

2019 Annual Water Report



1116 Herring Gull Way
Parksville, BC V9P 1R2

Phone: 250 248-5412
Fax: 250 248-6140

P O Box 1390
Parksville, BC V9P 2H3

Report by: Barbara Silenieks
Utilities Technician

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1.0 Introduction

This report provides information such as explanation of water source, water test results, maintenance programs and improvements to the water system. This is a requirement under the City of Parksville operating conditions, shown in Appendix G.

This report has been submitted to Island Health and is available on the City of Parksville website at www.parksville.ca [City Hall/Departments/Operations/Water].

2.0 Parksville Water System

The City of Parksville has about 5,000 water connections serving over 12,500 permanent as well as supplying water to the Regional District of Nanaimo (Nanose Bay Peninsula system). The City has four reservoirs at both ends of the City.

The City gets the water from three sources.

- Englishman River
- Springwood Well Field
- Railway Well Field

The water from the Englishman River goes through the Englishman River Water Treatment Plant, which can produce 16 megalitres 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. This is based on the BC Drinking Water Protection Act and the BC Drinking Water Protection Regulation.

Well water is treated using liquid chlorine and stored in four reservoirs where it gets mixed with the water from the water treatment plant.



Englishman River Water Treatment Plant
Operational October 2019

2.1 Groundwater Wells

The City's groundwater is pumped from a confined quadra sands aquifer that runs underground alongside the railway tracks from Trill Drive to the City's boundary in the southwest. The City currently has 16 production wells online.

See **Appendix A** for well locations.

Well Name	Pump intake (m)	Production (l/s)
Springwood Well #1	22.8	2.4
Springwood Well #3	30.36	4.8
Springwood Well #5	30.52	5.5
Springwood Well #6	31.8	5.4
Springwood Well #7	22.35	10.7
Springwood Well #8	23.71	10.2
Springwood Well #9	-	-
Springwood Well #10	32.18	6.8
Springwood Well #11	30.42	5.6
Railway Well#1	35	4.2
Railway Well#2	34.15	6.1
Railway Well#3	38.46	2.4
Railway Well#4	35.67	3.4
Railway Well#5	36	5.9
Railway Well#6	35	2.9
Railway Well#7	35	5.7
Railway Well #8	35.68	3.2
Industrial Well#8	-	-

Pump Depth and Production Information

2.2 River Intake

From the beginning of April to mid October, the City pumped 1,015,675 m³ of water from the Englishman River via the old intake to keep up with summer demands. On November 4th the City's new Water Treatment Plant went online and from November 4th to December 31st the City pumped 75,570 m³ of water from the Englishman River.



The water in the Englishman River is partially supplied from the Arrowsmith Dam. The Ministry of Environment, Fisheries and the Arrowsmith Water Service (AWS) developed an operating rule curve in an effort to conserve reservoir storage water for critical fisheries rearing periods. A minimum flow is released into the river based on this curve between June and October .

2.3 Arrowsmith Dam

The City of Parksville, the Regional District of Nanaimo, and the Town of Qualicum are partners in the Arrowsmith Water Service (AWS). A concrete gravity dam located at Arrowsmith Lake about nineteen km south of Parksville, was 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, a 900 mm and a 600 mm with flows and lake levels monitored by the City's Supervisory Control and Data Acquisition (SCADA) system.

See **Appendix B** for Arrowsmith Dam Lakes Levels 2019.

2.4 Reservoirs

Water which has been pumped either from the ground or from the river is stored in four reservoirs. Reservoirs numbers 1, 2 and 4 are located in the Springwood Water Complex on Despard Road. These three are concrete with two being partially below ground and one above. Storage capacities are:

- Reservoir #1 - 616 m³ (135,500 Imp. gal).
- Reservoir #2 - 2023 m³ (445,000 Imp. gal).
- Reservoir #4 - 4559 m³ (1,000,000 Imp. gal).

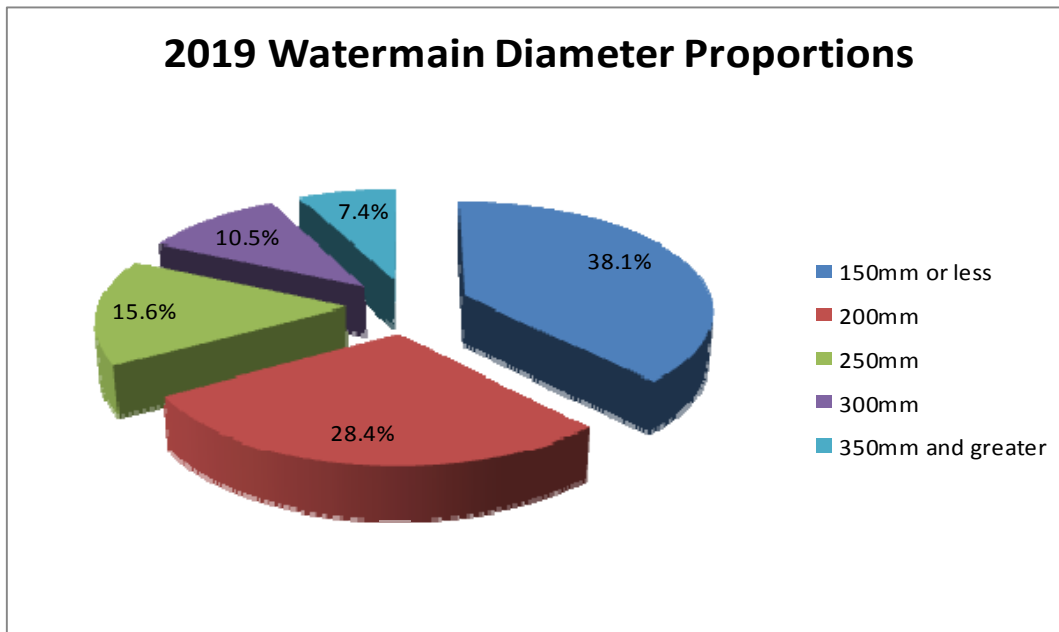
There are two additional reservoirs in the Top Bridge Park area, numbers 3 and 5. Reservoir #5 is a glass fused steel tank, Reservoir #3 is a steel tank although currently not in use. Storage capacities are:

- Reservoir #3 - 671m³ (148,000 Imp. gal) - Not in use.
- Reservoir #5 - 4300 m³ (950,000 Imp. gal).

3.0 Distribution System

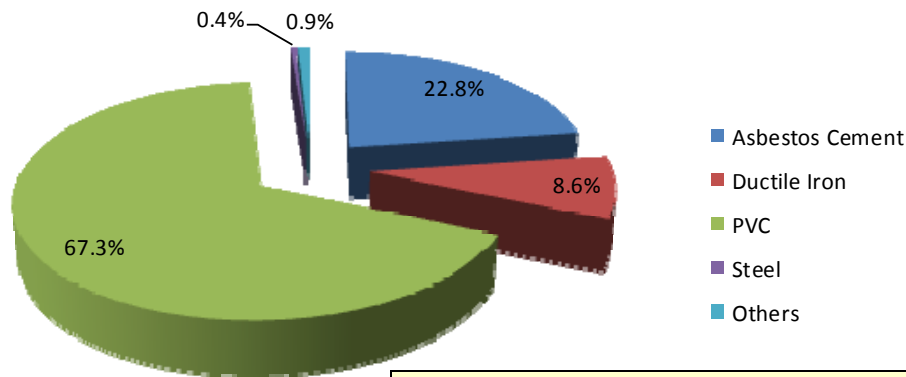
The distribution system consists of 70.7 km of PVC pipe, 9 km of Ductile Iron pipe and 23.9 km of AC (Asbestos Cement) pipe. Sizes range from 100 mm (4") to 400 mm (16"). There are just over 600 fire hydrants and one pressure reducing valve (PRV).

Like all municipalities, the infrastructure is aging and watermains are being replaced through capital improvements and development. The following shows the size, age and material of the mains in the Parksville Water System in 2019. Some of these pipes have been replaced over the past year but newer data sometimes takes a few months to be updated.



