

Annual Water Systems Report

2020



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1. RDEK Water Systems Overview

The Regional District of East Kootenay (RDEK) strives to provide a safe and reliable water supply to all of its customers. As required by the Drinking Water Protection Act, this Annual Water Report is intended to inform the public of the water systems owned and operated by the RDEK and provide details on water quality, system maintenance and improvements, water conservation tactics, and more. The RDEK employs certified water operators to ensure systems operations comply with regulations set out by the BC Interior Health Authority (IHA).

WATER SYSTEMS	EOCP #	2020 CONNECTIONS
EAST SIDE LAKE WINDERMERE	1926 & 1927 & 1099	1531
WINDERMERE UNTIL CONNECTED TO EAST SIDE	1098	628
HOLLAND CREEK	1866	383
EDGEWATER	649	469
RUSHMERE	1854	36
SPUR VALLEY	2421	73
MOYIE	2742	72
ELKO	2407	62

2. Systems at a Glance

Water System	Source Water	Supply Method	Disinfection/ Treatment Process	Pressure Reducing Stations	Reservoir & Capacity	Hydrants For Fire Protection
East Side Lk Windermere/	Lake Windermere	Pumped/ Gravity	Flocculation & Filtration, Chlorine & UV disinfection	7	962m ³	Yes
Windermere	Lake Windermere	Pumped/ Gravity	Flocculation & Filtration, Chlorine & UV disinfection	2	Concrete 1250m ³ & 1600m ³	Yes
Edgewater	Lake Baptiste	Gravity	Chlorine & UV disinfection	3	Steel 800m ³ & 400m ³	Yes
Holland Creek	Groundwater Well	Pumped/ Gravity	Chlorine disinfection	1	Supplied by Kinbasket Water and Sewer	Yes
Rushmere	Lake Windermere	Pumped	Ultra filtration and Chlorine disinfection	0	Polyurethane 17m ³	No ¹
Spur Valley	Groundwater Well	Pumped/ Gravity	Chlorine disinfection	0	Concrete 125m ³ & 222m ³	Yes ²
Moyie	Groundwater Well	Pumped/ Gravity	No treatment or disinfection	0	Concrete 71m ³	No
Elko	Groundwater Well	Pumped	No treatment or disinfection	0	No storage	No

¹Fire protection by tender only

²Insufficient fire flows through hydrants. Protection by tender only

3. Water Quality Performance

Parameters	Quality Standards	Frequency	Water Systems	Performance
Total Coliform, E.Coli	Less than one E.Coli and total coliform bacteria detectable per 100mL samples	Weekly	East Side Lake Windermere	100%
			Windermere	100%
			Edgewater	100%
			Holland Creek	100%
			Timber Ridge	100%
			Rushmere	100%
			Spur Valley	100%
		Monthly	Moyie	91% ¹
			Elko	100%
Free Chlorine Residual	Free chlorine residual minimum of 0.5mg/L entering the system after no less than 20 minutes contact time. Minimum of 0.2mg/L at any/all end points of the distribution system	Daily	East Side Lake Windermere	100% $\geq 0.5\text{mg/L}$
		Five days/week	Windermere	100% $\geq 0.5\text{mg/L}$
			Edgewater	100% $\geq 0.2\text{mg/L}$
			Timber Ridge Distribution	100% $\geq 0.2\text{mg/L}$
		One day/week	Holland Creek Distribution	100% $\geq 0.2\text{mg/L}$
		Three days/week	Rushmere	100% $\geq 0.5\text{mg/L}$
			Spur Valley	100% $\geq 0.5\text{mg/L}$
Turbidity	Disinfected water shall not be higher than 1 NTU. Between 1 NTU and under 5 NTU a water quality advisory must be issued. Above 5 NTU a boil water notice is issued. Turbidity of water treated by membrane filtration shall not exceed 0.1 NTU in at least 95% of the samples in any month	Daily	East Side Lake Windermere	100% ≤ 0.3 NTU
		Five days/week	Windermere	40% ≤ 1.0 NTU ² 100% ≤ 5.0 NTU
			Edgewater	89.3% ≤ 0.3 NTU ³
			Holland Creek	100% ≤ 0.3 NTU
			Timber Ridge	100% ≤ 1.0 NTU
		Three days/week	Rushmere	100% ≤ 0.3 NTU
			Spur Valley	100% ≤ 0.3 NTU
Total Trihalomethanes	Maximum Allowable Annual Average of 0.1mg/L	Quarterly	East Side Lake Windermere	100%
			Windermere	100%
			Edgewater	100%
			Holland Creek	N/A (groundwater)
			Timber Ridge	100%
			Rushmere	N/A
			Spur Valley	N/A (groundwater)

Parameters	Quality Standards	Frequency	Water Systems	Performance
Haloacetic Acids	Maximum Allowable Annual Average of 0.08mg/L	Quarterly	East Side Lake Windermere	100%
			Windermere	75% ⁴
			Edgewater	75% ⁵
			Holland Creek	N/A (groundwater)
			Timber Ridge	100%
			Rushmere	N/A (small system)
			Spur Valley	N/A (groundwater)
Edgewater Raw Water Monitoring for Filtration Deferral	<u>E. Coli</u> : <10% of samples may exceed 20/100 in any 6 month period	Weekly	Edgewater	100%
	<u>Total Coliform</u> : <10% of samples may exceed 100/100mL in any 6 month period		Edgewater	61.5%<100/100mL ⁶
	<u>Turbidity</u> : <1 NTU		Edgewater	89.3% ³

¹Two failed total coliform tests. Suspected sample contamination. Re-tests passed

²Standing Water Quality Advisory in place until system connected to treated source June 2020

³Macaulay Creek washout/mudslide causing water quality issue and boil water notice

⁴One HAA result of .145 in Windermere. Annual average = 0.0692. System now on treated source.

⁵One HAA result of .121 in Edgewater and flushing increased. Annual average = 0.0707

⁶20/52 untreated samples >100/100ml

Please see Appendix A for monthly turbidity, chlorine residual, and consumption data for each system graphed over time.

4. Water Systems in Detail

4.1 East Side Lake Windermere Water System:

East Side Lake Windermere's water is drawn from Lake Windermere and pumped from the Baltac Pumping Station to the East Side Lake Windermere Water Treatment Plant (WTP) located on Windermere Loop Road. It passes through the coagulation, flocculation, settling and filtration treatment stages and the filtered water is then disinfected using UV and chlorine before being fed to the reservoir and distribution system. The entire process is monitored via Supervisory Control and Data Acquisition (SCADA) instrumentation and auto-dialer alarms as well as being verified and documented by operators daily.

2020 Events and System improvements:

- Upgraded lake intake and WTP pumping capacity
- Cleaned 940 Reservoir and clear well
- Improved and upgraded SCADA remote monitoring
- Connection to Windermere Project completed
- Swansea Road and Timber Ridge watermain loops for improved system pressure and operation completed, including installation of above ground pressure regulating stations
- Standby power generator installed and commissioned at Baltac high-lift pump station
- Standby air compressor installed at WTP for uninterrupted operation in event of main unit failure
- Timber Ridge Phase 3 pump house decommissioned and bypassed
- 895/940 crossover system installed in event of emergency

- Ballast overhead lights in WTP changed out with LEDs for improved lighting and energy efficiency

2021 Plans:

- Complete Chlorine analyzer installation project at the 940 Reservoir
- Ongoing pursuit of unaccounted-for consumption (leakage, unmetered services, etc.) in Timber Ridge Phase 1
- Possible main replacement for section of Timber Ridge Phase 1
- Salvage equipment and material from Timber Ridge Phase 3 pump house

4.2 Windermere Water System:

Windermere's water in the first half of 2020 was drawn from Lake Windermere and pumped from the Lake Pumping Station to the Water Pumping Station that is located beside the Windermere Public Beach. During this transfer, chlorine gas was used to disinfect the water. It was then pumped to the distribution system and across Highway 93/95 to 1250m³ and 1600m³ concrete reservoirs. This process is monitored using instrumentation and alarm dialers to notify operators of problems. These sites are frequented 5 days per week and processes are verified and recorded.

