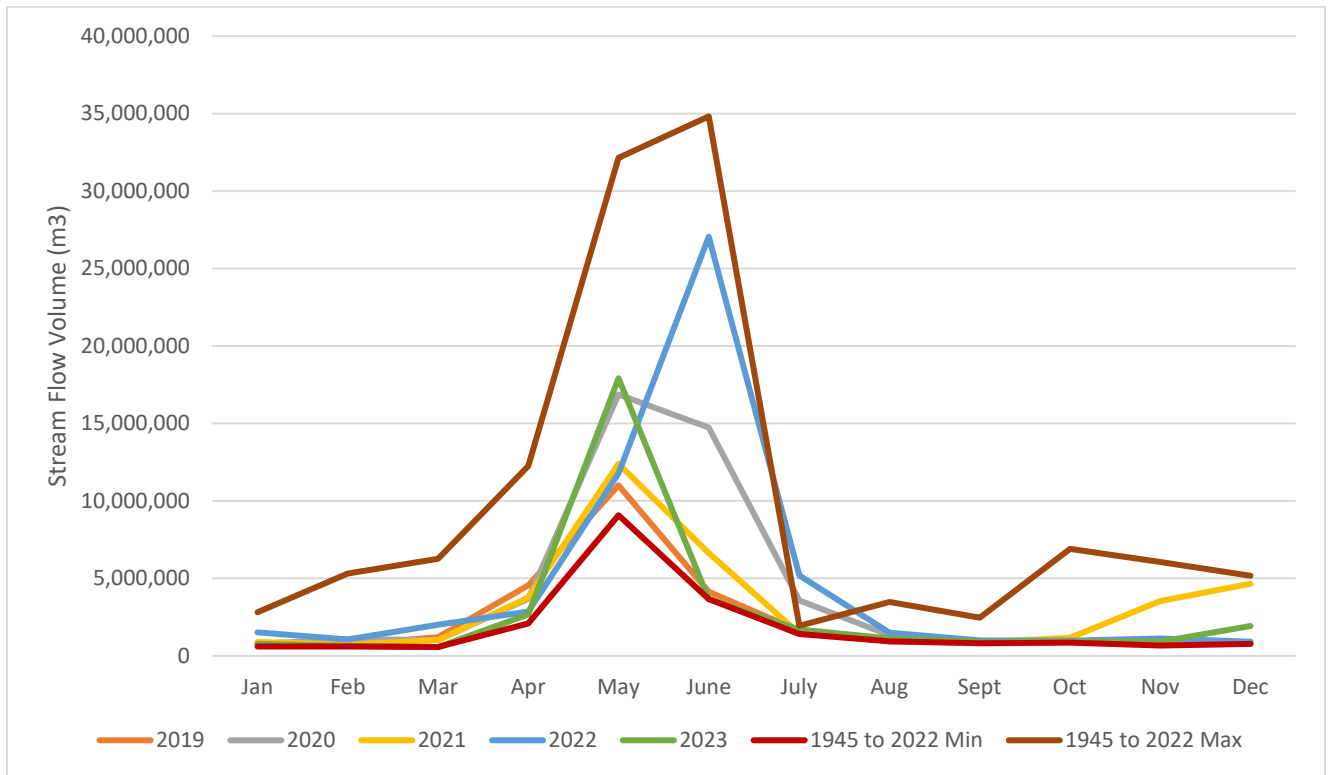


Figure 3-3 Arrow Creek Stream Flows



Figure 3-4 Fish Ladder at Arrow Creek

Any point of diversion can affect the licensed amount of water used. There are two such points of diversion shown in Figures 3-4 and 3-5.

More water is diverted at the Arrow intake than is represented in the consumption data. Some water is returned from one of the diversion structures to Arrow Creek immediately below the fish ladder. Water is also returned to Arrow Creek at the end of the Arrow settlement ponds. More water is diverted through the settlement ponds than is required for the treatment plant to ensure that the settlement ponds do not drain when the plant is operating.



Figure 3-5 Settling Pond Arrow Water Treatment Plant

3.1.2 Riondel

Riondel is a system of concern because MDD is higher than and emergency capacity. **In 2023 MDD was 14 L/S while emergency capacity is 10L/S.** This means that water storage provides the balance of water during times of drought. Riondel’s per connection consumption is 2318 L/day, which is higher than the Canadian average. The golf course at Riondel consumes approximately 17,000 m³/year, which in 2023 was about 10% of the total consumption. This makes a significant contribution to the per connection consumption in this system. The province recently issued a licence - #505687 under the Water Sustainability Act to the Riondel Golf Club authorizing the diversion and use of up to 47,750 m³/yr (April 1st – October 31st) of water from Kootenay Lake for irrigation. Included in the terms of the provincial water licence is a requirement for substantial completion of the required infrastructure works and start of use of the water by October 31, 2027. Winter demand was highest in the winter of 2022/23 compared to the other years within the reporting period.

