

City of West Kelowna
2020
ANNUAL
WATER
REPORT



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1 INTRODUCTION

The annual report is an important part of providing West Kelowna residents with information regarding the quality and the risks associated with the drinking water supply system. It also provides users with educational information, ongoing challenges, and planned improvements to the water supply system. The water systems are governed by the *British Columbia Drinking Water Protection Act* which sets out requirements for drinking water operators and suppliers to ensure the provision of safe drinking water to their customers. West Kelowna has a plan to guide future improvements to the water system and continuing to provide residents with safe drinking water.

Drinking water can be a complex issue and much of the information provided in the report is technical in nature. Please contact the City of West Kelowna's Engineering Services department should you have any questions.

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2 BACKGROUND



Water System Background

The City of West Kelowna is a rapidly growing community located in British Columbia’s Okanagan Basin. The municipality incorporated in December 2007. Prior to municipal incorporation, the community was within the Regional District of Central Okanagan’s rural electoral area boundaries. The City’s estimated population is 36,000 residents, with nearly 14,000 private dwellings (Stats Canada).

The incorporation of West Kelowna in 2007 included the transfer of the operation and administration of the West Kelowna Estates, Sunnyside and Pritchard Water Systems from the Regional District of the Central Okanagan. The Lakeview Irrigation District and the Westbank Irrigation District, which incorporated in 1951 and 1922 respectively, dissolved and transferred over to the West Kelowna municipality on Dec. 31, 2010. Each of those legacy water systems evolved according to its own customer requirements, resulting in the range of levels of service currently delivered to customers.

Key characteristics of each former water utility are:

- **Lakeview Irrigation District, now part of the Rose Valley Water System**

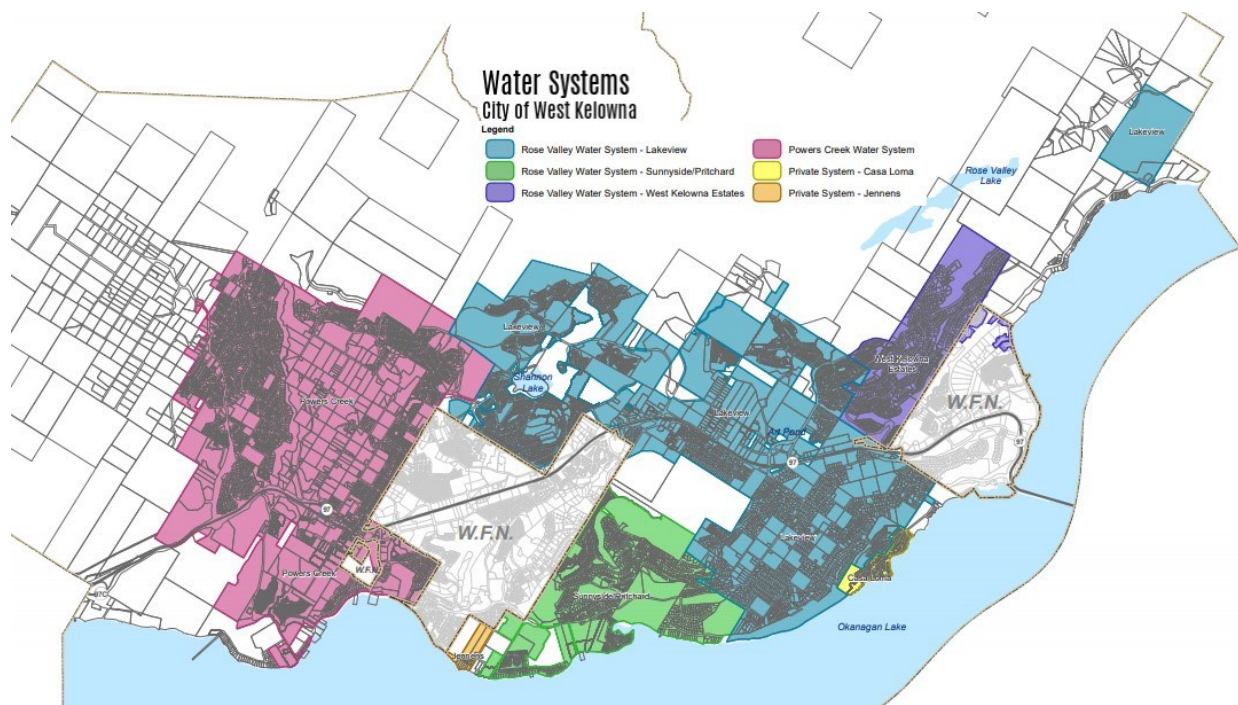
The Lakeview Irrigation District’s original purpose was the provision of water to agricultural customers. The system relies on Lambly Creek for its raw water supply, which is robust and reasonably efficient to operate given that it is gravity-fed from the Big Horn Reservoir and then diverted to the Rose Valley Dam. Upon leaving the dam, the raw water is chlorinated and primarily distributed via gravity to approximately 4,600 domestic customers and 226 ha. of irrigation land.

- Sunnyside/Pritchard Water System, now part of the Rose Valley Water System**

The Sunnyside/Pritchard system is a developer-constructed water system that supplies chlorinated Okanagan Lake water to 1,436 single-family domestic services and 36.4 ha. of irrigation land.
- Westbank Irrigation District, now the Powers Creek Water System**

First constructed as an irrigation supply for agricultural customers, the water system now supplies raw water diverted from Powers Creek, which is then treated at the Powers Creek Water Treatment Plant to be fully compliant with federal and provincial drinking water guidelines. This water system supplies treated water to 4,548 domestic customers and 385 ha. of irrigation land.
- West Kelowna Estates Water System, now part of the Rose Valley Water System**

The water system developed in conjunction with the primarily single-family West Kelowna Estates neighbourhood. The system supplies roughly 1,228 domestic customers with water drawn from Okanagan Lake, which is then chlorinated and predominantly distributed upland through a series of pumps and human-made holding reservoirs.