Since the completion of the Connection to Windermere Project on June 29, 2020, the Lake Windermere intake and chlorine gas disinfection have been decommissioned with disinfection now taking place at the East Side Water Treatment Plant. The reservoirs are now filled with treated water from the East Side Water Treatment Plant. When reservoir level demands have been met, all connections south of Timber Ridge Road are gravity fed from them. The Chlorine booster system at the reservoirs seems to no longer be a requirement, as Chlorine residuals are being satisfactorily maintained with the new process.

2020 Events and system improvements:

- One noncompliant yard hydrant has been removed
- Carscaden sub-division development complete
- Reservoir cleaning completed
- Second year of water main upgrades completed
- One new above-ground pressure regulating station installed on the South loop
- Distribution system connection to East Side completed and system flushed to Interior Health requirements of NTU less than 0.3. Water Quality Advisory lifted, and signage removed.
- High Lift Pumping Station decommissioned, isolated, and physically separated as per Interior Health Requirements
- Four-year hydrant replacement program complete

2021 Plans:

- Salvage equipment and material from Low and High lift Stations in Windermere
- Undertake a connection survey
- Year two of two-hydrant replacement program in Timber Ridge

4.3 Edgewater Water System:

The source water intake for Edgewater is located at Lake Baptiste, approximately two kilometers southeast of the community. Edgewater water is disinfected with both UV and chlorine and is stored at the Hewitt Road reservoirs which provide 1200m³ of treated storage. The RDEK has the capability to fully monitor the entire process through Edgewater's SCADA system, which alerts the operators of any potential problems.

2020 Events and System Improvements:

- New Crescentwood sub-division services complete and system now looped between North and South Crescentwood
- New chlorine and PH probes installed at reservoirs
- Hewitt annual culvert washout at Treatment Plant addressed
- Faulty level transducer replaced on tank #2 at reservoirs
- Two faulty/expired UV sensors replaced at Towers
- McCauley Creek mudslide created a major disruptive event resulting in a Water Quality Advisory, then upgraded to a Boil Water Notice due to excessive turbidity.
 - The situation warranted trucking water in from Radium, with a total of 1383m³ transported. We were able to maintain with water use restrictions in place.
 - The situation lasted approximately two weeks in June
- A mule deer that had fallen through the ice at Baptiste which eventually succumbed to his dire situation was frozen in place, close to the intake, and required chainsaw extraction.

2021 Plans:

- Safety upgrades to two pressure-reducing valve vaults
- Noxious weed and vegetation control on siphon line from Lake Baptiste to the Water Treatment Plant
- Completion of hydraulic model for water distribution system

4.4 Holland Creek Water System:

Kinbasket Water & Sewer Company (KWSC) supplies the community with bulk potable water. The well-sourced water is chlorinated to protect against contamination within the distribution system. The Holland Creek system has no reservoirs – all storage is provided by KWSC.

2020 Events and System Improvements:

- Pressure Reducing Valve station serviced and leak repaired
- Renewal of Bulk Supply Service Agreement with Kinbasket Water & Sewer started

4.5 Rushmere Water System:

The Rushmere water system draws raw water from Lake Windermere and is treated by way of a small membrane filtration treatment plant. Treated water is stored within the plant and pumped to the community using two variable frequency-drive distribution pumps. The plant is highly automated and operators maintain remote monitoring and control capability via SCADA. The plant is attended a minimum of 3 times per week and can alert staff when problems occur. The Rushmere water system is primarily for domestic use with some lawn and garden irrigation. There is no fire protection via fire hydrants.

2020 Events and System Improvements:

- Annual filter membranes clean-in-place completed
- 2 distribution check valves replaced due to failure
- Air Relief Valve in distribution changed out
- Raw influent cushion tank replaced
- Distribution pump/motor combo changed out
- On-going pressure loss issue resolved and discovered to be a faulty solenoid valve allowing air from the compressor to enter the pump distribution line

2021 Plans:

- Raw water lake intake screen cleaning
- Raw water wet well cleaning
- Replace hot water tank required for Membrane clean in place process
- Source and price spare Backwash pump and motor
- Water loss audit

4.6 Spur Valley Water System:

The community of Spur Valley is supplied with water from a groundwater well situated just south of the community. The water is chlorinated as it leaves the well and then pumped to two reservoirs before being distributed to residents. The RDEK has the capability to monitor the entire process through Spur Valley's SCADA system, which alerts the operators of any potential problems. Operators are on site a minimum of 3 times per week.

2020 Events and System Improvements:

- One noncompliant yard hydrant removed
- Large slash pile at reservoir site removed and hauled away
- Much public concern over proposed logging in close proximity to community

2021 Plans:

- Ongoing pursuit of unaccounted-for consumption (leakage, unmetered services, etc.) in system
- Well disinfection

4.7 Moyie Water System:

Moyie water is pumped from a 57m deep well to a 71m³ reservoir that maintains the pressure in the distribution system. The water is not chlorinated. RDEK operators are on site twice per week to ensure proper operation and perform monthly bacteriological sampling. The pumphouse is also outfitted with automatic alarm dialers to alert operators of any problems.

2020 Events and System Improvements:

- New Nelson box installed at blow-off valve
- One leak repair undertaken
- Two curb stop valves repaired

2021 Plans:

- Exploratory excavation to determine condition of distribution system
- Possibility of excavation of reservoir isolation valve for maintenance

4.8 Elko Water System:

The community of Elko receives raw water from a well located near the pumphouse. The well is located in a confined aquifer and water is pumped directly to the distribution system. Because there is no storage reservoir in Elko, the water system relies solely on the continuous operation of the pump to keep up with demand. There is no chlorination in Elko.

RDEK operators are on site 2 times per week to ensure proper operation and perform bacteriological sampling monthly as required. The pumphouse is also outfitted with automatic alarm dialers to alert staff when regular operations are compromised

2020 Events and System Improvements:

- Raw water chemical analysis completed by Teck

2021 Plans:

- Installation of new service connection
- Replacement of curb stop
- Installation of level sensor
- Installation of new well pump

