

# 2016 Annual Water Report



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## ***1.0 Introduction***

Water suppliers, under their Operating Permit and conditions, are required to provide an annual report to their users with information such as explanation of water source, water test results, maintenance programs and improvements to the water system. The following document summarizes these requirements. City of Parksville operating conditions are shown in Appendix G.

This report has been submitted to Island Health and it can be found on the City of Parksville Website. [www.Parksville.ca](http://www.Parksville.ca).

## ***2.0 Parksville Water System***

The City of Parksville has approximately 4,500 water connections serving over 11,000 permanent and seasonal residents as well as supplying water to the Regional District of Nanaimo (Nanoose Bay Peninsula system) in the summer months.

These users get their drinking water from three sources.

- Englishman River
- Springwood Well Field
- Railway Well Field

The water is treated using either liquid or gaseous chlorine and stored in four reservoirs at both ends of the City.



Springwood  
Well #8

## 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 ranging from 2.0 l/s (25.23 IGPM) to 8.6 l/s (113.5 IGPM). See **Appendix A** for Well locations.

Well Name	Pump intake (m)	Production (l/s)
Springwood Well #1	22.8	2.0
Springwood Well #3	30.36	3.4
Springwood Well #5	30.52	4.8
Springwood Well #6	31.8	2.5
Springwood Well #7	22.35	8.9
Springwood Well #8	23.71	9.3
Springwood Well #9	Under construction	Under construction
Springwood Well #10	32.18	5.1
Springwood Well #11	30.42	5.2
Railway Well#1	35	3.4
Railway Well#2	34.15	4.9
Railway Well#3	38.46	0.7
Railway Well#4	35.67	2.2
Railway Well#5	36	4.7
Railway Well#6	35	5.9
Railway Well#7	35	2.3
Railway Well #8	35.68	3.2
Industrial Well#8	-	-

Pump Depth and Production Information

## *2.2 River Intake*

Between the end of April to the beginning of October the City pumps water from the Englishman River at a maximum rate of 105 l/s (1390 IGPM) to keep up with summer demands. 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 1st and October 31st.

## *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 is located at Arrowsmith Lake approximately 19km south of Parksville. It was commissioned in September of 2000. The dam has a capacity of 9,000,000 m<sup>3</sup> and is operated and maintained by City of Parksville 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 2016.

## *2.4 Reservoirs*

Water that 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 m<sup>3</sup> (135,500 Imp. gal).
- Reservoir #2 - 2023 m<sup>3</sup> (445,000 Imp. gal)
- Reservoir #4 - 4559 m<sup>3</sup> (1,000,000 Imp. gal).

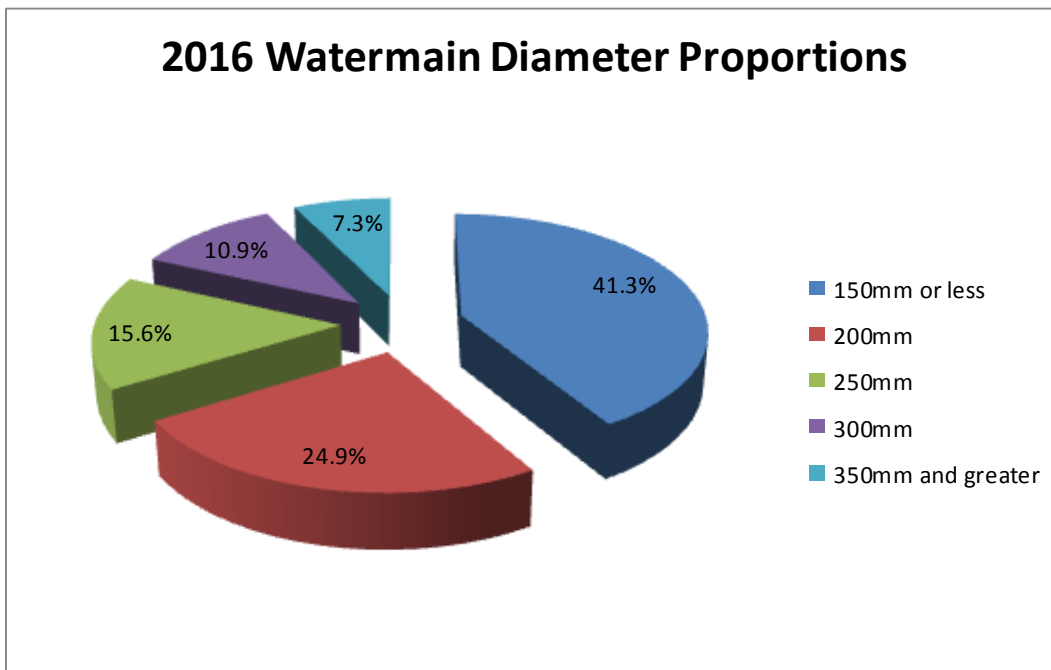
There are two additional reservoirs at the Top Bridge Park area, numbers 3 and 5. Reservoir #5 is a glass fused steel tank, Reservoir #3 is a steel tank although currently not in use. Storage capacities are:

- Reservoir #3 - 671m<sup>3</sup> (148,000 Imp. gal.)
- Reservoir #5 - 4300 m<sup>3</sup> (950,000 Imp. gal).

### 3.0 *Distribution System*

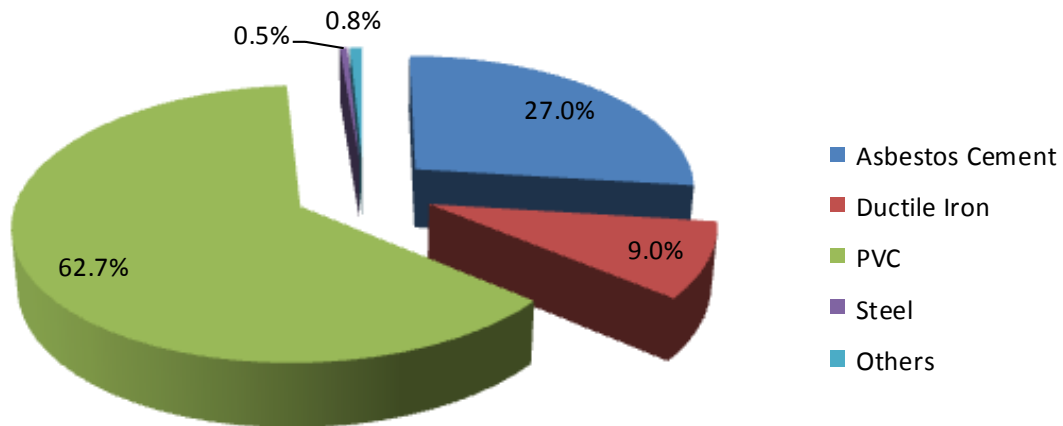
The distribution system consists of 64.6 km of PVC (plastic) pipe, 9.1 km of Ductile Iron pipe and 33.16 km of AC (Asbestos Cement) pipe. Sizes range from 100mm (4") to 400mm (16"). There are 564 fire hydrants and one Pressure Reducing Valve (PRV).

Like all municipalities, the infrastructure is aging and water mains 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 2015. Some of these pipes have been replaced since 2015 but newer data has not yet been updated by the Engineering department.



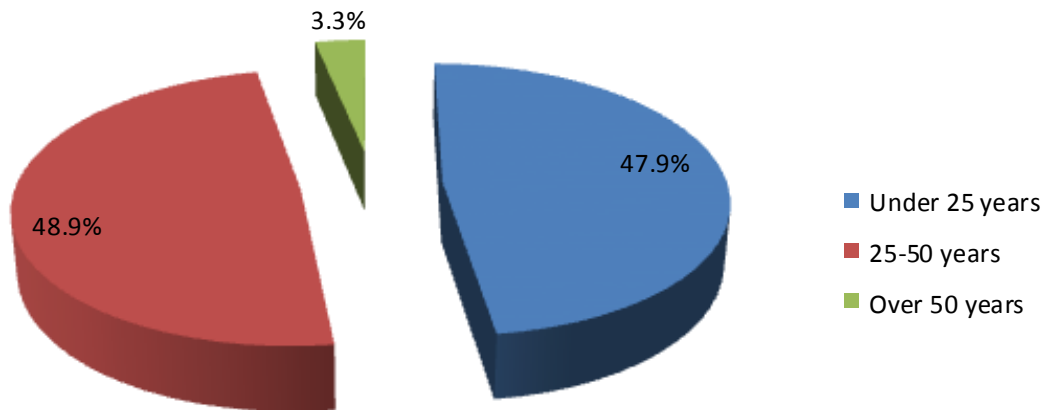
2016 Watermain Diameter Proportions				
Diameter	No Pipes	Distance (km)	Percentage	Type
150 mm or less	704	41.9	41.34%	Distribution Mains 66.26%
200 mm	510	25.3	24.92%	
250 mm	261	15.8	15.56%	Supply Mains 33.74%
300 mm	200	11	10.89%	
350 mm and greater	109	7.4	7.29%	
<b>Total:</b>	<b>1784</b>	<b>=101.38</b>	<b>km</b>	

## 2016 Watermain Material Proportions



2016 Watermain Material Proportions		
Material Types	Distance (km)	Percentage
Asbestos Cement	27.4	27%
Ductile Iron	9.1	9%
PVC	63.6	62.7%
Steel	0.45	0.5%
Others	0.84	0.8%
<b>Total:</b>	<b>101.4</b>	<b>km</b>

## 2016 Watermain Age Proportions



2016 Watermain Age Proportions			
Age	No Pipes	Distance (km)	Percentage
Under 25 Years ( $\geq 1991$ )	1059	48.5	47.9%
25 - 50 Years (1966 - 1991)	802	49.6	48.9%
Over 50 Years ( $< 1966$ )	62	3.3	3.3%
Total:	1923	101.4	km



### 3.1 *Pressure Zones*

The City is divided into two pressure zones. A low pressure and a 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 73.74m 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 initially was developed for higher elevation regions of the city that didn't have sufficient pressures or flows to meet fire fighting 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 80psi to 60psi.

The high pressure water in this zone is supplied from four pumps, a 15 hp, 2-40 hp and a 100 hp. These pumps are controlled through the SCADA system that automatically watches flows and switches on however many pumps it needs to meet the flow requirements.

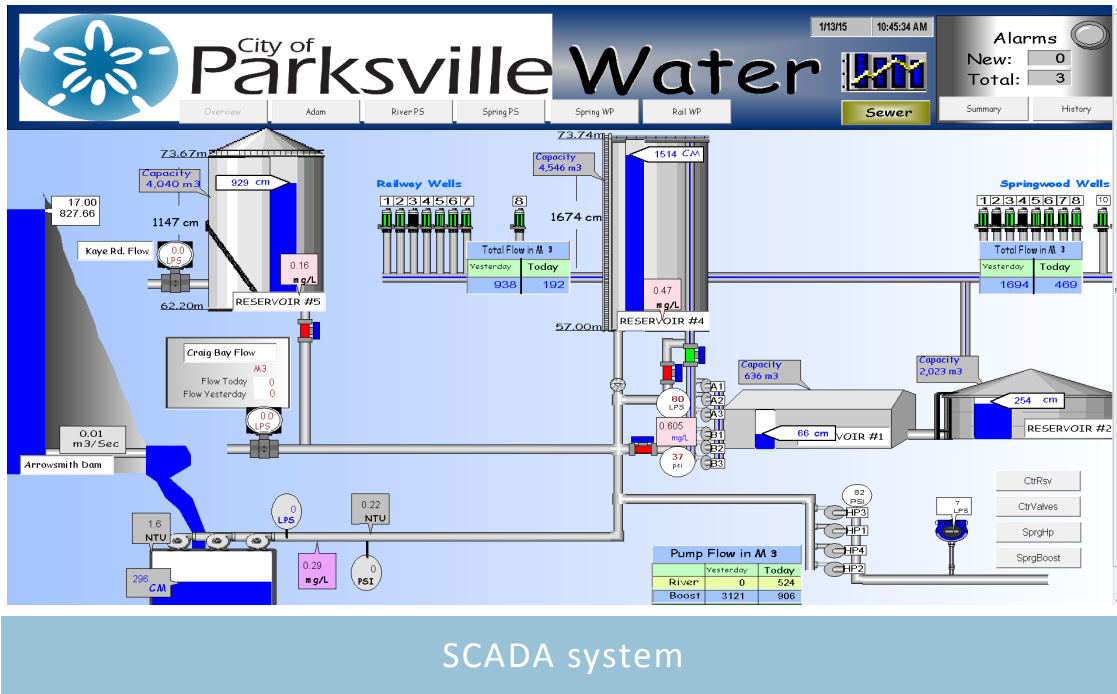
See **Appendix C** for Map of Pressure Zone Boundaries.