Map of Water Systems within the City of West Kelowna

One of the challenges within the West Kelowna water systems is that they must meet the needs of two very different customer classifications. Domestic customers require high quality water, while agricultural water requires no water quality treatment. Agricultural water demand is seasonal but accounts for a

significant portion of overall water demand and it drives the peak demand, which sets the capacity requirement for the design of the overall system.

For the supply of water to the domestic customers, the City has developed a plan to meet provincial “Drinking Water Treatment Objectives (Microbiological) for Surface Water Supplies in British Columbia” that is supported by Interior Health. As outlined in the West Kelowna Water Utility Master Plan, the City has moved forward with plans for a new water treatment plant from the Rose Valley source that will supply water to the former West Kelowna Estates, Lakeview, Sunnyside and Pritchard utilities. The City received grant funding of \$41,002,000 from the Government of Canada and the Province of British Columbia’s Clean Water and Wastewater Fund for the construction of the facility.

3 WATER TREATMENT

Existing Water Systems

West Kelowna relies on raw water from Powers Creek, Lambly Creek (which supplies Rose Valley Reservoir) and Okanagan Lake to meet the water demands of the community. These existing sources have successfully supplied the community for many decades, and they have sufficient capacity to continue to be the principle water sources.

West Kelowna is in the process of improving its treatment systems in order to ensure that it is compliant with provincial guidelines to supply potable water to all municipal users by 2023. Currently the Powers Creek Water Service Area is fully compliant with the Drinking Water Treatment Objectives, through the operation of the Powers Creek Water Filtration Plant. The Rose Valley Water Treatment Plant is currently under construction; and, once completed, it will ensure the remaining systems are fully compliant with Drinking Water Treatment Objectives.

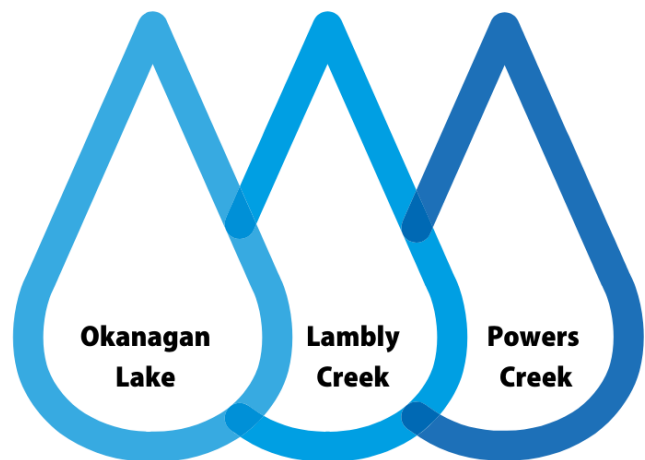


Table 3.1: Existing Treatment Methods for the City

Current Water Supply System	Water Source	Current Treatment
Powers Creek	Powers Creek via the Powers Creek Watershed	Multi-barrier treatment plant that fully meets provincial guidelines
Rose Valley	Rose Valley Reservoir via the Lambly Creek Watershed	Chlorination only of a surface water source that is subject to seasonal turbidity and algae
Rose Valley	Okanagan Lake (Sunnyside/Pritchard)	Chlorination only at lake intake
Rose Valley	Okanagan Lake (West Kelowna Estates)	Chlorination only at lake intake

Currently, Rose Valley water sources do not receive all stages of treatment required to reduce the risks posed from microorganisms such as protozoa, bacteria and viruses. Public health authorities recommend additional treatment for those with chronic health conditions, or in a high-risk group with weaker or compromised immune systems, who receive water from the three Rose Valley service areas, as noted in Table 3.1 above.

People who have a greater chance of getting sick include:

- People with weakened immunity due to chronic disease, transplants, cancer treatment, etc.
- Babies and younger children, including those who are breastfeeding;
- The elderly

For further information, residents should visit the website below and consult with their health care professional to determine if they need to take extra precautions.

<https://www.healthlinkbc.ca/healthlinkbc-files/preventing-water-borne-infection>

Water Quality Regulations and Treated Water Goals

Water suppliers are responsible for delivering safe drinking water that meets the requirements of the Drinking Water Protection Act and the Drinking Water Protection Regulation. The Act outlines general requirements for water suppliers, and the regulation addresses the immediate health risks associated with the potential for pathogens to be present within the water supply. The health authorities' Drinking Water Officers are responsible for providing the oversight to ensure compliance and drinking water safety.

BC Drinking Water Protection Act: Water Quality Requirements

The [Drinking Water Officers’ Guide](#) contains all provincial policies related to drinking water. It was initially released in 2007 to guide drinking water officers and public health engineers in their decision-making process. Part B of the Drinking Water Officers’ Guide contains Drinking Water Treatment Objectives (Microbiological) for Surface Water Supplies in British Columbia. This document provides guidance for water purveyors trying to establish long term goals and the general objectives include the following water quality parameters:

- 4-log reduction or inactivation of viruses.
- 3-log reduction or inactivation of giardia and cryptosporidium.
- Two treatment processes for surface water.
- Less than or equal to (\leq) 1 nephelometric turbidity unit (NTU) of turbidity.
- No detectable E.coli, fecal coliform and total coliform.

These treatment objectives provide a minimum performance target for the production of microbiologically safe drinking water. Depending on specifics to the source water, the actual amount of treatment required will depend on the risks identified; and greater levels of treatment may be required.

Water treatment is only one part of the multi-barrier approach to providing safe drinking water. Choosing an appropriate water source, protecting that source and reducing distribution system risks can be essential complementary steps to providing treatment when dealing with microbiological risks.