5. Operator Certification

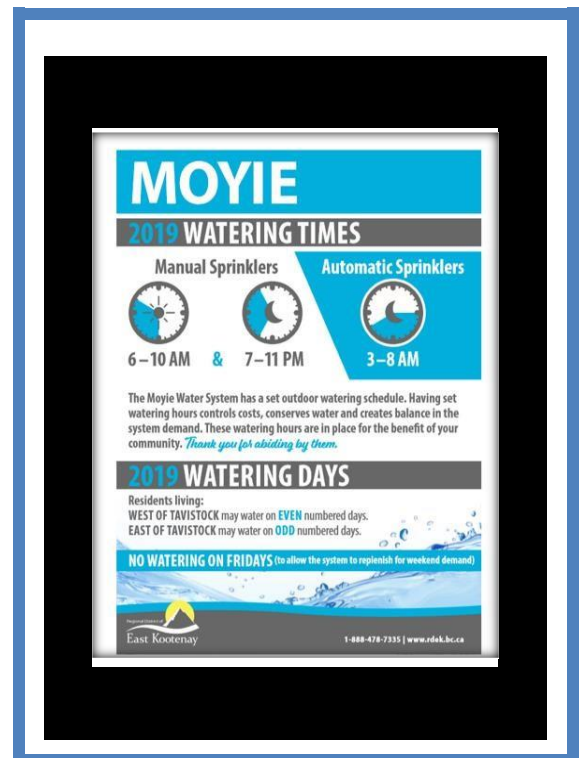
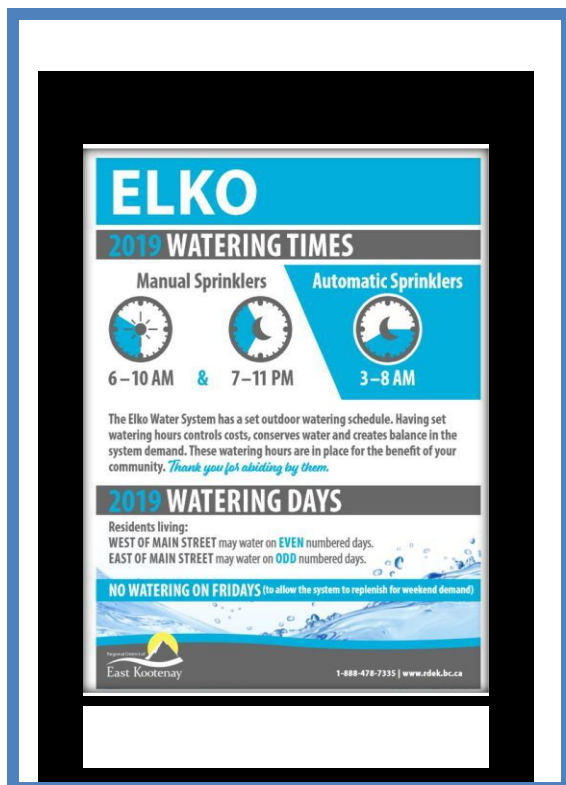
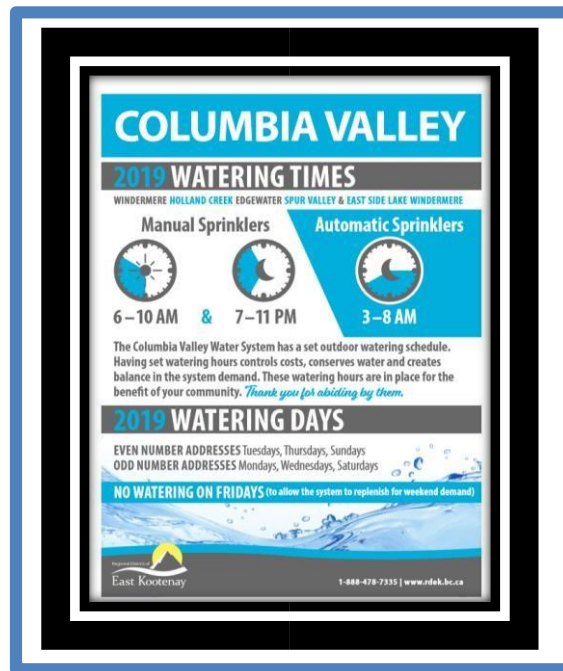
EOCP Certifications		
Employee	Certification #	Level
Norm Thies	6330	WT-III, WD-II MWWT-I, WWC-II, CH
Krista Goodman	7969	WT-I, WD-MUII, MWWT-MUII, WWC-I, CH
Jennifer Bartsch	100454	WWC II, WWT I, WD II, WT II
Jim Ralph	3389	WT-III, WD-III, MWWT-II, WC-I, CH
Aaron Bose	9550	WT-I, WD – I, MWWT - II
Dave Berger	7040	SWS
Brian De Paoli	8973	SWS
Jeff Nicholajsen	141754	SWS

- WT: Water Treatment
- WD: Water Distribution
- MWWT: Municipal Wastewater Treatment
- WWC: Wastewater Collection
- CH: Chlorine Handling
- SWS: Small Water Systems
- MUII: Multi Utility



6. Water Conservation

The RDEK has several parts to its Water Conservation Strategy. We have adopted scheduled watering hours for most of the operated water systems (see below). We encourage the use of low-flow fixtures in new construction. Our operators diligently monitor our systems for problems and routinely check for unaccounted-for consumption like leaks or unmetered use.



7. Water Treatment Objectives

The Canadian Drinking Water Guidelines, developed by Health Canada, are designed to protect the health of community members and in particular those most vulnerable; children, the elderly, and individuals with compromised immune systems. The parameters set out in those guidelines are the performance goals every water system should strive to achieve in order to provide the cleanest, safest and most reliable drinking water possible.

A Maximum Acceptable Concentration (MAC) level has been established by Health Canada for microbiological criteria. Each MAC has been designed to safeguard health, assuming a lifelong consumption of drinking water containing the substances at the maximum concentration level.

Aesthetic Objectives (AO) apply to characteristics of drinking water that can affect its acceptance by consumers. These would include such criteria as taste, odour, and appearance. Some AO's like turbidity could pose a health risk to some at-risk consumers if the MAC levels are exceeded.

In the East Kootenay, IHA acts as the water quality regulator by issuing Operating Permits and placing conditions on those permits. Those conditions are generally found in the BC Drinking Water Protection Act and the Canadian Drinking Water Guidelines.

IHA employs the 4-3-2-1-0 treatment objectives to ensure water-borne illnesses are not jeopardizing the public's health:

- Based on Canadian Drinking Water Quality Guidelines
- 4 log (99.99%) inactivation of viruses
- 3 log (99.9%) inactivation of or removal of Giardia and Cryptosporidium
- 2 treatment processes for surface water (typically this includes filtration and disinfection)
- 1 for <1 Nephelometric Turbidity Units (NTU) of turbidity (with a target of 0.1 NTU)
- 0 fecal coliform and E. Coli

8. Water Quality Monitoring

Monitoring programs are established as required by IHA regulations, the water system's Operating Permit, and the Drinking Water Officer. Bacteriological testing is a major requirement and is performed routinely in every RDEK water system. Samples are submitted to an approved lab where they are tested for Total Coliform and E. Coli bacteria.

Coliforms:

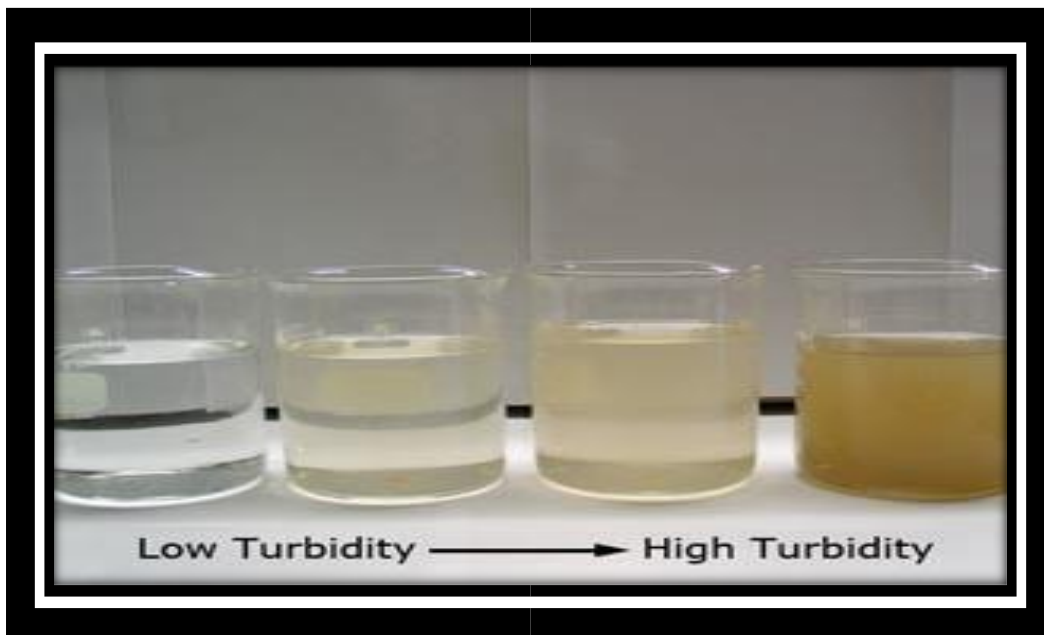
The presence of total coliforms in the water system is an indicator that the system is experiencing a regrowth of pathogens, that infiltration has occurred, or that it has not been properly treated at the source. It is an indication that the potential exists for bacteria to cause adverse health effects. The MAC for total coliform in all RDEK operated water systems is 0 per 100mL. If a sample comes back positive for coliform, operators review sampling practices, system operations anomalies, and a resample is conducted. If that result is positive, the main is flushed, monitored, and tested again. If the third result is positive, the main is taken out of service, chlorinated, flushed and remains out of service until acceptable results are obtained.

