

2023



ANNUAL WATER REPORT

City of Parksville
Operations

1116 Herring Gull Way

Phone: 250 248-5412

Table of Contents

INTRODUCTION	3
PARKSVILLE WATER SYSTEM	3
Arrowsmith Dam.....	5
Englishman River Water Service	7
ERWS Intake and Water Treatment Plant	7
Ultrafiltration Membranes	8
Geobags	9
Groundwater Wells	10
Water Production	11
Water Distribution System.....	12
Reservoirs.....	12
Distribution System Underground Infrastructure	13
Pressure Zones.....	15
Supervisory Control and Data Acquisition (SCADA) System	16
WATER QUALITY TESTING AND REPORTING	17
Sampling and Testing.....	17
Bacteriological.....	17
Full Spectrum Analysis.....	18
Trihalomethane and Haloacetic acids Analyses	18
Cryptosporidium and Giardia	18
COMPLAINTS AND INCIDENTS.....	19
ROUTINE MAINTENANCE PROGRAM.....	20
Distribution.....	20
Wells	20
Old River Intake	20
Reservoirs	20
Pump Stations	20
Water treatment Plant	21
Raw Water Pump Station.....	21
Strainers and Coagulant (pretreatment system)	22
Membrane System	22
Disinfection System	22
Finished Water System	22

Chemical and Auxiliary Systems	22
Mechanical and Electrical Equipment.....	22
PROGRAMS	23
Cross Connection Control Program	23
Emergency Response Program (ERP)	23
Watershed Protection Program	24
PROJECTS AND IMPROVEMENTS.....	25
2023 Operations Projects and Improvements.....	25
2024 Planned Operations Projects and Improvements	25
FREQUENTLY ASKED QUESTIONS.....	27
Water Pressure	27
Water Leaks.....	28
Watermain Flushing.....	28
Water Quality.....	28
Appendix A - Water Source and Sampling Map	i
Appendix B - Dam Lake Levels	ii
Appendix C - Bacteriological Results	iii
Appendix D.1 - Distribution System Trihalomethanes (THMs) & Haloacetic Acid (HAA).....	viii
Appendix D.2 - WTP Trihalomethanes (THMs) & Haloacetic Acid (HAA)	ix
Appendix E - Full Spectrum Report	x
Appendix F - Water System Operating Condition	xxxi

INTRODUCTION

The Annual Water Report is a summary of the City's ongoing efforts to achieve excellence through continued responsible operation, monitoring, evaluation, and management of its water system. The intent is to evaluate the previous year's progress to help determine how to meet current and future needs for water in the community.

Parksville consistently meets the necessary sustainable delivery of safe, adequate, secure, reliable, and aesthetically pleasing potable water. This report provides information on water source, water test results, maintenance programs, and improvements to the water system. It also helps increase public awareness of water systems and services and enables the community to provide educated input on the direction and focus of future initiatives. With understanding and support from the community, the City can work towards its objectives of enhanced water quality and operational efficiency.

The City is regulated by Island Health for its activities as a potable water supplier. The City must meet the requirements set out in the *BC Drinking Water Protection Act and Regulation*, and *Canadian Drinking Water Guidelines* to maintain its operating permit and manage the community's drinking water system. This report has been submitted to Island Health and is available on the City of Parksville [website](#).

PARKSVILLE WATER SYSTEM

The City of Parksville has roughly 4,250 water connections serving over 13,650 permanent residents as well as supplying water to the Regional District of Nanaimo (Nanoose Bay Peninsula system). The City has four reservoirs, one at the southeast end near Top Bridge Park and three at Springwood Station on the southwest end of the City.



Roughly 4,250
water connections



Four reservoirs



Englishman River
as main source of
water



Sixteen wells

The City operations targets consist of:

- Carrying out deactivation of micro-organisms and viruses through disinfection process
- Meeting or exceeding the Canadian Drinking Water Quality Guidelines
- Having a minimum 0.20 mg/L free chlorine and no positive bacteria results in the distribution system

The City gets water from the following sources:

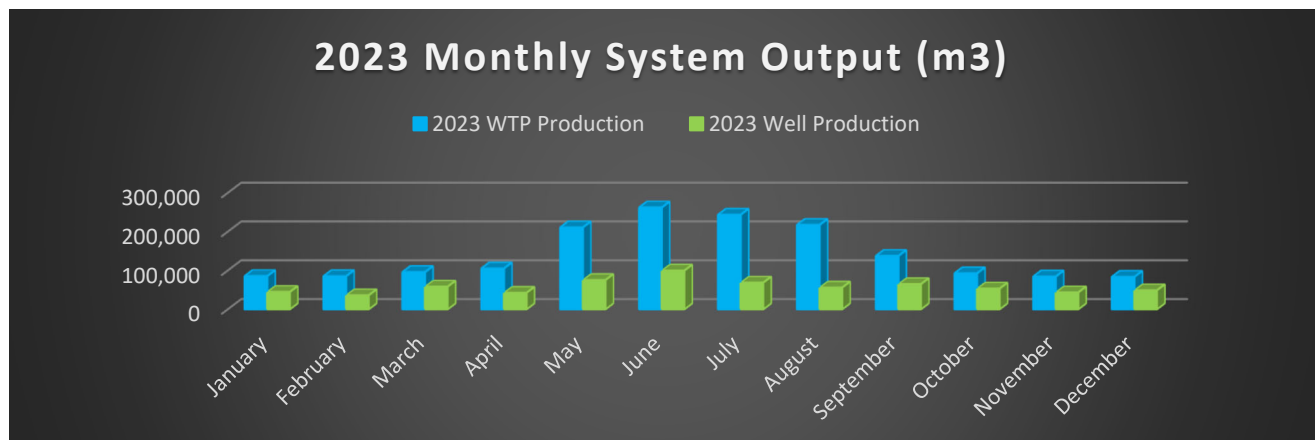
- Arrowsmith Dam through the Englishman River
- Well fields (Springwood and Railway well fields)

The water from the Englishman River goes through the Englishman River Water Treatment Plant, which can produce up to 16 megaliters per day (ML/d) by way of intake screens, sand separators, coagulation, fine strainers, primary and secondary ultrafiltration (UF) membranes, ultraviolet (UV) disinfection and chlorination. The plant focuses on addressing biological contaminants such as bacteria, *Cryptosporidium*, *Giardia*, and viruses.

The water treatment plant meets the 4-3-2-1-0 drinking water objective. Water suppliers are required to reach the goal of:

- 4 log inactivation of viruses
- 3 log removal or inactivation of *Giardia* and *Cryptosporidium*
- 2 treatment processes for all surface drinking water systems
- 1 NTU of turbidity or less, with a target of 0.1 NTU
- 0 total and fecal coliforms and *E.coli*.

Well water is disinfected with liquid chlorine before being pumped to the reservoirs where it is mixed with the treated water from the treatment plant. It is then distributed through the water distribution system.



Arrowsmith Dam

The City of Parksville, the Regional District of Nanaimo, and the Town of Qualicum Beach are partners in the Arrowsmith Water Service (AWS). The concrete gravity dam is located at Arrowsmith Lake, about nineteen kilometres (19 km) south of Parksville and commissioned in 2000. The dam has a capacity of 9,000,000 m³ and is operated and maintained by the City of Parksville utilities staff. Water is released to the Englishman River through two pipes, 900 mm and 600 mm in diameter. Flow and lake levels are monitored regularly by staff through the Supervisory Control and Data Acquisition (SCADA) system.

Appendix B shows the Arrowsmith Dam Lake levels. Ministry of Forests, and the Arrowsmith Water Service (AWS) may consider changes to the provisional operating rule, due to Climate Change related events, to conserve reservoir storage water for critical fisheries rearing periods at the end of the rearing season. A minimum flow is released into the river based on this curve between June and October.



At the beginning of the summer of 2023 through to fall, weather conditions were abnormal, with Vancouver Island reaching a level of extreme drought. The reservoir level was at lower levels than normal conditions due to the lack of precipitation and snowfall. The dam did not spill naturally, which was the second time this has happen since records started in 2003. 2009 was the first year the dam did not spill. Water was released into the river starting on May 25, 2023 (earlier than normal operation), and staff closed the Dam on October 12, 2023.

The lack of snowpack and rainfall caused the river flows to be below normal levels. Stage 4 water restriction was put in place on July 5, 2023, which is the earliest that stage 4 was ever put in place in Parksville.

As shown below on table 1, the baseflow maximum and average for June, July, August, and September 2023, were substantially lower than the historical baseflow. Staff was in constant contact with the province as the drought was affecting regular operations. On June 20, an order under the Water Sustainability Act was issued to authorize a reduction in flow at the Englishman River hydrometric gauge 08HB002. On September 6, due to the continuation of persistent drought conditions, and limited supplies, another reduction was issued allowing 3 more reductions (see table 2). The order to reduce the dam release rate was done to prolong the availability of water to maintain the fish habitat.

Table 1. Minimum, maximum and average baseflow for Englishman River (hydrometric gauge 08HB002)

	June	July	August	September	October
Historical Baseflow 2009-2022	0.6 m ³ /s	0.1 m ³ /s	0.0 m ³ /s	0.0 m ³ /s	0.0 m ³ /s
Minimum	25.5 m ³ /s	9.2 m ³ /s	3.8 m ³ /s	79.3 m ³ /s	99.1 m ³ /s
Maximum	5.2 m ³ /s	1.8 m ³ /s	0.6 m ³ /s	2.1 m ³ /s	8.8m ³ /s
Average					
2023 Baseflow	0.6 m ³ /s	0.1 m ³ /s	0.0 m ³ /s	0.0 m ³ /s	0.6 m ³ /s
Minimum	2.3 m ³ /s	0.6 m ³ /s	0.3 m ³ /s	3.4 m ³ /s	54.0 m ³ /s
Maximum					
Average	1.3 m ³ /s	0.3 m ³ /s	0.1 m ³ /s	0.5 m ³ /s	7.5 m ³ /s

Table 2. Order issued target flow at hydrometric gauge 08HB002

Start Date (2023)	Target flow at hydrometric gauge 08HB002
June 20	1.0 m ³ /s
September 8	0.8 m ³ /s
September 25	0.7 m ³ /s
October 17	0.6 m ³ /s

Englishman River Water Service

The Englishman River Water Service (ERWS) is a joint venture between the City of Parksville and the Regional District of Nanaimo, formed to secure water supply from the Englishman River. This regional partnership supplements existing well supply sources owned and operated by the City of Parksville and Nanoose Bay Peninsula Water Service Area. The percentages of interest are City of Parksville 74%, and Regional District of Nanaimo 26%.

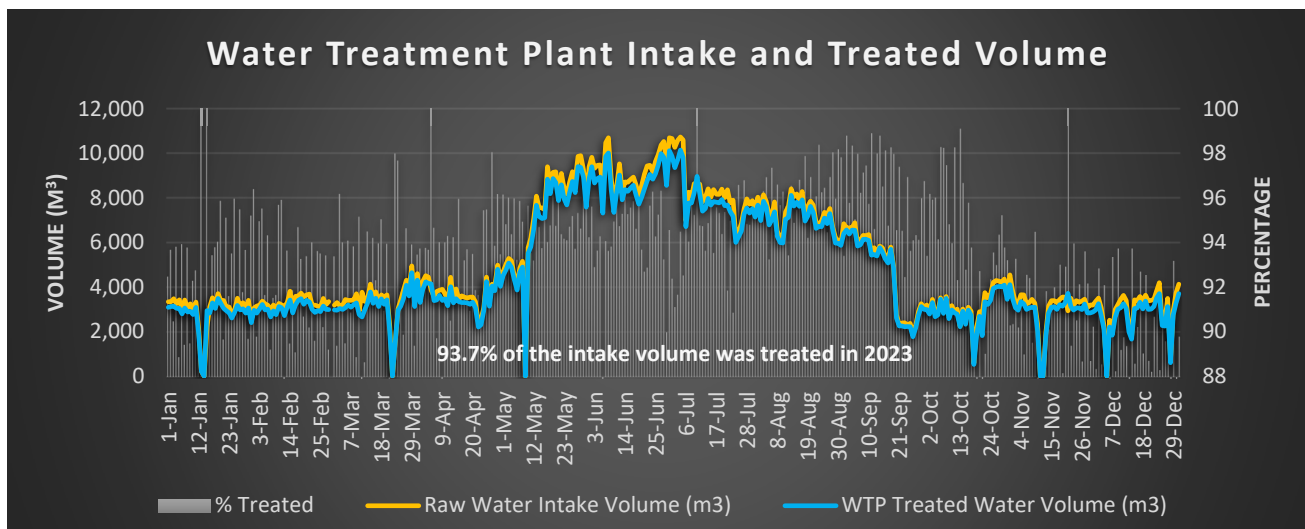
ERWS Intake and Water Treatment Plant

In 2023, the Englishman River Water Treatment Plant produced 1,704,290 m³ of water, in which 1,249,913 m³ was distributed to the City of Parksville while the remaining 454,377 m³ was supplied to the RDN.

The water treatment plant was designed with a capacity of up to 16 megaliters per day (ML/d), through intake screens, sand separators, coagulation, fine strainers, primary and secondary ultrafiltration (UF) membranes, ultraviolet (UV) disinfection and chlorination. In 2023, the highest production month was June, with 262,300 m³ of the Englishman River water treated, and the highest production day was July 4 with 10,140 m³ of river water treated. From January to April, and October to December, the average daily consumption was roughly 3,850 m³ per day, from May to September, the high consumption months for 2023, the daily average was roughly 7,325 m³ per day. The permit allows the City of Parksville to withdraw 48 ML/d (48,000m³) daily.

The intake structure has screens to protect fish and other aquatic life from entering the intake, and to keep debris from entering the system. The sand separators remove sand and heavy suspended solids during high turbidity events (turbidity is the cloudiness/haziness of the water).

A coagulant is added to the raw water, before it gets to the water treatment plant. This allows for sufficient mixing time for particles to clump together for ease of removal at the strainers and membranes. Strainers can remove material greater than 200 microns (0.2mm) in size, which helps protect the membranes from heavy solids and large particles.



Ultrafiltration Membranes

Ultrafiltration (UF) membranes are used in a pressure driven separation process where microporous membranes remove contaminants (bacteria, viruses, *Cryptosporidium* and *Giardia*) from the water. The process forces water through the UF membranes, leaving contaminants behind. Once enough contaminants accumulate on the feed side of the membrane, a cleaning process occurs to bring the membrane back to a good working pressure. The first stage process recovers approximately 95% of the water. The second stage membrane, when in use, can recover up to 99% of the total water. However, due to operational issues, the second stage membrane was not used in 2023.

Both ultraviolet (UV) and chlorination disinfection processes are used on the finished water. Ultraviolet disinfection inactivates *Cryptosporidium*, *Giardia*, and viruses. UV light disinfects water by altering the DNA or RNA of pathogens and destroys their ability to reproduce. Chlorination inactivates viruses. pH adjustment is followed thereafter, from the above steps and before it gets pumped into the reservoirs which then goes to the distribution system. The water is continually sampled to provide water quality assurance and to meet regulatory requirements.



Geobags

The waste water produced from the backwashing of the membranes are filtered on site using Geobags. These dewatering cells, along with the addition of a polymer, bind the small particles from the waste into larger ones that are filtered out. The solids stay in the bags, the water percolates out. When these bags are full the material is taken to the landfill to be used as cover material.