Table 3.2: BC Drinking Water Protection Act Water Quality Requirements

Parameter	Units	Long Term Goal
Fecal coliform bacteria	organisms/ 100 mL	No detectable fecal coliform bacteria
<i>Escherichia coli</i>	organisms/ 100 mL	No detectable <i>Escherichia coli</i>
Total coliform bacteria - (a) 1 sample in a 30 day period	organisms/ 100 mL	No detectable total coliform bacteria
Total coliform bacteria - (a) more than 1 sample in a 30 day period	organisms/ 100 mL	<ul style="list-style-type: none"> • At least 90% of samples have no detectable total coliform bacteria • No sample has more than 10 total coliform bacteria

Long Term Water Treatment Goals

West Kelowna is currently in the process of building the Rose Valley Water Treatment Plant that will serve users in the legacy Lakeview, Pritchard/Sunnyside and West Kelowna Estates Systems. In 2018, the City progressed the design of the facility and confirmed the treatment process through pilot testing. The treatment facility is located at the end of Rosewood Drive. In March 2019, the City of West Kelowna confirmed purchase of a 9.7-hectare portion of 2010 Bartley Road, at a cost of \$915,000. Civil construction of preparing the earthworks for the facility began in early 2020. The plant is expected to be commissioned in 2023. Once the facility is commissioned, West Kelowna will interconnect the two remaining lake sourced areas; see Table 3.3. The plant will meet the objectives identified in Section 4 of the Drinking Water Treatment Objectives (Microbiological) for Surface Water Supplies in BC.

Table 3.3: West Kelowna Water System Infrastructure Upgrades

Infrastructure Upgrade	Year
Rose Valley Water Treatment Plant	Commissioning 2023
West Kelowna Estates Transmission Main	2023
Sunnyside Transmission Main	2023
Connect Sunnyside and Pritchard	Completed 2018

Powers Creek Source Water Quality

The Powers Creek Water Treatment Plant was commissioned in 2007, providing residents with treated water from a source that had produced turbidity and colour challenges at times throughout the year. The treatment plant employs In-Filter Dissolved Air Flotation (DAF) and ultra violet and chlorine disinfection to produce safe, clean drinking water that meets or exceeds the federal and provincial water quality guidelines and standards.

Powers Creek is an upland water supply that frequently demonstrates contamination with pathogenic bacteria (such as coliforms) and protozoa (such as giardia). Bacterial contamination is generally more pronounced in summer, when warm temperatures accelerate growth. Risk from giardia and cryptosporidium contamination are typically highest during freshet and heavy rains, when runoff carries topsoil containing fecal matter into the creek. Raw water turbidity is also at its highest during these times, with averages of up to 3.0 NTU in April, and a peak exceeding 20.0 NTU.



Inside view of Powers Creek Water Treatment Plant

In April, Raw water's true colour reaches a peak of 80 – 90 TCU (True Colour Units), significantly above the Canadian Federal aesthetic guideline of 15 TCU. True colour is a significant concern with respect to palatability, since water in the creek has a tea-like appearance during freshet. Perhaps more importantly however, true colour is an indicator that naturally occurring organic compounds are present in the water and react with chlorine disinfectant to produce by-products such as the family of trihalomethanes (THM), linked to possible long-term health effects in humans. Trihalomethanes have been documented to reach as high as 160 ug/L in parts of the Powers Creek system in the spring, significantly in excess of the Canadian Federal Maximum Acceptable Concentration of 100 ug/L. Since the commissioning of the treatment plant, the true colour of the treated water is less than 15 TCU and 50ug/L THM, and the disinfection by-products are compliant with the Canadian guidelines.

The existing Powers Creek plant functions well, reliably treats water to meet the provincial guidelines and is suited to achieve long-term treatment and quality goals.

Rose Valley Lake Source Water Quality

The Water Utility Master Plan recommended a treatment facility for the Lambly Creek source near the outlet of the Rose Valley Reservoir. Currently, the City is constructing the treatment plant with the intent to commission the facility in 2023. The watershed that supplies Lambly Creek has similar characteristics and raw water quality to the Powers Creek watershed; therefore, the new Rose Valley facility will also use Dissolved Air Flotation and Granular Media Filtration methods similar to those utilized by the Powers Creek Water Treatment Plant.



The following are water quality parameters that are important for existing and future treatment of the Rose Valley source:

- **Turbidity:** While this in itself poses no known direct health concern, there is the potential for the physical masking of pathogens by turbidity particles, thereby reducing the effectiveness of disinfection. For the Rose Valley Reservoir, turbidity is typically in the order of 2.0 NTU. Excursions occasionally reach 10 NTU due to storms or seasonal turn-over events. The treatment facility will ensure water entering the distribution system remains below 1.0 NTU.
- **Protozoa (giardia & cryptosporidium):** Both of these chlorine-tolerant organisms have shown themselves to be present in watersheds throughout British Columbia. This means that all surface water sources should be treated to provide 3-log inactivation/removal of giardia and cryptosporidium. Past testing supports that these parasites are present in Lambly Creek and the Rose Valley Reservoir, but at low concentrations, meaning that a 3-log inactivation/removal target is acceptable.
- **Algae:** In most cases, algae do not pose a direct health threat; however, certain types of algae, particularly blue-green, may metabolize toxins. Algae can also create taste and odour problems and can clog filters in water treatment plants, presenting significant operational challenges. Historically, algae blooms occur in summer, in the Rose Valley Reservoir. In the past, algae blooms were managed by adding a copper-based compound. This practice is no longer considered acceptable, meaning that the new treatment process will remove more algae with a clarifier prior to filtration.
- **Nitrates:** Nitrates are naturally occurring ions within the environment and are widely used as inorganic fertilizers, and are also known as nutrients that support algae growth. There are links

between nitrates and elevated occurrences of gastric cancer, making prolonged exposure to elevated levels of nitrates undesirable. This contaminate has not historically been a concern, but this parameter should continue to be monitored given the activity within the watershed. An additional consideration is the potential health risk to newborn infants less than three months old. Overexposure to nitrates can result in Methaemoglobinaemia or “blue baby syndrome”.