E. coli:

Escherichia coli is one species in the fecal coliform group and is a definite indicator of the presence of feces in the distribution system. The MAC for E.coli is 0 per 100 ml. An unacceptable MAC test for E.coli triggers an immediate boil water order by the Medical Health Officer, which remains in effect until the problem is identified, isolated, resolved, and acceptable test results are obtained.

Turbidity:

Turbidity is a measure of water clarity. Turbid water can look cloudy or opaque and can also affect the color of the water. Turbidity is measured in Nephelometric Turbidity Units, or NTU. The instrument used for measuring is called nephelometer or turbidimeter, which measures the intensity of light scattered at 90 degrees as a beam of light passes through a water sample.



For all of its surface-sourced water systems, the RDEK monitors turbidity with continuous monitoring instrumentation and verifies values with daily grab samples, using this as a basis for determining general water quality. Water Quality Advisories are issued when turbidity levels are greater than 1 NTU. Boil Water Notices are issued at or above 5 NTU. Depending on the treatment system, Health Canada recommends different turbidity level objectives; however, if it is above 1 NTU, a Water Quality Advisory is issued.

Chlorine Disinfection:

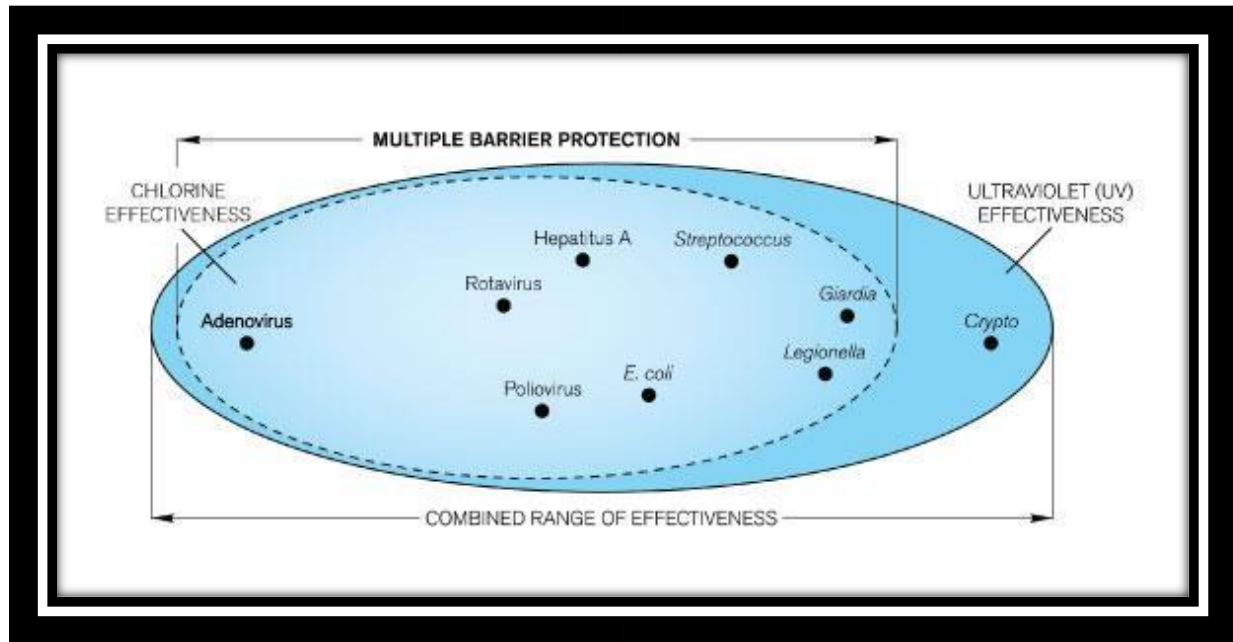
Most RDEK water systems are currently using chlorine to disinfect the water prior to sending it through the distribution system. Maintaining free chlorine residual in all parts of the system is important in keeping the water safe from bacteriological growth and other disease-causing organisms.

To ensure adequate chlorine levels exist, the RDEK has a number of online chlorine analyzers that monitor residuals, and will alert an operator should a residual fall below a desired point. Testing at remote points of distribution systems is also done routinely.

Ultraviolet Light Disinfection:

Ultraviolet light (UV) destroys harmful organisms by causing a molecular change in their DNA makeup that prevents them from multiplying. This process destroys the ability of the organism to spread disease. When pathogens cannot multiply, they are no longer considered to be harmful.

UV is often used in conjunction with chlorination for added protection and to combat organisms such as cryptosporidium. Cryptosporidium is a chlorine-resistant protozoan, but can easily be inactivated by UV. Another advantage of UV disinfection is that it does not produce any disinfection byproducts. The East Side Lake Windermere and Edgewater water systems have been equipped with UV disinfection systems.



Disinfection Byproducts:

Disinfection byproducts are formed when disinfectants used in water treatment react with bromide and/or natural organic matter (i.e., decaying vegetation) present in the source water. Different disinfectants produce different types or amounts of disinfection byproducts. Disinfection byproducts, for which MAC's have been established, have been identified in drinking water, including trihalomethanes and haloacetic acids.

- Trihalomethanes (THM) are a group of four chemicals that are formed along with other disinfection byproducts when chlorine or other disinfectants used to control microbial contaminants in drinking water react with naturally occurring organic and inorganic matter in water. The THM's are chloroform, bromodichloromethane, dibromochloromethane, and bromoform. The Canadian Drinking Water Guidelines have established a MAC to regulate total THM's (TTHM) at a maximum allowable annual average level of 0.1mg/L.
- Haloacetic Acids (HAA) are a group of chemicals that are formed along with other disinfection byproducts when chlorine or other disinfectants used to control microbial contaminants in drinking water react with naturally occurring organic and inorganic matter in water. The Canadian Drinking Water Guidelines has established the MAC for haloacetic

acids at 0.08 mg/L based on a location's running annual average of quarterly samples taken in the distribution system.

The RDEK samples for both THM's and HAA's on a quarterly basis¹. Of these samples, there was one result exceeding the Canadian Drinking Water thresholds for THMs in Edgewater in 2019. RDEK operators increased the frequency of distribution system flushing to further reduce THM's and continue to monitor the situation closely. All other tests met the required thresholds.

For more information on specific water quality parameters please contact the RDEK or visit *The Province of BC's Ministry of Healthy Living and Sport* website to find the *Drinking Water Protection Act and Regulation* http://www.health.gov.bc.ca/protect/dw_index.html or the Health Canada website to find the *Guidelines for Canadian Drinking Water Quality*. http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/index-eng.php#tech_doc

¹As per IHA standards, Spur Valley, Moyie, Elko, and Holland Creek are groundwater-sourced systems and do not require THM or HAA testing.

Filtration:

Filtration is part of the treatment process in the Rushmere and East Side Lake Windermere water systems. In Rushmere, filtration is performed by an ultra-filter cartridge system.