Springwood Pump Station

## 4.0 SCADA (Supervisory Control and Data Acquisition)

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



## 5.0 Water Sampling and Testing

### 5.1 Bacteriological

As required by the Island Health, City staff take weekly bacteriological samples to be tested for Total Coliforms and e-Coli Bacteria. There are 17 dedicated sampling sites throughout the city.

See **Appendix D** for 2016 test results (L1 means Less than 1 - no detectable bacteria - Acceptable).

### 5.2 Full Spectrum Analysis

In addition to weekly sampling throughout the distribution system, the City also sends samples from the source waters once per year, in the Fall, for a full spectrum analysis. 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 ( $\text{CaCO}_3$ ). 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 the Canadian Drinking Water Guidelines.

See **Appendix E** for the 2016 Full Spectrum Analysis of the Parksville Water System Source Water. Note: The water tested is in it's Raw form before any type of treatment.

### 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 that contains elevated levels of natural organic matter.

See **Appendix F** for the Trihalomethane results.



1116 Herring Gull  
Way sampling site

## 6.0 *Water Quality Complaints & Incidents*

The Operations Department had few water quality complaints throughout 2016. During water main 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 flushout at a location closest to the dead end or advise the homeowner that running an outside tap for a few minutes would clear up the problem.

There was one complaint 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 about it.

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 build up in washing machines and toilet bowl although the water is only considered “Moderately Hard” on the Hardness Scale. This rating drops throughout the summer when the river supply (soft water) is mixed with the well supply.

Many of the complaints in 2016 were related to pressure drop. The cause for most of the pressure drop complaints were from a faulty PRV (responsibility of the home owner). 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. There were no main breaks in 2016.

Clay Bank at Englishman River



## 7.0 *Englishman River Water Service*

The ERWS 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 project**

The City of Parksville and the Regional District of Nanaimo (Nanoose Bay Peninsula) are moving forward with an expansion to the drinking water supply which will ensure a safe and secure water system for the community. The projects includes:

- In-river water supply intake designed/located to consider the needs of river users and to protect aquatic habitat;
- Water treatment plant with a minimum of 16 million litres per day of membrane filtration capacity to comply with new water regulatory treatment standards; and
- Transmission supply main between plant and reservoirs.

This project is necessary to ensure a safe and secure water system is available for now and the future. Island Health has mandated the improvement of water quality standards for surface water (river water) and the plant is schedule to be operational in 2018.

The benefits of the water treatment plant include:

- Reduced health risk;
- Improved water quality;
- Ensures customers receive best quality water year round; and
- Will meet Canadian Drinking Water Guidelines.

For more information visit  
[www.arrowsmithwaterservice.ca](http://www.arrowsmithwaterservice.ca)



englishman river  
WATER SERVICE

## ***8.0 Routine Maintenance Program***

### ***8.1 Distribution***

- Water mains are flushed using a unidirectional flushing program
- Air relief valves are cleaned
- Fireline 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 1-2 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***

- Winter maintenance of chlorination system while off line
- Weekly blowing of air lines through intake screens
- Daily checks of pump flows and chlorine levels
- 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 5 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 2016 Projects & Improvements

- Updated the Dam O&M manual and the Dam Emergency Response Plan.
- Springwood well #1 and Railway well #4 were updated (pipes replaced).
- Railways #6 and Springwood #6 had their motor and pump replaced.
- Finished the water meter replacement for the 1 1/2" and the 1". Started the replacement of the 3/4" .
- Continued to update the water meter route maps and completed the Arrowsmith Dam Emergency Response Plan.
- Developments that included water main replacement for 823 Stanhope Road, 330 Church Road, 780 Stanhope and 577 Pym.
- Ran the pilot program to demonstrate the UF membrane system performance.

## 10.0 2016 Capital Projects

- Replacement of aging water mains (Temple Street from Bay to Chinook, Banks Avenue and Forsyth)
- Continued to update the unidirectional flushing maps.

## 11.0 2017 Projects & Improvements

- Start construction of water intake and treatment plant.
- Rehabilitate Springwood and Railways Wells #6.
- Continuing to replace aging water mains for better distribution (Corfield Street from Highway 19A to Stanford, Wallis and McKinnon.
- Developments that may have substantial completion in 2017 include 770 Hirst Avenue, 511 Soriel Road, Ceder Ridge phase 2 & 3, 705 & 677 Pym Street, Cider Ridge phase 4, Shelly Place and 312 Hirst.
- Continue working on the Cross Connection Control Program.
- Finish updating the unidirectional flushing maps.
- Continue to register all City Wells.
- Railway well #1 well rehabilitation.
- Springwood well #9 chemical rehab.
- Continue with water meter replacement program.



Pilot Plant—UF  
membrane system

## 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 Utilities Technician (Cross Connection Control Coordinator) is constantly working on the implementation of this program.



Irrigation cross connection

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.

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.

All City owned facilities were assessed and the appropriate backflow preventer were installed. Currently staff is assessing privately owned devices. Due to the large number of ICI users, this assessment may take a couple of years. 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 an Emergency Response Plan (ERP) pertaining to the water system. This document is not available online as it has private contact information for City Staff. This document outlines the strategies to deal with events such as contamination of water supply, pump failures and turbidity events. This plan was updated in 2015 and a separate ERP exists for the Arrowsmith Dam.

Englishman River  
High Water Level, January 2016





## ***14.0 Watershed Protection Program***

The City of Parksville is part of the Regional District of Nanaimo's regional Drinking Water and Watershed Protection Program.

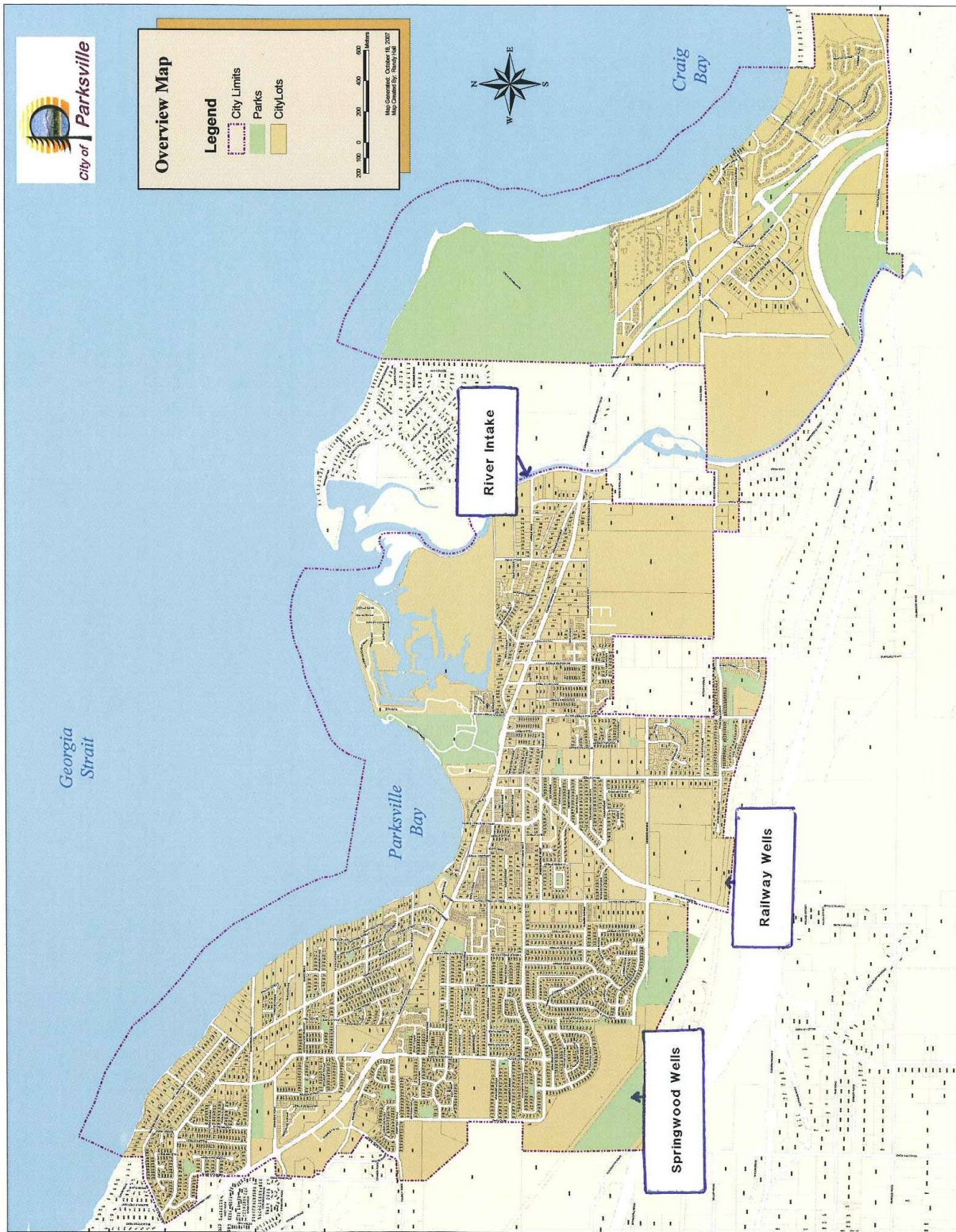
The Drinking Water and Watershed Protection (DWWP) program helps protect the Region's water resources. Through the DWWP program, more is being learned about water in the Region, this information is used to make better land use decisions, and help communities protect the environment.

Parksville is part of the Englishman River watershed. The Englishman River flows in an easterly direction from Mount Arrowsmith at 1819 m above sea level and discharges into the Strait of Georgia, north of Craig Bay. The main Englishman and South Englishman rivers originate in Arrowsmith, Hidden and Fishtail lakes.

The total drainage area is approximately 324 sq. km.