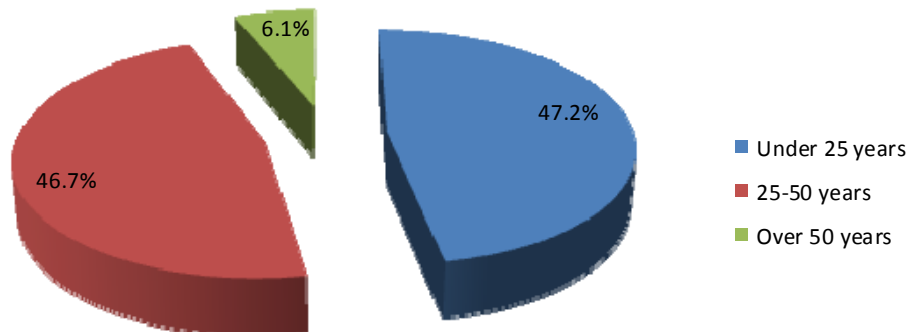
2019 Watermain Diameter Proportions				
Diameter	No Pipes	Distance (km)	Percentage	Type
150 mm or less	676	40.2	38.1%	Distribution Mains 66.5%
200 mm	586	29.9	28.4%	
250 mm	272	16.4	15.6%	Supply Mains 33.5%
300 mm	200	11.1	10.5%	
350 mm and greater	125	7.8	7.4%	
Total:	1859	=	105.4 km	

2019 Watermain Material Proportions



2019 Watermain Material Proportions		
Material Types	Distance (km)	Percentage
Asbestos Cement	23.92	22.8%
Ductile Iron	9.05	8.6%
PVC	70.66	67.3%
Steel	0.43	0.4%
Others	0.92	0.9%
Total:	104.98	km

2019 Watermain Age Proportions



2019 Watermain Age Proportions			
Age	No Pipes	Distance (km)	Percentage
Under 25 Years (≥ 1994)	1060	49.72	47.2%
25 - 50 Years (1970 - 1993)	714	49.21	46.7%
Over 50 Years (<1969)	85	6.43	6.1%
Total:	1859	105.36	km

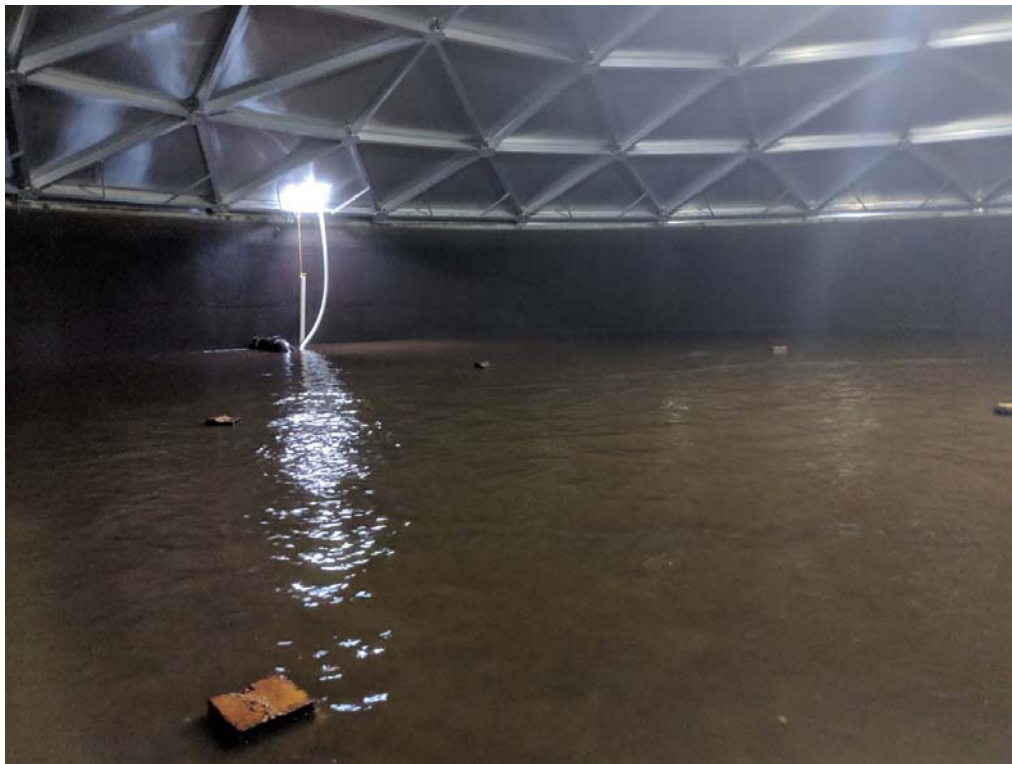
3.1 *Pressure Zones*

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

The high pressure system was initially developed for higher elevation regions of the City which do not have sufficient pressures or flows to meet firefighting flows. This high pressure zone has been expanded to areas furthest from the pump stations that lose pressure and flow due to line losses. In order to maintain a balance between high and low pressures but still keep a safe pressure in the lower areas, a PRV was installed to drop the pressure from 80 psi to 60 psi.

The high pressure water in this 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 watches flows and switches on however many pumps it needs to meet the flow requirements.

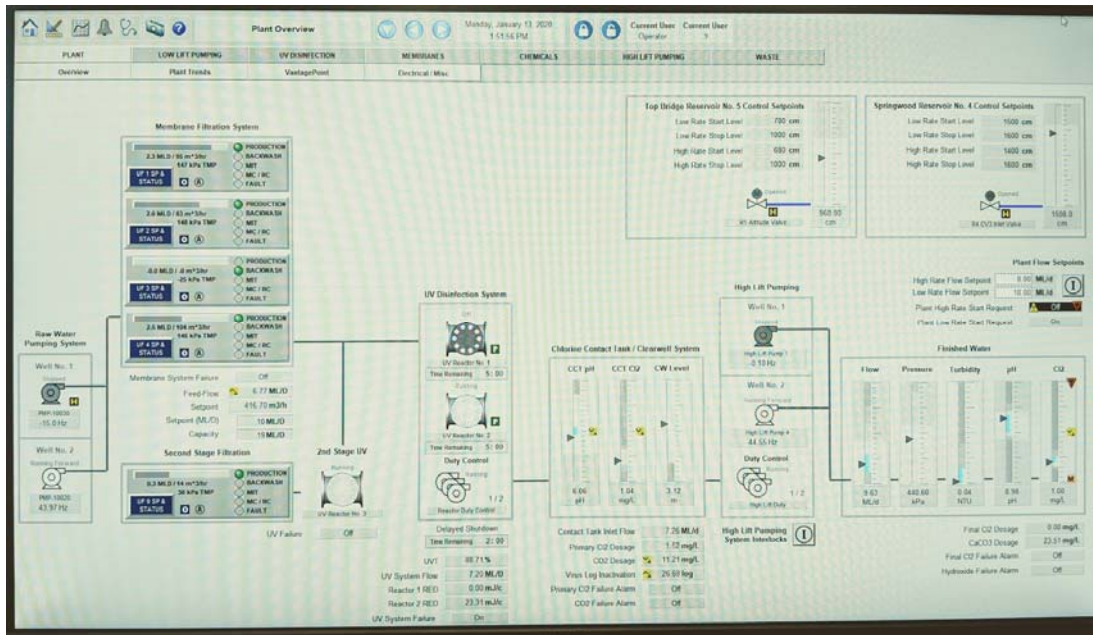
See **Appendix C** for Map of Pressure Zone Boundaries.



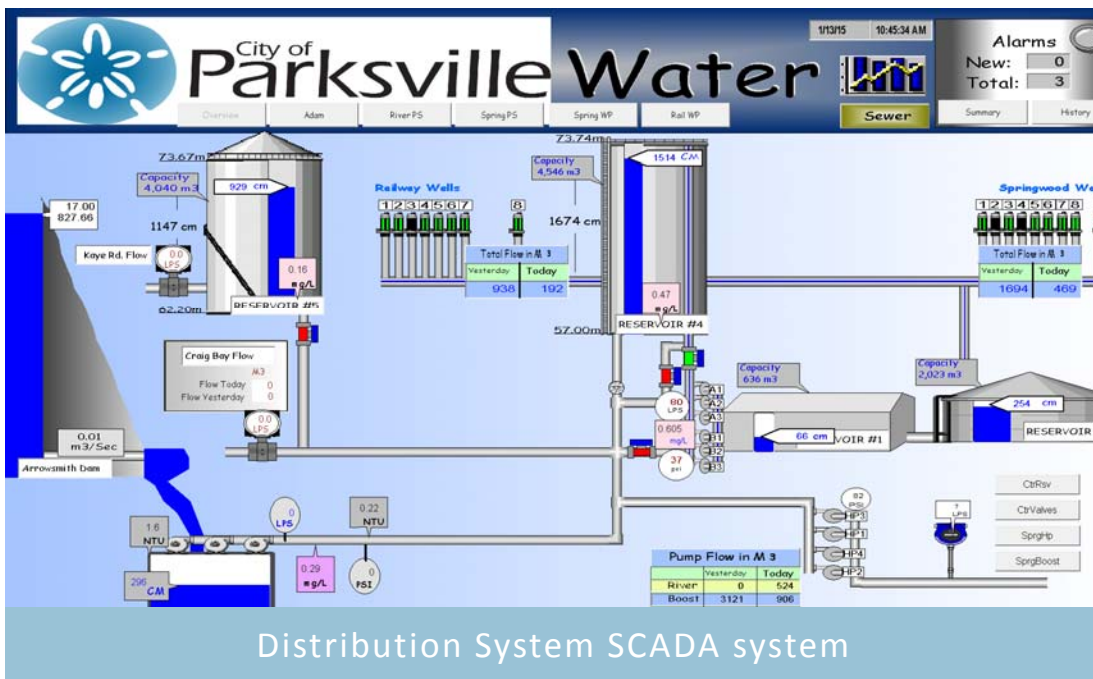
Springwood Reservoir #2 during cleaning

4.0 SCADA (Supervisory Control and Data Acquisition)

The water treatment plant, water distribution system, wells and sewer pump stations are controlled by a computerized control system called SCADA. This system allows the operators to monitor water treatment plant functions, monitor reservoir levels, monitor the status and flows of pumps, and monitor chlorine residuals. The operator can change set points and check on the system remotely. Alarms are automatically called out to City staff who monitors the system 24 hours a day, 7 days a week.