The filtration system for East Side Lake Windermere consists of the following steps:

- Coagulation: Polyaluminum Chloride, a primary coagulant, is used to destabilize colloidal (particles that do not settle out) substances
- Flocculation: A polymer is added to clump the destabilized particles together into aggregates that can be more easily separated from the water
- Settling: The water is sent through up-flow tube settlers, slowing down the flow to allow the floc to settle. This first step removes the majority of the solids
- Filtration: The water is passed through a mixed-media adsorption clarifier, which removes non-settleable solids using buoyant media. The final filtration process removes any remaining solids creating a very low turbidity product

Summary

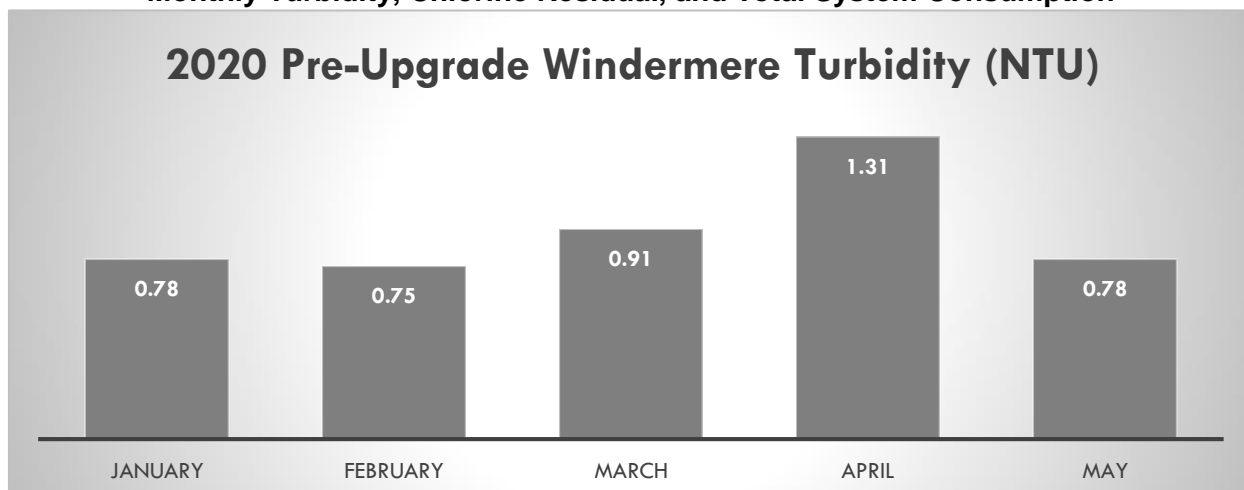
The RDEK is committed to providing safe, potable water to the public by working with IHA and maintaining standards set by Canadian Drinking Water Guidelines. This report represents a way of communicating facts and keeping the public apprised of the operational processes of the RDEK's water systems in the East Kootenay.



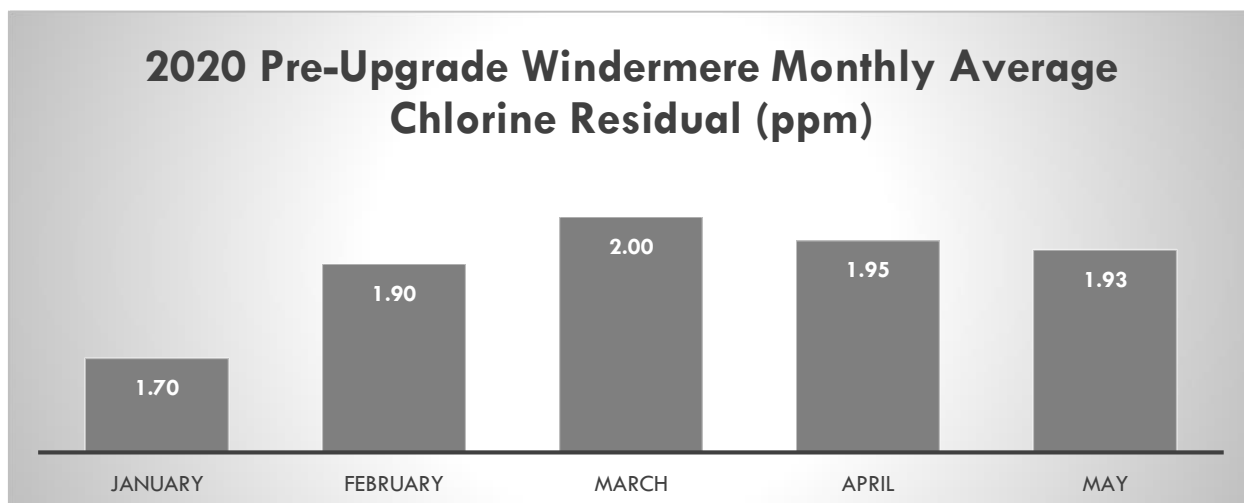
Appendix A: Monitoring Data

Monthly Turbidity, Chlorine Residual, and Total System Consumption

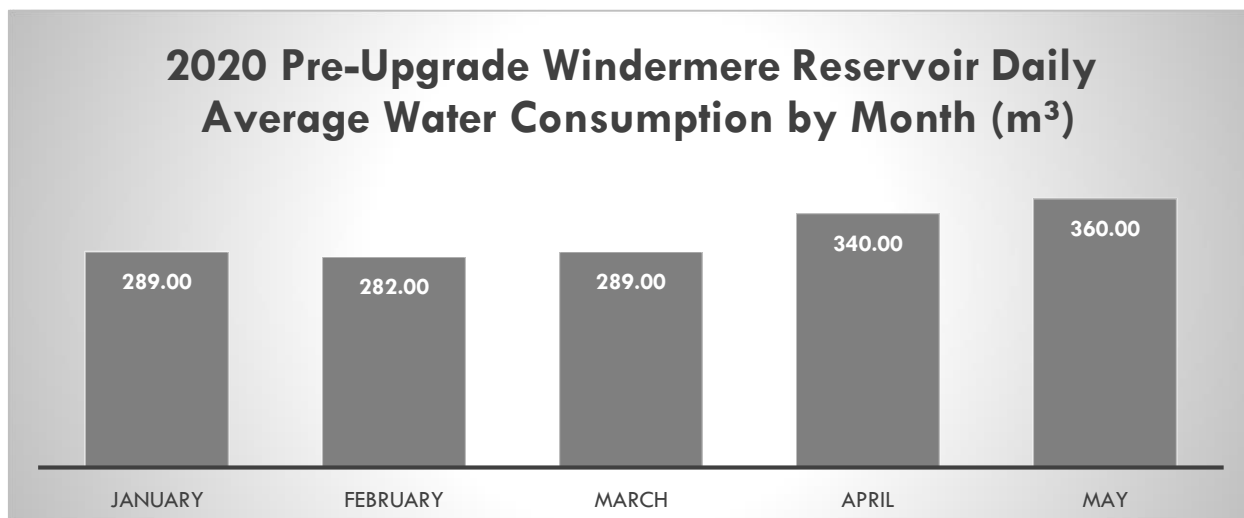
2020 Pre-Upgrade Windermere Turbidity (NTU)