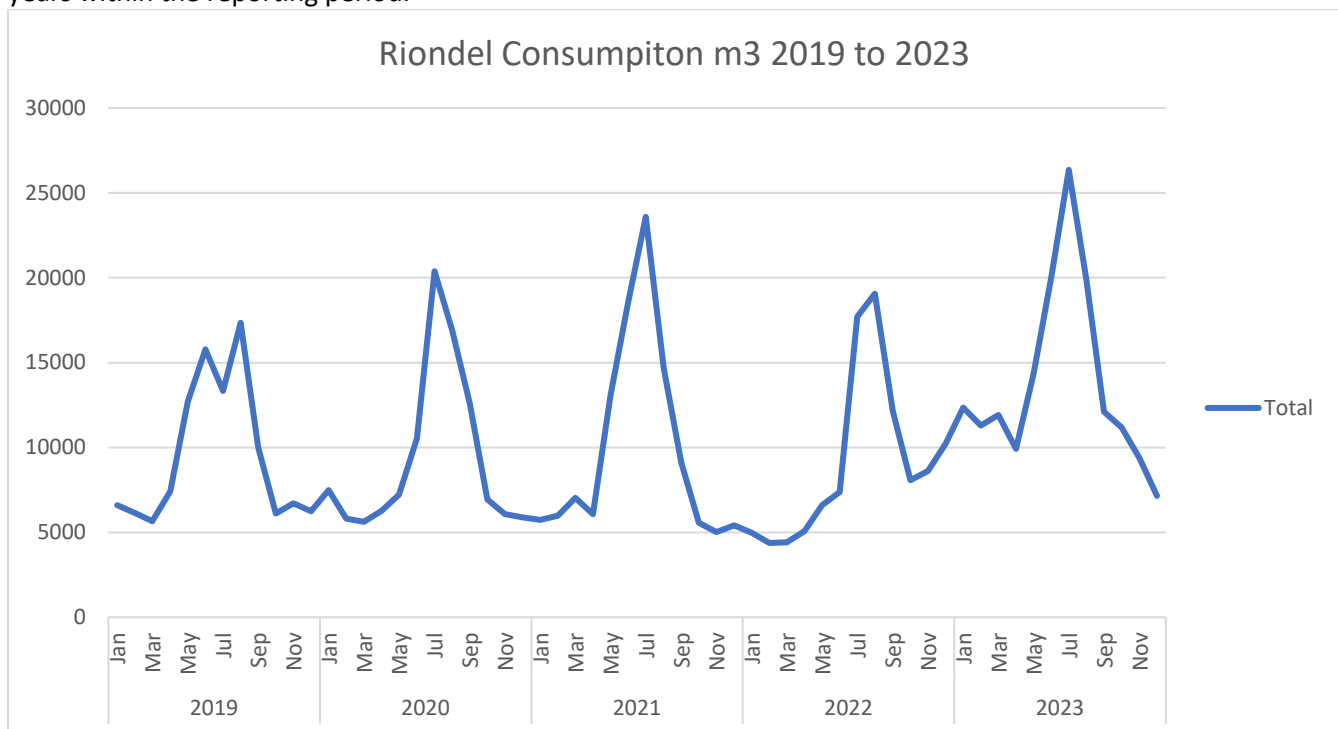




Figure 3-6. Riondel Reservoir

3.2 High Winter Water Demand, Seasonal Peaks and Increasing Water Use

High winter demand can indicate system leakage. High seasonal peaks can define patterns in water use, whether it is due to agriculture, lawn watering, car washing, driveway washing, swimming pools or seasonal occupation of property to name a few. It is therefore important to look at patterns of winter vs. summer consumption to determine what is happening with the infrastructure, and within the community that could affect water use.

This section highlights noteworthy trends in some water systems.

3.2.1 Duhamel Creek

This water system was seeing high water consumption in the winter months, until a major leak was repaired in 2020. The result was a significant decrease in winter water consumption. 2022 per-connection consumption in Duhamel is 2683 L/Day which is very high compared to the Canadian average. Summer water use is very high. There are no golf courses and very little agriculture in this water system, suggesting that water is used for lawns and gardens. However, peak consumption has decreased every summer season over the course of the reporting period.

The Duhamel water system is not metered.