Water Treatment Plant SCADA system



Distribution System SCADA system

5.0 Water Sampling and Testing

5.1 Bacteriological

As required by the Island Health, City staff takes bacteriological samples from 16 test ports around the City and a sample from the water treatment plant every month.

See **Appendix D** for 2019 test results (L1 means Less than 1 - no detectable bacteria - Acceptable). For a detailed list of water samples: <https://www.islandhealth.ca/learn-about-health/drinking-water/water-sampling-results>

5.2 Full Spectrum Analysis

In addition to monthly sampling throughout the distribution system, the City also sent samples for a full spectrum analysis in October 2019. As seen in Appendix E, parameters such as metals (iron, manganese) conventional parameters (pH, turbidity, hardness) and disinfection byproducts (Trihalomethane) are tested.

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

Hardness in the water comes from calcium carbonate (CaCO_3). The river water is considered "soft" under the guidelines and the well water is "moderate". Hardness levels above 500 mg/l are normally considered unacceptable.

All parameters meet Canadian Drinking Water Guidelines.

See **Appendix E** for the 2019 Full Spectrum Analysis of the Parksville Water System Source Water. Note: Most of the water tested (Full Spectrum) is in its raw form before any type of treatment, Memorial is the only sample where the water was treated.

5.3 Trihalomethane Analyses

The City also take Trihalomethanes (THMs) samples four times per year. THMs are disinfection by-products that form when chlorine is added to water containing elevated levels of natural organic matter.



1116 Herring Gull
Way sampling site

6.0 *Water Quality Complaints and Incidents*

The operations department had few water quality complaints throughout 2019. During watermain flushing and fire hydrant maintenance there were a few calls related to “brown or dirty” water. City of Parksville crews would either re-flush the mains through a hydrant or a flushout at a location closest to the dead end or advise the homeowner to run an outside tap for a few minutes to clear up the problem.

There were a couple of complaints about the taste of chlorine in the water. Chlorine residuals are tested weekly throughout the system and are kept at a safe level. Besides recommending a filter to remove the chlorine within the home, not much can be done.

There were a few hardness related complaints, mostly contributed to new homeowners from other municipalities who are used to different water composition. There were also a few calls concerning buildup in washing machines and toilet bowls although the water is only considered “moderately hard” on the hardness scale. This rating drops when the river supply (soft water) is mixed with the well supply.

Many of the complaints were related to pressure drop. The cause for most of the pressure drop complaints were from a faulty PRV (responsibility of the homeowner). There was the odd occasion where staff had to flush the line in order to clear debris (from construction) or where the setter needed to be replaced.

Many calls were related to water leaks. Most were regarding leaky services or water meters.

Clay Bank at Englishman River



7.0 *Englishman River Water Service*

The Englishman River Water Service is a joint venture between the City of Parksville and the Regional District of Nanaimo, formed to secure a bulk 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.

Englishman River Water Service joint venture agreement (percentages of interest).

- City of Parksville 74%
- Regional District of Nanaimo 26%

ERWS Water Treatment Plant

The Englishman River Water Treatment Plant can produce 16 megalitres 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 intake structure has screens to protect fish and other aquatic life at 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).

Coagulation clumps particles together so they can be easily strained. A coagulant is added to the raw water before it gets to the water treatment plant to allow for sufficient contact time before being removed by fine strainers which can remove material greater than 300 microns (0.3mm) in size. The purpose of the strainers is to protect the membranes from fine particles that could break or clog them.

Ultrafiltration (UF) membrane is a pressure driven separation process that uses microporous membranes to remove contaminant (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 remaining 5% is used for backwash and cleaning, which then goes through the second stage membrane which can treat 80 to 90% of that dirty water (the 5%), this brings the total recovery to over 99%. The dirty 1% has its pH equalized and pumped to the sanitary sewer.

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. In the plant there is sufficient contact time to disinfect the water, and enough chlorine is added so the distribution system will have enough chlorine to continue disinfecting the water outside of the plant.

Once the Water goes through all these systems, it gets pumped into the City reservoirs, which then goes to the distribution system. The water is continually sampled to provide water quality assurance and to meet regulatory requirement.

For more information visit www.englishmanriverwaterservice.ca

8.0 Routine Maintenance Program

8.1 Distribution

- Watermains are flushed using a unidirectional flushing program
- Air relief valves are cleaned
- Fire line meters are cleaned
- Fire hydrants are completely disassembled and inspected on a two-year rotation
- Paint and brush out around hydrants as needed
- All irrigation backflow prevention devices tested and repaired if needed

8.2 Wells

- Daily security check of all wells
- Rehabilitation of one to two wells per year
- Pumps and motors replaced as necessary
- Filling chlorine tank on Springwood Well #1 as needed
- Annual water sampling

8.3 River Intake

- Weekly blowing of air lines through intake screens
- Daily checks of turbidity, flows, pumps, sand separators and valves.
- Monthly calibration of turbidity analyzers

8.4 Reservoirs

- Daily security check of tanks and compounds
- Yearly cleaning of Reservoir #1 and 2
- Clean Reservoir #4 and 5 using divers every five years
- Sustaining valves cleaned monthly

8.5 Pump Stations

- Daily checks of pumps and chlorination system
- Security checks of compounds
- Bi-annual calibration of chlorine analyzers and turbidimeters

9.0 2019 Projects & Improvements

- Completed the construction of the water treatment plant.
- Continued to replace 3/4" water meter.
- Continued to update the water meter route maps.
- Camera installed at Reservoir #5.

10.0 2019 Capital Projects

- AC replaced on Moss from Craig to Mckillop.
- AC replaced on Corfield from Skulark to Highway 19A.

11.0 2020 Projects & Improvements

- Possible replacement of aging watermains for better distribution (Moss, Wallis and McKinnon).
- Start design for upgrades to Hirst and Memorial Avenue from Alberni Hwy to McMillan.
- Start design of Bagshaw Street, Highway 19A to Stanford.
- To be tendered for construction:
 - 250m of 300AC on Pym Street from Forsyth Ave to approximately Humphrey.
 - 175m of 150AC of Forsyth from Pym to Cameron.
- Continue working on the cross connection control program.
- Possible well rehabilitation.
- Continue with water meter replacement program.



Sodium Hypochlorite tank

12.0 Cross Connection Control Program

In 2006, the City of Parksville drafted a cross connection control program. Due to shortage of staff, the program was not able to be properly conducted until 2014.

The cross connection program is currently addressing medium and high hazard water use. These include Industrial, Commercial and Institutional (ICI) users. Each ICI user will be assessed as to the potential risk to the water system. Any costs associated with installation, replacement and testing of an approved backflow device will have to be covered by the property owner.



Irrigation cross connection

A tracking program called FAST is used to track devices around the City (both City-owned and privately-owned devices). Property owners are required to send the annual test to the utilities technician at the City of Parksville.

City staff remains watchful of potential cross connections around the City and problems are reported to the utilities technician.

13.0 Emergency Response Plan

The City of Parksville has three Emergency Response Plan (ERP) pertaining to the water system. These documents outlines the strategies to deal with events such as contamination of water supply, pump failures and turbidity events. The plans are updated annually.