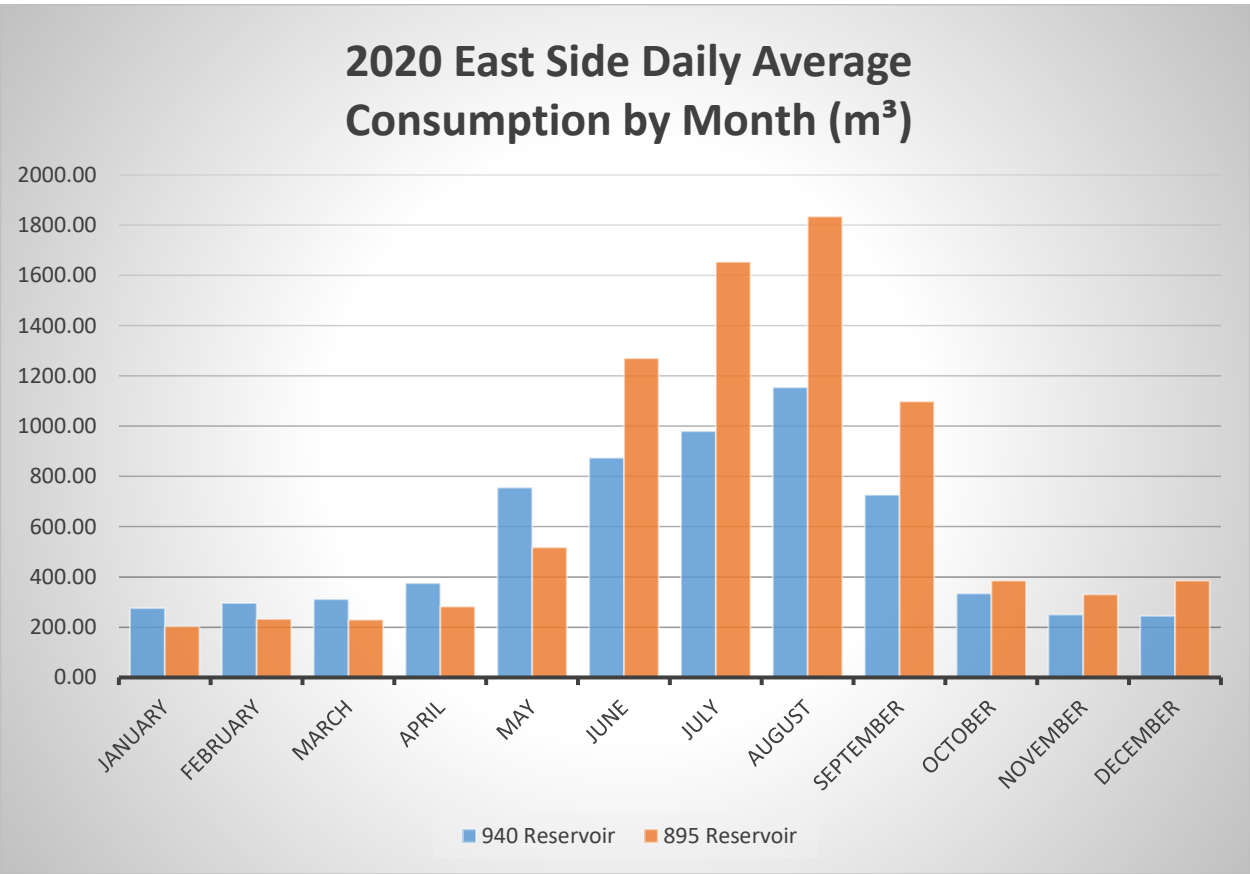
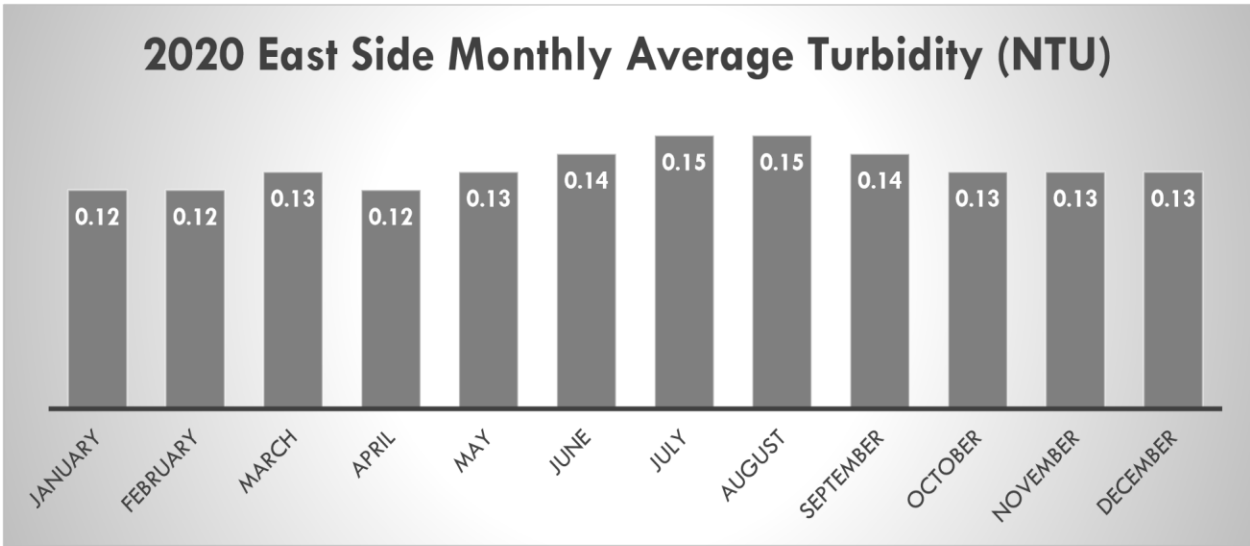