- **True Colour and Natural Organic Matter:** This is first and foremost an aesthetic concern, as it impacts the visual appeal of the water. However, if the colour has been imparted by the presence of naturally occurring organic acids, including the families of humic and fulvic acids, there is an increased potential for the formation of chlorinated disinfection by-products (DBP’s), such as trihalomethanes or haloacetic acids. The organic acids are not known to pose direct health effects in drinking water. The levels of organic matter within the Rose Valley Reservoir could be categorized as moderate to high, resulting in the need for treatment to reduce this contaminate from the process flow.
- **Disinfection By-Products (DBP’s):** DBP’s are the by-products of the reaction of chlorine with organic substances, and in many cases have been linked to health effects such as cancer in humans. It is common for surface water to contain natural humic and fulvic acids released into the water through the decay of natural organic materials such as leaves, and other plant matter in the watershed. The new treatment process will lower the interaction between chlorine and organic matter in turn lowering the DBP’s.



Okanagan Lake Source Water Quality

Okanagan Lake is the largest surface water source in the valley. Currently water is drawn from Okanagan Lake at the Sunnyside and West Kelowna Estates pump stations. These facilities use a single form of treatment – chlorine disinfection. Chlorine disinfection alone is not effective against protozoa. The quality of water entering a raw water intake from a surface water source is largely a function of its depth and location in relation to potential sources of contamination. A submerged lake intake can be subject to contamination from a multitude of sources, some of which include: tributary streams, seasonal lake turnover events, surface contamination (i.e. spills), wastewater treatment outfalls, and the lake hydraulics (such as seiches).



In 2018, in order to improve water quality for the residents receiving water from the Pritchard source, West Kelowna interconnected the former Pritchard utility into the Sunnyside source. This improved water quality because the Sunnyside source receives higher quality water from Okanagan Lake due to its deeper, farther-reaching intake. Once the Rose Valley Water Treatment Plant is commissioned, the focus will be on connecting the two lake-supplied water service areas to the Rose Valley Water Service within the year. After the projects are completed, the Water Utility Master Plan advises upgrading storage capacity throughout all systems and replacing older water mains.

4 WATER QUALITY MONITORING

The West Kelowna Water Quality Monitoring Program referenced the following legislation, regulations and guidelines to develop a Reporting and Monitoring Plan.

1. Guidelines for Canadian Drinking Water Quality (GCDWQ)
2. British Columbia Drinking Water Protection Act and Regulation (DWPA and DWPR)
3. British Columbia Approved Water Quality Guidelines (Criteria)
4. Drinking Water Treatment Objectives for Surface Water in BC
5. Decision Tree for Responding to Turbidity Event in Unfiltered Drinking Water

Based on the references above, the City strives to meet the following baseline objectives for water quality:

Table 4.1: City of West Kelowna Water Quality Objectives

City of West Kelowna Water Quality Objectives (WQO)	
FIELD - WQO	
Free Chlorine Residual (FCR) levels greater than or equal to 0.2 mg/L before collecting bacteriological sample	
Turbidity must not exceed 1.0 NTU before collecting bacteriological sample	
BACTERIOLOGICAL - WQO	
< 1 Total Coliform / 100ml	
< 1 E.coli / 100ml	
< 200 Background Colonies / 100ml	

Source and distribution water quality monitoring are performed as per the City of West Kelowna's Drinking Water Quality Monitoring Program. Samples are collected daily, weekly, quarterly and yearly as per the defined schedule for each of the treated water sources and from dedicated sample stations installed at various locations throughout the networks. In addition, the City continuously monitors the water quality at the treatment facilities using online analyzers that provide alarms to alert operations staff in the event a Water Quality Objective is not achieved. Pending the conditions, the City will institute the appropriate corrective action in accordance with the Emergency Response and Contingency Plan. Monthly reports are provided to Interior Health summarizing the data, system improvements and corrective action events from each of the water systems.

In addition to sampling throughout the system, West Kelowna hires a qualified professional contractor to conduct a yearly review, with ongoing testing in the Lambly and Powers Creek watersheds, to ensure the source water entering the treatment facilities is within acceptable parameters. The professional biologists complete these yearly reports, which are a valuable tool to ensure the watersheds provide high quality source water.

Reference Documents

- Rose Valley Water Treatment Plant:
 - www.westkelownacity.ca/rvwtp
- Water Utility Master Plan
 - westkelownacity.ca/en/City-Hall/resources/Documents/Water-Utility-Master-Plan.pdf
- Water Conservation Plan
 - westkelownacity.ca/en/city-hall/resources/Documents/Water-Conservation-Plan.pdf

Water Quality Advisories and Incidents

Water Quality Notifications: National and provincial regulations require water purveyors to consult with public health or regulatory authorities and issue alerts or notifications whenever consumers need to know about actions they should take to protect themselves, in cases where real or potential risks arise related to drinking water. Notifications are generally precautionary, and issued before drinking water quality problems occur. The most common advisories, in order of frequency, are Water Quality Advisories, Boil Water Notices, Do Not Consume Orders and Do Not Use Orders. Learn more about these notification types at: drinkingwaterforeveryone.ca/files/Interior_Health_Water_Advisory_Signs_March_28_2018.pdf

Reactive Events (Incidents): Reactive events are unanticipated incidents that disturb water quality. These water quality events require that flushing or repairs be made to the distribution system. Some examples are main breaks and leaks, damage during construction, fire hydrant use causing turbidity, or any other time that water quality objectives are not met.