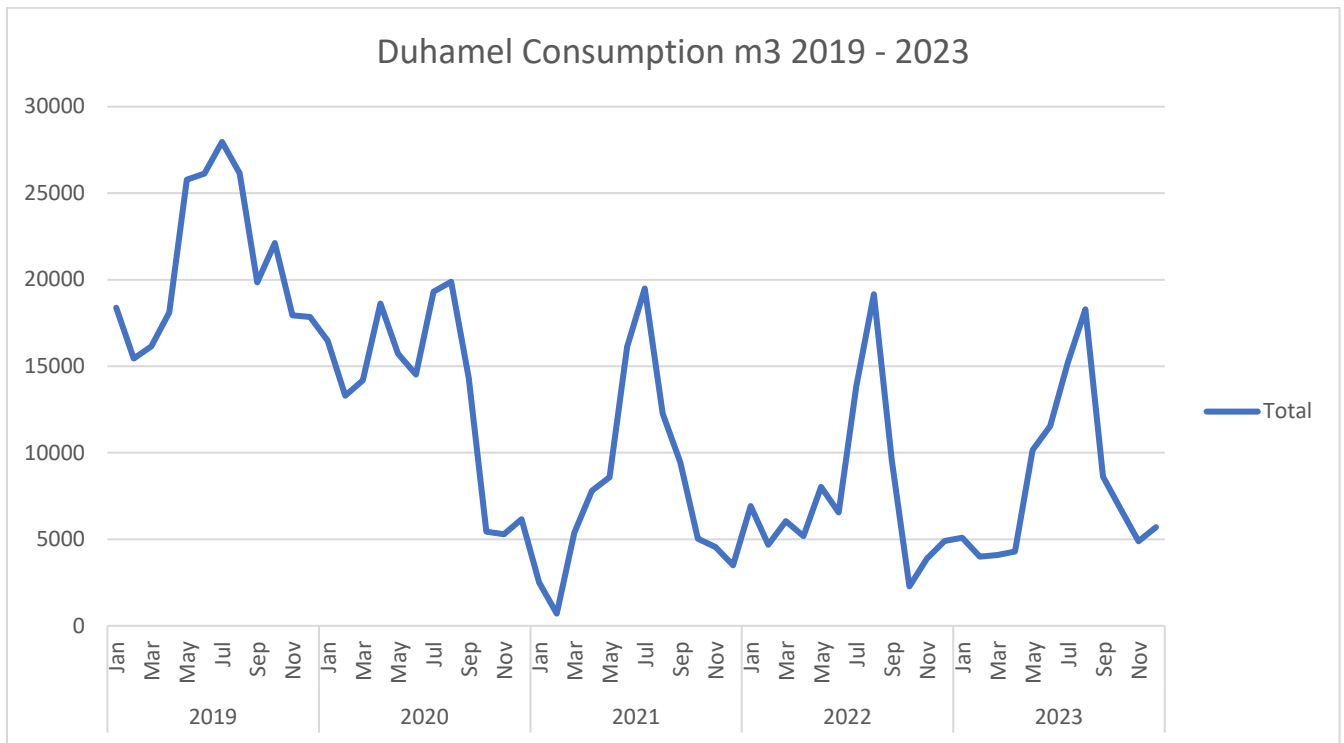


Figure 3-7 Duhamel Monthly Consumption m3

3.2.2 Burton

This water system has seen increases in consumption since 2018. The number of service connections has remained constant. The Burton school re-opened in 2020 which could also account for an increase in overall water use. The school irrigation had been off between 2010 and 2020. In a 2020 a school field renovation was complete and the irrigation system turned back on.

Per-connection consumption in Burton is very high at 3648 L/day, second only to the Erickson water system. Burton also has high season peaks suggesting that outdoor water use is high in the summer months. There is an orchard with a cidery and a campground in Burton. These two uses contribute to the high per-connection consumption.

There is an anomaly in the data during the winter months of the year 2020, which may skew the consumption results for Burton to some degree. The cause of the early 2020 spike is unknown. Both winter and summer water have increased consistently each year throughout the reporting period. The Burton water system is not metered.