For more information visit <http://www.rdn.bc.ca/cms.asp?wpID=1749>

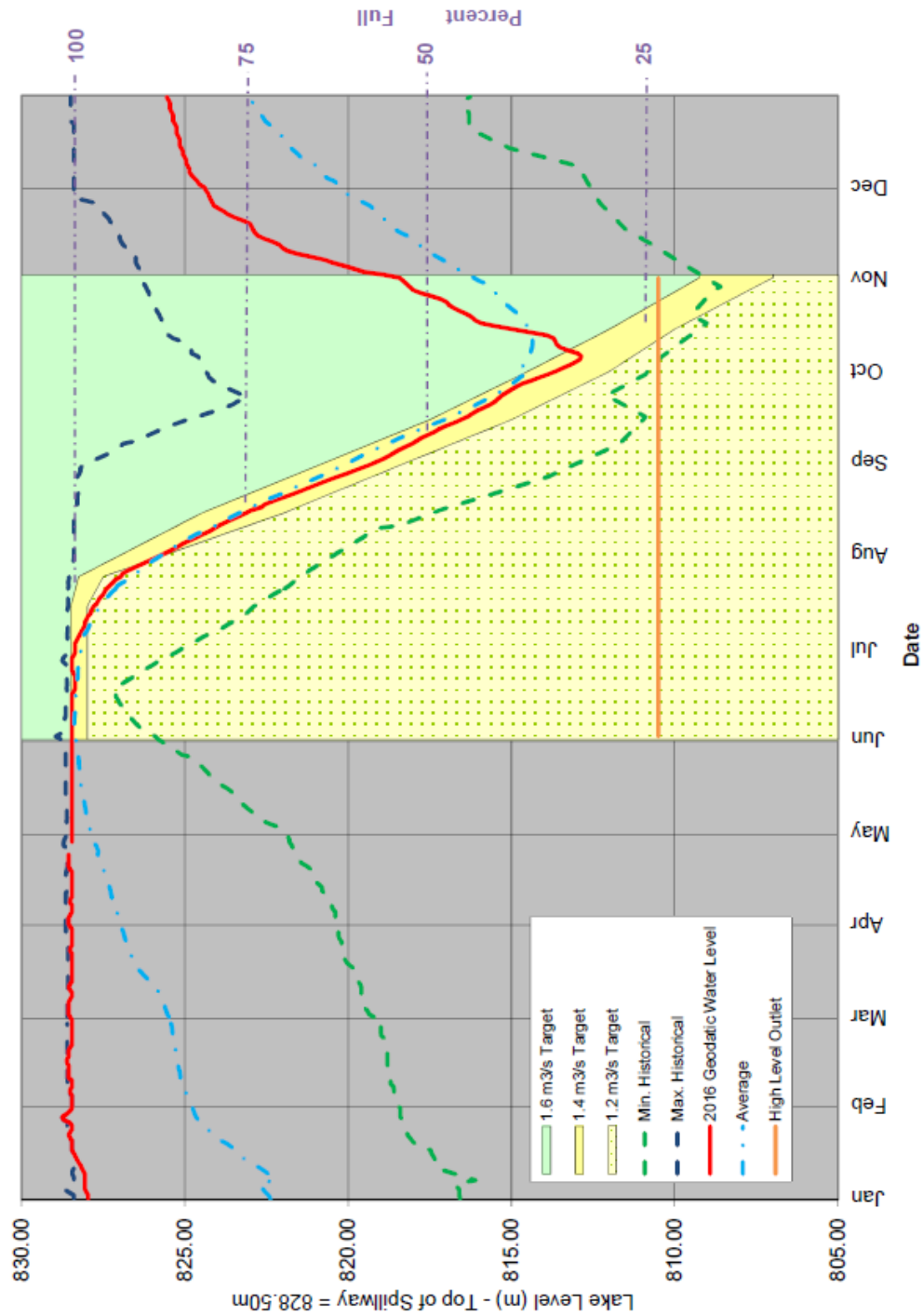
# Appendix A



Water Source Locations Map

# Appendix B

2016 Arrowsmith Dam Lake Levels  
Provisional Operating Rule Curve

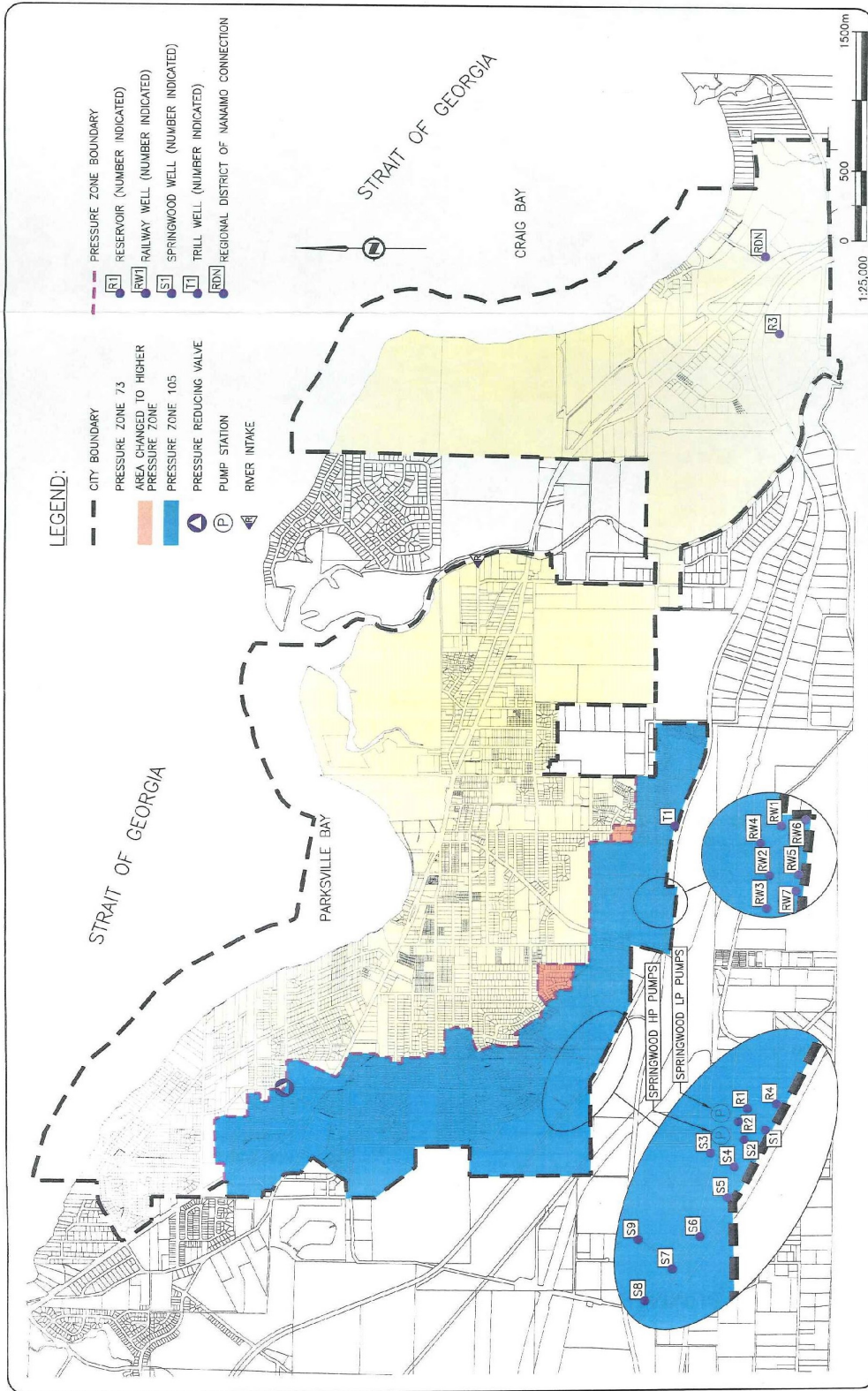


Current as of :2017-02-03

Prepared By: B. Sileniks

## Arrowsmith Dam Lake Levels

# Appendix C



TITLE		PROPOSED PRESSURE ZONE BOUNDARIES	
APPROVED	SCALE	1:25,000	
DATE	MAY 2005	DWG. No.	
JOB No.	0212	FIGURE 10	

CLIENT	CITY OF PARKSVILLE
PROJECT	WATER STUDY UPDATE

**KOERS & ASSOCIATES & ENGINEERING LTD.**  
Consulting Engineers

Map of Pressure Zone Boundaries

## Appendix D

### PARKSVILLE, WWS

**Facility Location:**

1116 Herring Gull Way  
Parksville

**Facility Information:**

Facility Type: DWT

**Facility Sampling History:**

<u>Location</u>	<u>Date</u>	<u>Total Coliform</u>	<u>E. Coli</u>
330 Park View, Parksville, 330 Park View, Parksville BC	24-Jan-2017	L1	L1
770 Soriel , 770 Soriel	24-Jan-2017	L1	L1
Island Highway, by Temple, Island Highway, by Temple	24-Jan-2017	L1	L1
136 Memorial, 136 Memorial	17-Jan-2017	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	17-Jan-2017	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	17-Jan-2017	L1	L1
851 TEMPLE (beside), 851 Temple	10-Jan-2017	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	10-Jan-2017	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	10-Jan-2017	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	3-Jan-2017	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	3-Jan-2017	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	3-Jan-2017	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	3-Jan-2017	L1	L1
136 Memorial, 136 Memorial	13-Dec-2016	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	13-Dec-2016	L1	L1
770 Soriel , 770 Soriel	13-Dec-2016	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	13-Dec-2016	L1	L1
Island Highway, by Temple, Island Highway, by Temple	13-Dec-2016	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	13-Dec-2016	L1	L1
River Pump Station, Englishman River Intake	13-Dec-2016	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	13-Dec-2016	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	6-Dec-2016	L1	L1
330 Park View, Parksville, 330 Park View, Parksville BC	6-Dec-2016	L1	L1
851 TEMPLE (beside), 851 Temple	6-Dec-2016	L1	L1
across from 450 Wisteria, 450 Wisteria	6-Dec-2016	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	6-Dec-2016	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	6-Dec-2016	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	6-Dec-2016	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	6-Dec-2016	L1	L1
136 Memorial, 136 Memorial	29-Nov-2016	L1	L1
Island Highway, by Temple, Island Highway, by Temple	29-Nov-2016	L1	L1
River Pump Station, Englishman River Intake	29-Nov-2016	L1	L1
770 Soriel , 770 Soriel	22-Nov-2016	L1	L1
across from 450 Wisteria, 450 Wisteria	22-Nov-2016	L1	L1

## Appendix D

Community Park, Parksville BC, 193 East Island Highway, Parksville BC	22-Nov-2016	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	15-Nov-2016	L1	L1
330 Park View, Parksville, 330 Park View, Parksville BC	15-Nov-2016	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	15-Nov-2016	L1	L1
851 TEMPLE (beside), 851 Temple	8-Nov-2016	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	8-Nov-2016	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	8-Nov-2016	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	1-Nov-2016	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	1-Nov-2016	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	1-Nov-2016	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	1-Nov-2016	L1	L1
136 Memorial, 136 Memorial	25-Oct-2016	L1	L1
770 Soriel , 770 Soriel	25-Oct-2016	L1	L1
Island Highway, by Temple, Island Highway, by Temple	25-Oct-2016	L1	L1
River Pump Station, Englishman River Intake	25-Oct-2016	4.1	L1
330 Park View, Parksville, 330 Park View, Parksville BC	18-Oct-2016	L1	L1
across from 450 Wisteria, 450 Wisteria	18-Oct-2016	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	18-Oct-2016	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	18-Oct-2016	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	12-Oct-2016	L1	L1
851 TEMPLE (beside), 851 Temple	12-Oct-2016	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	12-Oct-2016	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	12-Oct-2016	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	4-Oct-2016	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	4-Oct-2016	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	4-Oct-2016	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	4-Oct-2016	L1	L1
136 Memorial, 136 Memorial	27-Sep-2016	L1	L1
770 Soriel , 770 Soriel	27-Sep-2016	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	27-Sep-2016	L1	L1
Island Highway, by Temple, Island Highway, by Temple	27-Sep-2016	L1	L1
330 Park View, Parksville, 330 Park View, Parksville BC	20-Sep-2016	L1	L1
across from 450 Wisteria, 450 Wisteria	20-Sep-2016	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	20-Sep-2016	L1	L1
River Pump Station, Englishman River Intake	20-Sep-2016	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	13-Sep-2016	L1	L1
851 TEMPLE (beside), 851 Temple	13-Sep-2016	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	13-Sep-2016	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	13-Sep-2016	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	7-Sep-2016	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	7-Sep-2016	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	7-Sep-2016	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	7-Sep-2016	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	30-Aug-2016	L1	L1
Island Highway, by Temple, Island Highway, by Temple	30-Aug-2016	L1	L1
136 Memorial, 136 Memorial	23-Aug-2016	L1	L1
770 Soriel , 770 Soriel	23-Aug-2016	L1	L1
330 Park View, Parksville, 330 Park View, Parksville BC	16-Aug-2016	L1	L1
across from 450 Wisteria, 450 Wisteria	16-Aug-2016	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	16-Aug-2016	L1	L1
River Pump Station, Englishman River Intake	16-Aug-2016	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	10-Aug-2016	L1	L1
851 TEMPLE (beside), 851 Temple	10-Aug-2016	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	10-Aug-2016	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	10-Aug-2016	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	10-Aug-2016	L1	L1

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Top of Corfield, Parksville , Harbour Homes, Parksville BC	3-Aug-2016	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	2-Aug-2016	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	2-Aug-2016	48	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	2-Aug-2016	L1	L1
136 Memorial, 136 Memorial	26-Jul-2016	L1	L1
770 Soriel , 770 Soriel	26-Jul-2016	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	26-Jul-2016	L1	L1
Island Highway, by Temple, Island Highway, by Temple	26-Jul-2016	L1	L1
330 Park View, Parksville, 330 Park View, Parksville BC	19-Jul-2016	L1	L1
across from 450 Wisteria, 450 Wisteria	19-Jul-2016	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	19-Jul-2016	L1	L1
River Pump Station, Englishman River Intake	19-Jul-2016	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	13-Jul-2016	L1	L1
851 TEMPLE (beside), 851 Temple	13-Jul-2016	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	13-Jul-2016	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	13-Jul-2016	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	6-Jul-2016	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	6-Jul-2016	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	6-Jul-2016	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	6-Jul-2016	L1	L1
136 Memorial, 136 Memorial	28-Jun-2016	L1	L1
770 Soriel , 770 Soriel	28-Jun-2016	L1	L1
Island Highway, by Temple, Island Highway, by Temple	28-Jun-2016	L1	L1
River Pump Station, Englishman River Intake	28-Jun-2016	L1	L1
330 Park View, Parksville, 330 Park View, Parksville BC	21-Jun-2016	L1	L1
across from 450 Wisteria, 450 Wisteria	21-Jun-2016	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	21-Jun-2016	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	21-Jun-2016	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	15-Jun-2016	L1	L1
851 TEMPLE (beside), 851 Temple	15-Jun-2016	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	15-Jun-2016	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	15-Jun-2016	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	8-Jun-2016	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	8-Jun-2016	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	8-Jun-2016	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	8-Jun-2016	L1	L1
136 Memorial, 136 Memorial	31-May-2016	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	31-May-2016	L1	L1
770 Soriel , 770 Soriel	25-May-2016	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	25-May-2016	L1	L1
851 TEMPLE (beside), 851 Temple	18-May-2016	L1	L1
Island Highway, by Temple, Island Highway, by Temple	18-May-2016	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	18-May-2016	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	18-May-2016	L1	L1
across from 450 Wisteria, 450 Wisteria	9-May-2016	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	9-May-2016	L1	L1
River Pump Station, Englishman River Intake	9-May-2016	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	9-May-2016	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	4-May-2016	L1	L1
330 Park View, Parksville, 330 Park View, Parksville BC	4-May-2016	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	4-May-2016	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	3-May-2016	L1	L1
136 Memorial, 136 Memorial	26-Apr-2016	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	26-Apr-2016	L1	L1
770 Soriel , 770 Soriel	26-Apr-2016	L1	L1