Table 4.1: West Kelowna Water Source Events

Water Source	# of Water Quality Advisories	# of Reactive Events
Powers Creek	2	42
Rose Valley (Reservoir)	6	29
West Kelowna Estates (Okanagan Lake)	1	6
Sunnyside Pritchard (Okanagan Lake)	1	4

Frequently Asked Questions about Water Quality

How does West Kelowna treat drinking water?

- Lakeview-Rose Valley, Sunnyside and West Kelowna Estates Water Service Areas use only chlorine for disinfection.
- The Powers Creek Water Service Area uses a multi-barrier plant that fully meets provincial guidelines.
- Find more detailed information on Pages 4 and 5 of this report.

Does West Kelowna add fluoride to the water?

No, the City of West Kelowna does not add fluoride to the water.

What is the pH of West Kelowna’s Water?

The pH of West Kelowna’s water usually ranges from 7.5 - 8.5.

How can I reduce possible exposure to lead from household plumbing?

To the best of our knowledge, the City of West Kelowna does not have lead pipes for water mains and service connections. Items on private property that may contain lead include:

- Lead solder used to join copper pipes (prior to 1986).
- Brass fittings on faucets.

A few simple things one can do to reduce exposure to lead in the drinking water include:

- Run the tap until it is cold before drinking or cooking with water from that tap.
- Replace brass fittings.
- Inspect the aerators on screens at the tap monthly and remove any debris.
- Install a water filter on the tap that is certified to the NSF International standard for removal of lead.

What causes my water to become discoloured?

Sediment and organic matter from the source water can cause discolouration. It can also happen within the distribution system if a fire hydrant is flushed, a water main break occurs or a plumbing issue arises at your home such as with your filter, softener or hot water tank.

5 ROUTINE MAINTENANCE PROGRAM

The City of West Kelowna has a highly qualified team of operators who oversee a robust maintenance program for our pump stations, lake intakes, reservoirs and distribution system.

Table 5.1 Number of utility staff that hold certifications

Level of Certification	Water Distribution	Water Treatment
Operator in Training	1	0
Level 1	4	6
Level 2	8	7
Level 3	4	3
Level 4	3	1
Total	20	17

**NOTE: The City of West Kelowna has 23 total certified operators; however, of those, 13 hold multiple certificates.



Distribution

- Water mains are flushed using a unidirectional procedure
- Fire hydrants are completely disassembled and inspected on a two-year rotation
- Painting and weed control are completed around the hydrants as needed
- Irrigation backflow prevention devices are tested and repaired when required

Reservoirs

- Daily/weekly/monthly security checks of tanks and compounds are completed
- Monthly reservoir water quality testing is conducted
- Human-made reservoirs are cleaned on an annual rotation basis

Lake Intakes

- Annual winter maintenance of chlorination system is completed while offline
- Y-Strainers are flushed weekly or monthly as needed
- Daily checks of pump flows, water quality and free chlorine levels are performed
- Online analyzers are calibrated weekly

Pump Station

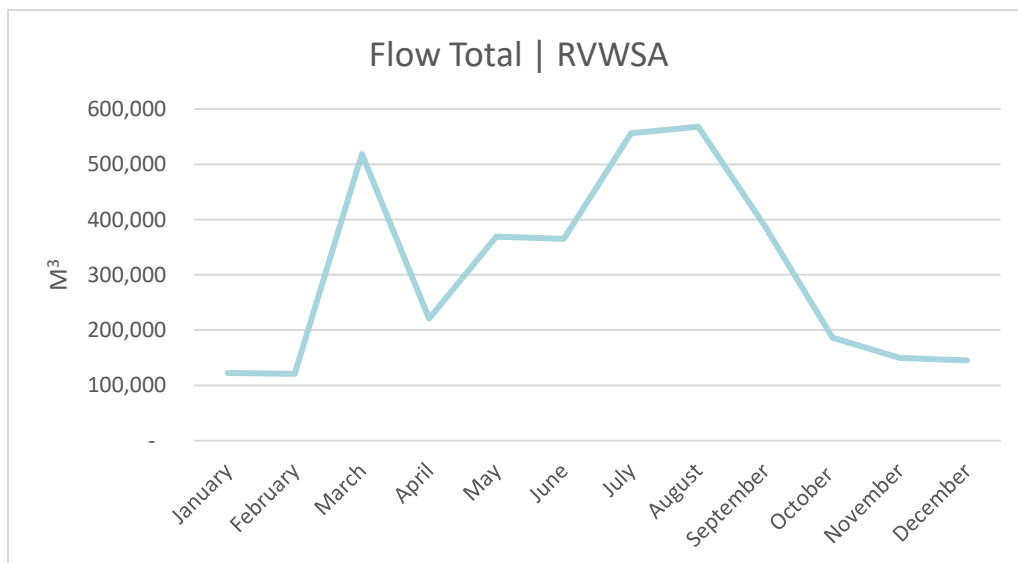
- Pumps and chlorination system are checked daily
- Check valves and control valves are inspected daily
- Security checks are performed at all compounds
- Back-up generator run testing is done weekly
- Generator load testing and maintenance are completed monthly

APPENDIX A

Lakeview-Rose Valley Distribution Flows and Test Results Summary

2020 Water Quality Test Results

	Flow Total	Turbidity	Avg Chlorine Residual (mg/L)		Total Bacteriological Samples Taken
			600mm	750mm	
	m ³	Avg (NTU)			
January	122,276	0.38	n/a	2.92	12
February	120,877	0.40	n/a	2.92	12
March	518,571	0.85	n/a	3.00	13
April	221,215	0.80	1.45	3.01	18
May	369,171	0.86	2.67	2.72	20
June	364,976	0.77	2.37	2.31	24
July	556,344	0.83	3.09	2.93	16
August	568,061	0.91	2.76	2.70	20
September	386,372	1.80	2.81	2.86	24
October	185,979	0.98	2.96	2.85	17
November	149,515	0.46	3.30	3.55	17
December	145,383	0.33	3.19	n/a	12
2020 Total	3,708,740				205