Groundwater Wells

The City's groundwater is pumped from a confined quadra sands aquifer. The wells run alongside the railway tracks from Trill Drive to the City's boundary in the southwest. The City of Parksville currently has 16 production wells (see **Appendix A** for well locations).

Well Name	Pump Intake (m)	2023 Annual Production (m ³)
Springwood Well #1	35.00	19,877
Springwood Well #3	29.00	37,042
Springwood Well #5	31.33	34,073
Springwood Well #6	31.80	56,201
Springwood Well #7	22.35	89,673
Springwood Well #8	23.71	80,537
Springwood Well #9	Casing installed	Future development
Springwood Well #10	30.18	43,934
Springwood Well #11	30.42	49,734
Railway Well#1	34.50	48,259
Railway Well#2	33.54	58,945
Railway Well#3	38.46	24,627
Railway Well#4	36.00	35,053
Railway Well#5	36.00	71,111
Railway Well#6	35.00	58,900
Railway Well#7	35.00	51,269
Railway Well #8	35.68	Currently unavailable
Industrial Well#8	Irrigation use only	Not metered

Water Production

The following table provides a summary of the ERWS Water Treatment Plant and groundwater well production. With the water treatment plant online since the end of 2019, the yearly average well water production was reduced by almost 40% as more water is pulled from the river during the high flow months.

2023	2022	2021	2020	
				Annual Water Consumption (m ³)
2,395,772	2,578,157	2,595,015	2,358,518	
				Annual Production: Springwood & Railway Wells (m ³)
691,482	718,757	666,455	720,158	
				Annual Production: Water Treatment Plant - Englishman River (m ³)
1,704,290	1,859,400	1,925,560	1,638,360	

Water Distribution System

Reservoirs

Treated water from the river and wells is stored in four reservoirs. Reservoirs #1, #2 and #4 are located at the Springwood Water Complex on Despard Avenue while Reservoir #5 is located at the Top Bridge Park.

The reservoirs at Springwood are concrete structure with two being partially below ground and one above ground. The Top Bridge Reservoir is a glass fused steel tank.

A summary of the reservoir storage capacity and status is provided in the following table.

Reservoir	Location	Capacity	Type	Date
1	Springwood	616 m ³ (135,500 Imp. gal)	Concrete	1967
2	Springwood	2023 m ³ (445,000 Imp. gal)	Concrete	1968
4	Springwood	4559 m ³ (1,000,000 Imp. gal)	Concrete	1979
5	Top Bridge	4300 m ³ (950,000 Imp. gal)	Glass Fused Steel Tank	2007

Reservoir 1



Reservoir 4



Reservoir 2



Reservoir 5



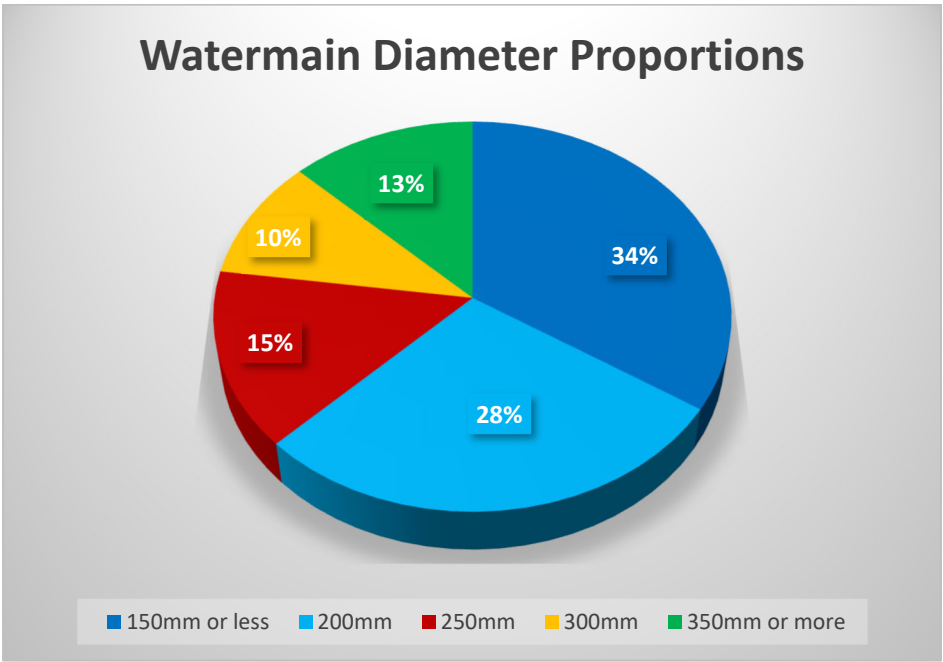
Distribution System Underground Infrastructure

The distribution system consists of 112.35 km of pipe, sizes range from 100 mm (4") to 400 mm (16"). There are 579 fire hydrants and one pressure reducing valve (PRV).

Like other municipalities, the aging infrastructures are being replaced through capital and development works and services. The following shows the size, age, and material of the mains in the Parksville water system in 2023.

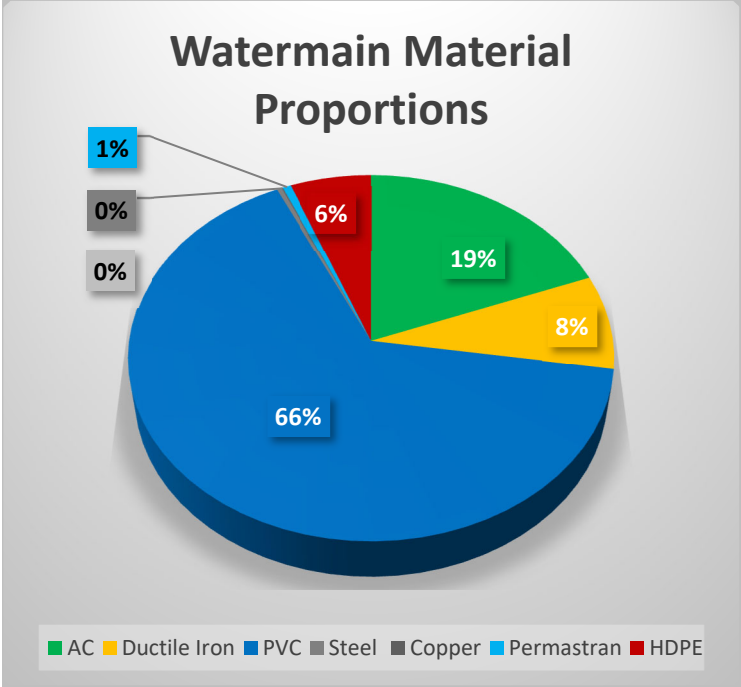
2023 Watermain Diameter Proportions

Diameter	N° of Pipes	Distance (km)	Percentage	Type
150mm or less	670	38.43	34%	Distribution Main 63%
200mm	650	31.86	28%	
250mm	286	16.47	15%	Supply Main 37%
300mm	211	11.32	10%	
350mm or more	178	14.27	13%	
Total		112.35		

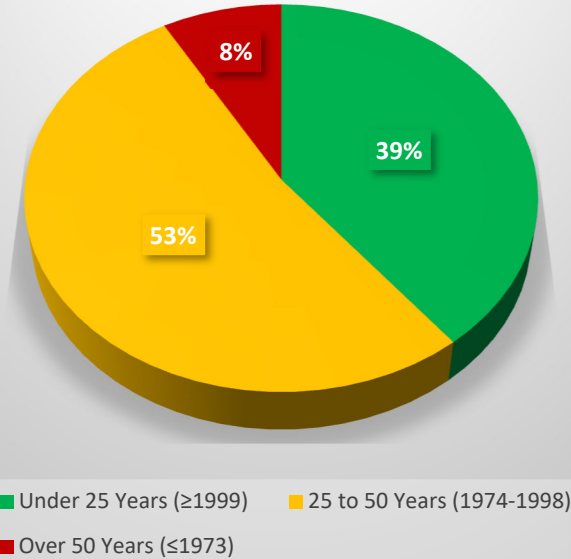


2023 Watermain Material Proportions

Material Type	Distance (km)
AC	21.5
Ductile Iron	9.3
PVC	73.7
Steel	0.4
Copper	0.1
Permastran	0.7
HDPE	6.6
Total	112.3



Watermain Age Proportions



2023 Watermain Age Proportions

Age	N° of Pipes	Distance (km)
Under 25 Years (≥1999)	954	44.17
25 to 50 Years (1974-1998)	931	58.9
Over 50 Years (≤1973)	110	9.28
Total		112.35

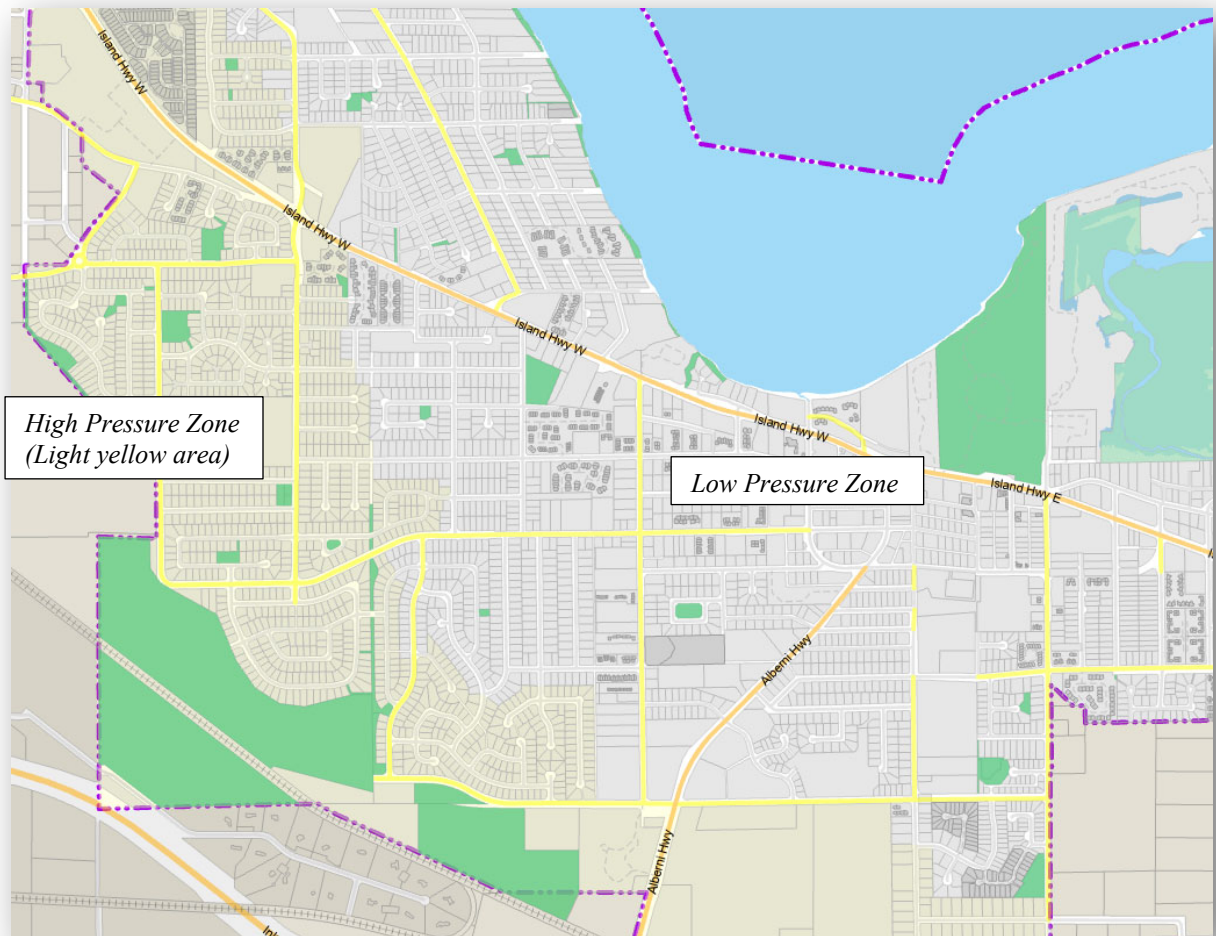
Pressure Zones

The City of Parksville is divided into two pressure zones, a low- and high-pressure systems. The low pressure is gravity-fed based on the elevation of Reservoirs #4 and #5. With the top reservoir water level of 73.74 m above sea level (geodetic), it gives a range of 55 psi to 85 psi throughout the system, depending on the geographic location.

The high-pressure system was developed for areas with higher elevation that do not have sufficient pressures or flows to meet firefighting flows and service pressures. The zone is supplied from four pumps, a 15 hp, two 40 hp and a 100 hp. These pumps are controlled through the SCADA system which automatically monitors flows and turns on however many pumps it needs to meet the flow requirements.

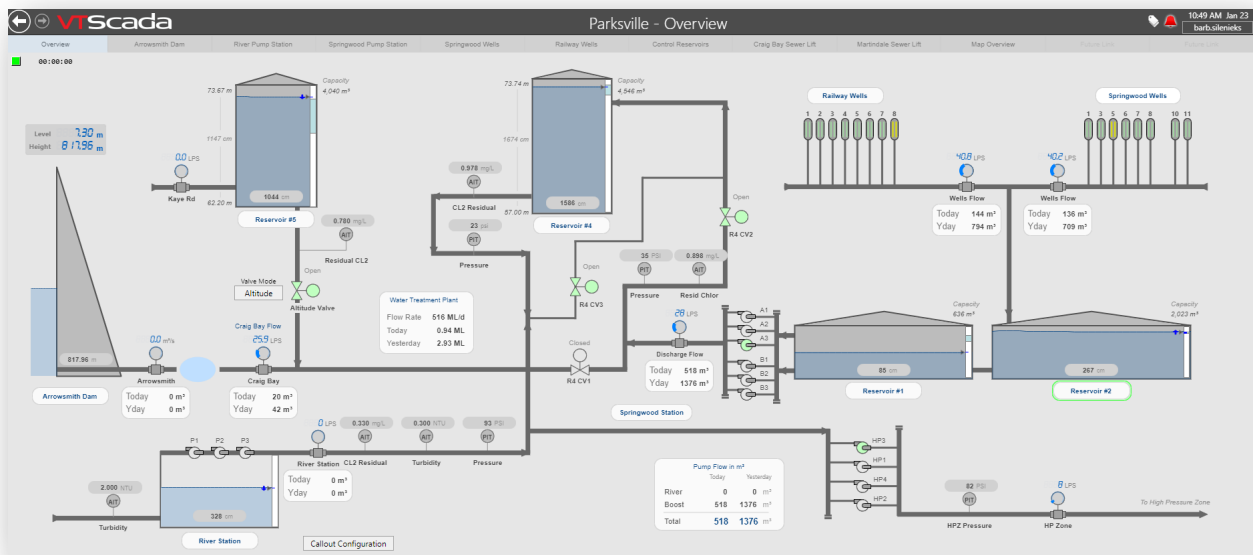
To maintain a balance between high and low pressures but keep a safe pressure in the high-pressure system, a pressure reducing valve (PRV) was installed to drop the pressure from 80 psi to 60 psi.