2015 Bacteriological Results

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Island Highway, by Temple, Island Highway, by Temple	26-Apr-2016	L1	L1
330 Park View, Parksville, 330 Park View, Parksville BC	19-Apr-2016	L1	L1
851 TEMPLE (beside), 851 Temple	19-Apr-2016	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	19-Apr-2016	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	19-Apr-2016	L1	L1
across from 450 Wisteria, 450 Wisteria	11-Apr-2016	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	11-Apr-2016	L1	L1
River Pump Station, Englishman River Intake	11-Apr-2016	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	11-Apr-2016	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	5-Apr-2016	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	5-Apr-2016	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	5-Apr-2016	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	5-Apr-2016	L1	L1
136 Memorial, 136 Memorial	30-Mar-2016	L1	L1
Island Highway, by Temple, Island Highway, by Temple	30-Mar-2016	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	22-Mar-2016	L1	L1
770 Soriel , 770 Soriel	22-Mar-2016	L1	L1
330 Park View, Parksville, 330 Park View, Parksville BC	15-Mar-2016	L1	L1
851 TEMPLE (beside), 851 Temple	15-Mar-2016	L1	L1
River Pump Station, Englishman River Intake	15-Mar-2016	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	15-Mar-2016	L1	L1
across from 450 Wisteria, 450 Wisteria	8-Mar-2016	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	8-Mar-2016	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	8-Mar-2016	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	8-Mar-2016	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	2-Mar-2016	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	2-Mar-2016	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	2-Mar-2016	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	2-Mar-2016	L1	L1
136 Memorial, 136 Memorial	24-Feb-2016	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	24-Feb-2016	L1	L1
Island Highway, by Temple, Island Highway, by Temple	24-Feb-2016	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	24-Feb-2016	L1	L1
330 Park View, Parksville, 330 Park View, Parksville BC	16-Feb-2016	L1	L1
770 Soriel , 770 Soriel	16-Feb-2016	L1	L1
851 TEMPLE (beside), 851 Temple	16-Feb-2016	L1	L1
River Pump Station, Englishman River Intake	16-Feb-2016	L1	L1
across from 450 Wisteria, 450 Wisteria	9-Feb-2016	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	9-Feb-2016	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	9-Feb-2016	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	9-Feb-2016	L1	L1
613 Chinook Avenue, Parksville , 613 Chinook Avenue, Parksville BC	2-Feb-2016	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	2-Feb-2016	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	2-Feb-2016	L1	L1
Top of Corfield, Parksville , Harbour Homes, Parksville BC	2-Feb-2016	L1	L1



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136 Memorial, 136 Memorial	26-Jan-2016	L1	L1
330 Park View, Parksville, 330 Park View, Parksville BC	26-Jan-2016	L1	L1
Island Highway, by Temple, Island Highway, by Temple	26-Jan-2016	L1	L1
Wheeler, Top of Kingsley, 378 Kingsley Street	26-Jan-2016	L1	L1
271 Chestnut Street, Parksville, 271 Chestnut Street, Parksville BC	20-Jan-2016	L1	L1
770 Soriel, 770 Soriel	20-Jan-2016	L1	L1
851 TEMPLE (beside), 851 Temple	20-Jan-2016	L1	L1
Community Park, Parksville BC, 193 East Island Highway, Parksville BC	20-Jan-2016	L1	L1
across from 450 Wisteria, 450 Wisteria	12-Jan-2016	L1	L1
Daffodil at Camas, Parksville, Daffodil at Camas, Parksville BC	12-Jan-2016	L1	L1
River Pump Station, Englishman River Intake	12-Jan-2016	L1	L1
Works Yard, Parksville, 1390 Herring Gull Way, Parksville BC	12-Jan-2016	L1	L1
613 Chinook Avenue, Parksville, 613 Chinook Avenue, Parksville BC	5-Jan-2016	L1	L1
Despard & Moilliet, 401 S. Moilliet Street, Parksville BC	5-Jan-2016	L1	L1
Parksville MHP/Utility Building, Parksville, 1247 Arbutus Road, Parksville BC	5-Jan-2016	L1	L1
Top of Corfield, Parksville, Harbour Homes, Parksville BC	5-Jan-2016	L1	L1

Information taken from: [http://www.viha.ca/mho/water/water\\_sampling\\_results.htm](http://www.viha.ca/mho/water/water_sampling_results.htm)

# Appendix E



## CERTIFICATE OF ANALYSIS

<b>REPORTED TO</b>	Parksville, City of P O Box 1390, 100 Jensen Avenue East Parksville, BC V9P 2H3	<b>TEL</b>	(250) 951-2489
<b>ATTENTION</b>	Barbara Silenieks	<b>FAX</b>	
<b>PO NUMBER</b>	PO002303	<b>WORK ORDER</b>	6110030
<b>PROJECT</b>	Drinking Water Pkg	<b>RECEIVED / TEMP</b>	2016-11-01 09:30 / 7°C
<b>PROJECT INFO</b>		<b>REPORTED</b>	2016-11-08
		<b>COC NUMBER</b>	B35456

### General Comments:

CARO Analytical Services employs methods which are conducted according to procedures accepted by appropriate regulatory agencies, and/or are conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts, except where otherwise agreed to by the client.

The results in this report apply to the samples analyzed in accordance with the Chain of Custody or Sample Requisition document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued unless otherwise agreed to in writing.

Authorized By: **Brent Coates, B.Sc.**  
Division Manager, Richmond

*If you have any questions or concerns, please contact your Account Manager:  
Jeffery Lopes (jlopes@caro.ca)*

### Locations:

#110 4011 Viking Way  
Richmond, BC V6V 2K9  
Tel: 604-279-1499 Fax: 604-279-1599

#102 3677 Highway 97N  
Kelowna, BC V1X 5C3  
Tel: 250-765-9646 Fax: 250-765-3893

17225 109 Avenue  
Edmonton, AB T5S 1H7  
Tel: 780-489-9100 Fax: 780-489-9700

[www.caro.ca](http://www.caro.ca)

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Full Spectrum Analysis—Well Water

# Appendix E



## ANALYSIS INFORMATION

**REPORTED TO PROJECT** Parkville, City of  
Drinking Water Pkg

**WORK ORDER REPORTED** 6110030  
2016-11-08

Analysis Description	Method Reference	Technique	Location
Alkalinity in Water	APHA 2320 B*	Titration with H2SO4	Kelowna
Ammonia, Total in Water	APHA 4500-NH3 G*	Automated Colorimetry (Phenate)	Kelowna
Anions by IC in Water	APHA 4110 B	Ion Chromatography with Chemical Suppression of Eluent Conductivity	Kelowna
Coliforms, Fecal (MF) in Water	APHA 9222	Membrane Filtration	Sublet
Coliforms, Total (MF) in Water	APHA 9222	Membrane Filtration	Sublet
Colour, True in Water	APHA 2120 C	Spectrophotometry (456 nm)	Kelowna
Conductivity in Water	APHA 2510 B	Conductivity Meter	Kelowna
Cyanide, SAD in Water	ASTM D7511-12	Flow Injection Analysis with In-Line Ultraviolet Digestion and Amperometric Detection	Kelowna
E. coli (MF) in Water	APHA 9223 B	Enzyme Substrate Endo Agar	Sublet
Hardness (as CaCO3) in Water	APHA 2340 B*	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Estimated)	N/A
Langelier Index in Water	APHA 2330 B	Calculation	N/A
Mercury, total by CVAFS in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	Richmond
pH in Water	APHA 4500-H+ B	Electrometry	Kelowna
Solids, Total Dissolved in Water	APHA 1030 E	Calculation: $100 \times \frac{([\text{Cations}] - [\text{Anions}])}{([\text{Cations}] + [\text{Anions}])}$	N/A
Temperature (lab) in Water	APHA 2550 B	Thermometer	Kelowna
Total Metals by ICPMS in Water	APHA 3030E* / APHA 3125 B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma Mass Spectrometry (ICP-MS)	Richmond
Turbidity in Water	APHA 2130 B	Nephelometry	Kelowna

*Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method*

### Method Reference Descriptions:

APHA Standard Methods for the Examination of Water and Wastewater, 22nd Edition, American Public Health Association/American Water Works Association/Water Environment Federation  
 ASTM ASTM International Test Methods  
 EPA United States Environmental Protection Agency Test Methods

### Glossary of Terms:

MRL Method Reporting Limit  
 < Less than the Reported Detection Limit (RDL) - the RDL may be higher than the MRL due to various factors such as dilutions, limited sample volume, high moisture, or interferences  
 °C Degrees Celcius  
 CFU/100 mL Colony Forming Units per 100 millilitres  
 CU Colour Units (referenced against a platinum cobalt standard)  
 mg/L Milligrams per litre  
 NTU Nephelometric Turbidity Units  
 pH units pH < 7 = acidic, pH > 7 = basic  
 µS/cm Microsiemens per centimetre

# Appendix E



## SAMPLE ANALYTICAL DATA

REPORTED TO PROJECT Parkville, City of Drinking Water Pkg

WORK ORDER REPORTED 6110030 2016-11-08

Analyte	Result / Recovery	Standard / Guideline	MRL / Units Limits	Prepared	Analyzed	Notes
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Sample ID: River (6110030-01) [Water] Sampled: 2016-10-31 00:00 To 2016-10-31 08:45

### Anions

Chloride	3.82	N/A	0.10 mg/L	N/A	2016-11-03	
Fluoride	< 0.10	N/A	0.10 mg/L	N/A	2016-11-03	
Nitrate (as N)	0.043	N/A	0.010 mg/L	N/A	2016-11-03	
Nitrite (as N)	< 0.010	N/A	0.010 mg/L	N/A	2016-11-03	
Sulfate	1.4	N/A	1.0 mg/L	N/A	2016-11-03	

### General Parameters

Alkalinity, Total (as CaCO3)	16	N/A	2 mg/L	N/A	2016-11-03	
Alkalinity, Phenolphthalein (as CaCO3)	< 1	N/A	2 mg/L	N/A	2016-11-03	
Alkalinity, Bicarbonate (as CaCO3)	16	N/A	2 mg/L	N/A	2016-11-03	
Alkalinity, Carbonate (as CaCO3)	< 1	N/A	2 mg/L	N/A	2016-11-03	
Alkalinity, Hydroxide (as CaCO3)	< 1	N/A	2 mg/L	N/A	2016-11-03	
Colour, True	26	N/A	5 CU	N/A	2016-11-07	HT1
Conductivity (EC)	51	N/A	2 µS/cm	N/A	2016-11-03	
Cyanide, Total	< 0.0020	N/A	0.0020 mg/L	N/A	2016-11-03	
pH	7.11	N/A	0.01 pH units	N/A	2016-11-03	HT2
Temperature	20	N/A	°C	N/A	2016-11-03	HT2
Turbidity	1.19	N/A	0.10 NTU	N/A	2016-11-03	

### Calculated Parameters

Hardness, Total (as CaCO3)	19.6	N/A	4.99 mg/L	N/A	N/A	
Langelier Index	-2.4	N/A	-5.0 -	N/A	2016-11-08	
Solids, Total Dissolved	24.5	N/A	2.00 mg/L	N/A	N/A	