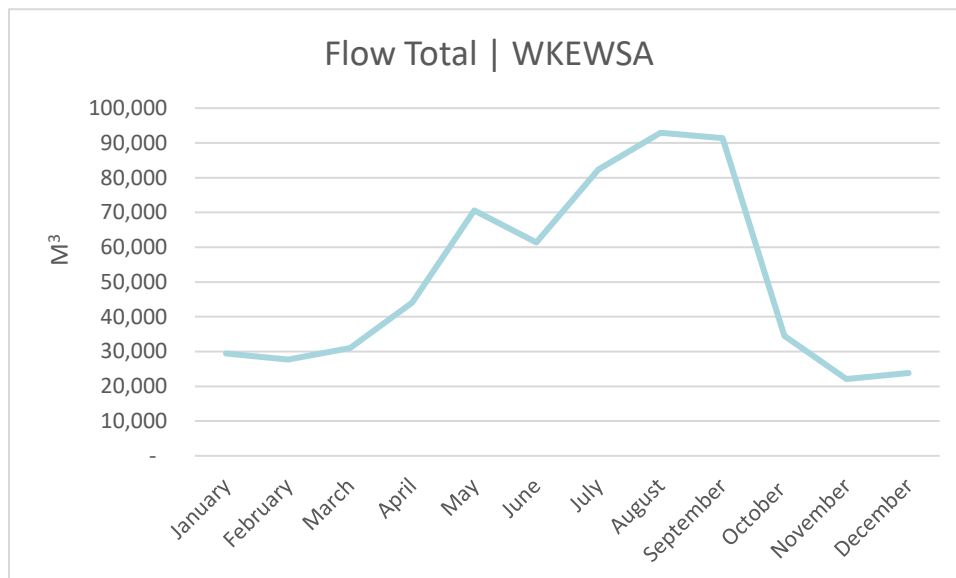


APPENDIX B

West Kelowna Estates Distribution Flows and Test Results Summary

2020 Water Quality Test Results

	Flow Total	Turbidity	Avg Chlorine Residual	Total Bacteriological Samples Taken
	m ³	Avg (NTU)	(mg/L)	
January	29,422	0.24	1.91	12
February	27,701	0.29	1.92	12
March	31,027	0.33	1.97	15
April	44,108	0.43	1.88	12
May	70,539	0.92	1.98	12
June	61,381	1.15	1.94	15
July	82,325	0.79	1.83	15
August	92,914	0.78	1.83	15
September	71,374	0.48	1.92	12
October	34,458	0.43	1.86	12
November	22,087	0.40	1.92	15
December	23,823	0.51	2.06	12
2020 Total	611,159			159

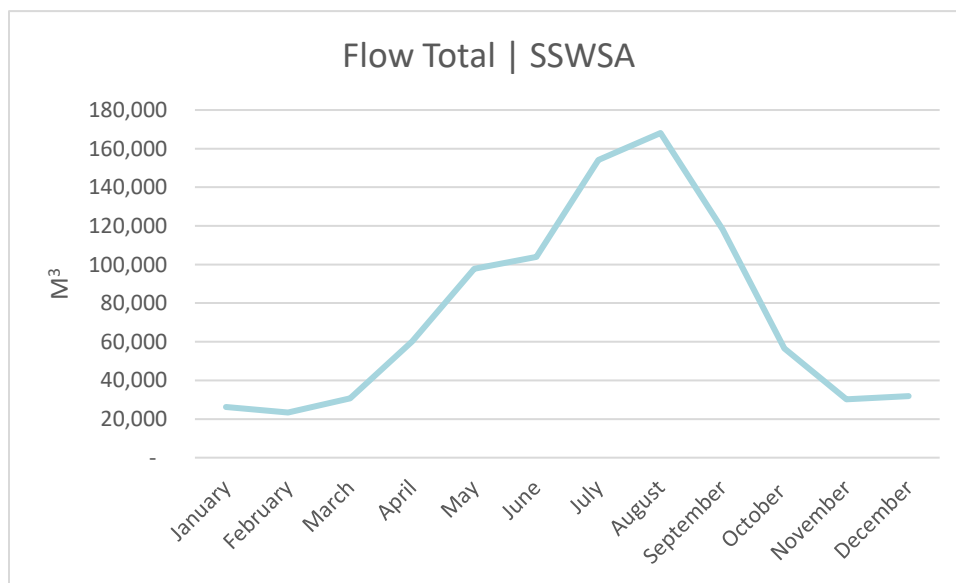


APPENDIX C

Sunnyside/Pritchard Distribution Flows and Test Results Summary

2020 Water Quality Test Results

	Flow Total	Turbidity	Avg Chlorine Residual	Total Bacteriological Samples Taken
	m ³	Avg (NTU)	(mg/L)	
January	26,176	0.30	1.99	12
February	23,375	0.39	1.96	12
March	30,750	0.39	2.14	16
April	60,129	0.56	1.92	12
May	97,774	1.00	1.77	12
June	103,924	2.60	1.71	15
July	154,131	0.99	1.62	12
August	168,087	0.95	1.65	16
September	118,135	0.85	1.87	12
October	56,487	0.49	1.74	12
November	30,172	0.39	1.98	15
December	31,871	0.40	2.03	13
2020 Total	901,011			159