2020 Pre-Upgrade Windermere Monthly Average Chlorine Residual (ppm)

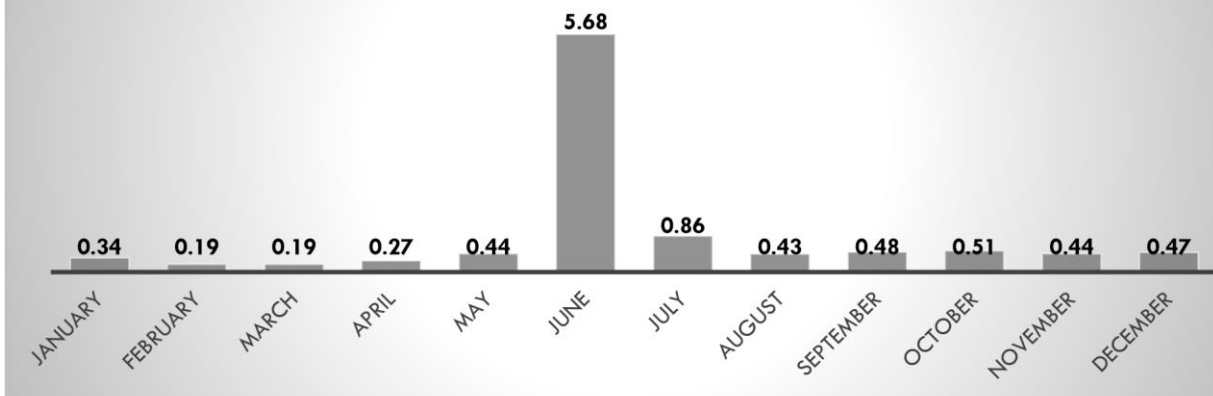


2020 Pre-Upgrade Windermere Reservoir Daily Average Water Consumption by Month (m³)

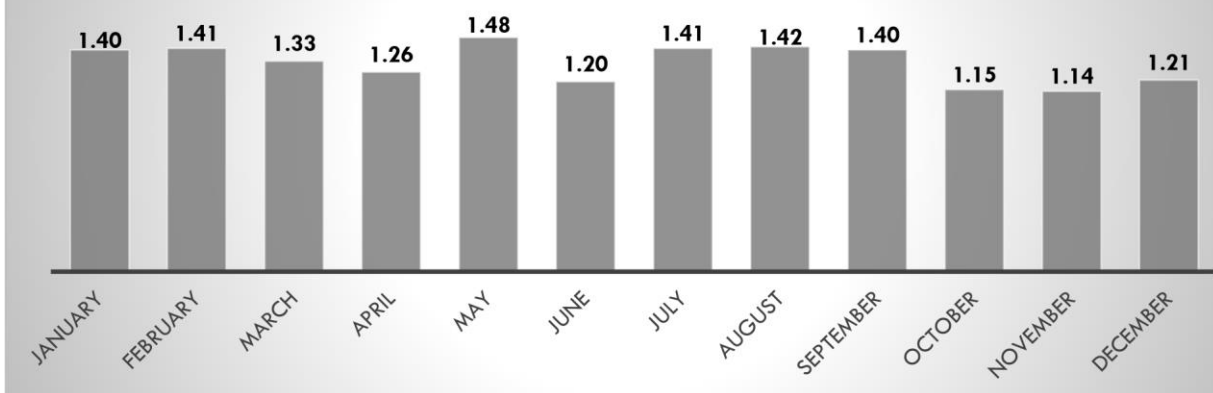




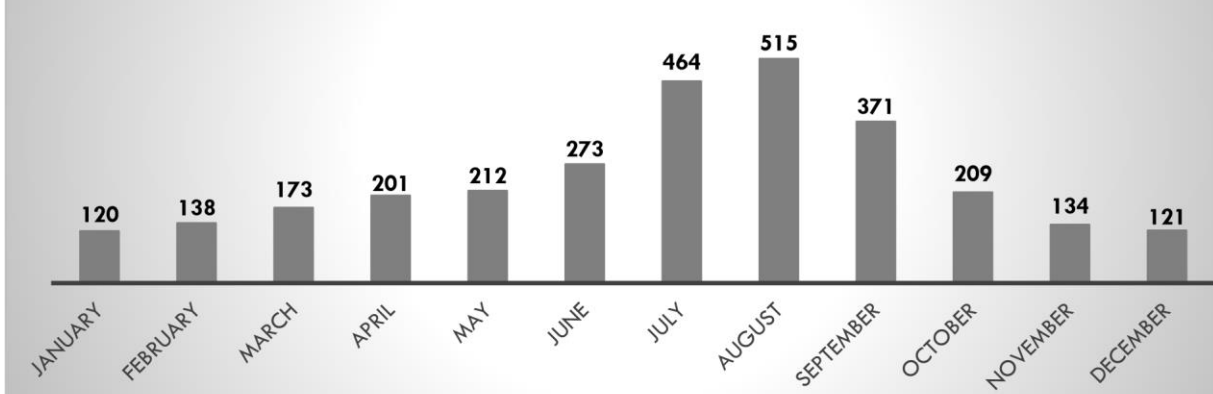
2020 Edgewater Monthly Average Turbidity (NTU)



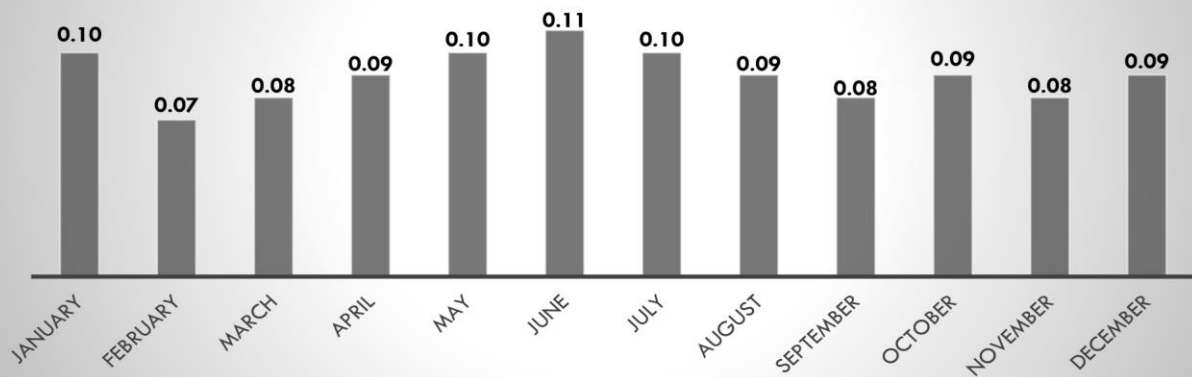
2020 Edgewater Monthly Average Chlorine Residual (ppm)



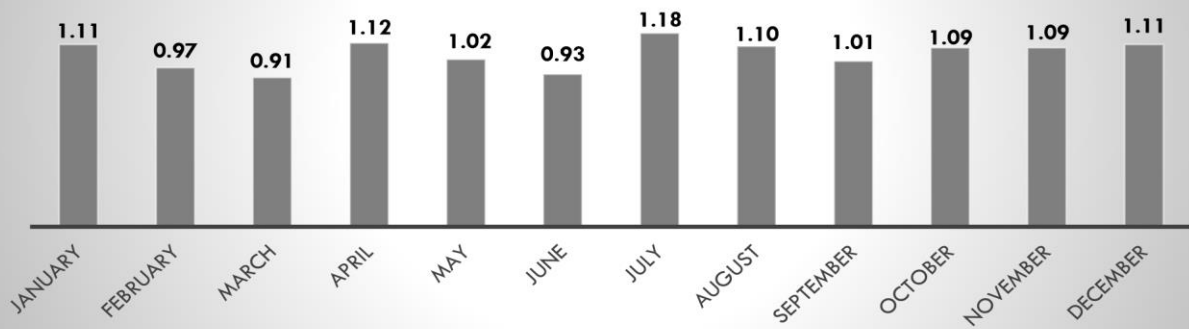
2020 Edgewater Daily Average Water Consumption by Month (m³)



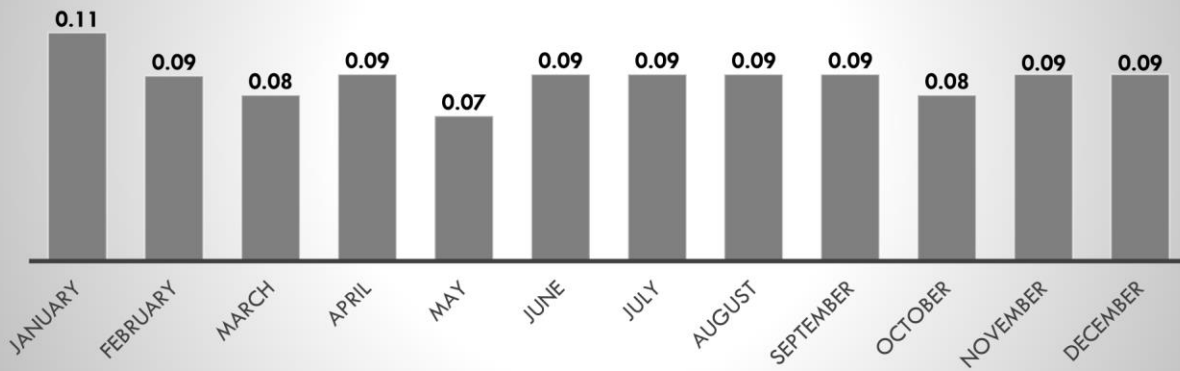
2020 Holland Creek Monthly Average Turbidity (NTU)



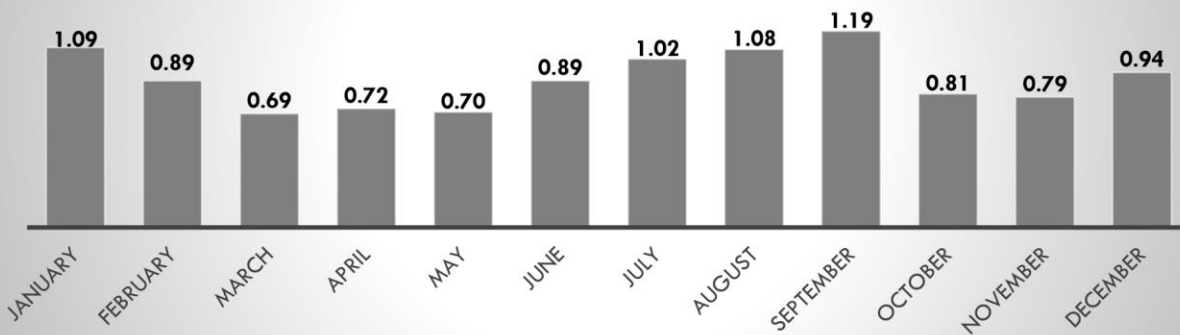
2020 Holland Creek Monthly Average Chlorine Residual (ppm)