Power loss at Springwood Station due to a tree falling on power lines

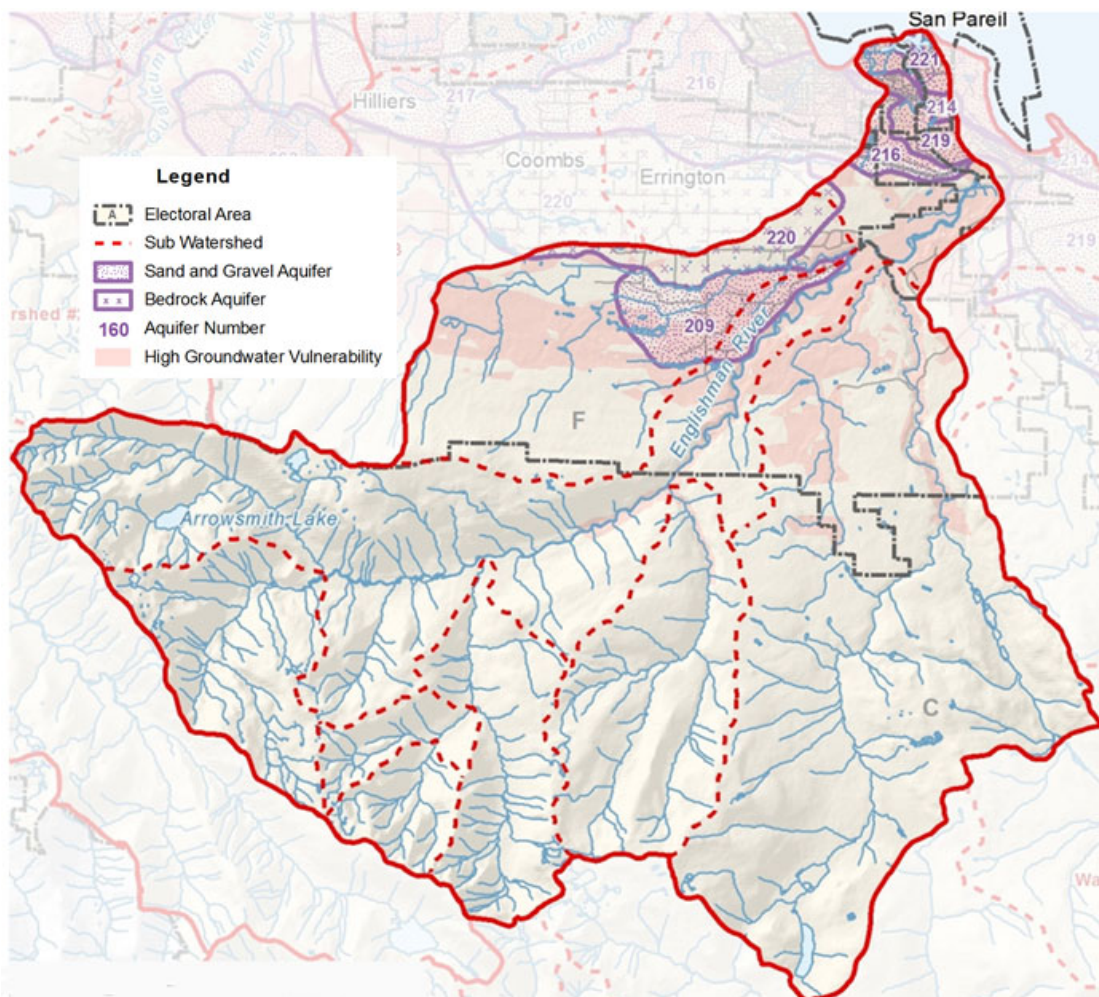
14.0 Watershed Protection Program

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

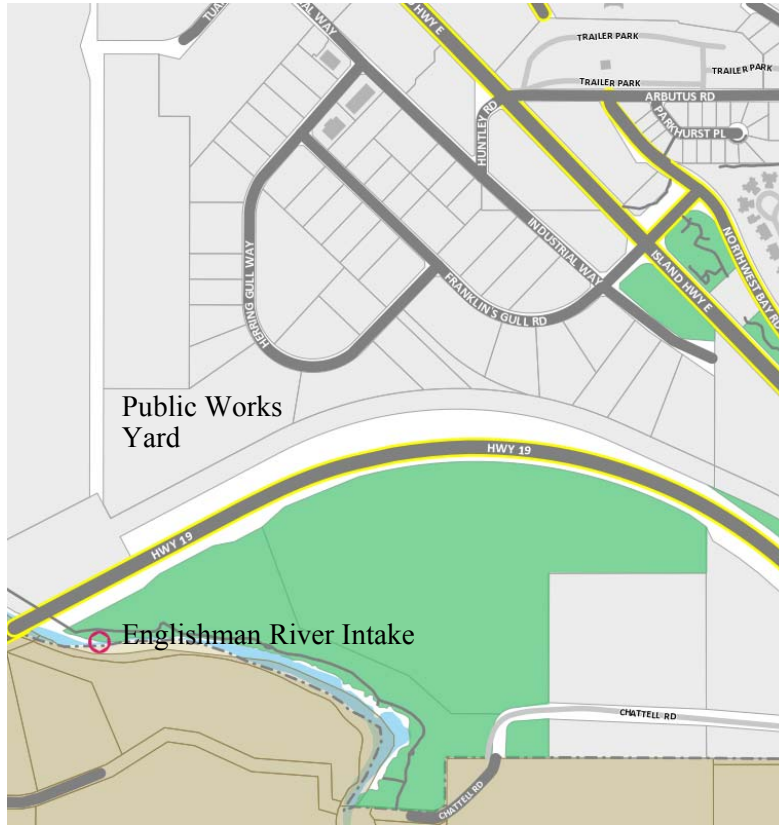
The South Englishman River, Swane Creek, Morison Creek, Shelly Creek and Centre Creek all drain into the Englishman River. The Englishman River is an important fisheries river and through the Arrowsmith Water Service, provides additional summer water supply for the City of Parksville and the Nanoose Peninsula. Water is stored behind a dam in Arrowsmith Lake and released as needed. Fish in the Englishman River include trout, steelhead and salmon. The Englishman River is identified as a 'sensitive stream' requiring special management attention under the Fisheries Protection Act. This is because of risk to fish populations due to inadequate water flows and other habitat concerns.

Several aquifers in this watershed area are showing signs of stress. Water levels in aquifers 216 and 220 have been dropping over the past several years. This means less water is available for rural residents who rely on wells for drinking water and less water is available in streams for fish. Surface water and groundwater are connected in this watershed, and in the summer when there is no rain, groundwater should be contributing base flow to the local rivers.

Unfortunately, dropping groundwater levels mean lower flows in streams and decreased fish health in the Englishman River and its tributaries.



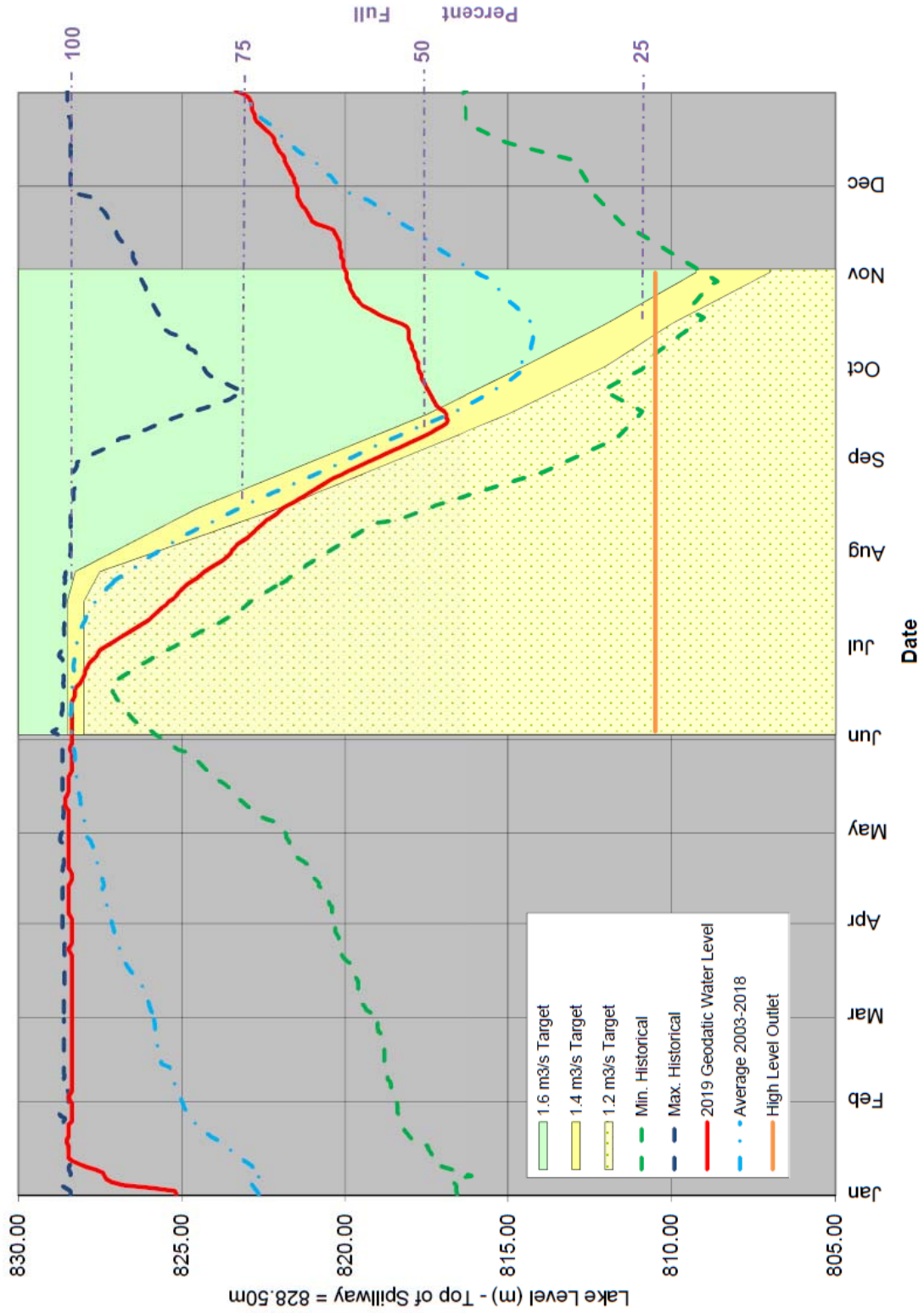
Appendix A



Water Source Locations Map

Appendix B

2019 Arrowsmith Dam Lake Levels
Provisional Operating Rule Curve



Arrowsmith Dam Lake Levels

Current as of :2020-01-08

Prepared By: B. Silenieks

Appendix C



Map of Pressure Zones (Yellow is High Pressure)