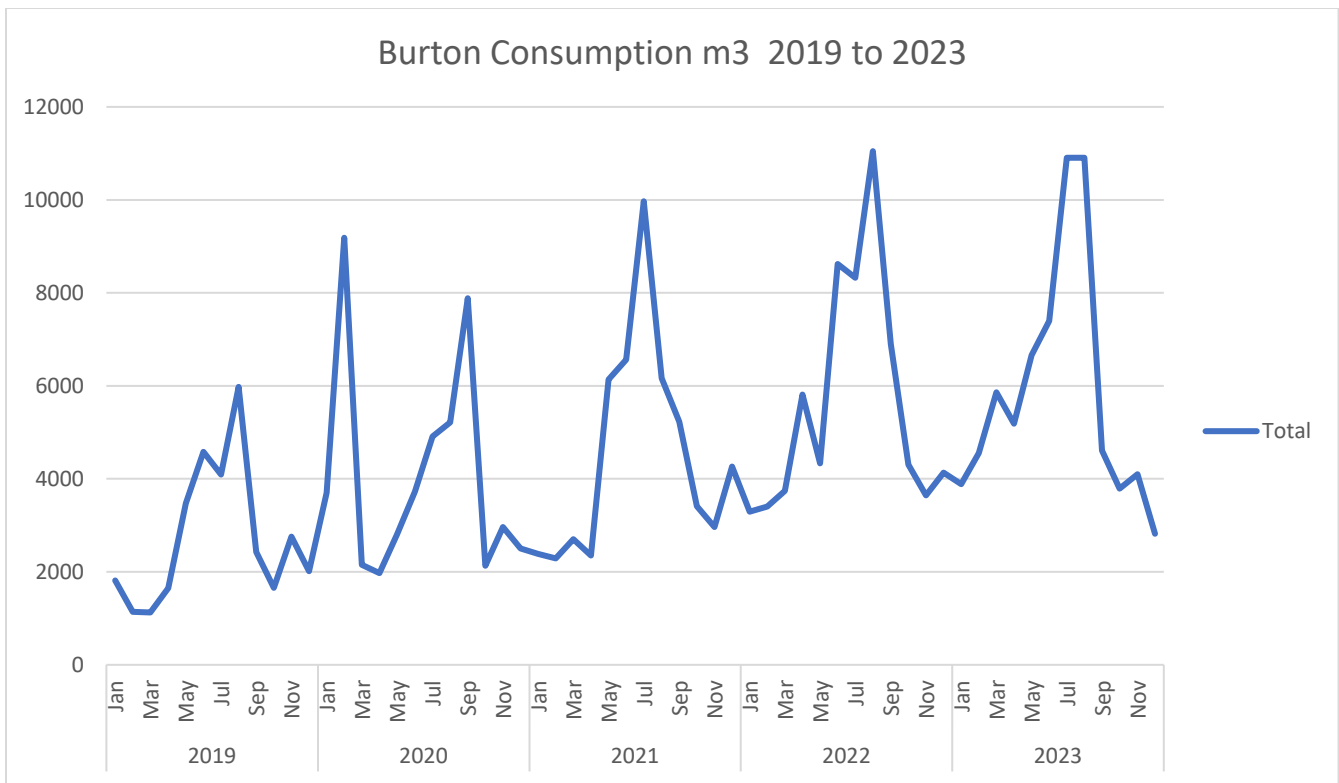


Figure 3-8 Monthly Consumption in Burton Water System

3.2.3 Edgewood

This water system has seen a steady decrease in consumption since 2021. The number of connections in Edgewood has remained constant since 2018.

A large leak was isolated on private property in early 2020 and a second leak was repaired in the school irrigation system. Some of the increase in 2019 demand might be attributed to construction of the new well and reservoir.

The year 2021 was the BC heat dome and the year of the Michaud Creek wildfire. Residents of Edgewood were evacuated from their homes on July 21, 2021. This could have resulted in sprinklers running continuously to protect homes and property. Consumption was very high in 2021.

Edgewood’s per-connection consumption rate in 2023 was 2,402 Litres/day, which was a significant reduction since the year prior. Winter use appears to have decreased significantly in 2023.

The Edgewood water system is not metered.

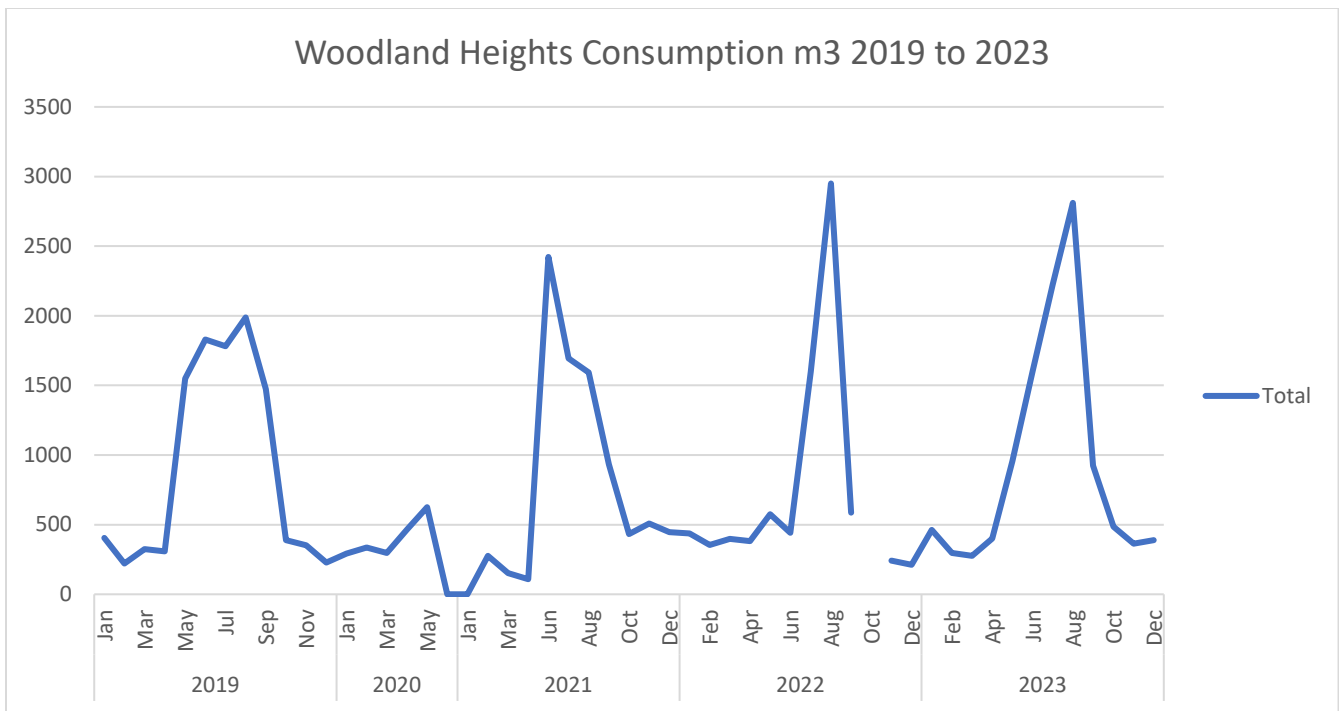


Figure 3-10 Woodland Heights Monthly Consumption

3.2.5 Erickson

The Erickson water system uses source water from Arrow Creek. Erickson is an agricultural area and treated water is used for agricultural purposes, mostly orchards. As a result, there are extreme differences between consumption in summer months when crops are irrigated, and winter months when irrigation systems are turned off. Figure 3-11 shows that winter use in Erickson is typically below 50,000 m3 per month but increases to over 300 000 m3 in during the growing season.