### Total Metals

Aluminum, total	0.127	N/A	0.005 mg/L	2016-11-03	2016-11-03	
Antimony, total	< 0.0010	N/A	0.0001 mg/L	2016-11-03	2016-11-03	
Arsenic, total	< 0.0050	N/A	0.0005 mg/L	2016-11-03	2016-11-03	
Barium, total	< 0.050	N/A	0.005 mg/L	2016-11-03	2016-11-03	
Boron, total	< 0.040	N/A	0.004 mg/L	2016-11-03	2016-11-03	
Cadmium, total	< 0.00010	N/A	0.00001 mg/L	2016-11-03	2016-11-03	
Calcium, total	6.2	N/A	0.2 mg/L	2016-11-03	2016-11-03	
Chromium, total	< 0.0050	N/A	0.0005 mg/L	2016-11-03	2016-11-03	
Cobalt, total	< 0.00050	N/A	0.00005 mg/L	2016-11-03	2016-11-03	
Copper, total	< 0.0020	N/A	0.0002 mg/L	2016-11-03	2016-11-03	
Iron, total	0.15	N/A	0.01 mg/L	2016-11-03	2016-11-03	
Lead, total	< 0.0010	N/A	0.0001 mg/L	2016-11-03	2016-11-03	
Magnesium, total	0.98	N/A	0.01 mg/L	2016-11-03	2016-11-03	
Manganese, total	0.0053	N/A	0.0002 mg/L	2016-11-03	2016-11-03	
Mercury, total	< 0.00002	N/A	0.00002 mg/L	2016-11-02	2016-11-03	
Molybdenum, total	< 0.0010	N/A	0.0001 mg/L	2016-11-03	2016-11-03	
Nickel, total	< 0.0020	N/A	0.0002 mg/L	2016-11-03	2016-11-03	
Potassium, total	< 0.20	N/A	0.02 mg/L	2016-11-03	2016-11-03	
Selenium, total	< 0.0050	N/A	0.0005 mg/L	2016-11-03	2016-11-03	
Sodium, total	2.10	N/A	0.02 mg/L	2016-11-03	2016-11-03	
Uranium, total	< 0.00020	N/A	0.00002 mg/L	2016-11-03	2016-11-03	
Zinc, total	< 0.040	N/A	0.004 mg/L	2016-11-03	2016-11-03	

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Full Spectrum Analysis—Well Water

# Appendix E



## SAMPLE ANALYTICAL DATA

REPORTED TO Parksville, City of  
PROJECT Drinking Water Pkg

WORK ORDER 6110030  
REPORTED 2016-11-08

Analyte	Result / Recovery	Standard / Guideline	MRL / Units Limits	Prepared	Analyzed	Notes
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Sample ID: River (6110030-01) [Water] Sampled: 2016-10-31 00:00 To 2016-10-31 08:45, Continued

### Microbiological Parameters

Coliforms, Total	64	N/A	1 CFU/100 mL		2016-11-01	
Coliforms, Fecal	32	N/A	1 CFU/100 mL		2016-11-01	
E. coli	34	N/A	1 CFU/100 mL		2016-11-01	

Sample ID: Springwood Well #6 (6110030-02) [Water] Sampled: 2016-10-31 09:15

### Anions

Chloride	14.8	N/A	0.10 mg/L	N/A	2016-11-03	
Fluoride	< 0.10	N/A	0.10 mg/L	N/A	2016-11-03	
Nitrate (as N)	1.21	N/A	0.010 mg/L	N/A	2016-11-03	
Nitrite (as N)	< 0.010	N/A	0.010 mg/L	N/A	2016-11-03	
Sulfate	6.5	N/A	1.0 mg/L	N/A	2016-11-03	

### General Parameters

Alkalinity, Total (as CaCO3)	132	N/A	2 mg/L	N/A	2016-11-03	
Alkalinity, Phenolphthalein (as CaCO3)	< 1	N/A	2 mg/L	N/A	2016-11-03	
Alkalinity, Bicarbonate (as CaCO3)	132	N/A	2 mg/L	N/A	2016-11-03	
Alkalinity, Carbonate (as CaCO3)	< 1	N/A	2 mg/L	N/A	2016-11-03	
Alkalinity, Hydroxide (as CaCO3)	< 1	N/A	2 mg/L	N/A	2016-11-03	
Colour, True	< 5	N/A	5 CU	N/A	2016-11-07	HT1
Conductivity (EC)	319	N/A	2 µS/cm	N/A	2016-11-03	
Cyanide, Total	< 0.0020	N/A	0.0020 mg/L	N/A	2016-11-03	
pH	7.51	N/A	0.01 pH units	N/A	2016-11-03	HT2
Temperature	21	N/A	°C	N/A	2016-11-03	HT2
Turbidity	1.08	N/A	0.10 NTU	N/A	2016-11-03	

### Calculated Parameters

Hardness, Total (as CaCO3)	159	N/A	4.99 mg/L	N/A	N/A	
Langelier Index	-0.3	N/A	-5.0 -	N/A	2016-11-08	
Solids, Total Dissolved	168	N/A	2.00 mg/L	N/A	N/A	

### Total Metals

Aluminum, total	< 0.050	N/A	0.005 mg/L	2016-11-03	2016-11-03	
Antimony, total	< 0.0010	N/A	0.0001 mg/L	2016-11-03	2016-11-03	
Arsenic, total	< 0.0050	N/A	0.0005 mg/L	2016-11-03	2016-11-03	
Barium, total	< 0.050	N/A	0.005 mg/L	2016-11-03	2016-11-03	
Boron, total	< 0.040	N/A	0.004 mg/L	2016-11-03	2016-11-03	
Cadmium, total	< 0.00010	N/A	0.00001 mg/L	2016-11-03	2016-11-03	
Calcium, total	34.9	N/A	0.2 mg/L	2016-11-03	2016-11-03	
Chromium, total	< 0.0050	N/A	0.0005 mg/L	2016-11-03	2016-11-03	
Cobalt, total	< 0.00050	N/A	0.00005 mg/L	2016-11-03	2016-11-03	
Copper, total	0.0073	N/A	0.0002 mg/L	2016-11-03	2016-11-03	
Iron, total	0.21	N/A	0.01 mg/L	2016-11-03	2016-11-03	
Lead, total	0.0028	N/A	0.0001 mg/L	2016-11-03	2016-11-03	
Magnesium, total	17.4	N/A	0.01 mg/L	2016-11-03	2016-11-03	
Manganese, total	0.0313	N/A	0.0002 mg/L	2016-11-03	2016-11-03	
Mercury, total	< 0.00002	N/A	0.00002 mg/L	2016-11-02	2016-11-03	

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Full Spectrum Analysis—Well Water

# Appendix E



## SAMPLE ANALYTICAL DATA

REPORTED TO PROJECT Parksville, City of Drinking Water Pkg

WORK ORDER REPORTED 6110030 2016-11-08

Analyte	Result / Recovery	Standard / Guideline	MRL / Units Limits	Prepared	Analyzed	Notes
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Sample ID: Springwood Well #6 (6110030-02) [Water] Sampled: 2016-10-31 09:15, Continued

### Total Metals, Continued

Molybdenum, total	< 0.0010	N/A	0.0001 mg/L	2016-11-03	2016-11-03	
Nickel, total	< 0.0020	N/A	0.0002 mg/L	2016-11-03	2016-11-03	
Potassium, total	0.86	N/A	0.02 mg/L	2016-11-03	2016-11-03	
Selenium, total	< 0.0050	N/A	0.0005 mg/L	2016-11-03	2016-11-03	
Sodium, total	7.48	N/A	0.02 mg/L	2016-11-03	2016-11-03	
Uranium, total	0.00022	N/A	0.00002 mg/L	2016-11-03	2016-11-03	
Zinc, total	< 0.040	N/A	0.004 mg/L	2016-11-03	2016-11-03	

### Microbiological Parameters

Coliforms, Total	<1	N/A	1 CFU/100 mL		2016-11-01	
Coliforms, Fecal	<1	N/A	1 CFU/100 mL		2016-11-01	
E. coli	<1	N/A	1 CFU/100 mL		2016-11-01	

Sample ID: Springwood Well #5 (6110030-03) [Water] Sampled: 2016-10-31 09:30

### Anions

Chloride	18.3	N/A	0.10 mg/L	N/A	2016-11-03	
Fluoride	< 0.10	N/A	0.10 mg/L	N/A	2016-11-03	
Nitrate (as N)	1.48	N/A	0.010 mg/L	N/A	2016-11-03	
Nitrite (as N)	< 0.010	N/A	0.010 mg/L	N/A	2016-11-03	
Sulfate	7.9	N/A	1.0 mg/L	N/A	2016-11-03	

### General Parameters

Alkalinity, Total (as CaCO3)	189	N/A	2 mg/L	N/A	2016-11-03	
Alkalinity, Phenolphthalein (as CaCO3)	< 1	N/A	2 mg/L	N/A	2016-11-03	
Alkalinity, Bicarbonate (as CaCO3)	189	N/A	2 mg/L	N/A	2016-11-03	
Alkalinity, Carbonate (as CaCO3)	< 1	N/A	2 mg/L	N/A	2016-11-03	
Alkalinity, Hydroxide (as CaCO3)	< 1	N/A	2 mg/L	N/A	2016-11-03	
Colour, True	< 5	N/A	5 CU	N/A	2016-11-07	HT1
Conductivity (EC)	427	N/A	2 µS/cm	N/A	2016-11-03	
Cyanide, Total	< 0.0020	N/A	0.0020 mg/L	N/A	2016-11-03	
pH	7.63	N/A	0.01 pH units	N/A	2016-11-03	HT2
Temperature	21	N/A	°C	N/A	2016-11-03	HT2
Turbidity	0.19	N/A	0.10 NTU	N/A	2016-11-03	

### Calculated Parameters

Hardness, Total (as CaCO3)	197	N/A	4.99 mg/L	N/A	N/A	
Langelier Index	0.08	N/A	-5.0 -	N/A	2016-11-08	
Solids, Total Dissolved	234	N/A	2.00 mg/L	N/A	N/A	

### Total Metals

Aluminum, total	< 0.050	N/A	0.005 mg/L	2016-11-03	2016-11-03	
Antimony, total	< 0.0010	N/A	0.0001 mg/L	2016-11-03	2016-11-03	
Arsenic, total	< 0.0050	N/A	0.0005 mg/L	2016-11-03	2016-11-03	
Barium, total	< 0.050	N/A	0.005 mg/L	2016-11-03	2016-11-03	
Boron, total	< 0.040	N/A	0.004 mg/L	2016-11-03	2016-11-03	
Cadmium, total	< 0.00010	N/A	0.00001 mg/L	2016-11-03	2016-11-03	

# Appendix E



## SAMPLE ANALYTICAL DATA

REPORTED TO PROJECT Parksville, City of Drinking Water Pkg

WORK ORDER REPORTED 6110030 2016-11-08

Analyte	Result / Recovery	Standard / Guideline	MRL / Units Limits	Prepared	Analyzed	Notes
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Sample ID: Springwood Well #5 (6110030-03) [Water] Sampled: 2016-10-31 09:30, Continued

**Total Metals, Continued**

Calcium, total	43.5	N/A	0.2 mg/L	2016-11-03	2016-11-03	
Chromium, total	< 0.0050	N/A	0.0005 mg/L	2016-11-03	2016-11-03	
Cobalt, total	< 0.00050	N/A	0.00005 mg/L	2016-11-03	2016-11-03	
Copper, total	0.0337	N/A	0.0002 mg/L	2016-11-03	2016-11-03	
Iron, total	0.11	N/A	0.01 mg/L	2016-11-03	2016-11-03	
Lead, total	0.0021	N/A	0.0001 mg/L	2016-11-03	2016-11-03	
Magnesium, total	21.5	N/A	0.01 mg/L	2016-11-03	2016-11-03	
Manganese, total	0.0296	N/A	0.0002 mg/L	2016-11-03	2016-11-03	
Mercury, total	< 0.00002	N/A	0.00002 mg/L	2016-11-02	2016-11-03	
Molybdenum, total	0.0012	N/A	0.0001 mg/L	2016-11-03	2016-11-03	
Nickel, total	0.0024	N/A	0.0002 mg/L	2016-11-03	2016-11-03	
Potassium, total	1.02	N/A	0.02 mg/L	2016-11-03	2016-11-03	
Selenium, total	< 0.0050	N/A	0.0005 mg/L	2016-11-03	2016-11-03	
Sodium, total	19.2	N/A	0.02 mg/L	2016-11-03	2016-11-03	
Uranium, total	0.00026	N/A	0.00002 mg/L	2016-11-03	2016-11-03	
Zinc, total	< 0.040	N/A	0.004 mg/L	2016-11-03	2016-11-03	

**Microbiological Parameters**

Coliforms, Total	<1	N/A	1 CFU/100 mL		2016-11-01	
Coliforms, Fecal	<1	N/A	1 CFU/100 mL		2016-11-01	
E. coli	<1	N/A	1 CFU/100 mL		2016-11-01	