Appendix D

Location	Date	Total Coliform	E.coli
136 Memorial	17-Dec-2019	L1	L1
613 Chinook Avenue	17-Dec-2019	L1	L1
Daffodil at Camas	17-Dec-2019	L1	L1
River Pump Station, Englishman River Intake	17-Dec-2019	L1	L1
330 Park View	10-Dec-2019	L1	L1
851 Temple	10-Dec-2019	L1	L1
across from 450 Wisteria	10-Dec-2019	L1	L1
Community Park, 193 East Island Highway	10-Dec-2019	L1	L1
401 S. Moiliet Street	10-Dec-2019	L1	L1
378 Kingsley Street	10-Dec-2019	L1	L1
271 Chestnut Street	2-Dec-2019	L1	L1
770 Soriel	2-Dec-2019	L1	L1
Island Highway, by Temple	2-Dec-2019	L1	L1
Parksville MHP/Utility Building, 1247 Arbutus Rd	2-Dec-2019	L1	L1
Top of Corfield	2-Dec-2019	L1	L1
Works Yard, 1390 Herring Gull Way	2-Dec-2019	L1	L1
330 Park View	26-Nov-2019	L1	L1
851 Temple	26-Nov-2019	L1	L1
River Pump Station, Englishman River Intake	26-Nov-2019	L1	L1
378 Kingsley Street	26-Nov-2019	L1	L1
136 Memorial	19-Nov-2019	L1	L1
across from 450 Wisteria	19-Nov-2019	L1	L1
Community Park, 193 East Island Highway	19-Nov-2019	L1	L1
Daffodil at Camas	19-Nov-2019	L1	L1
613 Chinook Avenue	12-Nov-2019	L1	L1
Despard & Moilliet, 401 S. Moiliet Street	12-Nov-2019	L1	L1
Top of Corfield	12-Nov-2019	L1	L1
Works Yard, 1390 Herring Gull Way	12-Nov-2019	L1	L1
271 Chestnut Street	5-Nov-2019	L1	L1
770 Soriel	5-Nov-2019	L1	L1
Island Highway, by Temple	5-Nov-2019	L1	L1
Parksville MHP/Utility Building, 1247 Arbutus Rd	5-Nov-2019	L1	L1
136 Memorial	29-Oct-2019	L1	L1
851 Temple	29-Oct-2019	L1	L1
378 Kingsley Street	29-Oct-2019	L1	L1
330 Park View	22-Oct-2019	L1	L1
450 Wisteria	22-Oct-2019	L1	L1
Daffodil at Camas	22-Oct-2019	L1	L1
613 Chinook Avenue	15-Oct-2019	L1	L1
Community Park, 193 East Island Highway	15-Oct-2019	L1	L1
River Pump Station, Englishman River Intake	15-Oct-2019	L1	L1
271 Chestnut Street	1-Oct-2019	L1	L1

2019 Bacteriological Results—Facility type 301-10000 (DWT)

Appendix D

770 Soriel	1-Oct-2019	L1	L1
Island Highway, by Temple	1-Oct-2019	L1	L1
Parkville MHP/Utility Building, 1247 Arbutus Rd	1-Oct-2019	L1	L1
136 Memorial	24-Sep-2019	L1	L1
851 Temple	24-Sep-2019	L1	L1
Island Highway, by Temple	24-Sep-2019	L1	L1
River Pump Station, Englishman River Intake	24-Sep-2019	L1	L1
378 Kingsley Street	24-Sep-2019	L1	L1
across from 450 Wisteria	18-Sep-2019	L1	L1
Daffodil at Camas	18-Sep-2019	L1	L1
Despard & Moilliet, 401 S. Moilliet Street	18-Sep-2019	L1	L1
613 Chinook Avenue	11-Sep-2019	L1	L1
Community Park, 193 East Island Highway	11-Sep-2019	L1	L1
Top of Corfield	11-Sep-2019	L1	L1
Works Yard, 1390 Herring Gull Way	11-Sep-2019	L1	L1
271 Chestnut Street	3-Sep-2019	L1	L1
330 Park View	3-Sep-2019	L1	L1
770 Soriel	3-Sep-2019	L1	L1
Parkville MHP/Utility Building, 1247 Arbutus Rd	3-Sep-2019	L1	L1
136 Memorial	27-Aug-2019	L1	L1
851 Temple	27-Aug-2019	L1	L1
Daffodil at Camas	27-Aug-2019	L1	L1
378 Kingsley Street	27-Aug-2019	L1	L1
across from 450 Wisteria	20-Aug-2019	L1	L1
Despard & Moilliet, 401 S. Moilliet Street	20-Aug-2019	L1	L1
Island Highway, by Temple	20-Aug-2019	L1	L1
River Pump Station, Englishman River Intake	20-Aug-2019	L1	L1
770 Soriel	14-Aug-2019	L1	L1
613 Chinook Avenue	13-Aug-2019	L1	L1
Community Park, 193 East Island Highway	13-Aug-2019	L1	L1
Top of Corfield	13-Aug-2019	L1	L1
Works Yard, 1390 Herring Gull Way	13-Aug-2019	L1	L1
271 Chestnut Street	7-Aug-2019	L1	L1
330 Park View	7-Aug-2019	L1	L1
770 Soriel	7-Aug-2019	7	L1
Parkville MHP/Utility Building, 1247 Arbutus Rd	7-Aug-2019	L1	L1
across from 450 Wisteria	30-Jul-2019	L1	L1
Island Highway, by Temple	30-Jul-2019	L1	L1
River Pump Station, Englishman River Intake	30-Jul-2019	L1	L1
136 Memorial	23-Jul-2019	L1	L1
851 Temple	23-Jul-2019	L1	L1
Daffodil at Camas	23-Jul-2019	L1	L1
330 Park View	16-Jul-2019	L1	L1
Community Park, 193 East Island Highway	16-Jul-2019	L1	L1

2019 Bacteriological Results—Facility type 301-10000 (DWT)

Appendix D

378 Kingsley Street	16-Jul-2019	L1	L1
271 Chestnut Street	9-Jul-2019	L1	L1
770 Soriel	9-Jul-2019	L1	L1
Works Yard, 1390 Herring Gull Way	9-Jul-2019	L1	L1
613 Chinook Avenue	2-Jul-2019	L1	L1
Despard & Moilliet, 401 S. Moiliet Street	2-Jul-2019	L1	L1
Parksville MHP/Utility Building, 1247 Arbutus Rd	2-Jul-2019	L1	L1
Top of Corfield	2-Jul-2019	L1	L1
136 Memorial	25-Jun-2019	L1	L1
Daffodil at Camas	25-Jun-2019	L1	L1
Island Highway, by Temple	25-Jun-2019	L1	L1
River Pump Station, Englishman River Intake	25-Jun-2019	L1	L1
770 Soriel	19-Jun-2019	L1	L1
851 Temple	19-Jun-2019	L1	L1
Community Park, 193 East Island Highway	19-Jun-2019	L1	L1
Despard & Moilliet, 401 S. Moiliet Street	19-Jun-2019	L1	L1
330 Park View	11-Jun-2019	L1	L1
613 Chinook Avenue	11-Jun-2019	L1	L1
across from 450 Wisteria	11-Jun-2019	L1	L1
378 Kingsley Street	11-Jun-2019	L1	L1
Works Yard, 1390 Herring Gull Way	11-Jun-2019	L1	L1
271 Chestnut Street	4-Jun-2019	L1	L1
across from 450 Wisteria	4-Jun-2019	7	L1
Parksville MHP/Utility Building, 1247 Arbutus Rd	4-Jun-2019	L1	L1
Top of Corfield	4-Jun-2019	L1	L1
136 Memorial	28-May-2019	L1	L1
851 Temple	28-May-2019	L1	L1
Daffodil at Camas	28-May-2019	L1	L1
Island Highway, by Temple	28-May-2019	L1	L1
271 Chestnut Street	21-May-2019	L1	L1
770 Soriel	21-May-2019	L1	L1
Community Park, 193 East Island Highway	21-May-2019	L1	L1
River Pump Station, Englishman River Intake	21-May-2019	L1	L1
330 Park View	15-May-2019	L1	L1
613 Chinook Avenue	15-May-2019	L1	L1
378 Kingsley Street	15-May-2019	L1	L1
Works Yard, 1390 Herring Gull Way	15-May-2019	L1	L1
across from 450 Wisteria	6-May-2019	L1	L1
Despard & Moilliet, 401 S. Moiliet Street	6-May-2019	L1	L1
Parksville MHP/Utility Building, 1247 Arbutus Rd	6-May-2019	L1	L1
Top of Corfield, Parksville	6-May-2019	L1	L1
136 Memorial	30-Apr-2019	L1	L1
770 Soriel	30-Apr-2019	L1	L1
River Pump Station, Englishman River Intake	30-Apr-2019	L1	L1