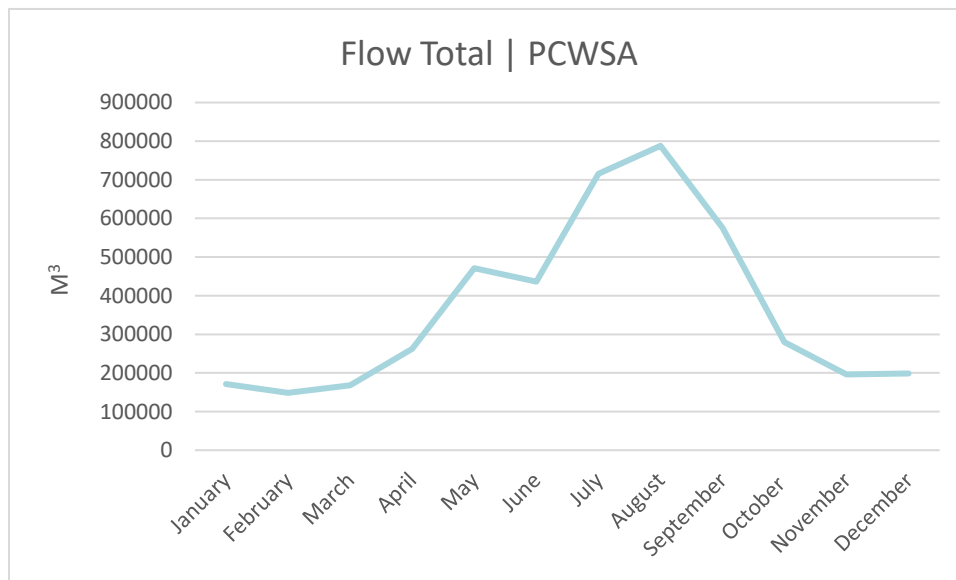


APPENDIX D

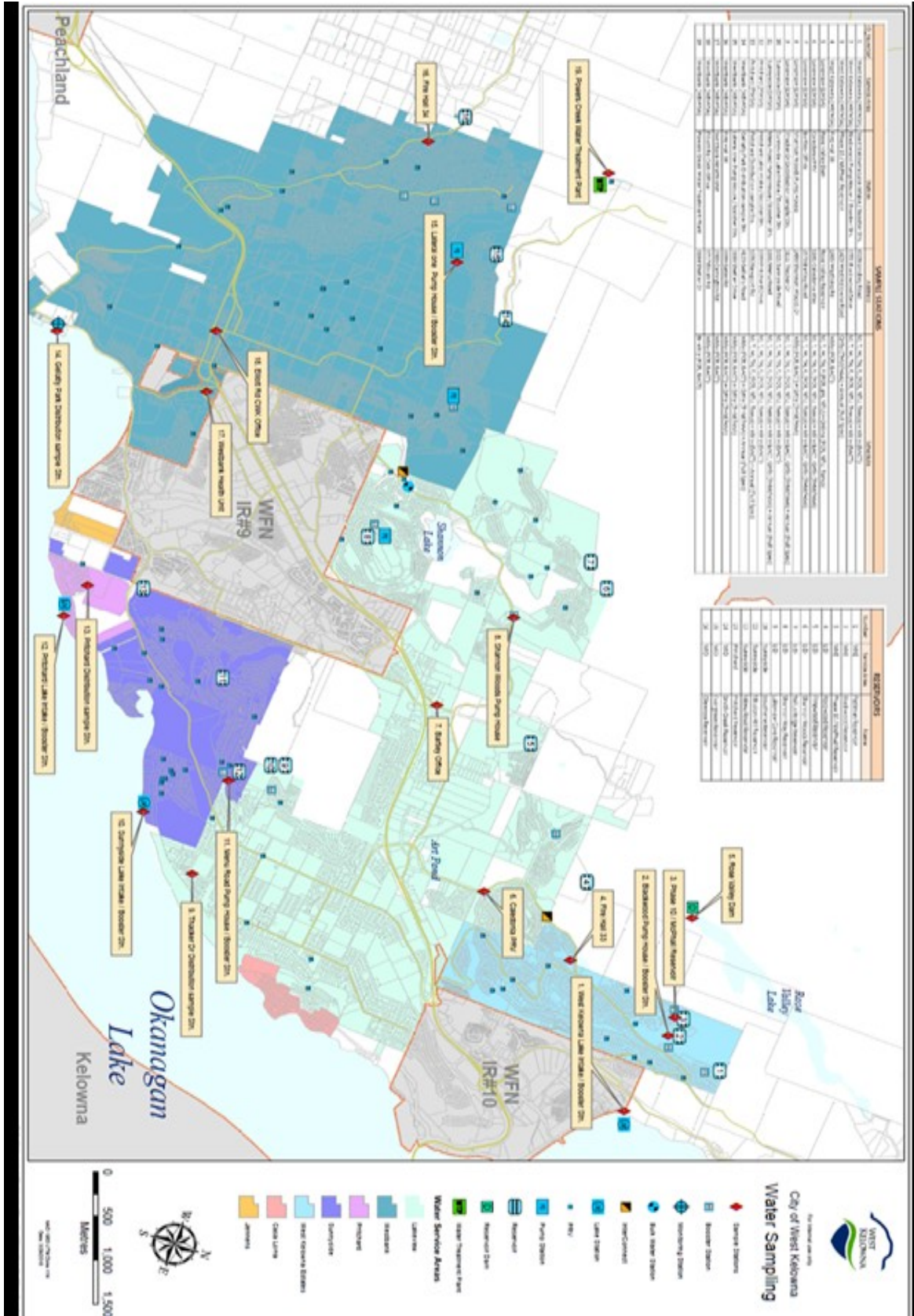
Powers Creek Distribution Flows and Test Results Summary

2020 Water Quality Test Results

	Flow Total	Raw Water Turbidity	Finished Water Turbidity	Avg Chlorine Residual	Total Bacteriological Samples Taken
	m ³	Avg (NTU)	Avg (NTU)	(mg/L)	
January	171,700	0.71	0.01	0.77	20
February	148,480	1.01	0.03	0.73	19
March	168,240	1.34	0.04	0.70	32
April	262,440	4.93	0.04	0.74	19
May	471,497	3.43	0.03	0.86	20
June	436,124	1.20	0.04	1.09	24
July	715,879	0.83	0.04	1.12	20
August	787,962	0.42	0.04	0.94	25
September	575,941	0.42	0.04	0.94	20
October	279,741	0.36	0.03	0.85	20
November	195,928	0.45	0.04	0.89	25
December	198,971	0.80	0.03	0.86	22
2020 Total	4,412,903				266



Appendix E –Water Sampling Locations



Appendix F –Water Quality Definitions

Refer to the Guideline for Canada Drinking Water Quality for additional information.