Pressure Zone Map



Supervisory Control and Data Acquisition (SCADA) System

The water treatment plant, water distribution system and wells are controlled by a supervisory control and data acquisition system (SCADA). This system allows the operators to monitor water treatment plant functions, reservoir levels, the status and flows of pumps, and chlorine residuals. Operators can change set points and check the system remotely. Alarms are automatically called out to City staff who monitors the system 24 hours a day, 7 days a week. The water distribution SCADA hardware upgrade is to be completed in 2024, and the software was upgraded in 2022.



WATER QUALITY TESTING AND REPORTING

Sampling and Testing

Testing and sampling are conducted daily in-house for the water treatment plant. Raw water is tested for temperature, turbidity, colour, pH, and UVT. Treated water is tested for free and total chlorine, turbidity, colour, pH, and UVT.



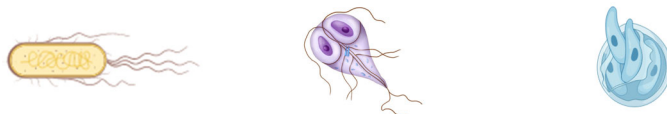
Bacteriological

All water suppliers in BC are required to monitor drinking water for total coliforms and Escherichia coli (E.coli) regularly. City staff takes bacteriological samples from 16 test ports (**Appendix A**) around the City of Parksville and a sample from the water treatment plant every month. These samples are tested by Island Health.

The presence of E.coli in water samples indicate that bacteria capable of causing illness may be present in the water system. The presence of total coliform bacteria may indicate a breakdown in the treatment process, or growth in the distribution system.

No E.coli should be detectable per 100 ml of water sample. Coliforms are considered acceptable if at least 90% of samples do not have any detectable Coliform per 100ml of water, and no sample has more than 10 total Coliform per 100ml of water.

Refer to **Appendix C** for 2023 test results and the following link for a list of water samples: <https://www.islandhealth.ca/learn-about-health/drinking-water/water-sampling-results>



No E.coli, Giardia, or Cryptosporidium detected in Parksville's drinking water.

Full Spectrum Analysis

In addition to monthly sampling throughout the distribution system, the City also sends samples for a full spectrum analysis to an accredited lab. The results are provided in **Appendix E** which included parameters such as total metals, conventional parameters (pH, turbidity, hardness), and microbiological analysis. All results meet or exceed the Canadian Drinking Water Guidelines.

The source water is aesthetically acceptable as set by the "Guidelines for Canadian Drinking Water Summary Table". Aesthetic qualities apply to certain characteristics such as high iron content which will stain fixtures red, or manganese which will stain black.

Water hardness is generally the amount of dissolved calcium and magnesium in water. Hard water is high in dissolved minerals. The river water is considered "soft" under the guidelines and the well water is "moderate".

Trihalomethane and Haloacetic acids Analyses

The city collects samples to analyze for trihalomethanes (THMs), and haloacetic acid (HAA) four times a year. THMs and HAAs are a type of disinfection by-products that form when chlorine is added to water containing natural organic matter.

Refer to **Appendix D** for the results, which are within the maximum acceptable concentration (MAC) of 0.1 mg/L for THMs, and 0.08 mg/L for HAA, set by the Canadian Drinking Water Quality Guidelines.

Cryptosporidium and Giardia

The City tests for cryptosporidium (oocysts) and giardia (cysts) once a year. There were no cysts found in the treated water, and 0.11 cryptosporidium cysts/100L found in the Englishman River sample.

PARASITE ANALYSIS			
<u>Sample</u>	<u>Cysts/100L</u>	<u>Organisms Identified</u>	<u>Comments</u>
1 High-lift Finished 29May23 09:15a	ND ND	Giardia (cysts) Cryptosporidium (oocysts)	-protozoan; enteric parasite -protozoan; enteric parasite
2 RAW Water Pump Stn 29May23 11:05a	ND 0.11	Giardia (cysts) Cryptosporidium (oocysts)	-protozoan; enteric parasite -protozoan; enteric parasite
Detection Limit = 1 per 100L * Lab Test Recovery = 94.6% * test is strongly influenced by volume collected, amount & type of sediment present ND = none detected			

COMPLAINTS AND INCIDENTS

Water complaints are generally from pressure issues, water service or main leaks, and water quality.

There were 54 calls related to water shutoff, where majority of the calls were during watermain tie-ins. Notifications are distributed prior to the construction work.

There were 64 calls related to water leaks and most were from services or water meters. Repairs were carried out accordingly.

There were 14 complaints from pressure drop and generally the cause for those were from faulty PRV (responsibility of the homeowner). There were a few pressure-drop instances where staff had to flush the line to clear debris.

There were 14 water quality complaints, and a few occurred during watermain flushing and fire hydrant maintenance. Residents noticed “brown or dirty” water and crews responded by either re-flushing the mains through a hydrant or a flush out at a location closest to the dead end or advising the homeowner to run an outside tap for a few minutes to clear the water.

There were complaints about the taste of chlorine in the water. Chlorine residuals are tested weekly throughout the system and are kept at a safe level.

There were a few calls related to water hardness. Mostly contributed to new homeowners from other municipalities who are used to different water composition. There was also a call concerning buildup in washing machines and toilet bowls although the water is only considered “moderately hard” on the hardness scale.

ROUTINE MAINTENANCE PROGRAM

Routine maintenance and inspection of the water system can help protect water quality, ensure everything is operating properly, protect and prolong the life of the system, ensure that the system operates efficiently, and reduce the risk of costly and disruptive malfunctions.

Distribution

- Conduct watermain flushing between February and April using unidirectional flushing method.
- Clean air relief valves.
- Clean fire line meters.
- Carry out Fire Hydrant Service Program. Fire hydrants are completely disassembled and inspected on a three-year rotation. Hydrants are painted as needed.
- Test and repair backflow prevention devices as needed.

Wells

- Rehabilitate as needed.
- Inspect and replace pumps and motors as needed.
- Refill Springwood Well #1 chlorine tank.
- Complete water sampling and testing as per regulations.
- Calibrate flow meters and level transducers.

Old River Intake

- Calibrate turbidity analyzers to validate and improve accuracy.

Reservoirs

- Clean reservoirs. Conventional method is used for Reservoirs #1 and #2. Reservoirs #4 and #5 cleaning are completed using divers every five years.
- Clean sustaining valves monthly.

Pump Stations

- Check pumps and chlorination system.
- Calibrate chlorine analyzers and turbidimeters.

Springwood Pump Station



Water treatment Plant

Raw Water Pump Station

- Clean intake structure from debris buildups.
- Service sand separator, and analyzers.
- Record power consumption usage and test power generator monthly.



Strainers and Coagulant (pretreatment system)

- Monitor and ensure coagulant dosing is carrying out properly. Flush and clean the line when not in use.
- Monitor strainer's differential pressure and check for leaks. Service and conduct maintenance as needed.

Membrane System

- Check blowers and backwash pumps.
- Carryout maintenance and recovery clean for ultrafiltration membrane trains.
- Service turbidity analyzers.

Disinfection System

- Monitor the ultraviolet transmittance trend to ensure it meets log removal. Service the instrument as necessary to improve performance.
- Service the ultraviolet units twice a year.
- Service chlorine analyzer.

Finished Water System

- Conduct vibration monitoring for high lift pumps.

Chemical and Auxiliary Systems

- Inspect and repair leaks from chemical skids.
- Check and service exhaust fans.
- Inspect and test emergency showers, and eyewash stations monthly.
- Check chemical tank levels and refill as needed.

Mechanical and Electrical Equipment

- Clean motor control centre (MCC) area.
- Exercise and adjust valves as needed.

Strainers at the Water Treatment Plant



UV Units at the Water Treatment Plant



PROGRAMS

Cross Connection Control Program

The Cross Connection Program aims to protect the water supply system by identifying and addressing potential hazards from industrial, commercial, and institutional users. Property owners are responsible for any cost related to the installation, replacement, and testing of approved backflow devices.

A tracking program called FAST is used to track registered devices around the City (both City-owned and privately-owned devices). Property owners are required to submit an annual test report to the City.

Commonly used backflow preventers



Reduced Pressure Assembly (RP): Used for severe hazard application such as properties with wells, medical facilities, auto body shop, auto repair shop, carwash, RV hookup locations and dump stations, etc.



Double Check Valve Assembly (DCVA): Used for moderate or minor hazard applications such as irrigation systems, apartment buildings, dealerships, arena, restaurant, office building, etc.



Hose Connection Vacuum Breaker (HCVB): Used for minor hazards only on hose bibs. HCVB is effective against backflow caused by back siphonage and low head pressure due to terminal end of a hose being elevated above the HCVB. All hose bibs must have a HCVB installed.

Emergency Response Program (ERP)

The City of Parksville has three ERPs pertaining to the water system and a short supplemental Drought Response Plan. The plans are the following:

- Arrowsmith Dam Emergency Response Plan.
- Parksville Water System Emergency Response Plan.
- Englishman River Water Treatment Plant Emergency Plan.

All plans are part of the corporate emergency framework. These documents outline the strategies to deal with events such as contamination of water supply, pump failures, and turbidity events.

Watershed Protection Program

The Englishman River flows in an easterly direction from Mount Arrowsmith and discharges into the Salish Sea, north of Craig Bay. The highest elevation in the watershed is Mount Arrowsmith, at 1819 metres and has a drainage area of 324 km².

The South Englishman River, Swane Creek, Morison Creek, Shelly Creek, and Centre Creek all drain into the Englishman River. The Englishman River is an important fisheries river and through the Arrowsmith Water Service, provides water supply for the City of Parksville and the Nanoose Peninsula. Water is stored at a dam at Arrowsmith Lake and released as needed as per the Ministry of Forests Provisional Operating Rule. Fish in the Englishman River includes trout, steelhead, and salmon. The Englishman River is identified as a 'sensitive stream' requiring special management attention under the *Fisheries Protection Act*.

Englishman River Watershed



PROJECTS AND IMPROVEMENTS

2023 Operations Projects and Improvements

- Piping and sampling ports installed for the ultraviolet (UV) analyzer to eliminate air in the line.
- Water supply line re-plumbed on coagulant system, to ensure adequate pressure to maintain dosing.
- SCADA programming and system graphics updated. Extensive programming for strainers to help reduce amount of physical dismantling and cleaning.
- Geobag monitoring program put in place by environmental consultant.
- Preventative maintenance program started for the water treatment plant (WTP) and raw water pump station (RWPS).
- Continued replacement of residential water meters (3/4" size).
- Improved spare parts list for the water treatment plant
- Groundwater at Risk of Containing Pathogens (GARP) study completed at Railway wells by consultant and submitted to Island Health.
- Arrowsmith Dam Safety review completed by consultant.
- 2022 report for Fish and Fish Habitat monitoring program completed.
- Arrowsmith Dam Operation, Maintenance, and Surveillance updated.
- Purchased new lab equipment to test for alkalinity and hardness.
- Installed 3" water connection at Resort Way.
- Flush all groundwater wells.
- Cleared debris from dam spillway.
- Springwood Well #5 meter replaced.
- Updated:
 - Englishman River Water Service Treatment Plant Emergency Response Plan
 - Emergency Response Plan - Supplementary Drought Response Plan
 - Water Distribution Emergency Response Plan
 - Arrowsmith Dam Emergency Plan

2024 Planned Operations Projects and Improvements

- Ongoing:
 - Englishman river 5-year fish monitoring program.
 - Preventative maintenance program for the WTP and RWPS.
 - Updates on water meter route maps.

- Geobag monitoring program.
- Water meter replacement program.
- Cross connection control program.
- Optimization work for the SCADA system.
- Take distribution system samples to determine effectiveness of corrosion control from the WTP.
- Rehab Railway well #8 and replace motor and pump.
- Replace 6" fireline meter at Coast Hotel.
- Service all altitude valves in pump stations.
- Service raw water pump station pumps and air burst.
- Service high lift pumps at WTP.
- Design meter bypass for RV park.
- Replace Doehle PRV.
- Consultant:
 - Complete Water Master Plan.
 - Review Englishman River flows, dam conditions, and how climate change is affecting the operating conditions.
 - Conduct chemical room safety audit and provide sodium hydroxide tank design and installation.



FREQUENTLY ASKED QUESTIONS

Water Pressure

My water pressure is too high. What can I do?

It is a good practice to install a pressure reducing valve (PRV) to control the pressure in your home or business. PRV's are required for buildings where pressure is expected to be greater than 80 psi.

What is a pressure reducing valve? Do I have a PRV? Where would it be? What does it look like?

A pressure reducing valve is an assembly installed in a plumbing system to regulate water pressure. Most homes should be equipped with a PRV as per the BC Plumbing Code.

To locate or to determine if you have a PRV, first locate where your water service line comes into your home or business. There should be a water shutoff valve and the water piping could branch out with one going to the outdoor and the other leading into the internal plumbing; a PRV would be located right before it splits up. It may be in a crawl space or near your hot water tank.



Household PRV's are about 3" tall and generally look like this:

I don't have a PRV. How do I find out if I need one?

If you are experiencing significant pressure fluctuations or water flow from fixtures appear lower than normal, you may need a PRV. Contact a plumber to inspect and carryout the work accordingly.

How do I know if my existing PRV has failed?

The most common signs that a PRV is beginning to fail are:

- Water pressure surges
- Noted increase/decrease in pressure at fixtures
- Flow rate of fixtures is higher than flow rating for fixture.
- Frequent leaks or dripping faucets (high water pressure can wear out valves and cause leaks)
- Sudden loss of water pressure (an adjustment to the PRV may resolve the issue)
- Unexplained loss of water flow (an adjustment to the PRV may resolve the issue)

Can my PRV be adjusted or repaired?

You can contact a plumber to have your PRV adjusted or repaired. However, if your PRV is older, it may be difficult or impossible to adjust. You should then consider replacing your PRV.

Water Leaks

How do I know if I have a water leak?

Drainage problems are often mistaken for water leaks. If water is coming out of the ground after heavy or continuous rainfall, it is unlikely to be a water leak. If the weather has been dry, the water coming up is likely a water leak.

Is the leak on my property or the City's?

Leaks that are between the water main and property lines are the City's responsibility. Crews will turn off the water at the property shut-off valve to determine where the leak is. If the leak stops after closing the property shut-off valve, then the leak is on the homeowner's side. The City does not repair leaks on private property. Various local plumbing companies provide this service.

Watermain Flushing

How will water main flushing affect me?

Usually, you will not be aware that flushing is even taking place in your neighborhood. Flushing is generally conducted during work hours. However, to minimize service disruption to the downtown core and/or highly developed areas, nighttime flushing is also carried out by City crews.

When flushing is underway, short periods of low pressure and discolored water may occur. Both will be temporary, and water remains safe to use and drink. Please minimize your water use if discolored water is noticed as the sediments may stain your laundry or plug your household PRV. To clear your water lines, turn on your cold water tap until the water runs clear.



Why is my water cloudy after flushing?

Water is cloudy when air gets in it and makes tiny bubbles. These bubbles are harmless and will disappear once the water sits for a few minutes.

Water Quality

How will this affect me?

Usually, you will not be aware that flushing is even taking place in your neighborhood. Flushing is generally conducted between February and April.

How would people be notified if a water quality problem arose?

If the quality of our drinking water presented a health risk, the City would immediately issue a notice to the community through the media and other available resources. The City would coordinate with all available agencies such as Island Health, RDN, and the fire department to ensure the community is aware of any health risks.

How do I know my water is safe to drink?