A major capital infrastructure project to replace the Arrow mainline was completed in 2017. It appears from the overall decrease in winter monthly consumption from 2013 to 2020, that the Arrow transmission line replacement project reduced leakage. Although not apparent in the data, some of the leakage reduction achieved with the transmission line replacement could now be offset with increased leakage in the aging Erickson distribution system. The Erickson water system is aging and a night flow analysis during non-irrigation periods is recommended to review potential system leakage.

The Erickson water system is partially metered. Grant money has been secured to install more water meters on Agricultural, Industrial, Commercial and Institutional properties over 5 acres in size. These meters will help collect data on how water is being used and identify private side leakage. The meters are expected to be installed in 2025.

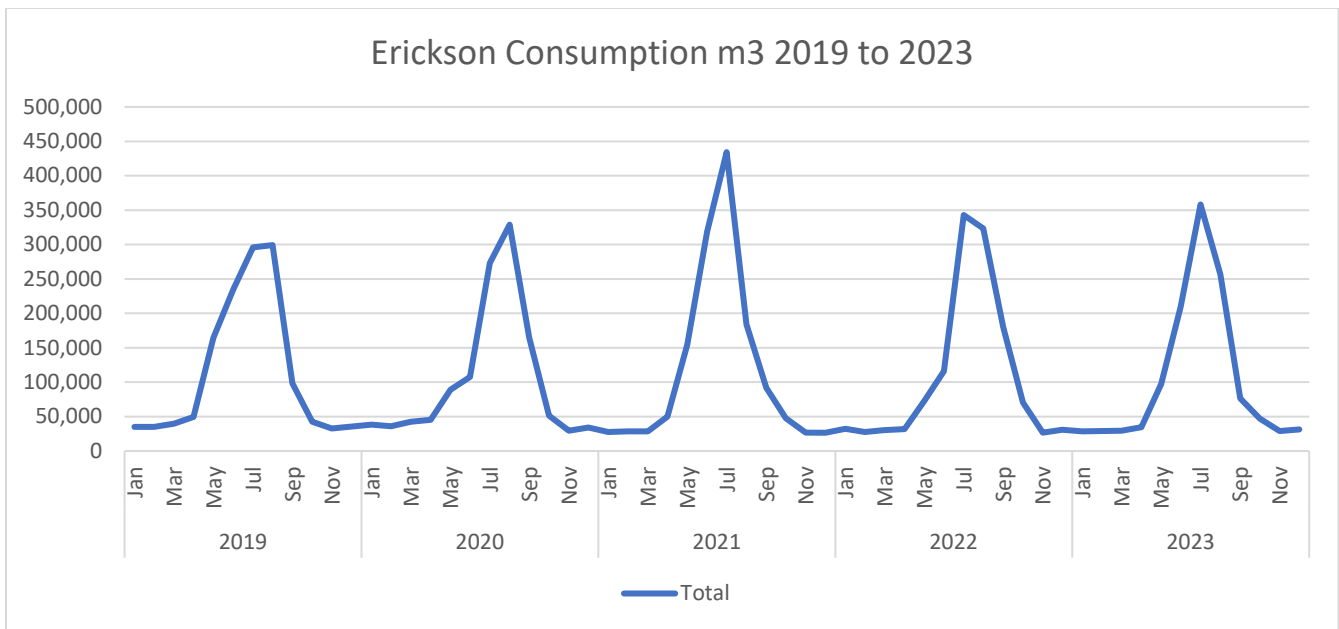


Figure 3-11 Seasonal Water Use in the Erickson Water System.

3.3 Low Per-Connection Water Use

3.3.1 Woodbury

The Woodbury water system has seen an increase in overall consumption since 2019. The number of service connections has increased from 34 to 41 during the reporting period, which has likely contributed to the increase. There may also be more year round residents living in the service area. Despite the increase, the per-connection consumption remains relatively low at 683 L/Day, which is very close to the Canadian average. Woodbury is an engaged community with members who volunteer to collect water quality and consumption data.

The Woodbury water system received a new water treatment plant in 2023. Data was lost during the transition at the end of 2023 when the old flow meter was removed and a new meter was not yet on line.

The Woodbury water system is not metered.