Alkalinity: Refers to the capability of water to resist changing pH when an acid is added. Water is said to be low in alkalinity when it is not able to neutralize acids well.

Aesthetic Objective (AO): Consumers will take into account esthetic effects such as colour, odour and taste in determining whether they consider water drinkable.

Boil Water Notification (BWN): A public utility, such as the City of West Kelowna, will issue a notice as a preventative measure when the microbiological quality of drinking water is suspected or confirmed to be compromised, meaning disease-causing microorganisms, such as bacteria, viruses or parasites, could be in the drinking water.

Escherichia coli (E. coli): Used as an indicator of the microbiological safety of drinking water.

Chemical or Physical Parameters: Affect multiple aspects of water quality including human health, aesthetic considerations and operational considerations. Health Canada provides guidelines for chemical and physical parameters.

Disinfection By-Products (DBP): A chemical compound formed by the reaction of a water disinfectant (e.g. chlorine) with a precursor (e.g. natural organic matter) in a water supply.

Drinking Water Advisory: Drinking water advisories are public health protection messages, which a public health or regulatory authority issues to inform consumers about actions they should take to protect themselves from real or potential health risks related to their drinking water supply. Advisories are generally precautionary, meaning they are typically issued before drinking water quality problems happen, and can take four forms in order of lowest to highest severity: Water Quality Advisory, Boil Water Notice, Do Not Consume Order and Do Not Use Order.

Drinking Water Officer (DWO): A person employed by a Public Health Authority, such as Interior Health, who has significant authority to require individuals and purveyors, such as the City of West Kelowna, to undertake action to remove a threat to drinking water quality. Such authority is granted per the Drinking Water Protection Regulation (B.C. Reg. 200/2003) and the Drinking Water Protection Act.

Water System Emergency Response and Contingency Plan (ERCP): The City of West Kelowna has prepared a Water System Emergency Response Plan for its drinking water system, as required under Section 13 of the Drinking Water Protection Regulation (B.C. Reg. 200/2003). The Water System ERCP summarizes possible emergencies and the person's role in responding to them.

Free Chlorine Residuals (FCR): Free chlorine is defined as the concentration of residual chlorine in water present as dissolved gas (Cl_2), hypochlorous acid (HOCl), and/or hypochlorite ion (OCl^-). A test kit which measures free chlorine will indicate the combined concentrations of HOCl , OCl^- , and Cl_2 .

Haloacetic Acids (HAA): A type of chlorination disinfection by-product (CDBP) formed when the chlorine used to disinfect drinking water reacts with naturally occurring organic matter (NOM) in water. Haloacetic acids are a relatively new disinfection by-product.

Hardness: Naturally occurring (sedimentary rock erosion and seepage, runoff from soils); levels generally higher in groundwater. Although hardness may have significant aesthetic effects, a guideline has not been established because public acceptance of hardness may vary considerably according to the local conditions; major contributors to hardness -- calcium and magnesium -- are not of direct public health concern.

Maximum Allowable Concentrations (MAC): Water in nature contains impurities, some of which may pose a health risk when ingested. To address this risk, Health Canada works with the provincial and territorial governments to develop guidelines that set out the maximum acceptable concentrations of these substances in drinking water. These drinking water guidelines are designed to protect the health of the most vulnerable members of society, such as children and the elderly and those with weakened immunity. The guidelines set out the basic parameters that every water system should strive to achieve in order to provide the cleanest, safest and most reliable drinking water possible.

Microbiological contaminants: Contaminants such as bacteria, protozoa and viruses naturally occurring in water, soil and vegetation or entering raw water sources from human and animal feces, that pose health risks to end users of public water supply and distribution systems.

pH: A measure of hydrogen ion concentration; a measure of the acidity or alkalinity of a solution. Aqueous solutions at 25 degrees Celsius with a pH less than seven are acidic, while those with a pH greater than seven are basic or alkaline. A pH of seven is neutral.

Sodium Hypochlorite solution: A liquid chlorine product used for disinfection of drinking water. Molecular formula is Na_2OCl .

Total Chlorine Residual (TCR): Remaining chlorine concentration after chlorine demand of water.

Total coliforms: Total coliforms should be monitored in the distribution system because they are used to indicate changes in water quality.

Trihalomethanes (THMs): A type of chlorination disinfection by-product (CDBP) that is formed when the chlorine used to disinfect drinking water reacts with organic and non-organic matter.

Turbidity: Naturally occurring organic (decomposed plant and animal debris, microorganisms) and inorganic (clays, silts, metal precipitates) particles that reduce water quality by harbouring microorganisms and protecting them from disinfection, and entrapping heavy metals and biocides. The units of turbidity are called Nephelometric Turbidity Units (NTU), which refers to the instrument used to measure turbidity (a calibrated nephelometer).

LSI: The Langelier Index is one of several tools used by water operators for stabilizing water to control both internal corrosion and the deposition of scale. Water supply operators can optimize their water supply systems and identify leakage potentials with the Langelier Index. Leakage is a common problem in Newfoundland and Labrador due to the acidic nature of provincial natural waters.