2019 Bacteriological Results—Facility type 301-10000 (DWT)

Appendix D

271 Chestnut Street	23-Apr-2019	L1	L1
Community Park, 193 East Island Highway	23-Apr-2019	L1	L1
Island Highway, by Temple	23-Apr-2019	L1	L1
851 Temple	17-Apr-2019	L1	L1
378 Kingsley Street	17-Apr-2019	L1	L1
Works Yard, 1390 Herring Gull Way	17-Apr-2019	L1	L1
330 Park View	9-Apr-2019	L1	L1
613 Chinook Avenue	9-Apr-2019	L1	L1
Daffodil at Camas	9-Apr-2019	L1	L1
across from 450 Wisteria	3-Apr-2019	L1	L1
Despard & Moilliet, 401 S. Moilliet Street	3-Apr-2019	L1	L1
Parksville MHP/Utility Building, 1247 Arbutus Rd	3-Apr-2019	L1	L1
Top of Corfield, Parksville	3-Apr-2019	L1	L1
136 Memorial	26-Mar-2019	L1	L1
770 Soriel	26-Mar-2019	L1	L1
Island Highway, by Temple	26-Mar-2019	L1	L1
River Pump Station, Englishman River Intake	26-Mar-2019	L1	L1
271 Chestnut Street	19-Mar-2019	L1	L1
Community Park, 193 East Island Highway	19-Mar-2019	L1	L1
Daffodil at Camas	19-Mar-2019	L1	L1
378 Kingsley Street	19-Mar-2019	L1	L1
across from 450 Wisteria	12-Mar-2019	L1	L1
Despard & Moilliet, 401 S. Moilliet Street	12-Mar-2019	L1	L1
Parksville MHP/Utility Building, 1247 Arbutus Rd	12-Mar-2019	L1	L1
Top of Corfield, Parksville	12-Mar-2019	L1	L1
330 Park View	6-Mar-2019	L1	L1
613 Chinook Avenue	6-Mar-2019	L1	L1
851 Temple	6-Mar-2019	L1	L1
Works Yard, 1390 Herring Gull Way	6-Mar-2019	L1	L1
136 Memorial	27-Feb-2019	L1	L1
Island Highway, by Temple	27-Feb-2019	L1	L1
River Pump Station, Englishman River Intake	27-Feb-2019	L1	L1
378 Kingsley Street	27-Feb-2019	L1	L1
851 Temple	19-Feb-2019	L1	L1
across from 450 Wisteria	19-Feb-2019	L1	L1
Community Park, 193 East Island Highway	19-Feb-2019	L1	L1
Daffodil at Camas	19-Feb-2019	L1	L1
Despard & Moilliet, 401 S. Moilliet Street	19-Feb-2019	L1	L1
Works Yard, 1390 Herring Gull Way	19-Feb-2019	L1	L1
330 Park View	12-Feb-2019	L1	L1
770 Soriel	12-Feb-2019	L1	L1
271 Chestnut Street	5-Feb-2019	L1	L1
613 Chinook Avenue	5-Feb-2019	L1	L1
Parksville MHP/Utility Building, 1247 Arbutus Rd	5-Feb-2019	L1	L1

2019 Bacteriological Results—Facility type 301-10000 (DWT)

Appendix D

Top of Corfield	5-Feb-2019	L1	L1
136 Memorial	29-Jan-2019	L1	L1
770 Soriel	29-Jan-2019	L1	L1
Island Highway, by Temple	29-Jan-2019	L1	L1
River Pump Station, Englishman River Intake	29-Jan-2019	L1	L1
851 Temple	22-Jan-2019	L1	L1
Community Park, 193 East Island Highway	22-Jan-2019	L1	L1
Daffodil at Camas	22-Jan-2019	L1	L1
Despard & Moilliet, 401 S. Moilliet Street	22-Jan-2019	L1	L1
330 Park View	15-Jan-2019	L1	L1
across from 450 Wisteria	15-Jan-2019	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	15-Jan-2019	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way,	15-Jan-2019	L1	L1
271 Chestnut Street, Parksville	8-Jan-2019	L1	L1
613 Chinook Avenue, Parksville	8-Jan-2019	L1	L1
Parksville MHP/Utility Building, 1247 Arbutus Rd	8-Jan-2019	L1	L1
Top of Corfield, Parksville	8-Jan-2019	L1	L1

Appendix E



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: 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: City of Parksville LSD: P.O.: PO003647 Proj. Acct. code:	Lot ID: 1380838 Control Number: Date Received: Oct 2, 2019 Date Reported: Oct 9, 2019 Report Number: 2447204
Attn: Accounts Payable Sampled By: Barbara Silenieks Company: City of Parksville		

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Reference Number 1380838-1					
Sample Date October 01, 2019					
Sample Time 09:15					
Sample Location River Station					
Sample Description Water					
Sample Matrix Water					
Inorganic Nonmetallic Parameters					
Cyanide Total	mg/L	<0.002	0.002	0.2	Below MAC
Metals Total					
Calcium Total	mg/L	11	0.01		
Magnesium Total	mg/L	1.3	0.02		
Potassium Total	mg/L	0.15	0.04		
Silicon Total	mg/L	2.3	0.005		
Sodium Total	mg/L	5.5	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
Microbiological Analysis					
Total Coliforms	Enzyme Substrate Test	MPN/100 mL	>200.5	1.0	0 per 100 mL Above MAC
Escherichia coli	Enzyme Substrate Test	MPN/100 mL	6.4	1.0	0 per 100 mL Above MAC
Physical and Aggregate Properties					
Colour	True	Colour units	<5	5	
Turbidity		NTU	1.97	0.1	0.1 Above AO
Routine Water					
Digestion	Dissolved		Lab filtered & preserved Exceeded		
pH - Holding Time					
pH	at 25 °C		6.67	0.01	7.0-10.5 Below Range
Electrical Conductivity		µS/cm at 25 °C	106	1	
T-Alkalinity	as CaCO3	mg/L	25	5	
Chloride	Dissolved	mg/L	13.1	0.05	250 Below AO
Fluoride	Dissolved	mg/L	<0.01	0.01	1.5 Below MAC
Nitrate - N	Dissolved	mg/L	0.07	0.01	10 Below MAC
Nitrite - N	Dissolved	mg/L	<0.01	0.01	1 Below MAC
Sulfate (SO4)	Dissolved	mg/L	1.7	0.1	500 Below AO
Hardness	as CaCO3 (dissolved)	mg/L	31	5	
Total Dissolved Solids	Calculated	mg/L	53	1	500 Below AO
Langelier Index			-2.2		
Trace Metals Total					
Aluminum Total	mg/L	0.059	0.001	0.1	Below OG
Antimony Total	mg/L	0.00004	0.00002	0.006	Below MAC
Arsenic Total	mg/L	0.0002	0.0001	0.010	Below MAC
Barium Total	mg/L	0.0075	0.0001	1.0	Below MAC
Boron Total	mg/L	0.014	0.002	5	Below MAC

Full Spectrum Analysis

Appendix E



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Surrey, British Columbia
V3S 8P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: info.vancouver@element.com
W: 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: City of Parksville LSD: P.O.: PO003647 Proj. Acct. code:	Lot ID: 1380838 Control Number: Date Received: Oct 2, 2019 Date Reported: Oct 9, 2019 Report Number: 2447204
Attn: Accounts Payable Sampled By: Barbara Silenieks Company: City of Parksville		

Reference Number	1380838-1
Sample Date	October 01, 2019
Sample Time	09:15
Sample Location	
Sample Description	River Station
Sample Matrix	Water

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments	
Trace Metals Total - Continued						
Cadmium	Total	mg/L	<0.00001	0.00001	0.005	Below MAC
Chromium	Total	mg/L	0.00017	0.00005	0.05	Below MAC
Copper	Total	mg/L	0.0009	0.0002	1 AO; 2 MAC	Below AO
Iron	Total	mg/L	0.11	0.002	0.3	Below AO
Lead	Total	mg/L	0.00006	0.00001	0.005	Below MAC
Manganese	Total	mg/L	0.011	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	0.050	0.0001	7.0	Below MAC
Uranium	Total	mg/L	0.00001	0.00001	0.02	Below MAC
Zinc	Total	mg/L	0.0035	0.0005	5.0	Below AO

Full Spectrum Analysis

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E: info.vancouver@element.com
W: 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: City of Parksville LSD: P.O.: PO003647 Proj. Acct. code:	Lot ID: 1380838 Control Number: Date Received: Oct 2, 2019 Date Reported: Oct 9, 2019 Report Number: 2447204
Attn: Accounts Payable Sampled By: Barbara Silenieks Company: City of Parksville		