To ensure our drinking water is clean and safe to drink, the City monitors the source waters and the distribution system with both online instrumentation at points of disinfection and a comprehensive sampling program. Weekly samples are taken at various locations throughout the City and submitted to Island Health for bacterial analysis. As well, the City tests for water quality according to the *BC Drinking Water Protection Act* and *Guidelines for Canadian Drinking Water Quality*.

Why does my water sometimes look brown?

Brown water from your tap is usually caused by a change to the normal flow in a watermain. The change can occur from opening or closing a watermain valve, opening a fire hydrant, or a watermain break. The brown colour is from normal sediment in the pipes coming off the bottom and flowing with the water to your tap. Try flushing out the brown water by running your cold water for 10 to 15 minutes. If the brown water doesn't clear, it may be caused by old, rusty pipes inside the building or from a failing hot water tank.

Why does my water sometimes look “milky” and “cloudy”?

Cloudy water is usually the result of air in the watermains. Air may be introduced into the mains during repairs or from opening fire hydrants. Although it is temporary, it may take several hours for the air to dissipate. To check, fill a glass of water and leave it on the counter for a few minutes. The water should clear. This type of cloudy water is safe to drink.

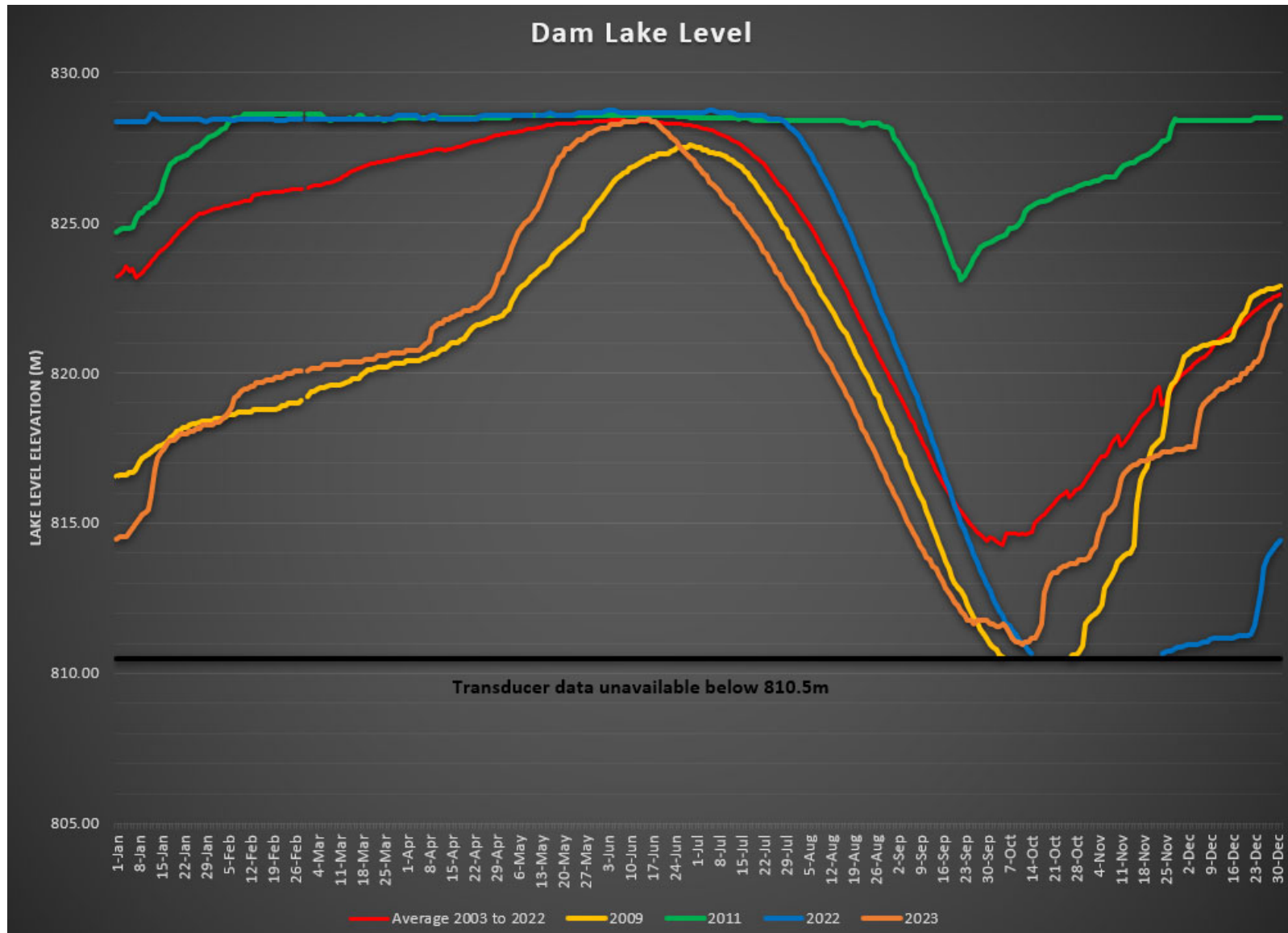
Why do my toilet and bathroom tiles sometimes turn pink?

According to the American Water Works Association (AWWA), the pink residue is likely associated with naturally occurring airborne bacteria that produces a pinkish film and sometimes a dark gray film, on surfaces that are regularly moist, including toilet bowls, showerheads, sink drains and tiles. The problem is more common in humid regions. Regular cleaning is the best solution to keep these surfaces free from the bacterial film.

Appendix A - Water Source and Sampling Map



Appendix B - Dam Lake Levels



Appendix C - Bacteriological Results

Target: **LT1** – Less than 1 (no detectable bacteria)

QRWRT- Sample exceeded 30 hours from time of collection, results may not be valid.

Location	Date	Total Coliform	E.Coli
1247 Arbutus Road	January 3, 2023	LT1	LT1
Island Highway by Temple	January 3, 2023	LT1	LT1
770 Soriel	January 3, 2023	LT1	LT1
378 Kingsley	January 10, 2023	LT1	LT1
851 Temple	January 10, 2023	LT1	LT1
330 Park View	January 10, 2023	LT1	LT1
136 Memorial	January 10, 2023	LT1	LT1
Works Yard	January 18, 2023	LT1	LT1
Top of Corfield	January 18, 2023	LT1	LT1
271 Chestnut	January 18, 2023	LT1	LT1
Despard & Moilliet	January 24, 2023	LT1	LT1
613 Chinook	January 24, 2023	LT1	LT1
186 Shelly	January 24, 2023	LT1	LT1
Daffodil at Camas	January 31, 2023	LT1	LT1
Community Park	January 31, 2023	LT1	LT1
450 Wisteria	January 31, 2023	LT1	LT1
378 Kingsley	February 7, 2023	LT1	LT1
1247 Arbutus Road	February 7, 2023	LT1	LT1
Island Highway by Temple	February 7, 2023	LT1	LT1
770 Soriel	February 7, 2023	LT1	LT1
Works Yard	February 14, 2023	LT1	LT1
Top of Corfield	February 14, 2023	LT1	LT1
613 Chinook	February 14, 2023	LT1	LT1
Despard & Moilliet	February 22, 2023	LT1	LT1
Daffodil at Camas	February 22, 2023	LT1	LT1
851 Temple	February 22, 2023	LT1	LT1
271 Chestnut	February 22, 2023	LT1	LT1
136 Memorial	February 22, 2023	LT1	LT1
Community Park	February 28, 2023	LT1	LT1
450 Wisteria	February 28, 2023	LT1	LT1
330 Park View	February 28, 2023	LT1	LT1
186 Shelly	February 28, 2023	LT1	LT1
1247 Arbutus Road	March 7, 2023	LT1	LT1
Island Highway by Temple	March 7, 2023	LT1	LT1
770 Soriel	March 7, 2023	LT1	LT1
330 Park View	March 7, 2023	LT1	LT1

Location	Date	Total Coliform	E.Coli
Works Yard	March 14, 2023	LT1	LT1
Top of Corfield	March 14, 2023	LT1	LT1
851 Temple	March 14, 2023	LT1	LT1
271 Chestnut	March 14, 2023	LT1	LT1
Despard & Moilliet	March 21, 2023	LT1	LT1
Community Park	March 21, 2023	LT1	LT1
450 Wisteria	March 21, 2023	LT1	LT1
186 Shelly	March 21, 2023	LT1	LT1
378 Kingsley	March 28, 2023	LT1	LT1
Daffodil at Camas	March 28, 2023	LT1	LT1
613 Chinook	March 28, 2023	LT1	LT1
136 Memorial	March 28, 2023	LT1	LT1
1247 Arbutus Road	April 4, 2023	LT1	LT1
Island Highway by Temple	April 4, 2023	LT1	LT1
770 Soriel	April 4, 2023	LT1	LT1
330 Park View	April 4, 2023	LT1	LT1
378 Kingsley	April 11, 2023	LT1	LT1
Daffodil at Camas	April 11, 2023	LT1	LT1
851 Temple	April 11, 2023	LT1	LT1
136 Memorial	April 11, 2023	LT1	LT1
Top of Corfield	April 18, 2023	LT1	LT1
Despard & Moilliet	April 18, 2023	LT1	LT1
613 Chinook	April 18, 2023	LT1	LT1
330 Park View	April 18, 2023	LT1	LT1
Works Yard	April 25, 2023	LT1	LT1
Community Park	April 25, 2023	LT1	LT1
450 Wisteria	April 25, 2023	LT1	LT1
271 Chestnut	April 25, 2023	LT1	LT1
186 Shelly	April 25, 2023	LT1	LT1
378 Kingsley	May 2, 2023	LT1	LT1
Daffodil at Camas	May 2, 2023	LT1	LT1
330 Park View	May 2, 2023	LT1	LT1
1247 Arbutus Road	May 10, 2023	LT1	LT1
Island Highway by Temple	May 10, 2023	LT1	LT1
770 Soriel	May 10, 2023	LT1	LT1
136 Memorial	May 10, 2023	LT1	LT1
Works Yard	May 16, 2023	LT1	LT1
Top of Corfield	May 16, 2023	LT1	LT1
Despard & Moilliet	May 16, 2023	LT1	LT1
271 Chestnut	May 16, 2023	LT1	LT1
Community Park	May 23, 2023	LT1	LT1
186 Shelly	May 23, 2023	LT1	LT1

Location	Date	Total Coliform	E.Coli
450 Wisteria	May 30, 2023	LT1	LT1
851 Temple	May 30, 2023	LT1	LT1
613 Chinook	May 30, 2023	LT1	LT1
1247 Arbutus Road	June 6, 2023	LT1	LT1
Island Highway by Temple	June 6, 2023	LT1	LT1
Daffodil at Camas	June 6, 2023	LT1	LT1
770 Soriel	June 6, 2023	LT1	LT1
378 Kingsley	June 13, 2023	LT1	LT1
851 Temple	June 13, 2023	LT1	LT1
330 Park View	June 13, 2023	LT1	LT1
136 Memorial	June 13, 2023	LT1	LT1
Works Yard	June 20, 2023	LT1	LT1
Top of Corfield	June 20, 2023	LT1	LT1
Despard & Moilliet	June 20, 2023	LT1	LT1
613 Chinook	June 20, 2023	LT1	LT1
Community Park	June 27, 2023	LT1	LT1
450 Wisteria	June 27, 2023	LT1	LT1
271 Chestnut	June 27, 2023	LT1	LT1
186 Shelly	June 27, 2023	LT1	LT1
1247 Arbutus Road	July 4, 2023	LT1	LT1
Island Highway by Temple	July 4, 2023	LT1	LT1
770 Soriel	July 4, 2023	LT1	LT1
330 Park View	July 4, 2023	LT1	LT1
378 Kingsley	July 11, 2023	LT1	LT1
Daffodil at Camas	July 11, 2023	LT1	LT1
851 Temple	July 11, 2023	LT1	LT1
136 Memorial	July 11, 2023	LT1	LT1
Works Yard	July 18, 2023	LT1	LT1
Top of Corfield	July 18, 2023	LT1	LT1
Despard & Moilliet	July 18, 2023	LT1	LT1
613 Chinook	July 18, 2023	LT1	LT1
Community Park	July 25, 2023	LT1	LT1
450 Wisteria	July 25, 2023	LT1	LT1
271 Chestnut	July 25, 2023	LT1	LT1
186 Shelly	July 25, 2023	LT1	LT1
Daffodil at Camas	August 1, 2023	LT1	LT1
330 Park View	August 1, 2023	LT1	LT1
1247 Arbutus Road	August 9, 2023	LT1	LT1
Island Highway by Temple	August 9, 2023	LT1	LT1
770 Soriel	August 9, 2023	LT1	LT1
271 Chestnut	August 9, 2023	LT1	LT1
Works Yard	August 15, 2023	LT1	LT1

Location	Date	Total Coliform	E.Coli
Top of Corfield	August 15, 2023	LT1	LT1
Despard & Moilliet	August 15, 2023	LT1	LT1
613 Chinook	August 15, 2023	LT1	LT1
Daffodil at Camas	August 22, 2023	LT1	LT1
Community Park	August 22, 2023	LT1	LT1
450 Wisteria	August 22, 2023	LT1	LT1
186 Shelly	August 22, 2023	LT1	LT1
378 Kingsley	August 29, 2023	LT1	LT1
851 Temple	August 29, 2023	LT1	LT1
330 Park View	August 29, 2023	LT1	LT1
136 Memorial	August 29, 2023	LT1	LT1
Top of Corfield	September 5, 2023	LT1	LT1
1247 Arbutus Road	September 5, 2023	LT1	LT1
Island Highway by Temple	September 5, 2023	LT1	LT1
271 Chestnut	September 5, 2023	LT1	LT1
Works Yard	September 12, 2023	LT1	LT1
Despard & Moilliet	September 12, 2023	LT1	LT1
770 Soriel	September 12, 2023	LT1	LT1
613 Chinook	September 12, 2023	LT1	LT1
Daffodil at Camas	September 20, 2023	LT1	LT1
Community Park	September 20, 2023	LT1	LT1
450 Wisteria	September 20, 2023	LT1	LT1
186 Shelly	September 20, 2023	LT1	LT1
378 Kingsley	September 26, 2023	LT1	LT1
851 Temple	September 26, 2023	LT1	LT1
330 Park View	September 26, 2023	LT1	LT1
136 Memorial	September 26, 2023	LT1	LT1
1247 Arbutus Road	October 3, 2023	LT1	LT1
Island Highway by Temple	October 3, 2023	LT1	LT1
770 Soriel	October 3, 2023	LT1	LT1
271 Chestnut	October 3, 2023	LT1	LT1
Works Yard	October 10, 2023	LT1	LT1
Top of Corfield	October 10, 2023	LT1	LT1
Despard & Moilliet	October 10, 2023	LT1	LT1
Community Park	October 17, 2023	LT1	LT1
613 Chinook	October 17, 2023	LT1	LT1
186 Shelly	October 17, 2023	LT1	LT1
Daffodil at Camas	October 25, 2023	LT1	LT1
450 Wisteria	October 25, 2023	LT1	LT1
330 Park View	October 25, 2023	LT1	LT1
378 Kingsley	October 31, 2023	LT1	LT1
851 Temple	October 31, 2023	LT1	LT1