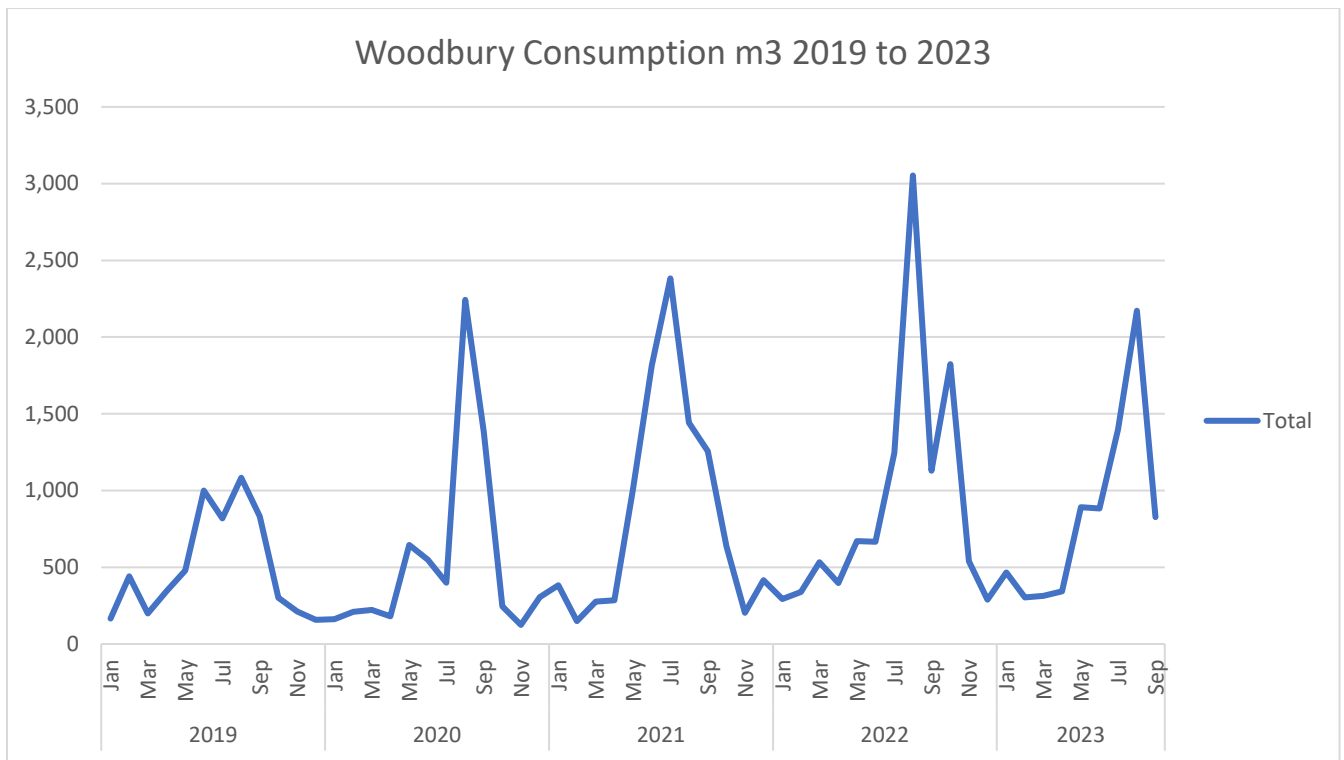


Figure 3-12 Monthly Consumption Woodbury Village

3.3.2 Ymir

The Ymir water system has consistently been one of the lowest water users per connection over the past two reporting periods. At 685 L/day Ymir is lower than the Canadian average. Ymir uses water from Quartz Creek. The watershed has been identified as being vulnerable to proposed forest harvesting. The community of Ymir has advocated for watershed protection for the past few years. A Natural Asset Management Plan will be completed for the Quartz Creek watershed in 2025.

The Ymir water system is not metered.