Reference Number	1380838-2
Sample Date	October 01, 2019
Sample Time	09:50
Sample Location	
Sample Description	Springwood Well #7
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	38	0.01			
Magnesium Total	mg/L	18	0.02			
Potassium Total	mg/L	0.81	0.04			
Silicon Total	mg/L	12	0.005			
Sodium Total	mg/L	7.6	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	
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
Physical and Aggregate Properties						
Colour	True	Colour units	<5	5		
Turbidity		NTU	0.31	0.1	0.1	Above AO
Routine Water						
Digestion	Dissolved		Lab filtered & preserved Exceeded			
pH - Holding Time						
pH	at 25 °C		7.72	0.01	7.0-10.5	Within Range
Electrical Conductivity		µS/cm at 25 °C	369	1		
T-Alkalinity	as CaCO3	mg/L	149	5		
Chloride	Dissolved	mg/L	20.4	0.05	250	Below AO
Fluoride	Dissolved	mg/L	0.08	0.01	1.5	Below MAC
Nitrate - N	Dissolved	mg/L	1.03	0.01	10	Below MAC
Nitrite - N	Dissolved	mg/L	<0.01	0.01	1	Below MAC
Sulfate (SO4)	Dissolved	mg/L	7.2	0.1	500	Below AO
Hardness	as CaCO3 (dissolved)	mg/L	157	5		
Total Dissolved Solids	Calculated	mg/L	213	1	500	Below AO
Langelier Index			0.04			
Trace Metals Total						
Aluminum	Total	mg/L	0.004	0.001	0.1	Below OG
Antimony	Total	mg/L	0.00004	0.00002	0.006	Below MAC
Arsenic	Total	mg/L	0.0002	0.0001	0.010	Below MAC
Barium	Total	mg/L	0.0060	0.0001	1.0	Below MAC
Boron	Total	mg/L	0.010	0.002	5	Below MAC

Full Spectrum Analysis

Appendix E



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: 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: City of Parksville LSD: P.O.: PO003647 Proj. Acct. code:	Lot ID: 1380838 Control Number: Date Received: Oct 2, 2019 Date Reported: Oct 9, 2019 Report Number: 2447204
Attn: Accounts Payable Sampled By: Barbara Silenieks Company: City of Parksville		

Reference Number	1380838-2
Sample Date	October 01, 2019
Sample Time	09:50
Sample Location	
Sample Description	Springwood Well #7
Sample Matrix	Water

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments	
Trace Metals Total - Continued						
Cadmium	Total	mg/L	<0.00001	0.00001	0.005	Below MAC
Chromium	Total	mg/L	0.00076	0.00005	0.05	Below MAC
Copper	Total	mg/L	0.0010	0.0002	1 AO; 2 MAC	Below AO
Iron	Total	mg/L	0.015	0.002	0.3	Below AO
Lead	Total	mg/L	0.00027	0.00001	0.005	Below MAC
Manganese	Total	mg/L	0.010	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	0.098	0.0001	7.0	Below MAC
Uranium	Total	mg/L	0.00023	0.00001	0.02	Below MAC
Zinc	Total	mg/L	0.0027	0.0005	5.0	Below AO

Full Spectrum Analysis

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V3S 8P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: info.vancouver@element.com
W: 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: City of Parksville LSD: P.O.: PO003647 Proj. Acct. code:	Lot ID: 1380838 Control Number: Date Received: Oct 2, 2019 Date Reported: Oct 9, 2019 Report Number: 2447204
Attn: Accounts Payable Sampled By: Barbara Silenieks Company: City of Parksville		

Reference Number	1380838-3
Sample Date	October 01, 2019
Sample Time	10:05
Sample Location	
Sample Description	Springwood Well #11
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	29	0.01		
Magnesium	Total	mg/L	13	0.02		
Potassium	Total	mg/L	0.68	0.04		
Silicon	Total	mg/L	12	0.005		
Sodium	Total	mg/L	8.1	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
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
Physical and Aggregate Properties						
Colour	True	Colour units	<5	5		
Turbidity		NTU	0.45	0.1	0.1	Above AO
Routine Water						
Digestion	Dissolved		Lab filtered & preserved Exceeded			
pH - Holding Time						
pH	at 25 °C		7.63	0.01	7.0-10.5	Within Range
Electrical Conductivity		µS/cm at 25 °C	293	1		
T-Alkalinity	as CaCO3	mg/L	106	5		
Chloride	Dissolved	mg/L	21.5	0.05	250	Below AO
Fluoride	Dissolved	mg/L	0.08	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	5.4	0.1	500	Below AO
Hardness	as CaCO3 (dissolved)	mg/L	115	5		
Total Dissolved Solids	Calculated	mg/L	175	1	500	Below AO
Langelier Index			-0.3			
Trace Metals Total						
Aluminum	Total	mg/L	0.004	0.001	0.1	Below OG
Antimony	Total	mg/L	0.00004	0.00002	0.006	Below MAC
Arsenic	Total	mg/L	0.0003	0.0001	0.010	Below MAC
Barium	Total	mg/L	0.0065	0.0001	1.0	Below MAC
Boron	Total	mg/L	0.012	0.002	5	Below MAC

Full Spectrum Analysis

Appendix E



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: element.com

Analytical Report

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

Project ID:
Project Name: Full Spectrum
Project Location: City of Parksville
LSD:
P.O.: PO003647
Proj. Acct. code:

Lot ID: **1380838**
Control Number:
Date Received: Oct 2, 2019
Date Reported: Oct 9, 2019
Report Number: 2447204

Reference Number 1380838-3
Sample Date October 01, 2019
Sample Time 10:05
Sample Location
Sample Description Springwood Well #11
Sample Matrix Water

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Trace Metals Total - Continued					
Cadmium Total	mg/L	0.00001	0.00001	0.005	Below MAC
Chromium Total	mg/L	0.00054	0.00005	0.05	Below MAC
Copper Total	mg/L	0.0022	0.0002	1 AO; 2 MAC	Below AO
Iron Total	mg/L	0.010	0.002	0.3	Below AO
Lead Total	mg/L	0.00035	0.00001	0.005	Below MAC
Manganese Total	mg/L	0.026	0.001	0.02 AO; 0.12 MAC	Above AO
Selenium Total	mg/L	<0.0002	0.0002	0.05	Below MAC
Strontium Total	mg/L	0.089	0.0001	7.0	Below MAC
Uranium Total	mg/L	0.00008	0.00001	0.02	Below MAC
Zinc Total	mg/L	0.0067	0.0005	5.0	Below AO

Full Spectrum Analysis

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#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: 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: City of Parksville LSD: P.O.: PO003647 Proj. Acct. code:	Lot ID: 1380838 Control Number: Date Received: Oct 2, 2019 Date Reported: Oct 9, 2019 Report Number: 2447204
Attn: Accounts Payable Sampled By: Barbara Silenieks Company: City of Parksville		

Reference Number	1380838-4
Sample Date	October 01, 2019
Sample Time	10:30
Sample Location	
Sample Description	Railway Well #6
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	30	0.01		
Magnesium	Total	mg/L	15	0.02		
Potassium	Total	mg/L	0.75	0.04		
Silicon	Total	mg/L	10	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
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
Physical and Aggregate Properties						
Colour	True	Colour units	<5	5		
Turbidity		NTU	0.34	0.1	0.1	Above AO
Routine Water						
Digestion	Dissolved		Lab filtered & preserved Exceeded			
pH - Holding Time			7.78	0.01	7.0-10.5	Within Range
pH	at 25 °C			1		
Electrical Conductivity		µS/cm at 25 °C	325	5		
T-Alkalinity	as CaCO3	mg/L	123	0.01	1.5	Below MAC
Chloride	Dissolved	mg/L	24.7	0.01	10	Below MAC
Fluoride	Dissolved	mg/L	0.08	0.01	1	Below MAC
Nitrate - N	Dissolved	mg/L	0.57	0.1	500	Below AO
Nitrite - N	Dissolved	mg/L	<0.01	0.01		
Sulfate (SO4)	Dissolved	mg/L	5.1	0.1		
Hardness	as CaCO3 (dissolved)	mg/L	130	5		
Total Dissolved Solids	Calculated	mg/L	186	1	500	Below AO
Langelier Index			-0.06			
Trace Metals Total						
Aluminum	Total	mg/L	0.007	0.001	0.1	Below OG
Antimony	Total	mg/L	0.00004	0.00002	0.006	Below MAC
Arsenic	Total	mg/L	0.0009	0.0001	0.010	Below MAC
Barium	Total	mg/L	0.015	0.0001	1.0	Below MAC
Boron	Total	mg/L	0.013	0.002	5	Below MAC

Full Spectrum Analysis

Appendix E



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V3S 8P8, Canada

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F: +1 (604) 514-3323
E: info.vancouver@element.com
W: 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: City of Parksville LSD: P.O.: PO003647 Proj. Acct. code:	Lot ID: 1380838 Control Number: Date Received: Oct 2, 2019 Date Reported: Oct 9, 2019 Report Number: 2447204
Attn: Accounts Payable Sampled By: Barbara Silenieks Company: City of Parksville		

Reference Number	1380838-4
Sample Date	October 01, 2019
Sample Time	10:30
Sample Location	
Sample Description	Railway Well #6
Sample Matrix	Water