Location	Date	Total Coliform	E.Coli
136 Memorial	October 31, 2023	LT1	LT1
1247 Arbutus Road	November 7, 2023	LT1	LT1
Island Highway by Temple	November 7, 2023	LT1	LT1
770 Soriel	November 7, 2023	LT1	LT1
271 Chestnut	November 7, 2023	LT1	LT1
Works Yard	November 14, 2023	LT1	LT1
Top of Corfield	November 14, 2023	LT1	LT1
Despard & Moilliet	November 14, 2023	LT1	LT1
613 Chinook	November 14, 2023	LT1	LT1
Daffodil at Camas	November 21, 2023	LT1	LT1
Community Park	November 21, 2023	LT1	LT1
450 Wisteria	November 21, 2023	LT1	LT1
186 Shelly	November 21, 2023	LT1	LT1
378 Kingsley	November 28, 2023	LT1	LT1
851 Temple	November 28, 2023	LT1	LT1
330 Park View	November 28, 2023	LT1	LT1
136 Memorial	November 28, 2023	LT1	LT1
1247 Arbutus Road	December 5, 2023	LT1	LT1
Island Highway by Temple	December 5, 2023	LT1	LT1
770 Soriel	December 5, 2023	LT1	LT1
271 Chestnut	December 5, 2023	LT1	LT1
Works Yard	December 12, 2023	LT1	LT1
Top of Corfield	December 12, 2023	LT1	LT1
Despard & Moilliet	December 12, 2023	LT1	LT1
613 Chinook	December 12, 2023	LT1	LT1
Daffodil at Camas	December 19, 2023	LT1	LT1
Community Park	December 19, 2023	LT1	LT1
450 Wisteria	December 19, 2023	LT1	LT1
186 Shelly	December 19, 2023	LT1	LT1
378 Kingsley	December 20, 2023	LT1	LT1
851 Temple	December 20, 2023	LT1	LT1
330 Park View	December 20, 2023	LT1	LT1
136 Memorial	December 20, 2023	LT1	LT1

Appendix D.1 - Distribution System Trihalomethanes (THMs) & Haloacetic Acid (HAA)

2023	Community Park				Temple			
	February	May	August	November	February	May	August	November
Total THM	0.09	82	51.1	26.9	0.034	33.9	46.9	20.6
Bromodichloromethanes	0.003	3.4	13.3	4.5	0.005	3.8	12.9	4.6
Bromoform	<0.001	<0.5	<0.5	0.7	0.001	0.5	<0.5	1
Chloroform	0.087	78.6	34.3	19.2	0.025	27.9	30.1	11.5
Dibromochloromethane	<0.001	<0.5	3.6	2.5	0.003	1.7	3.9	3.5
Toluene-d8 (%)	100	101	108	107	97	99	115	111
Bromofluorobenzene (%)	100	102	104	104	99	100	99	106
Monochloroacetic Acid	-	-	<2.0	<2.0	-	-	<2.0	<2.0
Monobromoacetic Acid	-	-	<2.0	<2.0	-	-	<2.0	<2.0
Dichloroacetic Acid	-	-	7.6	7.4	-	-	7.7	4.5
Trichloroacetic Acid	-	-	5	5.2	-	-	5.4	3.1
Bromochloroacetic Acid	-	-	2.8	<2.0	-	-	2.9	<2.0
Dibromoacetic Acid	-	-	<2.0	<2.0	-	-	<2.0	<2.0
Total Haloacetic Acids HAA6	-	-	15.3	12.6	-	-	16	17.5
2,3-Dibromopropionic Acid (%)	-	-	86	96	-	-	87	94
2023	Ermineskin				Public Works			
	February	May	August	November	February	May	August	November
Total THM	0.03	31.3	39.2	8	0.071	67.8	71.5	17
Bromodichloromethanes	0.003	3	10.4	1.9	0.002	2.1	15.5	4
Bromoform	0.001	0.5	<0.5	1	<0.001	<0.5	<0.5	0.6
Chloroform	0.023	26.3	25.8	2.8	0.069	65.7	53.4	23.2
Dibromochloromethane	0.003	1.5	3.1	2.3	<0.001	<0.5	2.6	1.9
Toluene-d8 (%)	99	103	111	107	99	102	114	110
Bromofluorobenzene (%)	99	104	106	105	103	100	106	105
Monochloroacetic Acid	-	-	<2.0	<2.0	-	-	<2.0	<2.0
Monobromoacetic Acid	-	-	<2.0	<2.0	-	-	<2.0	<2.0
Dichloroacetic Acid	-	-	6.5	<2.0	-	-	12.3	9.7
Trichloroacetic Acid	-	-	4.2	<2.0	-	-	5.5	7.3
Bromochloroacetic Acid	-	-	2.4	<2.0	-	-	2.9	<2.0
Dibromoacetic Acid	-	-	<2.0	<2.0	-	-	<2.0	<2.0
Total Haloacetic Acids HAA6	-	-	13.2	<12.0	-	-	20.8	17
2,3-Dibromopropionic Acid (%)	-	-	73	100	-	-	71	100

Appendix D.2 - WTP Trihalomethanes (THMs) & Haloacetic Acid (HAA)

2023	Water Treatment Plant			
	February	May	August	November
Total THM	0.035	22.2	24.6	24.1
Bromodichloromethanes	0.001	0.9	6.3	1.6
Bromoform	<0.001	<0.5	<0.5	<0.5
Chloroform	0.034	21.3	17.3	22.5
Dibromochloromethane	<0.001	<0.5	1	<0.5
Toluene-d8 (%)	97	100	117	104
Bromofluorobenzene (%)	101	104	100	102
Monochloroacetic Acid	-	-	<2.0	<2.0
Monobromoacetic Acid	-	-	<2.0	<2.0
Dichloroacetic Acid	-	-	4.7	8.2
Trichloroacetic Acid	-	-	2.4	5.4
Bromochloroacetic Acid	-	-	<2.0	<2.0
Dibromoacetic Acid	-	-	<2.0	<2.0
Total Haloacetic Acids HAA6	-	-	7.1	13.6
2,3-Dibromopropionic Acid (%)	-	-	82	97

All THM and HAA results are within the maximum acceptable concentration (MAC) of 0.1 mg/L for THMs and 0.08 mg/L for HAAs set by the Canadian Drinking Water Quality Guidelines.

Appendix E - Full Spectrum Report



Element
 #104, 19575-55 A Ave.
 Surrey, British Columbia
 V3S 9P8, Canada
 T: +1 (604) 514-3322
 F: +1 (604) 514-3323
 E: info.vancouver@element.com
 W: www.element.com

Report Transmission Cover Page

Bill To: City of Parksville 1116 Herring Gull Way Parksville, BC, Canada V9P 1R2	Project ID: Project Name: Project Location: LSD: P.O.: S22-5095 Proj. Acct. code:	Lot ID: 1664537 Control Number: Date Received: Jul 12, 2023 Date Reported: Jul 18, 2023 Report Number: 2892868
Attn: Accounts Payable Sampled By: Barb Silenske Company: City of Parksville		

Contact	Company	Address
Accounts Payable	City of Parksville	1116 Herring Gull Way Parksville, BC V9P 1R2 Phone: (250) 951-2489 Fax: Email: ap@parksville.ca
<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email	PDF	Invoice
Barbara Silenieks	City of Parksville	1116 Herring Gull Way Parksville, BC V9P 1R2 Phone: (250) 951-2489 Fax: Email: bsilenieks@parksville.ca
<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email	PDF	COA
Email - Merge	PDF	COC / Test Report
Email - Merge	Standard Crosstab Without Tabs	Test Report

Notes To Clients:

- Jul 12, 2023 - Upon receipt, sample had exceeded recommended temperature for bacterial analysis.

The information contained on this and all other pages transmitted, is intended for the addressee only and is considered confidential. If the reader is not the intended recipient, you are hereby notified that any use, dissemination, distribution or copy of this transmission is strictly prohibited. If you receive this transmission by error, or if this transmission is not satisfactory, please notify us by telephone.

Terms and Conditions: <https://www.element.com/terms/terms-and-conditions>



Element
#104, 19575-55 A Ave.
Surrey, British Columbia
V3S 8P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: info.vancouver@element.com
W: www.element.com

Analytical Report

Bill To: City of Parksville 1116 Herring Gull Way Parksville, BC, Canada V9P 1R2	Project ID: Project Name: Project Location: LSD: P.O.: S22-5095 Proj. Acct. code:	Lot ID: 1664537 Control Number: Date Received: Jul 12, 2023 Date Reported: Jul 18, 2023 Report Number: 2892868
Attn: Accounts Payable Sampled By: Barb Silenske Company: City of Parksville		

		Reference Number	1664537-1	1664537-2	1664537-3	
		Sample Date	Jul 11, 2023	Jul 11, 2023	Jul 11, 2023	
		Sample Time	09:15	08:55	09:35	
		Sample Location				
		Sample Description	Railway#2 / 12.7 °C	Springwood #1 / 12.7 °C	WTP Fine Shed / 12.7 °C	
Analyte	Matrix	Units	Water Results	Water Results	Water Results	Nominal Detection Limit
Inorganic Nonmetallic Parameters						
Cyanide	Total	mg/L	<0.002	<0.002	<0.002	0.002
Metals Total						
Calcium	Total	mg/L	41	23	13	0.01
Magnesium	Total	mg/L	21	11	1.5	0.02
Potassium	Total	mg/L	0.96	0.46	0.19	0.04
Silicon	Total	mg/L	12	12	2.6	0.005
Sodium	Total	mg/L	12	7.4	15	0.1
Digestion	Preparation		Field Pres, digest as total Hg	Field Pres, digest as total Hg	Field Pres, digest as total Hg	
Mercury	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Microbiological Analysis						
Total Coliforms	Enzyme Substrate Test	MPN/100 mL	<1.0	<1.0	<1.0	1.0
Escherichia coli	Enzyme Substrate Test	MPN/100 mL	<1.0	<1.0	<1.0	1.0
Physical and Aggregate Properties						
Colour	True	Colour units	<5	<5	<5	5
Turbidity		NTU	<0.10	<0.10	<0.10	0.1
Routine Water						
Digestion	Dissolved		Lab filtered & preserved Exceeded	Lab filtered & preserved Exceeded	Lab filtered & preserved Exceeded	
pH - Holding Time						
pH	at 25 °C		7.50	7.40	8.10	0.01
Electrical Conductivity		µS/cm at 25 °C	428	246	143	1
T-Alkalinity	as CaCO3	mg/L	137	88	40	5
Chloride	Dissolved	mg/L	41.3	15.5	16.2	0.05
Fluoride	Dissolved	mg/L	0.03	0.05	0.02	0.01
Nitrate - N	Dissolved	mg/L	1.15	1.56	0.02	0.01
Nitrite - N	Dissolved	mg/L	<0.01	<0.01	<0.01	0.01
Sulfate (SO4)	Dissolved	mg/L	5.5	4.1	1.8	0.1
Hardness	as CaCO3 (dissolved)	mg/L	174	96	29	5
Total Dissolved Solids	Calculated	mg/L	236	150	71	1
Langelier Index			-0.2	-0.7	-0.6	
Trace Metals Total						
Aluminum	Total	mg/L	0.003	0.009	0.010	0.001
Antimony	Total	mg/L	0.00004	0.00003	0.00004	0.00002
Arsenic	Total	mg/L	0.0003	0.0002	0.0002	0.0001
Barium	Total	mg/L	0.082	0.074	0.067	0.0001
Boron	Total	mg/L	0.018	0.008	0.017	0.002
Cadmium	Total	mg/L	0.00003	<0.00001	<0.00001	0.00001

Terms and Conditions: <https://www.element.com/terms/terms-and-conditions>



Element
#104, 19575-55 A Ave.
Surrey, British Columbia
V3S 8P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: info.vancouver@element.com
W: www.element.com

Analytical Report

Bill To: City of Parksville
1116 Herring Gull Way
Parksville, BC, Canada
V9P 1R2
Attn: Accounts Payable
Sampled By: Barb Silenske
Company: City of Parksville

Project ID:
Project Name:
Project Location:
LSD:
P.O.: S22-5095
Proj. Acct. code:

Lot ID: **1664537**
Control Number:
Date Received: Jul 12, 2023
Date Reported: Jul 18, 2023
Report Number: 2892868

	Reference Number	1664537-1	1664537-2	1664537-3		
	Sample Date	Jul 11, 2023	Jul 11, 2023	Jul 11, 2023		
	Sample Time	09:15	08:55	09:35		
	Sample Location					
	Sample Description	Railway#2 / 12.7 °C	Springwood #1 / 12.7 °C	WTP Fine Shed / 12.7 °C		
	Matrix	Water	Water	Water		
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Trace Metals Total - Continued						
Chromium	Total	mg/L	0.00072	0.00033	0.00014	0.00005
Copper	Total	mg/L	0.0012	0.0007	0.0006	0.0002
Iron	Total	mg/L	0.015	0.019	0.011	0.002
Lead	Total	mg/L	0.00039	0.00006	0.00001	0.00001
Manganese	Total	mg/L	0.006	0.007	0.003	0.001
Selenium	Total	mg/L	<0.0002	<0.0002	<0.0002	0.0002
Strontium	Total	mg/L	0.13	0.071	0.050	0.0001
Uranium	Total	mg/L	0.00034	0.00006	<0.00001	0.00001
Zinc	Total	mg/L	0.17	0.19	0.14	0.0005

Terms and Conditions: <https://www.element.com/terms/terms-and-conditions>



Element
#104, 19575-55 A Ave.
Surrey, British Columbia
V3B 8P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: info.vancouver@element.com
W: www.element.com

Page 3 of 5

Analytical Report

Bill To: City of Parksville 1116 Herring Gull Way Parksville, BC, Canada V9P 1R2	Project ID: Project Name: Project Location: LSD: P.O.: S22-5095 Proj. Acct. code:	Lot ID: 1664537 Control Number: Date Received: Jul 12, 2023 Date Reported: Jul 18, 2023 Report Number: 2892868
Attn: Accounts Payable Sampled By: Barb Silenske Company: City of Parksville		

Reference Number		1664537-4	1664537-5		
Sample Date		Jul 11, 2023	Jul 11, 2023		
Sample Time		10:10	10:30		
Sample Location					
Sample Description		River / 12.7 °C	Work Yard / 12.7 °C		
Analyte	Matrix	Water	Water	Results	Nominal Detection Limit
Inorganic Nonmetallic Parameters					
Cyanide	Total	mg/L	<0.002	<0.002	0.002
Metals Total					
Calcium	Total	mg/L	12	12	0.01
Magnesium	Total	mg/L	1.5	1.4	0.02
Potassium	Total	mg/L	0.14	0.17	0.04
Silicon	Total	mg/L	2.6	2.5	0.005
Sodium	Total	mg/L	6.1	15	0.1
Digestion	Preparation		Field Pres, digest as total Hg	Field Pres, digest as total Hg	
Mercury	Total	mg/L	<0.00001	<0.00001	0.00001
Microbiological Analysis					
Total Coliforms	Enzyme Substrate Test	MPN/100 mL	960.6	<1.0	1.0
Escherichia coli	Enzyme Substrate Test	MPN/100 mL	45.5	<1.0	1.0
Physical and Aggregate Properties					
Colour	True	Colour units	<5	<5	5
Turbidity		NTU	0.40	<0.10	0.1
Routine Water					
Digestion	Dissolved		Lab filtered & preserved Exceeded	Lab filtered & preserved Exceeded	
pH - Holding Time					
pH	at 25 °C		7.32	8.10	0.01
Electrical Conductivity		µS/cm at 25 °C	108	142	1
T-Alkalinity	as CaCO3	mg/L	26	41	5
Chloride	Dissolved	mg/L	14.3	16.2	0.05
Fluoride	Dissolved	mg/L	0.02	0.02	0.01
Nitrate - N	Dissolved	mg/L	0.02	0.02	0.01
Nitrite - N	Dissolved	mg/L	<0.01	<0.01	0.01
Sulfate (SO4)	Dissolved	mg/L	1.7	1.7	0.1
Hardness	as CaCO3 (dissolved)	mg/L	35	33	5
Total Dissolved Solids	Calculated	mg/L	58	75	1
Langelier Index			-1.5	-0.6	
Trace Metals Total					
Aluminum	Total	mg/L	0.018	0.013	0.001
Antimony	Total	mg/L	0.00003	0.00003	0.00002
Arsenic	Total	mg/L	0.0002	0.0002	0.0001
Barium	Total	mg/L	0.057	0.055	0.0001
Boron	Total	mg/L	0.017	0.017	0.002
Cadmium	Total	mg/L	<0.00001	<0.00001	0.00001
Chromium	Total	mg/L	0.00015	0.00011	0.00005