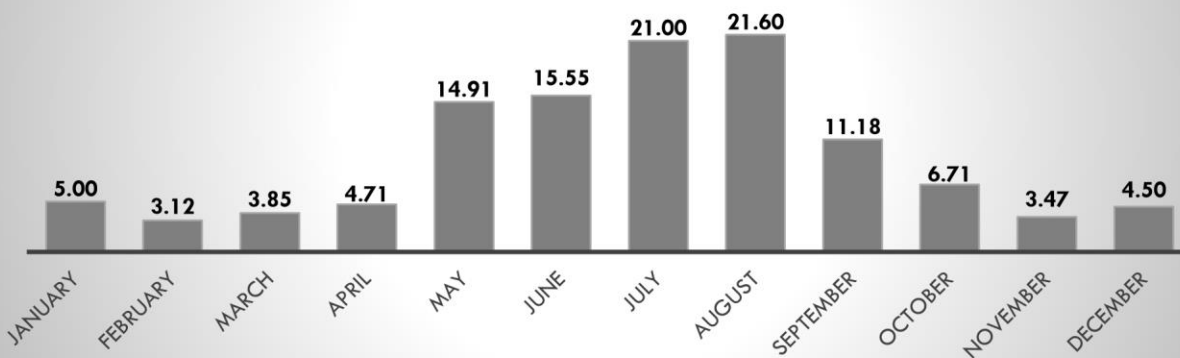
2020 Rushmere Monthly Average Turbidity (NTU)



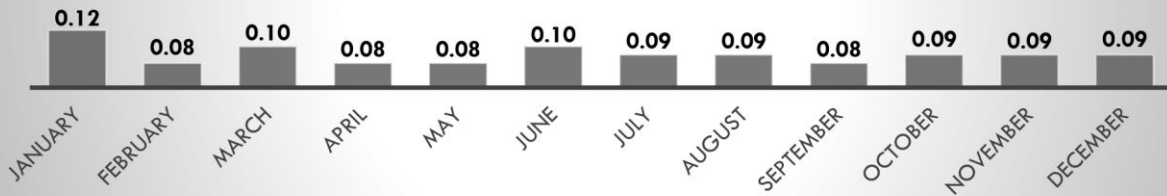
2020 Rushmere Monthly Average Chlorine Residual (ppm)



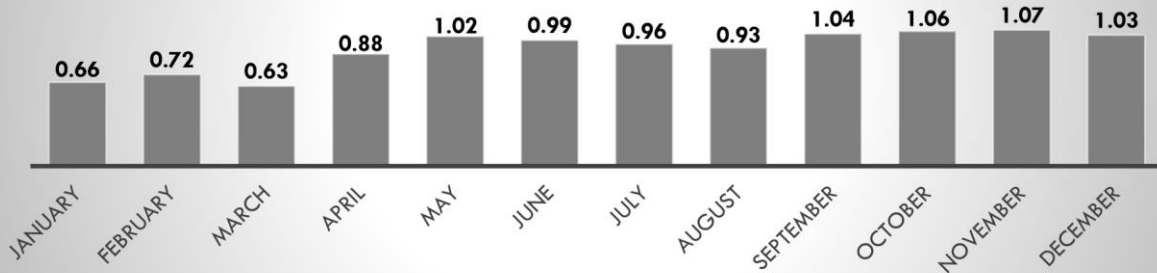
2020 Rushmere Daily Average Water Consumption by Month(m³)



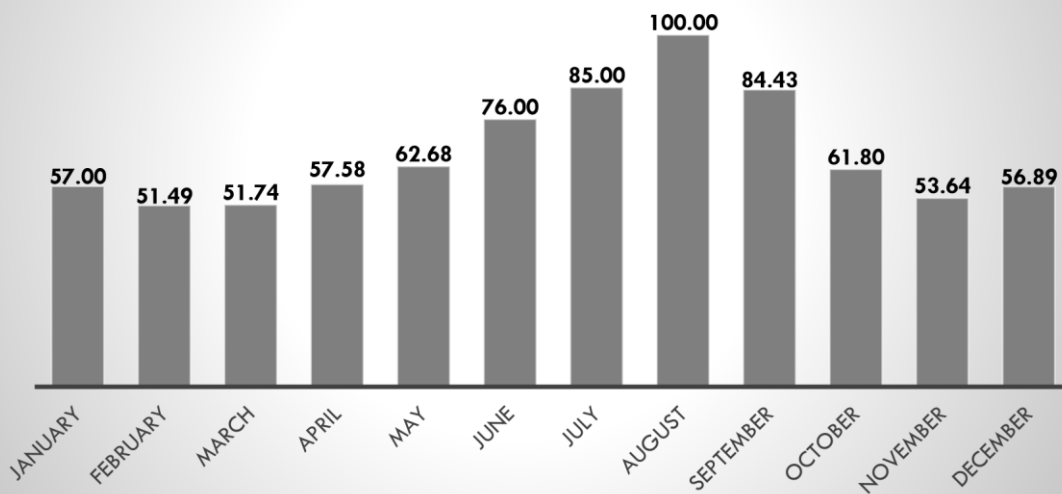
2020 Spur Valley Monthly Average Turbidity (NTU)



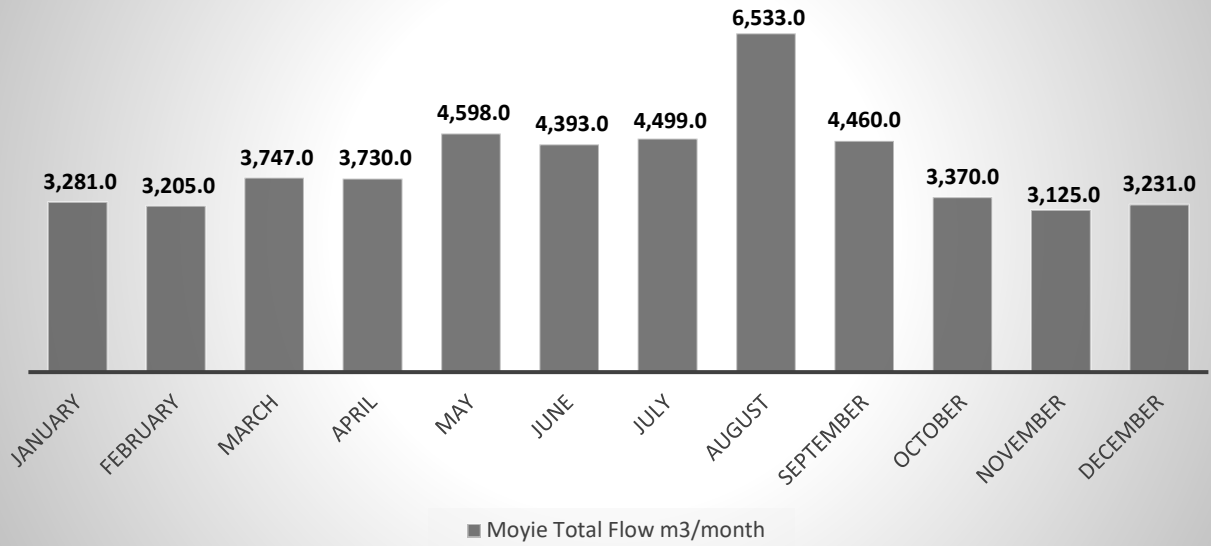
2020 Spur Valley Monthly Average Chlorine Residual (ppm)



2020 Spur Valley Daily Average Water Consumption by Month(m³)



Moyie Average Consumption by Month (m³)



Elko Average Consumption by Month (m³)