Analyte		Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Trace Metals Total - Continued						
Cadmium	Total	mg/L	<0.00001	0.00001	0.005	Below MAC
Chromium	Total	mg/L	0.0012	0.00005	0.05	Below MAC
Copper	Total	mg/L	0.013	0.0002	1 AO; 2 MAC	Below AO
Iron	Total	mg/L	0.48	0.002	0.3	Above AO
Lead	Total	mg/L	0.0021	0.00001	0.005	Below MAC
Manganese	Total	mg/L	0.026	0.001	0.02 AO; 0.12 MAC	Above AO
Selenium	Total	mg/L	<0.0002	0.0002	0.05	Below MAC
Strontium	Total	mg/L	0.088	0.0001	7.0	Below MAC
Uranium	Total	mg/L	0.00058	0.00001	0.02	Below MAC
Zinc	Total	mg/L	0.0077	0.0005	5.0	Below AO

Full Spectrum Analysis

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Analytical Report

Bill To: City of Parksville 1116 Herring Gull Way Parksville, BC, Canada V9P 1R2	Project ID: Project Name: Full Spectrum Project Location: City of Parksville LSD: P.O.: PO003647 Proj. Acct. code:	Lot ID: 1380838 Control Number: Date Received: Oct 2, 2019 Date Reported: Oct 9, 2019 Report Number: 2447204
Attn: Accounts Payable Sampled By: Barbara Sileniekis Company: City of Parksville		

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments	
Reference Number 1380838-5						
Sample Date October 01, 2019						
Sample Time 10:45						
Sample Location						
Sample Description Memorial						
Sample Matrix Water						
Inorganic Nonmetallic Parameters						
Cyanide	Total	mg/L	<0.002	0.002	0.2	Below MAC
Metals Total						
Calcium	Total	mg/L	11	0.01		
Magnesium	Total	mg/L	1.4	0.02		
Potassium	Total	mg/L	0.18	0.04		
Silicon	Total	mg/L	2.3	0.005		
Sodium	Total	mg/L	5.1	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
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
Physical and Aggregate Properties						
Colour	True	Colour units	<5	5		
Turbidity		NTU	1.00	0.1	0.1	Above AO
Routine Water						
Digestion	Dissolved		Lab filtered & preserved Exceeded			
pH - Holding Time						
pH	at 25 °C		6.86	0.01	7.0-10.5	Below Range
Electrical Conductivity		µS/cm at 25 °C	106	1		
T-Alkalinity	as CaCO3	mg/L	27	5		
Chloride	Dissolved	mg/L	13.9	0.05	250	Below AO
Fluoride	Dissolved	mg/L	<0.01	0.01	1.5	Below MAC
Nitrate - N	Dissolved	mg/L	0.06	0.01	10	Below MAC
Nitrite - N	Dissolved	mg/L	<0.01	0.01	1	Below MAC
Sulfate (SO4)	Dissolved	mg/L	1.7	0.1	500	Below AO
Hardness	as CaCO3 (dissolved)	mg/L	31	5		
Total Dissolved Solids	Calculated	mg/L	55	1	500	Below AO
Langelier Index			-2.0			
Trace Metals Total						
Aluminum	Total	mg/L	0.024	0.001	0.1	Below OG
Antimony	Total	mg/L	0.00003	0.00002	0.006	Below MAC
Arsenic	Total	mg/L	0.0002	0.0001	0.010	Below MAC
Barium	Total	mg/L	0.0062	0.0001	1.0	Below MAC
Boron	Total	mg/L	0.013	0.002	5	Below MAC

Full Spectrum Analysis

Appendix E



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: 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: City of Parksville LSD: P.O.: PO003647 Proj. Acct. code:	Lot ID: 1380838 Control Number: Date Received: Oct 2, 2019 Date Reported: Oct 9, 2019 Report Number: 2447204
Attn: Accounts Payable Sampled By: Barbara Silenieks Company: City of Parksville		

Reference Number	1380838-5
Sample Date	October 01, 2019
Sample Time	10:45
Sample Location	
Sample Description	Memorial
Sample Matrix	Water

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments	
Trace Metals Total - Continued						
Cadmium	Total	mg/L	<0.00001	0.00001	0.005	Below MAC
Chromium	Total	mg/L	0.00039	0.00005	0.05	Below MAC
Copper	Total	mg/L	0.056	0.0002	1 AO; 2 MAC	Below AO
Iron	Total	mg/L	0.069	0.002	0.3	Below AO
Lead	Total	mg/L	0.00041	0.00001	0.005	Below MAC
Manganese	Total	mg/L	0.001	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	0.047	0.0001	7.0	Below MAC
Uranium	Total	mg/L	<0.00001	0.00001	0.02	Below MAC
Zinc	Total	mg/L	0.0059	0.0005	5.0	Below AO

Approved by: 
Anthony Neumann, MSc
General Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).
Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

Terms and Conditions: http://www.element.com/terms/terms_and_conditions

Full Spectrum Analysis

Appendix E



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Methodology and Notes

Bill To: City of Parksville 1116 Herring Gull Way Parksville, BC, Canada V9P 1R2	Project ID: Project Name: Full Spectrum Project Location: City of Parksville LSD: P.O.: PO003647 Proj. Acct. code:	Lot ID: 1380838 Control Number: Date Received: Oct 2, 2019 Date Reported: Oct 9, 2019 Report Number: 2447204
Attn: Accounts Payable Sampled By: Barbara Silenieks Company: City of Parksville		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alk, pH, EC, Turb in water (BC)	APHA	* Alkalinity - Titration Method, 2320 B	Oct 2, 2019	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* Conductivity, 2510 B	Oct 2, 2019	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* pH - Electrometric Method, 4500-H+ B	Oct 2, 2019	Element Vancouver
Anions by IEC in water (VAN)	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Oct 2, 2019	Element Vancouver
Cyanide (Total) in water	US EPA	* US EPA method, 335.3	Oct 3, 2019	Element Edmonton - Roper Road
Mercury Low Level (Total) in water (VAN)	EPA	* Mercury in Water by Cold Vapor Atomic Fluorescence Spectrometry, 245.7	Oct 3, 2019	Element Vancouver
Metals SemiTrace (Dissolved) in water (VAN)	US EPA	* Metals & Trace Elements by ICP-AES, 6010C	Oct 3, 2019	Element Vancouver
Metals SemiTrace (Total) in Water (VAN)	US EPA	* Metals & Trace Elements by ICP-AES, 6010C	Oct 7, 2019	Element Vancouver
Total and E-Coli - Colilert - DW (VAN)	APHA	Enzyme Substrate Test, APHA 9223 B	Oct 2, 2019	Element Vancouver
Trace Metals (Total) in Water (VAN)	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Oct 7, 2019	Element Vancouver
True Color in water (VAN)	APHA	* Spectrophotometric - Single Wavelength Method, 2120 C	Oct 3, 2019	Element Vancouver
Turbidity - Water (VAN)	APHA	* Turbidity - Nephelometric Method, 2130 B	Oct 3, 2019	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, June 2019
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

The comparison of test results to guideline limits is provided for information purposes only. This is not to be taken as a statement of conformance / nonconformance to any guideline, regulation or limit. The data user is responsible for all conclusions drawn with respect to the data and is advised to consult official regulatory references when evaluating compliance.

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.

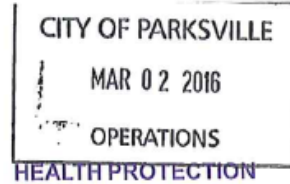
Full Spectrum Analysis

Appendix F

2019	Community Park			Temple		
	March	May	August	March	May	August
Total THM (mg/L)	0.00691	0.0156	0.029	0.00636	0.0083	0.0134
Bromodichloromethanes (mg/L)	0.0018	0.0013	0.0062	0.0016	0.0016	0.0033
Bromoform (mg/L)	0.0012	<0.001	<0.001	0.0012	0.0012	0.0016
Chloroform (mg/L)	0.0014	0.0143	0.0214	0.0011	0.0032	0.0053
Dibromochloromethane (mg/L)	0.0025	<0.001	0.0014	0.0024	0.0024	0.0032
Toluene-d8 (%)	95	118	85	98	114	87
4-Bromofluorobenzene (%)	101	105	114	102	100	117
2019	Ermineskin			Public Works		
	March	May	August	March	May	August
Total THM (mg/L)	<0.004	<0.004	0.00463	0.00761	0.022	0.0311
Bromodichloromethanes (mg/L)	0.0012	<0.001	0.0011	0.0021	0.0021	0.0068
Bromoform (mg/L)	<0.001	<0.001	0.0015	0.0013	<0.001	<0.001
Chloroform (mg/L)	<0.001	<0.001	<0.001	0.0014	0.0199	0.0228
Dibromochloromethane (mg/L)	0.0019	0.0014	0.002	0.0028	<0.001	0.0015
Toluene-d8 (%)	95	114	82	89	115	88
4-Bromofluorobenzene (%)	100	102	111	98	104	117

THM Analysis

Appendix G



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: 
Environmental Health Officer

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

Place Decal Here

Water System Operating Conditions

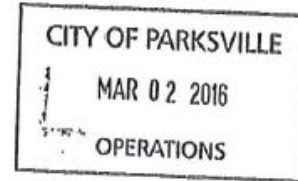
Appendix G

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

Water System Operating Conditions

Appendix G

March 1, 2016

Appendix A - Operational

Water System Operating Permit Terms and Conditions For the Current 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. 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 *VIHA 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.

Appendix G

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.