Terms and Conditions: <https://www.element.com/terms/terms-and-conditions>



Element
 #104, 19575-55 A Ave.
 Surrey, British Columbia
 V3S 8P8, Canada

T: +1 (604) 514-3322
 F: +1 (604) 514-3323
 E: info.vancouver@element.com
 W: www.element.com


Analytical Report

Bill To: City of Parksville
 1116 Herring Gull Way
 Parksville, BC, Canada
 V9P 1R2
 Attn: Accounts Payable
 Sampled By: Barb Silenske
 Company: City of Parksville

Project ID:
 Project Name:
 Project Location:
 LSD:
 P.O.: S22-5095
 Proj. Acct. code:

Lot ID: **1664537**
 Control Number:
 Date Received: Jul 12, 2023
 Date Reported: Jul 18, 2023
 Report Number: 2892868

Reference Number		1664537-4	1664537-5		
Sample Date		Jul 11, 2023	Jul 11, 2023		
Sample Time		10:10	10:30		
Sample Location					
Sample Description		River / 12.7 °C	Work Yard / 12.7 °C		
Matrix		Water	Water		
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Total - Continued					
Copper	Total	mg/L	0.0007	0.0031	0.0002
Iron	Total	mg/L	0.091	0.009	0.002
Lead	Total	mg/L	0.00002	0.00023	0.00001
Manganese	Total	mg/L	0.007	0.002	0.001
Selenium	Total	mg/L	<0.0002	<0.0002	0.0002
Strontium	Total	mg/L	0.051	0.050	0.0001
Uranium	Total	mg/L	<0.00001	<0.00001	0.00001
Zinc	Total	mg/L	0.15	0.15	0.0005

Approved by: 
 Benjamin Morris, B.Sc.

Navigation toolbar with icons for back, forward, search, zoom (75.5%), print, and other document controls.

Terms and Conditions: [http://...](#)



Element
 #104, 19575-55 A Ave.
 Surrey, British Columbia
 V3S 8P8, Canada

T: +1 (604) 514-3322
 F: +1 (604) 514-3323
 E: info.vancouver@element.com
 W: www.element.com

Methodology and Notes

Bill To: City of Parksville 1118 Herring Gull Way Parksville, BC, Canada V9P 1R2	Project ID: Project Name: Project Location: LSD:	Lot ID: 1664537
Attn: Accounts Payable	P.O.: S22-5085	Control Number:
Sampled By: Barb Silenske	Proj. Acct. code:	Date Received: Jul 12, 2023
Company: City of Parksville		Date Reported: Jul 18, 2023
		Report Number: 2892868

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alk, pH, EC, Turb in water (BC)	APHA	* Alkalinity - Titration Method, 2320 B	Jul 12, 2023	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* Conductivity, 2510 B	Jul 12, 2023	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* pH - Electrometric Method, 4500-H+ B	Jul 12, 2023	Element Vancouver
Anions by IEC in water (VAN)	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Jul 12, 2023	Element Vancouver
Cyanide (Total) in water	US EPA	* US EPA method, 335.3	Jul 18, 2023	Element Edmonton - Roper Road
Mercury Low Level (Total) in water (VAN)	EPA	* Mercury in Water by Cold Vapor Atomic Fluorescence Spectrometry, 245.7	Jul 14, 2023	Element Vancouver
Metals SemiTrace (Dissolved) in water (VAN)	US EPA	* Metals & Trace Elements by ICP-AES, 6010C	Jul 12, 2023	Element Vancouver
Metals SemiTrace (Total) in Water (VAN)	US EPA	* Metals & Trace Elements by ICP-AES, 6010C	Jul 13, 2023	Element Vancouver
Total and E-Coli - Colilert - DW (VAN)	APHA	Enzyme Substrate Test, APHA 9223 B	Jul 12, 2023	Element Vancouver
Trace Metals (Total) in Water (VAN)	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Jul 13, 2023	Element Vancouver
True Color in water (VAN)	APHA	* Spectrophotometric - Single Wavelength Method, 2120 C	Jul 12, 2023	Element Vancouver
Turbidity - Water (VAN)	APHA	* Turbidity - Nephelometric Method, 2130 B	Jul 12, 2023	Element Vancouver

* Reference Method Modified

References

APHA Standard Methods for the Examination of Water and Wastewater
 EPA Environmental Protection Agency Test Methods - US
 US EPA US Environmental Protection Agency Test Methods

Comments:

- Jul 12, 2023 - Upon receipt, sample had exceeded recommended temperature for bacterial analysis.



Element
#104, 19575-55 A Ave.
Surrey, British Columbia
V3S 8P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: info.vancouver@element.com
W: www.element.com

Report Transmission Cover Page

Bill To: City of Parksville 1116 Herring Gull Way Parksville, BC, Canada V9P 1R2	Project ID: Project Name: Full Spectrum Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1695092 Control Number: Date Received: Nov 17, 2023 Date Reported: Nov 23, 2023 Report Number: 2944821
Attn: Accounts Payable Sampled By: Barb Silenieks Company: City of Parksville		

Contact	Company	Address
Accounts Payable	City of Parksville	1116 Herring Gull Way Parksville, BC V9P 1R2 Phone: (250) 951-2489 Fax: Email: ap@parksville.ca
<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email	PDF	Invoice
Barbara Silenieks	City of Parksville	1116 Herring Gull Way Parksville, BC V9P 1R2 Phone: (250) 951-2489 Fax: Email: bsilenieks@parksville.ca
<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email	PDF	COA
Email - Merge	PDF	COC / Test Report
Email - Merge	Standard Crosstab Without Tabs	Test Report

Notes To Clients:

- Nov 20, 2023 - Sample 1695092-1; 8988877: Reduction of analytical volume was necessary for chloride analysis to bring results within the analytical range for sample 1695092-1. Detection limits are adjusted accordingly.

The information contained on this and all other pages transmitted, is intended for the addressee only and is considered confidential. If the reader is not the intended recipient, you are hereby notified that any use, dissemination, distribution or copy of this transmission is strictly prohibited. If you receive this transmission by error, or if this transmission is not satisfactory, please notify us by telephone.

Terms and Conditions: <https://www.element.com/terms/terms-and-conditions>



Element
#104, 19575-55 A.Ave.
Surrey, British Columbia
V3S 8P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: info.vancouver@element.com
W: www.element.com

Analytical Report

Bill To: City of Parksville
1116 Herring Gull Way
Parksville, BC, Canada
V9P 1R2
Attn: Accounts Payable
Sampled By: Barb Silenieks
Company: City of Parksville

Project ID:
Project Name: Full Spectrum
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1695092**
Control Number:
Date Received: Nov 17, 2023
Date Reported: Nov 23, 2023
Report Number: 2944821

Reference Number	1695092-1
Sample Date	November 15, 2023
Sample Time	10:25
Sample Location	
Sample Description	Railway # 1 / 12.2 °C
Sample Matrix	Water

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments	
Inorganic Nonmetallic Parameters						
Cyanide	Total	mg/L	<0.002	0.002	0.2	Below MAC
Metals Total						
Calcium	Total	mg/L	34	0.01		
Magnesium	Total	mg/L	17	0.02		
Potassium	Total	mg/L	0.93	0.04		
Silicon	Total	mg/L	11	0.005		
Sodium	Total	mg/L	8.2	0.1	200	Below AO
Digestion	Preparation		Field Pres, digest as total Hg			
Mercury	Total	mg/L	<0.00001	0.00001	0.001	Below MAC
Physical and Aggregate Properties						
Colour	True	Colour units	<5	5		
Turbidity		NTU	0.12	0.1	0.1/0.3/1.0 OG	
Routine Water						
Digestion	Dissolved		Lab filtered & preserved Exceeded			
pH - Holding Time						
pH	at 25 °C		7.61	0.01	7.0-10.5	Within Range
Electrical Conductivity		µS/cm at 25 °C	353	1		
T-Alkalinity	as CaCO3	mg/L	121	5		
Chloride	Dissolved	mg/L	32.0	0.05	250	Below AO
Fluoride	Dissolved	mg/L	0.03	0.01	1.5	Below MAC
Nitrate - N	Dissolved	mg/L	1.36	0.01	10	Below MAC
Nitrite - N	Dissolved	mg/L	<0.01	0.01	1	Below MAC
Sulfate (SO4)	Dissolved	mg/L	7.4	0.1	500	Below AO
Hardness	as CaCO3 (dissolved)	mg/L	161	5		
Total Dissolved Solids	Calculated	mg/L	211	1	500	Below AO
Langelier Index			-0.2			
Trace Metals Total						
Aluminum	Total	mg/L	0.005	0.001	0.1 OG; 2.9 MAC	Below OG
Antimony	Total	mg/L	0.00002	0.00002	0.006	Below MAC
Arsenic	Total	mg/L	0.0004	0.0001	0.010	Below MAC
Barium	Total	mg/L	0.018	0.0001	2.0	Below MAC
Boron	Total	mg/L	0.014	0.002	5	Below MAC
Cadmium	Total	mg/L	<0.00001	0.00001	0.007	Below MAC
Chromium	Total	mg/L	0.0011	0.00005	0.05	Below MAC
Copper	Total	mg/L	0.0018	0.0002	1 AO; 2 MAC	Below AO
Iron						Below AO
Lead						Below MAC

Terms and Conditions: <http://www.element.com/terms-conditions>

Navigation bar with icons for back, home, zoom in, zoom out, 75.5% zoom level, print, search, and other utility icons.



Element
 #104, 19575-55 A Ave.
 Surrey, British Columbia
 V3S 8P8, Canada

T: +1 (604) 514-3322
 F: +1 (604) 514-3323
 E: info.vancouver@element.com
 W: www.element.com

Analytical Report

Bill To: City of Parksville 1116 Herring Gull Way Parksville, BC, Canada V9P 1R2	Project ID: Project Name: Full Spectrum Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1695092 Control Number: Date Received: Nov 17, 2023 Date Reported: Nov 23, 2023 Report Number: 2944821
Attn: Accounts Payable Sampled By: Barb Silenieks Company: City of Parksville		

Reference Number	1695092-1
Sample Date	November 15, 2023
Sample Time	10:25
Sample Location	
Sample Description	Railway # 1 / 12.2 °C
Sample Matrix	Water

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Trace Metals Total - Continued					
Manganese	Total	mg/L	0.009	0.001	0.02 AO; 0.12 MAC
Selenium	Total	mg/L	0.0002	0.0002	0.05
Strontium	Total	mg/L	0.11	0.0001	7.0
Uranium	Total	mg/L	0.00037	0.00001	0.02
Zinc	Total	mg/L	0.0040	0.0005	5.0

Terms and Conditions: <http://>

Navigation toolbar with icons for mouse, touch, zoom (75.5%), print, search, and other functions.



Element
#104, 19575-55 A Ave.
Surrey, British Columbia
V3S 8P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: info.vancouver@element.com
W: www.element.com

Analytical Report

Bill To: City of Parksville
1116 Herring Gull Way
Parksville, BC, Canada
V9P 1R2
Attn: Accounts Payable
Sampled By: Barb Silenieks
Company: City of Parksville

Project ID:
Project Name: Full Spectrum
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1695092**
Control Number:
Date Received: Nov 17, 2023
Date Reported: Nov 23, 2023
Report Number: 2944821

Reference Number	1695092-2
Sample Date	November 15, 2023
Sample Time	10:05
Sample Location	
Sample Description	Railway # 6 / 12.2 °C
Sample Matrix	Water

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments	
Inorganic Nonmetallic Parameters						
Cyanide	Total	mg/L	<0.002	0.002	0.2	Below MAC
Metals Total						
Calcium	Total	mg/L	28	0.01		
Magnesium	Total	mg/L	14	0.02		
Potassium	Total	mg/L	0.95	0.04		
Silicon	Total	mg/L	12	0.005		
Sodium	Total	mg/L	9.1	0.1	200	Below AO
Digestion	Preparation		Field Pres, digest as total Hg			
Mercury	Total	mg/L	<0.00001	0.00001	0.001	Below MAC
Physical and Aggregate Properties						
Colour	True	Colour units	<5	5		
Turbidity		NTU	0.15	0.1	0.1/0.3/1.0 OG	
Routine Water						
Digestion	Dissolved		Lab filtered & preserved Exceeded			
pH - Holding Time						
pH	at 25 °C		7.49	0.01	7.0-10.5	Within Range
Electrical Conductivity		µS/cm at 25 °C	300	1		
T-Alkalinity	as CaCO3	mg/L	110	5		
Chloride	Dissolved	mg/L	25.3	0.05	250	Below AO
Fluoride	Dissolved	mg/L	0.03	0.01	1.5	Below MAC
Nitrate - N	Dissolved	mg/L	0.88	0.01	10	Below MAC
Nitrite - N	Dissolved	mg/L	<0.01	0.01	1	Below MAC
Sulfate (SO4)	Dissolved	mg/L	4.9	0.1	500	Below AO
Hardness	as CaCO3 (dissolved)	mg/L	130	5		
Total Dissolved Solids	Calculated	mg/L	186	1	500	Below AO
Langelier Index			-0.4			
Trace Metals Total						
Aluminum	Total	mg/L	0.005	0.001	0.1 OG; 2.9 MAC	Below OG
Antimony	Total	mg/L	0.00003	0.00002	0.006	Below MAC
Arsenic	Total	mg/L	0.0005	0.0001	0.010	Below MAC
Barium	Total	mg/L	0.017	0.0001	2.0	Below MAC
Boron	Total	mg/L	0.013	0.002	5	Below MAC
Cadmium	Total	mg/L	0.00003	0.00001	0.007	Below MAC
Chromium	Total	mg/L	0.00073	0.00005	0.05	Below MAC
Copper	Total	mg/L	0.0005	0.0002	1 AO; 2 MAC	Below AO
Iron						Below AO
Lead						Below MAC

Terms and Conditions: <http://www.element.com/terms-conditions>

Navigation bar with icons for back, home, zoom in (+), zoom out (-), 75.5% zoom level, print, search, and other utility icons.