Sample ID: Railway Well #5 (6110030-04) [Water] Sampled: 2016-10-31 09:45

**Anions**

Chloride	24.1	N/A	0.10 mg/L	N/A	2016-11-03	
Fluoride	< 0.10	N/A	0.10 mg/L	N/A	2016-11-03	
Nitrate (as N)	0.611	N/A	0.010 mg/L	N/A	2016-11-03	
Nitrite (as N)	< 0.010	N/A	0.010 mg/L	N/A	2016-11-03	
Sulfate	4.1	N/A	1.0 mg/L	N/A	2016-11-03	

**General Parameters**

Alkalinity, Total (as CaCO3)	110	N/A	2 mg/L	N/A	2016-11-03	
Alkalinity, Phenolphthalein (as CaCO3)	< 1	N/A	2 mg/L	N/A	2016-11-03	
Alkalinity, Bicarbonate (as CaCO3)	110	N/A	2 mg/L	N/A	2016-11-03	
Alkalinity, Carbonate (as CaCO3)	< 1	N/A	2 mg/L	N/A	2016-11-03	
Alkalinity, Hydroxide (as CaCO3)	< 1	N/A	2 mg/L	N/A	2016-11-03	
Colour, True	< 5	N/A	5 CU	N/A	2016-11-07	HT1
Conductivity (EC)	302	N/A	2 µS/cm	N/A	2016-11-03	
Cyanide, Total	< 0.0020	N/A	0.0020 mg/L	N/A	2016-11-08	
pH	7.76	N/A	0.01 pH units	N/A	2016-11-03	HT2
Temperature	21	N/A	°C	N/A	2016-11-03	HT2
Turbidity	0.16	N/A	0.10 NTU	N/A	2016-11-03	

**Calculated Parameters**

Hardness, Total (as CaCO3)	139	N/A	4.99 mg/L	N/A	N/A	
Langelier Index	-0.2	N/A	-5.0 -	N/A	2016-11-08	

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# Appendix E



## SAMPLE ANALYTICAL DATA

REPORTED TO PROJECT Parksville, City of Drinking Water Pkg

WORK ORDER REPORTED 6110030 2016-11-08

Analyte	Result / Recovery	Standard / Guideline	MRL / Units Limits	Prepared	Analyzed	Notes
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Sample ID: Railway Well #5 (6110030-04) [Water] Sampled: 2016-10-31 09:45, Continued

### Calculated Parameters, Continued

Solids, Total Dissolved	153	N/A	2.00 mg/L	N/A	N/A	
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### Total Metals

Aluminum, total	< 0.050	N/A	0.005 mg/L	2016-11-03	2016-11-03	
Antimony, total	< 0.0010	N/A	0.0001 mg/L	2016-11-03	2016-11-03	
Arsenic, total	< 0.0050	N/A	0.0005 mg/L	2016-11-03	2016-11-03	
Barium, total	< 0.050	N/A	0.005 mg/L	2016-11-03	2016-11-03	
Boron, total	< 0.040	N/A	0.004 mg/L	2016-11-03	2016-11-03	
Cadmium, total	< 0.00010	N/A	0.00001 mg/L	2016-11-03	2016-11-03	
Calcium, total	30.6	N/A	0.2 mg/L	2016-11-03	2016-11-03	
Chromium, total	< 0.0050	N/A	0.0005 mg/L	2016-11-03	2016-11-03	
Cobalt, total	< 0.00050	N/A	0.00005 mg/L	2016-11-03	2016-11-03	
Copper, total	0.0117	N/A	0.0002 mg/L	2016-11-03	2016-11-03	
Iron, total	< 0.10	N/A	0.01 mg/L	2016-11-03	2016-11-03	
Lead, total	< 0.0010	N/A	0.0001 mg/L	2016-11-03	2016-11-03	
Magnesium, total	15.2	N/A	0.01 mg/L	2016-11-03	2016-11-03	
Manganese, total	0.0066	N/A	0.0002 mg/L	2016-11-03	2016-11-03	
Mercury, total	< 0.00002	N/A	0.00002 mg/L	2016-11-02	2016-11-03	
Molybdenum, total	< 0.0010	N/A	0.0001 mg/L	2016-11-03	2016-11-03	
Nickel, total	< 0.0020	N/A	0.0002 mg/L	2016-11-03	2016-11-03	
Potassium, total	0.72	N/A	0.02 mg/L	2016-11-03	2016-11-03	
Selenium, total	< 0.0050	N/A	0.0005 mg/L	2016-11-03	2016-11-03	
Sodium, total	8.05	N/A	0.02 mg/L	2016-11-03	2016-11-03	
Uranium, total	0.00038	N/A	0.00002 mg/L	2016-11-03	2016-11-03	
Zinc, total	< 0.040	N/A	0.004 mg/L	2016-11-03	2016-11-03	

### Microbiological Parameters

Coliforms, Total	< 1	N/A	1 CFU/100 mL		2016-11-01	
Coliforms, Fecal	< 1	N/A	1 CFU/100 mL		2016-11-01	
E. coli	< 1	N/A	1 CFU/100 mL		2016-11-01	

Sample ID: Railway Well #3 (6110030-05) [Water] Sampled: 2016-10-31 10:05

### Anions

Chloride	38.8	N/A	0.10 mg/L	N/A	2016-11-03	
Fluoride	< 0.10	N/A	0.10 mg/L	N/A	2016-11-03	
Nitrate (as N)	1.03	N/A	0.010 mg/L	N/A	2016-11-03	
Nitrite (as N)	< 0.010	N/A	0.010 mg/L	N/A	2016-11-03	
Sulfate	3.5	N/A	1.0 mg/L	N/A	2016-11-03	

### General Parameters

Alkalinity, Total (as CaCO3)	114	N/A	2 mg/L	N/A	2016-11-03	
Alkalinity, Phenolphthalein (as CaCO3)	< 1	N/A	2 mg/L	N/A	2016-11-03	
Alkalinity, Bicarbonate (as CaCO3)	114	N/A	2 mg/L	N/A	2016-11-03	
Alkalinity, Carbonate (as CaCO3)	< 1	N/A	2 mg/L	N/A	2016-11-03	
Alkalinity, Hydroxide (as CaCO3)	< 1	N/A	2 mg/L	N/A	2016-11-03	
Ammonia, Total (as N)	< 0.020	N/A	0.020 mg/L	N/A	2016-11-03	

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Full Spectrum Analysis—Well Water



# Appendix E



## SAMPLE ANALYTICAL DATA

REPORTED TO PROJECT Parksville, City of Drinking Water Pkg

WORK ORDER REPORTED 6110030 2016-11-08

Analyte	Result / Recovery	Standard / Guideline	MRL / Units Limits	Prepared	Analyzed	Notes
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Sample ID: Railway Well #3 (6110030-05) [Water] Sampled: 2016-10-31 10:05, Continued

### General Parameters, Continued

Colour, True	< 5	N/A	5 CU	N/A	2016-11-07	HT1
Conductivity (EC)	369	N/A	2 µS/cm	N/A	2016-11-03	
Cyanide, Total	< 0.0020	N/A	0.0020 mg/L	N/A	2016-11-08	
pH	7.77	N/A	0.01 pH units	N/A	2016-11-03	HT2
Temperature	22	N/A	°C	N/A	2016-11-03	HT2
Turbidity	0.12	N/A	0.10 NTU	N/A	2016-11-03	

### Calculated Parameters

Hardness, Total (as CaCO3)	176	N/A	4.99 mg/L	N/A	N/A	
Langelier Index	-0.04	N/A	-5.0 -	N/A	2016-11-08	
Solids, Total Dissolved	184	N/A	2.00 mg/L	N/A	N/A	

### Total Metals

Aluminum, total	< 0.050	N/A	0.005 mg/L	2016-11-03	2016-11-03	
Antimony, total	< 0.0010	N/A	0.0001 mg/L	2016-11-03	2016-11-03	
Arsenic, total	< 0.0050	N/A	0.0005 mg/L	2016-11-03	2016-11-03	
Barium, total	< 0.050	N/A	0.005 mg/L	2016-11-03	2016-11-03	
Boron, total	< 0.040	N/A	0.004 mg/L	2016-11-03	2016-11-03	
Cadmium, total	0.00010	N/A	0.00001 mg/L	2016-11-03	2016-11-03	
Calcium, total	38.0	N/A	0.2 mg/L	2016-11-03	2016-11-03	
Chromium, total	< 0.0050	N/A	0.0005 mg/L	2016-11-03	2016-11-03	
Cobalt, total	< 0.00050	N/A	0.00005 mg/L	2016-11-03	2016-11-03	
Copper, total	0.0083	N/A	0.0002 mg/L	2016-11-03	2016-11-03	
Iron, total	< 0.10	N/A	0.01 mg/L	2016-11-03	2016-11-03	
Lead, total	< 0.0010	N/A	0.0001 mg/L	2016-11-03	2016-11-03	
Magnesium, total	19.8	N/A	0.01 mg/L	2016-11-03	2016-11-03	
Manganese, total	0.160	N/A	0.0002 mg/L	2016-11-03	2016-11-03	
Mercury, total	< 0.00002	N/A	0.00002 mg/L	2016-11-02	2016-11-03	
Molybdenum, total	< 0.0010	N/A	0.0001 mg/L	2016-11-03	2016-11-03	
Nickel, total	< 0.0020	N/A	0.0002 mg/L	2016-11-03	2016-11-03	
Potassium, total	0.86	N/A	0.02 mg/L	2016-11-03	2016-11-03	
Selenium, total	< 0.0050	N/A	0.0005 mg/L	2016-11-03	2016-11-03	
Sodium, total	8.69	N/A	0.02 mg/L	2016-11-03	2016-11-03	
Uranium, total	0.00022	N/A	0.00002 mg/L	2016-11-03	2016-11-03	
Zinc, total	< 0.040	N/A	0.004 mg/L	2016-11-03	2016-11-03	

### Microbiological Parameters

Coliforms, Total	<1	N/A	1 CFU/100 mL		2016-11-01	
Coliforms, Fecal	<1	N/A	1 CFU/100 mL		2016-11-01	
E. coli	<1	N/A	1 CFU/100 mL		2016-11-01	

### Sample / Analysis Qualifiers:

HT1 The sample was prepared and/or analyzed past the recommended holding time.  
 HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.

# Appendix E



## APPENDIX 1: QUALITY CONTROL DATA

**REPORTED TO PROJECT** Parkville, City of  
Drinking Water Pkg

**WORK ORDER REPORTED** 6110030  
2016-11-08

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk):** Laboratory reagent water is carried through sample preparation and analysis steps. Method Blanks indicate that results are free from contamination, i.e. not biased high from sources such as the sample container or the laboratory environment
- **Duplicate (Dup):** Preparation and analysis of a replicate aliquot of a sample. Duplicates provide a measure of the analytical method's precision, i.e. how reproducible a result is. Duplicates are only reported if they are associated with your sample data.
- **Blank Spike (BS):** A known amount of standard is carried through sample preparation and analysis steps. Blank Spikes, also known as laboratory control samples (LCS), are prepared from a different source of standard than used for the calibration. They ensure that the calibration is acceptable (i.e. not biased high or low) and also provide a measure of the analytical method's accuracy (i.e. closeness of the result to a target value).
- **Standard Reference Material (SRM):** A material of similar matrix to the samples, externally certified for the parameter(s) listed. Standard Reference Materials ensure that the preparation steps in the method are adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Notes
<b>Anions, Batch B6K0263</b>									
<b>Blank (B6K0263-BLK1)</b>					Prepared: 2016-11-03, Analyzed: 2016-11-03				
Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.10	0.10 mg/L							
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
Sulfate	< 1.0	1.0 mg/L							
<b>Blank (B6K0263-BLK2)</b>					Prepared: 2016-11-03, Analyzed: 2016-11-03				
Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.10	0.10 mg/L							
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
Sulfate	< 1.0	1.0 mg/L							
<b>LCS (B6K0263-BS1)</b>					Prepared: 2016-11-03, Analyzed: 2016-11-03				
Chloride	15.3	0.10 mg/L	16.0		96	90-110			
Fluoride	3.84	0.10 mg/L	4.00		96	88-108			
Nitrate (as N)	3.98	0.010 mg/L	4.00		100	93-108			
Nitrite (as N)	1.90	0.010 mg/L	2.00		95	83-110			
Sulfate	15.5	1.0 mg/L	16.0		97	91-109			
<b>LCS (B6K0263-BS2)</b>					Prepared: 2016-11-03, Analyzed: 2016-11-03				
Chloride	15.3	0.10 mg/L	16.0		96	90-110			
Fluoride	3.78	0.10 mg/L	4.00		94	88-108			
Nitrate (as N)	3.96	0.010 mg/L	4.00		99	93-108			
Nitrite (as N)	1.80	0.010 mg/L	2.00		90	83-110			
Sulfate	15.9	1.0 mg/L	16.0		99	91-109			
<b>Duplicate (B6K0263-DUP2)</b>					Source: 6110030-05 Prepared: 2016-11-03, Analyzed: 2016-11-03				
Chloride	38.7	0.10 mg/L		38.8			< 1	10	
Fluoride	< 0.10	0.10 mg/L		< 0.10				10	
Nitrate (as N)	1.03	0.010 mg/L		1.03			< 1	10	
Nitrite (as N)	< 0.010	0.010 mg/L		< 0.010				6	
Sulfate	3.5	1.0 mg/L		3.5				6	