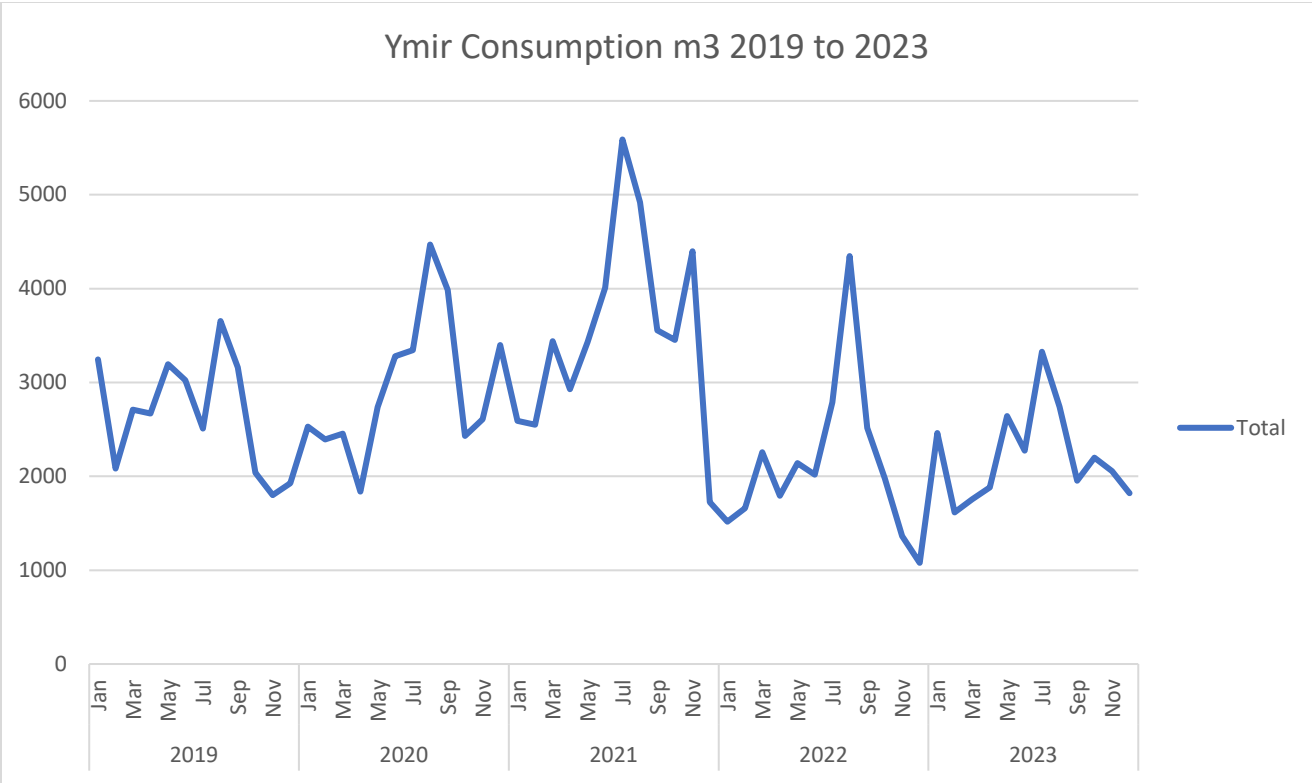


Figure 3-13 Ymir Monthly water consumption



Figure 3-14 Quartz Creek Intake in Ymir

3.3.3 Lucas Road

The Lucas Road is the RDCK’s smallest water system. Per-connection water use was 667 L/day in 2023. The RDCK receives quarterly consumption reports from the City of Castlegar when the water invoice is received for that system. As a result, the graph in Figure 3-14 shows quarterly consumption.

The Lucas Road water system is metered and billed quarterly.

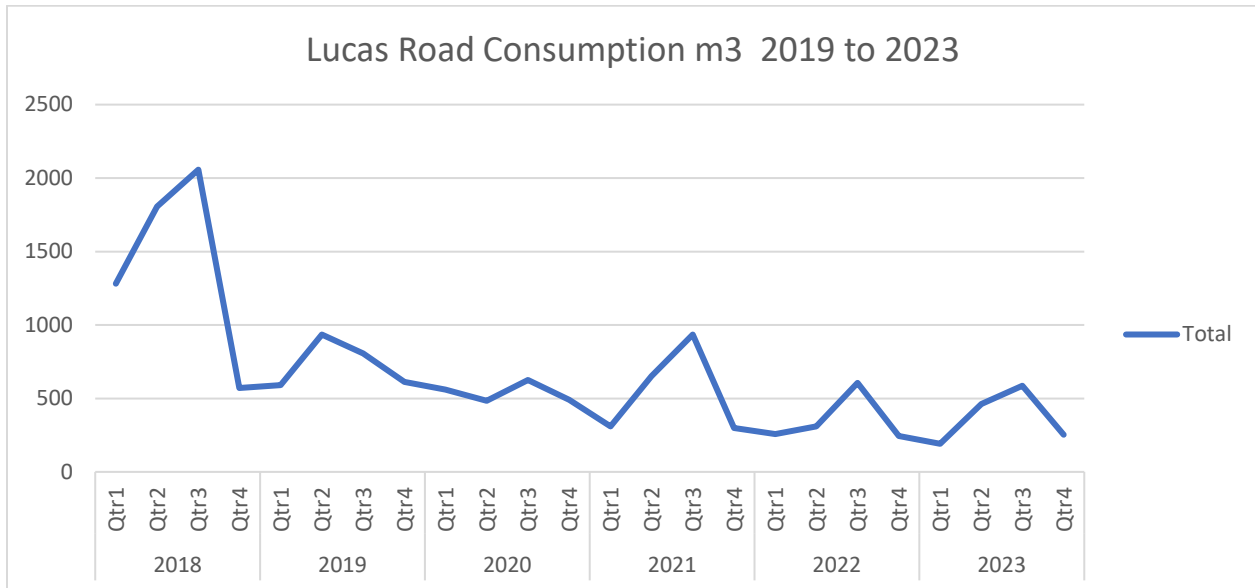


Figure 3-15 Quarterly consumption for Lucas Road

3.4 Golf Courses

The Riondel and Fauquier water systems have golf courses that use treated water for irrigation. These golf courses have meters to collect consumption data but do not have metered billing.

In Fauquier and Riondel, data collected in the Beacon/Badger software prior to 2023 was lost when a meter was replaced for an existing account. Some consumption data still exists in Tempest and was used in the report to quantify consumption in those two systems. 2023 data was also used as it is available and at the time of reporting (November), irrigation in the golf courses has been turned off.

3.4.1 Riondel Golf Course

The Riondel Golf Course water consumption data is available only for the years 2021 and 2023, during which the course used approximately 17,000 m³ annually—equivalent to about 10% of Riondel’s total water consumption. Given the limited system and emergency capacity of the Riondel water system, the removal of the golf course connection has been a longstanding recommendation. With the recent issuance of a provincial water licence and plans for the golf course to construct its own system and transition to using lake water by Q4 2027, it is anticipated that its irrigation demands on the Riondel water system will be addressed. The golf course is currently billed on an annual flat-rate basis.