Element
 #104, 19575-55 A Ave.
 Surrey, British Columbia
 V3S 8P8, Canada

T: +1 (604) 514-3322
 F: +1 (604) 514-3323
 E: info.vancouver@element.com
 W: www.element.com

Analytical Report

Bill To: City of Parksville
 1116 Herring Gull Way
 Parksville, BC, Canada
 V9P 1R2
 Attn: Accounts Payable
 Sampled By: Barb Silenieks
 Company: City of Parksville

Project ID:
 Project Name: Full Spectrum
 Project Location:
 LSD:
 P.O.:
 Proj. Acct. code:

Lot ID: **1695092**
 Control Number:
 Date Received: Nov 17, 2023
 Date Reported: Nov 23, 2023
 Report Number: 2944821

Reference Number	1695092-2
Sample Date	November 15, 2023
Sample Time	10:05
Sample Location	
Sample Description	Railway # 6 / 12.2 °C
Sample Matrix	Water

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Trace Metals Total - Continued					
Manganese	Total	mg/L	0.005	0.001	0.02 AO; 0.12 MAC
Selenium	Total	mg/L	<0.0002	0.0002	0.05
Strontium	Total	mg/L	0.086	0.0001	7.0
Uranium	Total	mg/L	0.00034	0.00001	0.02
Zinc	Total	mg/L	0.0013	0.0005	5.0

Terms and Conditions: <https://www.element.com/terms/terms-and-conditions>



Element
#104, 19575-55 A Ave.
Surrey, British Columbia
V3S 8P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: info.vancouver@element.com
W: www.element.com

Analytical Report

Bill To: City of Parksville
1116 Herring Gull Way
Parksville, BC, Canada
V9P 1R2
Attn: Accounts Payable
Sampled By: Barb Silenieks
Company: City of Parksville

Project ID:
Project Name: Full Spectrum
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1695092**
Control Number:
Date Received: Nov 17, 2023
Date Reported: Nov 23, 2023
Report Number: 2944821

Reference Number	1695092-3
Sample Date	November 15, 2023
Sample Time	09:45
Sample Location	
Sample Description	Springwood # 7 / 12.2 °C
Sample Matrix	Water

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments	
Inorganic Nonmetallic Parameters						
Cyanide	Total	mg/L	<0.002	0.002	0.2	Below MAC
Metals Total						
Calcium	Total	mg/L	48	0.01		
Magnesium	Total	mg/L	24	0.02		
Potassium	Total	mg/L	1.1	0.04		
Silicon	Total	mg/L	12	0.005		
Sodium	Total	mg/L	8.7	0.1	200	Below AO
Digestion	Preparation		Field Pres, digest as total Hg			
Mercury	Total	mg/L	<0.00001	0.00001	0.001	Below MAC
Physical and Aggregate Properties						
Colour	True	Colour units	<5	5		
Turbidity		NTU	0.25	0.1	0.1/0.3/1.0 OG	
Routine Water						
Digestion	Dissolved		Lab filtered & preserved Exceeded			
pH - Holding Time						
pH	at 25 °C		7.47	0.01	7.0-10.5	Within Range
Electrical Conductivity		µS/cm at 25 °C	456	1		
T-Alkalinity	as CaCO3	mg/L	199	5		
Chloride	Dissolved	mg/L	22.1	0.05	250	Below AO
Fluoride	Dissolved	mg/L	0.02	0.01	1.5	Below MAC
Nitrate - N	Dissolved	mg/L	1.14	0.01	10	Below MAC
Nitrite - N	Dissolved	mg/L	<0.01	0.01	1	Below MAC
Sulfate (SO4)	Dissolved	mg/L	8.2	0.1	500	Below AO
Hardness	as CaCO3 (dissolved)	mg/L	220	5		
Total Dissolved Solids	Calculated	mg/L	273	1	500	Below AO
Langelier Index			0.03			
Trace Metals Total						
Aluminum	Total	mg/L	0.002	0.001	0.1 OG; 2.9 MAC	Below OG
Antimony	Total	mg/L	0.00009	0.00002	0.008	Below MAC
Arsenic	Total	mg/L	0.0003	0.0001	0.010	Below MAC
Barium	Total	mg/L	0.0087	0.0001	2.0	Below MAC
Boron	Total	mg/L	0.011	0.002	5	Below MAC
Cadmium	Total	mg/L	<0.00001	0.00001	0.007	Below MAC
Chromium	Total	mg/L	0.00073	0.00005	0.05	Below MAC
Copper	Total	mg/L	0.0023	0.0002	1 AO; 2 MAC	Below AO
Iron						Below AO
Lead						Below MAC

Terms and Conditions: http

Navigation bar with icons for back, home, zoom in (+), zoom out (-), zoom level (75.5%), print, search, and other utility icons.



Element
 #104, 19575-55 A.Ave.
 Surrey, British Columbia
 V3S 8P8, Canada

T: +1 (604) 514-3322
 F: +1 (604) 514-3323
 E: info.vancouver@element.com
 W: www.element.com

Analytical Report

Bill To: City of Parksville
 1116 Herring Gull Way
 Parksville, BC, Canada
 V9P 1R2
 Attn: Accounts Payable
 Sampled By: Barb Silenieks
 Company: City of Parksville

Project ID:
 Project Name: Full Spectrum
 Project Location:
 LSD:
 P.O.:
 Proj. Acct. code:

Lot ID: **1695092**
 Control Number:
 Date Received: Nov 17, 2023
 Date Reported: Nov 23, 2023
 Report Number: 2944821

Reference Number	1695092-3
Sample Date	November 15, 2023
Sample Time	09:45
Sample Location	
Sample Description	Springwood # 7 / 12.2 °C
Sample Matrix	Water

Analyte		Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Trace Metals Total - Continued						
Manganese	Total	mg/L	0.016	0.001	0.02 AO; 0.12 MAC	Below AO
Selenium	Total	mg/L	<0.0002	0.0002	0.05	Below MAC
Strontium	Total	mg/L	0.13	0.0001	7.0	Below MAC
Uranium	Total	mg/L	0.00045	0.00001	0.02	Below MAC
Zinc	Total	mg/L	0.0024	0.0005	5.0	Below AO

Terms and Conditions: <https://www.element.com/terms/terms-and-conditions>



Element
#104, 19575-55 A Ave.
Surrey, British Columbia
V3S 9P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: info.vancouver@element.com
W: www.element.com

Analytical Report

Bill To: City of Parksville
1116 Herring Gull Way
Parksville, BC, Canada
V9P 1R2
Attn: Accounts Payable
Sampled By: Barb Silenieks
Company: City of Parksville

Project ID:
Project Name: Full Spectrum
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1695092**
Control Number:
Date Received: Nov 17, 2023
Date Reported: Nov 23, 2023
Report Number: 2944821

Reference Number	1695092-4
Sample Date	November 15, 2023
Sample Time	09:25
Sample Location	
Sample Description	Ermineskin / 12.2 °C
Sample Matrix	Water

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments	
Inorganic Nonmetallic Parameters						
Cyanide	Total	mg/L	<0.002	0.002	0.2	Below MAC
Metals Total						
Calcium	Total	mg/L	34	0.01		
Magnesium	Total	mg/L	16	0.02		
Potassium	Total	mg/L	0.88	0.04		
Silicon	Total	mg/L	11	0.005		
Sodium	Total	mg/L	10	0.1	200	Below AO
Digestion	Preparation		Field Pres, digest as total Hg			
Mercury	Total	mg/L	<0.00001	0.00001	0.001	Below MAC
Physical and Aggregate Properties						
Colour	True	Colour units	<5	5		
Turbidity		NTU	<0.10	0.1	0.1/0.3/1.0 OG	
Routine Water						
Digestion	Dissolved		Lab filtered & preserved Exceeded			
pH - Holding Time						
pH	at 25 °C		7.46	0.01	7.0-10.5	Within Range
Electrical Conductivity		µS/cm at 25 °C	345	1		
T-Alkalinity	as CaCO3	mg/L	126	5		
Chloride	Dissolved	mg/L	27.6	0.05	250	Below AO
Fluoride	Dissolved	mg/L	0.03	0.01	1.5	Below MAC
Nitrate - N	Dissolved	mg/L	1.33	0.01	10	Below MAC
Nitrite - N	Dissolved	mg/L	<0.01	0.01	1	Below MAC
Sulfate (SO4)	Dissolved	mg/L	7.1	0.1	500	Below AO
Hardness	as CaCO3 (dissolved)	mg/L	153	5		
Total Dissolved Solids	Calculated	mg/L	209	1	500	Below AO
Langelier Index			-0.3			
Trace Metals Total						
Aluminum	Total	mg/L	0.003	0.001	0.1 OG; 2.9 MAC	Below OG
Antimony	Total	mg/L	0.00002	0.00002	0.006	Below MAC
Arsenic	Total	mg/L	0.0003	0.0001	0.010	Below MAC
Barium	Total	mg/L	0.012	0.0001	2.0	Below MAC
Boron	Total	mg/L	0.013	0.002	5	Below MAC
Cadmium	Total	mg/L	<0.00001	0.00001	0.007	Below MAC
Chromium	Total	mg/L	0.00057	0.00005	0.05	Below MAC
Copper	Total	mg/L	0.011	0.0002	1 AO; 2 MAC	Below AO
Iron						Below AO
Lead						Below AO

Terms and Conditions: http

Navigation bar with icons for back, home, search, zoom (75.5%), print, and other document functions.



Element
 #104, 19575-55 A Ave.
 Surrey, British Columbia
 V3R 8P8, Canada

T: +1 (604) 514-3322
 F: +1 (604) 514-3323
 E: info.vancouver@element.com
 W: www.element.com

Analytical Report

Bill To: City of Parksville
 1116 Herring Gull Way
 Parksville, BC, Canada
 V9P 1R2
 Attn: Accounts Payable
 Sampled By: Barb Silenieks
 Company: City of Parksville

Project ID:
 Project Name: Full Spectrum
 Project Location:
 LSD:
 P.O.:
 Proj. Acct. code:

Lot ID: **1695092**
 Control Number:
 Date Received: Nov 17, 2023
 Date Reported: Nov 23, 2023
 Report Number: 2944821

Reference Number	1695092-4
Sample Date	November 15, 2023
Sample Time	09:25
Sample Location	
Sample Description	Ermieskin / 12.2 °C
Sample Matrix	Water

Analyte		Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Trace Metals Total - Continued						
Manganese	Total	mg/L	0.008	0.001	0.02 AO; 0.12 MAC	Below AO
Selenium	Total	mg/L	<0.0002	0.0002	0.05	Below MAC
Strontium	Total	mg/L	0.11	0.0001	7.0	Below MAC
Uranium	Total	mg/L	0.00025	0.00001	0.02	Below MAC
Zinc	Total	mg/L	0.012	0.0005	5.0	Below AO

Terms and Conditions: <http://>

Navigation toolbar with icons for mouse, hand, zoom in (+), zoom out (-), 75.5% zoom level, print, search, and other document controls.



Element
#104, 19575-55 A Ave.
Surrey, British Columbia
V3S 8P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: info.vancouver@element.com
W: www.element.com

Analytical Report

Bill To: City of Parksville
1116 Herring Gull Way
Parksville, BC, Canada
V9P 1R2
Attn: Accounts Payable
Sampled By: Barb Silenieks
Company: City of Parksville

Project ID:
Project Name: Full Spectrum
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1695092**
Control Number:
Date Received: Nov 17, 2023
Date Reported: Nov 23, 2023
Report Number: 2944821

Reference Number	1695092-5
Sample Date	November 15, 2023
Sample Time	10:45
Sample Location	
Sample Description	Works Yard / 12.2 °C
Sample Matrix	Water

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments	
Inorganic Nonmetallic Parameters						
Cyanide	Total	mg/L	<0.002	0.002	0.2	Below MAC
Metals Total						
Calcium	Total	mg/L	16	0.01		
Magnesium	Total	mg/L	5.9	0.02		
Potassium	Total	mg/L	0.42	0.04		
Silicon	Total	mg/L	5.6	0.005		
Sodium	Total	mg/L	10	0.1	200	Below AO
Digestion	Preparation		Field Pres. digest as total Hg			
Mercury	Total	mg/L	<0.00001	0.00001	0.001	Below MAC
Physical and Aggregate Properties						
Colour	True	Colour units	<5	5		
Turbidity		NTU	<0.10	0.1	0.1/0.3/1.0 OG	
Routine Water						
Digestion	Dissolved		Lab filtered & preserved Exceeded			
pH - Holding Time						
pH	at 25 °C		7.46	0.01	7.0-10.5	Within Range
Electrical Conductivity		µS/cm at 25 °C	184	1		
T-Alkalinity	as CaCO3	mg/L	65	5		
Chloride	Dissolved	mg/L	15.2	0.05	250	Below AO
Fluoride	Dissolved	mg/L	0.02	0.01	1.5	Below MAC
Nitrate - N	Dissolved	mg/L	0.53	0.01	10	Below MAC
Nitrite - N	Dissolved	mg/L	<0.01	0.01	1	Below MAC
Sulfate (SO4)	Dissolved	mg/L	3.6	0.1	500	Below AO
Hardness	as CaCO3 (dissolved)	mg/L	66	5		
Total Dissolved Solids	Calculated	mg/L	108	1	500	Below AO
Langelier Index			-0.9			
Trace Metals Total						
Aluminum	Total	mg/L	0.011	0.001	0.1 OG; 2.9 MAC	Below OG
Antimony	Total	mg/L	0.00002	0.00002	0.006	Below MAC
Arsenic	Total	mg/L	0.0001	0.0001	0.010	Below MAC
Barium	Total	mg/L	0.011	0.0001	2.0	Below MAC
Boron	Total	mg/L	0.010	0.002	5	Below MAC
Cadmium	Total	mg/L	<0.00001	0.00001	0.007	Below MAC
Chromium	Total	mg/L	0.00025	0.00005	0.05	Below MAC
Copper	Total	mg/L	0.015	0.0002	1 AO; 2 MAC	Below AO
Iron						Below AO
Lead						Below MAC

Terms and Conditions: http



Element
#104, 19575-55 A Ave.
Surrey, British Columbia
V3B 8P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: info.vancouver@element.com
W: www.element.com

Analytical Report

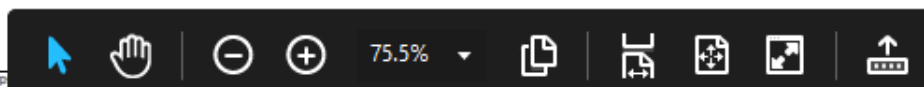
Bill To: City of Parksville
1116 Herring Gull Way
Parksville, BC, Canada
V9P 1R2
Attn: Accounts Payable
Sampled By: Barb Silenieks
Company: City of Parksville

Project ID:
Project Name: Full Spectrum
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1695092**
Control Number:
Date Received: Nov 17, 2023
Date Reported: Nov 23, 2023
Report Number: 2944821

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Reference Number 1695092-5					
Sample Date November 15, 2023					
Sample Time 10:45					
Sample Location					
Sample Description Works Yard / 12.2 °C					
Sample Matrix Water					
Trace Metals Total - Continued					
Manganese	Total	mg/L	0.003	0.001	0.02 AO; 0.12 MAC
Selenium	Total	mg/L	<0.0002	0.0002	0.05
Strontium	Total	mg/L	0.049	0.0001	7.0
Uranium	Total	mg/L	0.00007	0.00001	0.02
Zinc	Total	mg/L	0.0065	0.0005	5.0