# Appendix E



## APPENDIX 1: QUALITY CONTROL DATA

REPORTED TO Parksville, City of  
PROJECT Drinking Water Pkg

WORK ORDER 6110030  
REPORTED 2016-11-08

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Notes
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### Anions, Batch B6K0263, Continued

Matrix Spike (B6K0263-MS2)	Source: 6110030-05		Prepared: 2016-11-03, Analyzed: 2016-11-03						
Chloride	58.6	0.10 mg/L	16.0	38.8	124	75-125			
Fluoride	3.71	0.10 mg/L	4.00	< 0.10	93	75-125			
Nitrate (as N)	4.95	0.010 mg/L	4.00	1.03	98	75-125			
Nitrite (as N)	1.86	0.010 mg/L	2.00	< 0.010	93	75-125			
Sulfate	18.8	1.0 mg/L	16.0	3.5	96	75-125			

### General Parameters, Batch B6K0085

Blank (B6K0085-BLK1)	Prepared: 2016-11-03, Analyzed: 2016-11-03								
Ammonia, Total (as N)	< 0.020	0.020 mg/L							
Blank (B6K0085-BLK2)	Prepared: 2016-11-03, Analyzed: 2016-11-03								
Ammonia, Total (as N)	< 0.020	0.020 mg/L							
LCS (B6K0085-BS1)	Prepared: 2016-11-03, Analyzed: 2016-11-03								
Ammonia, Total (as N)	1.01	0.020 mg/L	1.00		101	86-111			
LCS (B6K0085-BS2)	Prepared: 2016-11-03, Analyzed: 2016-11-03								
Ammonia, Total (as N)	1.01	0.020 mg/L	1.00		101	86-111			

### General Parameters, Batch B6K0220

Blank (B6K0220-BLK1)	Prepared: 2016-11-07, Analyzed: 2016-11-07								
Colour, True	< 5	5 CU							
LCS (B6K0220-BS1)	Prepared: 2016-11-07, Analyzed: 2016-11-07								
Colour, True	10	5 CU	10.0		100	85-115			

### General Parameters, Batch B6K0259

Blank (B6K0259-BLK1)	Prepared: 2016-11-03, Analyzed: 2016-11-03								
Cyanide, Total	< 0.0020	0.0020 mg/L							
LCS (B6K0259-BS1)	Prepared: 2016-11-03, Analyzed: 2016-11-03								
Cyanide, Total	0.0201	0.0020 mg/L	0.0200		100	85-115			
LCS Dup (B6K0259-BSD1)	Prepared: 2016-11-03, Analyzed: 2016-11-03								
Cyanide, Total	0.0187	0.0020 mg/L	0.0200		94	85-115	7	10	

### General Parameters, Batch B6K0271

Blank (B6K0271-BLK1)	Prepared: 2016-11-03, Analyzed: 2016-11-03								
Alkalinity, Total (as CaCO3)	< 1	2 mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1	2 mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1	2 mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1	2 mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1	2 mg/L							
Conductivity (EC)	< 1	2 µS/cm							
Blank (B6K0271-BLK2)	Prepared: 2016-11-03, Analyzed: 2016-11-03								
Alkalinity, Total (as CaCO3)	< 1	2 mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1	2 mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1	2 mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1	2 mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1	2 mg/L							

# Appendix E



## APPENDIX 1: QUALITY CONTROL DATA

REPORTED TO PROJECT Parkville, City of Drinking Water Pkg

WORK ORDER REPORTED 6110030 2016-11-08

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Notes
<b>General Parameters, Batch B6K0271, Continued</b>									
<b>Blank (B6K0271-BLK2), Continued</b>			Prepared: 2016-11-03, Analyzed: 2016-11-03						
Conductivity (EC)	< 1	2 µS/cm							
<b>Blank (B6K0271-BLK3)</b>			Prepared: 2016-11-03, Analyzed: 2016-11-03						
Alkalinity, Total (as CaCO3)	< 1	2 mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1	2 mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1	2 mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1	2 mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1	2 mg/L							
Conductivity (EC)	1	2 µS/cm							BLK
<b>LCS (B6K0271-BS1)</b>			Prepared: 2016-11-03, Analyzed: 2016-11-03						
Alkalinity, Total (as CaCO3)	103	2 mg/L	100		103	96-108			
<b>LCS (B6K0271-BS2)</b>			Prepared: 2016-11-03, Analyzed: 2016-11-03						
Conductivity (EC)	1410	2 µS/cm	1410		100	95-104			
<b>LCS (B6K0271-BS3)</b>			Prepared: 2016-11-03, Analyzed: 2016-11-03						
Alkalinity, Total (as CaCO3)	102	2 mg/L	100		102	96-108			
<b>LCS (B6K0271-BS4)</b>			Prepared: 2016-11-03, Analyzed: 2016-11-03						
Conductivity (EC)	1410	2 µS/cm	1410		100	95-104			
<b>LCS (B6K0271-BS5)</b>			Prepared: 2016-11-03, Analyzed: 2016-11-03						
Alkalinity, Total (as CaCO3)	102	2 mg/L	100		102	96-108			
<b>LCS (B6K0271-BS6)</b>			Prepared: 2016-11-03, Analyzed: 2016-11-03						
Conductivity (EC)	1430	2 µS/cm	1410		102	95-104			
<b>Reference (B6K0271-SRM1)</b>			Prepared: 2016-11-03, Analyzed: 2016-11-03						
pH	6.97	0.01 pH units	7.00		100	98-102			
<b>Reference (B6K0271-SRM2)</b>			Prepared: 2016-11-03, Analyzed: 2016-11-03						
pH	6.97	0.01 pH units	7.00		100	98-102			
<b>Reference (B6K0271-SRM3)</b>			Prepared: 2016-11-03, Analyzed: 2016-11-03						
pH	6.97	0.01 pH units	7.00		100	98-102			
<b>General Parameters, Batch B6K0348</b>									
<b>Blank (B6K0348-BLK1)</b>			Prepared: 2016-11-04, Analyzed: 2016-11-04						
Turbidity	< 0.10	0.10 NTU							
<b>Blank (B6K0348-BLK2)</b>			Prepared: 2016-11-04, Analyzed: 2016-11-04						
Turbidity	< 0.10	0.10 NTU							
<b>Blank (B6K0348-BLK3)</b>			Prepared: 2016-11-04, Analyzed: 2016-11-04						
Turbidity	< 0.10	0.10 NTU							
<b>LCS (B6K0348-BS1)</b>			Prepared: 2016-11-04, Analyzed: 2016-11-04						
Turbidity	40.3	0.10 NTU	40.0		101	90-110			
<b>LCS (B6K0348-BS2)</b>			Prepared: 2016-11-04, Analyzed: 2016-11-04						
Turbidity	40.3	0.10 NTU	40.0		101	90-110			
<b>LCS (B6K0348-BS3)</b>			Prepared: 2016-11-04, Analyzed: 2016-11-04						
Turbidity	40.4	0.10 NTU	40.0		101	90-110			

# Appendix E



## APPENDIX 1: QUALITY CONTROL DATA

REPORTED TO Parksville, City of  
PROJECT Drinking Water Pkg

WORK ORDER 6110030  
REPORTED 2016-11-08

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Notes
<b>General Parameters, Batch B6K0456</b>									
<b>Blank (B6K0456-BLK1)</b>			Prepared: 2016-11-08, Analyzed: 2016-11-08						
Cyanide, Total	< 0.0020	0.0020 mg/L							
<b>Blank (B6K0456-BLK2)</b>			Prepared: 2016-11-08, Analyzed: 2016-11-08						
Cyanide, Total	< 0.0020	0.0020 mg/L							
<b>LCS (B6K0456-BS1)</b>			Prepared: 2016-11-08, Analyzed: 2016-11-08						
Cyanide, Total	0.0199	0.0020 mg/L	0.0200		99	85-115			
<b>LCS (B6K0456-BS2)</b>			Prepared: 2016-11-08, Analyzed: 2016-11-08						
Cyanide, Total	0.0204	0.0020 mg/L	0.0200		102	85-115			
<b>LCS Dup (B6K0456-BSD1)</b>			Prepared: 2016-11-08, Analyzed: 2016-11-08						
Cyanide, Total	0.0193	0.0020 mg/L	0.0200		97	85-115	3	10	
<b>LCS Dup (B6K0456-BSD2)</b>			Prepared: 2016-11-08, Analyzed: 2016-11-08						
Cyanide, Total	0.0198	0.0020 mg/L	0.0200		99	85-115	3	10	
<b>Total Metals, Batch B6K0162</b>									
<b>Blank (B6K0162-BLK1)</b>			Prepared: 2016-11-02, Analyzed: 2016-11-03						
Mercury, total	< 0.00002	0.00002 mg/L							
<b>Reference (B6K0162-SRM1)</b>			Prepared: 2016-11-02, Analyzed: 2016-11-03						
Mercury, total	0.00485	0.00002 mg/L	0.00486		100	50-150			
<b>Total Metals, Batch B6K0195</b>									
<b>Blank (B6K0195-BLK1)</b>			Prepared: 2016-11-03, Analyzed: 2016-11-03						
Aluminum, total	< 0.005	0.005 mg/L							
Antimony, total	< 0.0001	0.0001 mg/L							
Arsenic, total	< 0.0005	0.0005 mg/L							
Barium, total	< 0.005	0.005 mg/L							
Boron, total	< 0.004	0.004 mg/L							
Cadmium, total	< 0.00001	0.00001 mg/L							
Calcium, total	< 0.2	0.2 mg/L							
Chromium, total	< 0.0005	0.0005 mg/L							
Cobalt, total	< 0.00005	0.00005 mg/L							
Copper, total	< 0.0002	0.0002 mg/L							
Iron, total	< 0.01	0.01 mg/L							
Lead, total	< 0.0001	0.0001 mg/L							
Magnesium, total	< 0.01	0.01 mg/L							
Manganese, total	< 0.0002	0.0002 mg/L							
Molybdenum, total	< 0.0001	0.0001 mg/L							
Nickel, total	< 0.0002	0.0002 mg/L							
Potassium, total	< 0.02	0.02 mg/L							
Selenium, total	< 0.0005	0.0005 mg/L							
Sodium, total	< 0.02	0.02 mg/L							
Uranium, total	< 0.00002	0.00002 mg/L							
Zinc, total	< 0.004	0.004 mg/L							
<b>Matrix Spike (B6K0195-MS1)</b>			Source: 6110030-01		Prepared: 2016-11-03, Analyzed: 2016-11-03				
Antimony, total	0.370	0.0001 mg/L	0.400	< 0.0010	92	84-125			
Arsenic, total	0.194	0.0005 mg/L	0.200	< 0.0050	97	85-116			
Barium, total	0.956	0.005 mg/L	1.00	< 0.050	95	87-114			
Cadmium, total	0.0966	0.00001 mg/L	0.100	< 0.00010	97	90-112			
Chromium, total	0.403	0.0005 mg/L	0.400	< 0.0050	100	89-120			

# Appendix E



## APPENDIX 1: QUALITY CONTROL DATA

REPORTED TO PROJECT Parkville, City of  
Drinking Water Pkg

WORK ORDER 6110030  
REPORTED 2016-11-08

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Notes
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### Total Metals, Batch B6K0195, Continued

Matrix Spike (B6K0195-MS1), Continued	Source: 6110030-01		Prepared: 2016-11-03, Analyzed: 2016-11-03						
Cobalt, total	0.403	0.0005 mg/L	0.400	< 0.00050	101	88-120			
Copper, total	0.423	0.0002 mg/L	0.400	< 0.0020	105	88-125			
Iron, total	2.22	0.01 mg/L	2.00	0.15	103	88-119			
Lead, total	0.204	0.0001 mg/L	0.200	< 0.0010	102	89-118			
Manganese, total	0.407	0.0002 mg/L	0.400	0.0053	100	84-120			
Nickel, total	0.408	0.0002 mg/L	0.400	< 0.0020	102	87-119			
Selenium, total	0.102	0.0005 mg/L	0.100	< 0.0050	102	85-113			
Zinc, total	0.985	0.004 mg/L	1.00	< 0.040	98	85-116			