3.4.2 Fauquier Golf Course

Fauquier Golf Course consumption data is partially available for the reporting period. Use was very high during the years 2021 and 2022 averaging approximately 35,000 m³. This was approximately 30% of total consumption for those two seasons. During 2023, there was a significant reduction, with the Fauquier golf course consuming 7,558 m³. This is approximately 6.3% of the 2023 total water consumption. The decrease in consumption is likely due to leak repairs that took place during the summer of 2023. The Fauquier golf course is billed on an annual flat rate.

3.4.3 Balfour Golf Course

The Balfour Course does not use treated water from the water system to irrigate the greens. Water is only used for the clubhouse. Average water consumption per year over the reporting period for the clubhouse was 701 m³/year. Balfour has metered billing as therefore pays a quarterly base charge for water consumption up to 100 cubic meters per quarter, and a consumption charge over that amount.

3.4.4 Creston Golf Course

The Creston Golf Course sits on the edge of the Lister Water Service Area. The club house is connected to the Lister service, but the greens are not. Therefore, water consumption is not included for this golf course.

Table 6 - 2019–2023 Water Consumption Summary Matrix – All RDCK Water Systems

Water System	# Connections	2023 Use (m ³)	% Change in Water Consumption (2022–23)	Peaking Factor	MDD vs Capacity	Drought Sensitivity	Key Observations	Risk Level	Recommended Actions
Arrow Creek	656 in the Erickson System TOC - 3,056 residential connections plus 239 ICI connections	2,683,623	↓ -6%	8.9	Exceeded <i>(MDD exceeded Emergency Capacity 3 times in 2023)</i>	Severe	MDD > emergency capacity (290 L/s); record-low streamflows; high ag demands and environmental flow concerns related to seasonal low baseflows.	High	Continue to explore alternate water supply for agriculture via advancing and continuing the design development of the Creston Valley Agricultural Water Supply Study recommendations, monitor peak usage, encourage water conservation.
Riondel	198	167,420	↑ +35%	2.1	Exceeded	Moderate	MDD = 14 L/s > Emergency Capacity of 10 L/s; golf course = ~10% of volume; Golf Course lake licence approved but requires implementation of infrastructure works	High	Support Golf Course irrigation transition to lake water source; Water use education including adherence to summer water conservation measures
Erickson	656	1,228,083	↓ -5%	6.0+	see Arrow Creek	Very High	Agricultural irrigation drives high peaking; partial metering in place and more to come as metering installation rolls-out.	Medium	Complete metering; promote irrigation efficiency. Explore alternate water supply for agriculture via continued design development of the Creston Valley Agricultural Water Supply Study recommendations
Duhamel Creek	93	100,629	↑ +9%	3.6	Within	Moderate	Per connection water use is very high. High summer demand due to residential outdoor watering use	Low-Med	Water use education including adherence to summer water conservation measures
Burton	54	71,960	↑ +6%	2.8	Within	High	Per connection water use is very high School irrigation, orchard irrigation, campground influences peak demand	Medium	Water use education including adherence to summer water conservation measures
Lister	196	206,673	↑ +1%	2.7	Within	Moderate	Mixed residential/ag use; steady demand; metered dairy connection	Low-Med	Continue monitoring; Water use education including adherence to summer water conservation measures
Balfour	265	105,932	↓ -3%	2.6	Within	Moderate	Golf course not connected to treated supply; moderate summer peaking	Low	Water use education including adherence to summer water conservation measures; maintain current monitoring
Fauquier	93	119,440	↑ +4%	2.7	Within	Moderate	Golf course uses potable water; large share of system demand	Medium	Water use education including adherence to summer water conservation measures
Edgewood	92	80,545	↓ -39%	2.4	Within	High	2021 high demand possibly due to precautionary structure protection sprinkling for wildfire. Recent leak repairs and general reduction in per-connection consumption from 2022-2023.	Low-Med	Continue monitoring; Water use education including adherence to summer water conservation measures

Table 6 Cont'd - 2019–2023 Water Consumption Summary Matrix – All RDCK Water Systems

West Robson	114	77,957	↑ +13%	3.3	Within	Moderate	Moderate per-connection use; small system but consistent peaking	Low-Med	Review seasonal use patterns; leak detection
South Slokan	50	29,349	↑ +15%	1.1	Within	Low	Low peaking factor; steady use; minimal seasonal variation	Low	Replacement of aging distribution system as per asset management plan and as funds are available.
Ymir	108	27,291	↑ +7%	1.3	Within	Moderate	Lowest per-connection use; community engaged in watershed protection	Low	Support watershed protection work; maintain current approach
Woodland Heights	21	11,186	↑ +27%	6.8	Within	Low	High summer residential use for outdoor watering despite smaller lot sizes	Low	Educate on seasonal conservation; monitor trends
Grandview	37	16,833	↑ +14%	2.6	Within	Low	Small system; metered billing; steady growth	Low	Continue metered billing; monitor seasonal trends
Woodbury	41	7,599	↓ -44%	4.7	Within	Low	New WTP in 2023; low per-connection use; engaged community	Low	Maintain status quo; support community participation
Rosebery	9	10,244	↑ +20%	8.2	Within	Moderate	High peaking despite small size; partial occupancy area	Low	Educate on seasonal conservation; monitor trends
Lucas Road	6	1,493	↑ +5%	1.5	Within	Low	Smallest system; fully metered; stable use	Low	Maintain monitoring and metered billing