Terms and Conditions: <http://>





Element
#104, 19575-55 A Ave.
Surrey, British Columbia
V3S 8P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: info.vancouver@element.com
W: www.element.com

Analytical Report

Bill To: City of Parksville 1116 Herring Gull Way Parksville, BC, Canada V9P 1R2	Project ID: Project Name: Full Spectrum Project Location: LSD: P.O.:	Lot ID: 1695092 Control Number: Date Received: Nov 17, 2023 Date Reported: Nov 23, 2023 Report Number: 2944821
Attn: Accounts Payable Sampled By: Barb Silenieks Company: City of Parksville	Proj. Acct. code:	

Reference Number	1695092-6
Sample Date	November 20, 2023
Sample Time	10:30
Sample Location	
Sample Description	Railway # 1 / 1.6 °C
Sample Matrix	Water

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments	
Microbiological Analysis						
Total Coliforms	Enzyme Substrate Test	MPN/100 mL	<1.0	1.0	0 per 100 mL	Below MAC
Escherichia coli	Enzyme Substrate Test	MPN/100 mL	<1.0	1.0	0 per 100 mL	Below MAC



Element
#104, 19575-55 A Ave.
Surrey, British Columbia
V3S 8P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: info.vancouver@element.com
W: www.element.com

Analytical Report

Bill To: City of Parksville 1116 Herring Gull Way Parksville, BC, Canada V9P 1R2	Project ID: Project Name: Full Spectrum Project Location: LSD: P.O.:	Lot ID: 1695092 Control Number: Date Received: Nov 17, 2023 Date Reported: Nov 23, 2023 Report Number: 2944821
Attn: Accounts Payable Sampled By: Barb Silenieks Company: City of Parksville	Proj. Acct. code:	

Reference Number	1695092-7
Sample Date	November 20, 2023
Sample Time	10:20
Sample Location	
Sample Description	Railway # 6 / 1.6 °C
Sample Matrix	Water

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments	
Microbiological Analysis						
Total Coliforms	Enzyme Substrate Test	MPN/100 mL	<1.0	1.0	0 per 100 mL	Below MAC
Escherichia coli	Enzyme Substrate Test	MPN/100 mL	<1.0	1.0	0 per 100 mL	Below MAC



Element
#104, 19575-55 A Ave.
Surrey, British Columbia
V3S 8P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: info.vancouver@element.com
W: www.element.com

Page 13 of 17

Analytical Report

Bill To: City of Parksville 1116 Herring Gull Way Parksville, BC, Canada V9P 1R2	Project ID: Project Name: Full Spectrum Project Location: LSD: P.O.:	Lot ID: 1695092 Control Number: Date Received: Nov 17, 2023 Date Reported: Nov 23, 2023 Report Number: 2944821
Attn: Accounts Payable Sampled By: Barb Silenieks Company: City of Parksville	Proj. Acct. code:	

Reference Number	1695092-8
Sample Date	November 20, 2023
Sample Time	09:25
Sample Location	
Sample Description	Springwood # 7 / 1.6 °C
Sample Matrix	Water

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments	
Microbiological Analysis						
Total Coliforms	Enzyme Substrate Test	MPN/100 mL	<1.0	1.0	0 per 100 mL	Below MAC
Escherichia coli	Enzyme Substrate Test	MPN/100 mL	<1.0	1.0	0 per 100 mL	Below MAC



Element
#104, 19575-55 A Ave.
Surrey, British Columbia
V3S 8P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: info.vancouver@element.com
W: www.element.com

Page 14 of 17

Analytical Report

Bill To: City of Parksville 1116 Herring Gull Way Parksville, BC, Canada V9P 1R2	Project ID: Project Name: Full Spectrum Project Location: LSD: P.O.:	Lot ID: 1695092 Control Number: Date Received: Nov 17, 2023 Date Reported: Nov 23, 2023 Report Number: 2944821
Attn: Accounts Payable Sampled By: Barb Silenieks Company: City of Parksville	Proj. Acct. code:	

Reference Number	1695092-9
Sample Date	November 20, 2023
Sample Time	10:40
Sample Location	
Sample Description	Ermieskin / 1.6 °C
Sample Matrix	Water

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments	
Microbiological Analysis						
Total Coliforms	Enzyme Substrate Test	MPN/100 mL	<1.0	1.0	0 per 100 mL	Below MAC
Escherichia coli	Enzyme Substrate Test	MPN/100 mL	<1.0	1.0	0 per 100 mL	Below MAC



Element
#104, 19575-55 A Ave.
Surrey, British Columbia
V3S 8P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: info.vancouver@element.com
W: www.element.com

Analytical Report

Bill To: City of Parksville 1116 Herring Gull Way Parksville, BC, Canada V9P 1R2	Project ID: Project Name: Full Spectrum Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1695092 Control Number: Date Received: Nov 17, 2023 Date Reported: Nov 23, 2023 Report Number: 2944821
Attn: Accounts Payable Sampled By: Barb Silenieks Company: City of Parksville		

Reference Number	1695092-10
Sample Date	November 20, 2023
Sample Time	10:55
Sample Location	
Sample Description	Works Yard / 1.6 °C
Sample Matrix	Water

Analyte		Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Microbiological Analysis						
Total Coliforms	Enzyme Substrate Test	MPN/100 mL	<1.0	1.0	0 per 100 mL	Below MAC
Escherichia coli	Enzyme Substrate Test	MPN/100 mL	<1.0	1.0	0 per 100 mL	Below MAC



Element
#104, 19575-55 A Ave.
Surrey, British Columbia
V3S 8P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: info.vancouver@element.com
W: www.element.com

Methodology and Notes

Bill To: City of Parksville 1116 Herring Gull Way Parksville, BC, Canada V9P 1R2 Attn: Accounts Payable Sampled By: Barb Silenieks Company: City of Parksville	Project ID: Project Name: Full Spectrum Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1695092 Control Number: Date Received: Nov 17, 2023 Date Reported: Nov 23, 2023 Report Number: 2944821
--	---	---

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alk, pH, EC, Turb in water (BC)	APHA	* Alkalinity - Titration Method, 2320 B	Nov 20, 2023	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* Conductivity, 2510 B	Nov 20, 2023	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* pH - Electrometric Method, 4500-H+ B	Nov 20, 2023	Element Vancouver
Anions by IEC in water (VAN)	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Nov 17, 2023	Element Vancouver
Cyanide (Total) in water	US EPA	* US EPA method, 335.3	Nov 22, 2023	Element Edmonton - Roper Road
Mercury Low Level (Total) in water (VAN)	EPA	* Mercury in Water by Cold Vapor Atomic Fluorescence Spectrometry, 245.7	Nov 21, 2023	Element Vancouver
Metals SemiTrace (Dissolved) in water (VAN)	US EPA	* Metals & Trace Elements by ICP-AES, 6010C	Nov 20, 2023	Element Vancouver
Metals SemiTrace (Total) in Water (VAN)	US EPA	* Metals & Trace Elements by ICP-AES, 6010C	Nov 20, 2023	Element Vancouver
Total and E-Coli - Colilert - DW (VAN)	APHA	Enzyme Substrate Test, APHA 9223 B	Nov 21, 2023	Element Vancouver
Trace Metals (Total) in Water (VAN)	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Nov 20, 2023	Element Vancouver
True Color in water (VAN)	APHA	* Spectrophotometric - Single Wavelength Method, 2120 C	Nov 18, 2023	Element Vancouver
Turbidity - Water (VAN)	APHA	* Turbidity - Nephelometric Method, 2130 B	Nov 17, 2023	Element Vancouver

* Reference Method Modified

References

APHA Standard Methods for the Examination of Water and Wastewater
 EPA Environmental Protection Agency Test Methods - US
 US EPA US Environmental Protection Agency Test Methods

Guidelines

Guideline Description Health Canada GCDWQ
 Guideline Source Guidelines for Canadian Drinking Water Quality, Health Canada, Sept 2020
 Guideline Comments MAC = Maximum Acceptable Concentration
 AO = Aesthetic Objective
 OG = Operational Guideline for Water Treatment Plants
 (does not apply to private groundwater wells).
 Refer to Health Canada for complete guidelines at www.hc-sc.gc.ca

Comments:

- Nov 20, 2023 - Sample 1695092-1; 8988877: Reduction of analytical volume was necessary for chloride analysis to bring results within the analytical range for sample 1695092-1. Detection limits are adjusted accordingly.

Appendix F - Water System Operating Condition



CITY OF PARKSVILLE
 MAR 02 2016
 OPERATIONS
 HEALTH PROTECTION

PERMIT to OPERATE

A WATER SUPPLY SYSTEM
A Drinking Water System with 301- 10,000 connections

Water System Name: **PARKSVILLE, WWS**
 Premises Number: **1310814**
 Premises Address: **1116 Herring Gull Way
 Parksville, BC
 V9P 2H3**
 Water System Owner: **City of Parksville**

City of Parksville is hereby permitted to operate the above potable water supply system and is required to operate this system in accordance with the Drinking Water Protection Act and in accordance with the conditions set out in this operating permit and conditions established as part of any construction permit.

The water supply system for which this operating permit applies is generally described as:

Service Delivery Area: **Englishman River Water Service Area**
 Source Water: **Multiple wells & Englishman River (May to October)**
 Water Treatment methods are: **None**
 Water Disinfection methods are: **Chlorination (liquid & gas).**
 Number of Connections **301-10,000 Connections - DWT**

Operating conditions specific to this water supply system are in Appendix A.

Date: July 1, 1992

Issued By: *Bill W. ...*
 Environmental Health Officer

**This permit must be displayed
 in a conspicuous place and is not transferable**

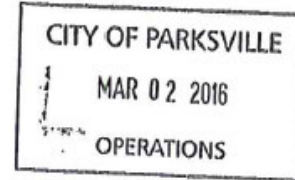


Excellent health and care for everyone,
everywhere, everytime.



March 1, 2016

Mike Squire
Program Manager
Englishman River Water Service
1116 Herring Gull Way
PO Box 1390
Parksville, BC V9P 2H3



Dear Mike:

**Re: Changes to Terms and Conditions of the City of Parksville Water System
Operating Permit**

Please find enclosed an amended operating permit issued under section 8(4) of the *Drinking Water Protection Act* (the "Act"). The terms and conditions are attached as Appendix A (Operational) and Appendix B (Surface Water Treatment Objectives) and are effective **March 1, 2016**.

The terms and conditions, Appendix A dated April, 2009 is hereby rescinded.

In accordance to section 8(1)(b) of the Act, the water supply system must be operated in accordance with these terms and conditions. It is understood that Appendix B timeframes are target dates. Large construction projects may encounter unforeseen delays which may prohibit the completion of the project by the listed dates.

Upon completion of the water treatment plant, this proposed permit will have to be amended to reflect the new works. At that time the City of Parksville will have to request an amendment to their Operating Permit. For example, performance standards for the selected filtration technology would be listed on the Operating Permit but are not reflected in this Permit.

Please also note that water suppliers have various responsibilities under the Act and the *Drinking Water Protection Regulation* (The "Regulation"), beyond those set out as terms and conditions of the operating permit. It is your responsibility to familiarize yourself with the Act and Regulations. See section 2.2 of part A of the *Drinking Water Officer's Guide* for a summary of responsibilities and references to some of the relevant provisions of the Act and Regulation. This is intended for basic information purposes only.

If you have any questions about this operating permit, please do not hesitate to contact me at (250) 947.8222 or by email at bill.wrathall@viha.ca

Health Protection and Environmental Services
489 Alberni Highway, Parksville, BC V9P 1J9

Phone: 250-947-8222
Fax: 250-951-9576

March 1, 2016

Appendix A - Operational

**Water System Operating Permit Terms and Conditions For the Current
City of Parkville Water System**

The permit holder is advised the following Terms and Conditions are in addition to other legislated responsibilities and obligations such as:

- The Drinking Water Protection Act, ([SBC 2001] Chapter 9
 - The Drinking Water Protection Regulation (B.C. Reg. 200/2003 O.C. 508/2003)
1. Adhere to monitoring requirements to ensure the efficacy of disinfection and/or treatment technology. Provide a minimum of 0.2 mg/L of residual disinfectant, measured as *free* chlorine for the water entering the system. The level of residual disinfectant at any point within the distribution system should be at least 0.05 mg/L, measured as *total* or *free* chlorine.

If detectable levels of chlorine are not observed during routine residual analysis in the distribution system, the water supplier shall obtain water samples and have them analyzed for total coliform and *Escherichia coli*, and undertake any necessary steps to return a chlorine residual as *total* and *free* chlorine.
 2. Provide continuous on-line turbidity monitoring of raw water for the Englishman River during drawing periods (May through October or as applicable) to ensure less than or equal to 1 NTU of turbidity in finished water. Ensure the Emergency Response Plan includes appropriate action for turbidity events as detailed in the "*Decision Tree for Responding to a Turbidity Event in Unfiltered Drinking Water*".
 3. Routine surveillance and evaluation of a source water protection program and emergency response plan to identify and respond to any activity that may impact or cause changes to the source water.
 4. Adhere to a sampling program as approved by the Drinking Water Officer and according to BCWWA standards or equivalent. Maintain records of all monitoring conducted. The sampling program is to include, but is not necessarily limited to, the following:
 - Bacteriological testing at representative locations within the distribution system.
 - Chemical testing in accordance with the *Guidelines Canadian Drinking Water Quality* or parameters specified in the *VIIHA Guidelines for Approval of Water Supply Systems*.
 - Chlorine disinfectant concentration testing at representative locations within the distribution system.
 5. Adhere to maintenance and operating procedures as approved by the Drinking Water Officer and abide by BCWWA standards or equivalent. Maintenance and operating procedures shall address but is not necessarily limited to:
 - Source water and intake protection.

March 1, 2016

Appendix B – Surface Water Treatment Objectives

**Water System Operating Permit Terms and Conditions For
City of Parksville Water System**

The permit holder is advised the following Terms and Conditions are in addition to other legislated responsibilities and obligations such as:

- The *Drinking Water Protection Act*, ([SBC 2001] Chapter 9)
- The *Drinking Water Protection Regulation* (B.C. Reg. 200/2003 O.C. 508/2003)

-
1. Englishman River water source must be treated in accordance with the *Drinking Water Treatment Objectives (Microbiological) for Surface Water Systems in British Columbia* to achieve the following performance standard:
 - 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 one (1) nephelometric turbidity unit (NTU) of turbidity in finished water.

 2. Establish an implementation strategy towards meeting the SWTO's with a projected water treatment plant operational date by September 30, 2018. The following timeframes and critical objectives are identified:
 - December 1, 2016 - Submission of construction permit application(s) for the water treatment plant, intake, pump station and transmission mains.
 - March 31, 2017- Construction commencement.
 - June 30, 2018 – Construction complete.
 - July 1, 2018 – Commissioning commences.
 - September 30, 2018 – Plant operational.

If unforeseen and/or extenuating circumstances prevent completion of the water treatment plant by September 30, 2018 the water supplier must notify the Environmental Health Officer (EHO), a minimum of 90 days in advance of the deadline, and provide rationale for the delay. Any changes to the operating permit must be approved by the EHO in writing.

3. Provide formal project updates by the following dates:
 - July 29, 2016.
 - January 27, 2017.
 - July 28, 2017.
 - January 31, 2018.

* Project updates may be written or in presentation format.

For questions related to this report, please contact the Operations Department:
Phone: 250 248-5412 E-mail: BSilenieks@Parksville.ca