Reference (B6K0195-SRM1)	Prepared: 2016-11-03, Analyzed: 2016-11-03								
Aluminum, total	0.305	0.005 mg/L	0.303		101	81-129			
Antimony, total	0.0475	0.0001 mg/L	0.0511		93	88-114			
Arsenic, total	0.116	0.0005 mg/L	0.118		99	88-114			
Barium, total	0.742	0.005 mg/L	0.823		90	72-104			
Boron, total	3.27	0.004 mg/L	3.45		95	75-121			
Cadmium, total	0.0474	0.00001 mg/L	0.0495		96	89-111			
Calcium, total	11.6	0.2 mg/L	11.6		100	86-121			
Chromium, total	0.252	0.0005 mg/L	0.250		101	89-114			
Cobalt, total	0.0396	0.00005 mg/L	0.0377		105	91-113			
Copper, total	0.533	0.0002 mg/L	0.486		110	91-115			
Iron, total	0.53	0.01 mg/L	0.488		108	77-124			
Lead, total	0.202	0.0001 mg/L	0.204		99	92-113			
Magnesium, total	3.97	0.01 mg/L	3.79		105	78-120			
Manganese, total	0.109	0.0002 mg/L	0.109		100	90-114			
Molybdenum, total	0.190	0.0001 mg/L	0.198		96	90-111			
Nickel, total	0.256	0.0002 mg/L	0.249		103	90-111			
Potassium, total	7.50	0.02 mg/L	7.21		104	84-113			
Selenium, total	0.129	0.0005 mg/L	0.121		107	85-115			
Sodium, total	8.05	0.02 mg/L	7.54		107	82-123			
Uranium, total	0.0277	0.00002 mg/L	0.0306		90	85-120			
Zinc, total	2.46	0.004 mg/L	2.49		99	85-111			

### QC Qualifiers:

BLK Analyte concentration in the Method Blank is above the Method Reporting Limit (MRL).

## Appendix E



CARO BC COC, Rev 2015-09

**CHAIN OF CUSTODY RECORD** COC# **B 35456** PAGE **OF**

RELINQUISHED BY: <b>Barb Sileniewks</b>	DATE: <b>Oct 31 1/2</b>	RECEIVED BY: <b>HM Peno</b>	DATE: <b>11/16</b>
PROJECT: <b>Drinking Water pkg</b>		PROJECT INFO:	

<b>REPORT TO:</b> COMPANY: <b>City of Parksville</b> ADDRESS: <b>1116 Herring gull way</b>	<b>INVOICE TO:</b> SAME AS REPORT TO <input type="checkbox"/> COMPANY: ADDRESS: CONTACT: <b>Barb Sileniewks</b> TEL/FAX:
DELIVERY METHOD: EMAIL <input checked="" type="checkbox"/> MAIL <input type="checkbox"/> OTHER* <input type="checkbox"/> DATA FORMAT: EXCEL <input checked="" type="checkbox"/> WATERTRAX <input type="checkbox"/> Esdat <input type="checkbox"/> EQUIS <input type="checkbox"/> BC EMS <input type="checkbox"/> OTHER* <input type="checkbox"/>	DELIVERY METHOD: EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> OTHER* <input type="checkbox"/> EMAIL 1: EMAIL 2: EMAIL 3: PO #:

<b>TURNAROUND TIME REQUESTED:</b> Routine: (5-7 Days) <input checked="" type="checkbox"/> Rush: 1 Day* <input type="checkbox"/> 2 Day* <input type="checkbox"/> 3 Day* <input type="checkbox"/>	<b>REGULATORY APPLICATION:</b> Canadian Drinking Water Quality Guidelines <input type="checkbox"/> Regs on Report? <input type="checkbox"/> BC Drinking Water Protection Act / Reg. <input type="checkbox"/> BC CSR <input type="checkbox"/> AB TIER 1 <input type="checkbox"/> CCME <input type="checkbox"/> OTHER* <input type="checkbox"/> AL <input type="checkbox"/> PL <input type="checkbox"/> RL <input type="checkbox"/> CL <input type="checkbox"/> IL <input type="checkbox"/> AW <input type="checkbox"/> BW <input type="checkbox"/> LW <input type="checkbox"/>
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CLIENT SAMPLE ID:	MATRIX:			SAMPLING:		COMMENTS:
	DRINKING WATER	OTHER WATER	SOIL	DATE	TIME	
1 River	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 Oct 31	8:45	
2 Springwood well #6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 Oct 31	9:15	
3 Springwood well #5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 Oct 31	9:30	
4 Railway well #5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 Oct 31	9:45	
5 Railway well #3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 Oct 31	10:05	

**ANALYSES REQUESTED:**

BTEX <input type="checkbox"/>	VPH <input type="checkbox"/>	PHC F1 <input type="checkbox"/>	VOC <input type="checkbox"/>	VPH <input type="checkbox"/>	PHC F2-F4 <input type="checkbox"/>	EPH <input type="checkbox"/>	PAH <input type="checkbox"/>	PHENOLS Chlorinated <input type="checkbox"/> Non-Chlor. <input type="checkbox"/>	PCB <input type="checkbox"/>	GLYCOLS <input type="checkbox"/>	HAA <input type="checkbox"/>	PESTICIDES <input type="checkbox"/>	ACID HERBICIDES <input type="checkbox"/>	METALS - WATER TOTAL <input type="checkbox"/>	Hg <input type="checkbox"/>	METALS - WATER DISSOLVED <input type="checkbox"/>	Hg <input type="checkbox"/>	METALS - SOIL (SALM) <input type="checkbox"/>	inc. pH <input type="checkbox"/>	pH <input type="checkbox"/>	EC <input type="checkbox"/>	ALK <input type="checkbox"/>	TSS <input type="checkbox"/>	VSS <input type="checkbox"/>	TDS <input type="checkbox"/>	BOD <input type="checkbox"/>	COD <input type="checkbox"/>	TOG <input type="checkbox"/>	MOG <input type="checkbox"/>	FECAL COLIFORMS <input checked="" type="checkbox"/> HPC <input type="checkbox"/>	TOTAL COLIFORMS <input checked="" type="checkbox"/> E. coli <input checked="" type="checkbox"/>	ASBESTOS <input type="checkbox"/>	<b>Drinking water pkg</b>	HOLD <input type="checkbox"/>
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<b>SHIPPING INSTRUCTIONS:</b> Return Cooler(s) <input type="checkbox"/> Supplies Needed:	<b>SAMPLE RETENTION INSTRUCTIONS (Discarded 30 days after Report unless otherwise specified):</b> 60 Days <input type="checkbox"/> 90 Days <input type="checkbox"/> Longer Date (Surcharges will Apply): <b>* OTHER INSTRUCTIONS:</b>	<b>PAYMENT:</b> CHECK <input type="checkbox"/> CREDIT <input type="checkbox"/> DEBIT <input type="checkbox"/> CASH <input type="checkbox"/> INVOICE <input type="checkbox"/>	<b>SAMPLE RECEIPT CONDITION:</b> COOLER 1 (°C): <b>7.5</b> ICE: Y <input type="checkbox"/> N <input type="checkbox"/> COOLER 2 (°C): ICE: Y <input type="checkbox"/> N <input type="checkbox"/> COOLER 3 (°C): ICE: Y <input type="checkbox"/> N <input type="checkbox"/> CUSTODY SEALS INTACT: <input type="checkbox"/>
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### Full Spectrum Analysis—Well Water

# Appendix F



Success Through Science®

Maxxam Job #: B607694  
Report Date: 2016/02/05

City of Parksville

## TRIHALOMETHANES (THM) IN WATER

Maxxam ID		OB0612		OB0613		OB0614		OB0615			
Sampling Date		2016/02/01 09:30		2016/02/01 09:35		2016/02/01 09:45		2016/02/01 09:55			
COC Number		483862-04-01		483862-04-01		483862-04-01		483862-04-01			
	UNITS	851 TEMPLE	RDL	450 WILLOW	RDL	CORFIELD		1116 HERRING GULL	RDL	QC Batch	
<b>Volatiles</b>											
Chloroform	ug/L	1.0	1.0	<1.0	1.0	1.6		1.8	1.0	8183079	
Chlorodibromomethane	ug/L	3.1	1.0	2.6	1.0	4.5		4.4	1.0	8183079	
Bromodichloromethane	ug/L	<1.6 (1)	1.6	<1.4 (1)	1.4	2.8		3.1	1.0	8183079	
Bromoform	ug/L	1.8	1.0	1.7	1.0	2.4		1.9	1.0	8183079	
<b>Surrogate Recovery (%)</b>											
1,4-Difluorobenzene (sur.)	%	103		104		104		105		8183079	
4-Bromofluorobenzene (sur.)	%	97		96		94		95		8183079	
D4-1,2-Dichloroethane (sur.)	%	100		99		98		99		8183079	
RDL = Reportable Detection Limit											
(1) Detection limits raised due to matrix interference.											

## THM Analysis



# Appendix F



## SAMPLE ANALYTICAL DATA

**REPORTED TO PROJECT** Parksville, City of  
361341 - THM Quarterly (Island Health)

**WORK ORDER REPORTED** 6050239  
2016-05-10

Analyte	Result / Recovery	Standard / Guideline	MRL / Units Limits	Prepared	Analyzed	Notes
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**Sample ID: 770 Sorie (6050239-01) [Water] Sampled: 2016-05-02 09:50**

<b>Calculated Parameters</b>						
Total Trihalomethanes	0.009	N/A	0.004 mg/L	N/A	N/A	
<b>Volatile Organic Compounds (VOC)</b>						
Bromodichloromethane	0.002	N/A	0.001 mg/L	N/A	2016-05-04	
Bromoform	0.001	N/A	0.001 mg/L	N/A	2016-05-04	
Chloroform	0.003	N/A	0.001 mg/L	N/A	2016-05-04	
Dibromochloromethane	0.003	N/A	0.001 mg/L	N/A	2016-05-04	
Surrogate: Toluene-d8	94		70-130 %	N/A	2016-05-04	
Surrogate: 4-Bromofluorobenzene	94		70-130 %	N/A	2016-05-04	

**Sample ID: Hwy @ Temple (6050239-02) [Water] Sampled: 2016-05-02 09:45**

<b>Calculated Parameters</b>						
Total Trihalomethanes	0.007	N/A	0.004 mg/L	N/A	N/A	
<b>Volatile Organic Compounds (VOC)</b>						
Bromodichloromethane	0.002	N/A	0.001 mg/L	N/A	2016-05-04	
Bromoform	< 0.001	N/A	0.001 mg/L	N/A	2016-05-04	
Chloroform	0.004	N/A	0.001 mg/L	N/A	2016-05-04	
Dibromochloromethane	0.002	N/A	0.001 mg/L	N/A	2016-05-04	
Surrogate: Toluene-d8	96		70-130 %	N/A	2016-05-04	
Surrogate: 4-Bromofluorobenzene	93		70-130 %	N/A	2016-05-04	

**Sample ID: Top of Moilliet (6050239-03) [Water] Sampled: 2016-05-02 10:05**

<b>Calculated Parameters</b>						
Total Trihalomethanes	0.010	N/A	0.004 mg/L	N/A	N/A	
<b>Volatile Organic Compounds (VOC)</b>						
Bromodichloromethane	0.001	N/A	0.001 mg/L	N/A	2016-05-04	
Bromoform	< 0.001	N/A	0.001 mg/L	N/A	2016-05-04	
Chloroform	0.009	N/A	0.001 mg/L	N/A	2016-05-04	
Dibromochloromethane	< 0.001	N/A	0.001 mg/L	N/A	2016-05-04	
Surrogate: Toluene-d8	94		70-130 %	N/A	2016-05-04	
Surrogate: 4-Bromofluorobenzene	92		70-130 %	N/A	2016-05-04	

**Sample ID: Hwy @ Arbutus Park (6050239-04) [Water] Sampled: 2016-05-02 08:45**

<b>Calculated Parameters</b>						
Total Trihalomethanes	0.013	N/A	0.004 mg/L	N/A	N/A	
<b>Volatile Organic Compounds (VOC)</b>						
Bromodichloromethane	0.001	N/A	0.001 mg/L	N/A	2016-05-05	
Bromoform	< 0.001	N/A	0.001 mg/L	N/A	2016-05-05	
Chloroform	0.012	N/A	0.001 mg/L	N/A	2016-05-05	
Dibromochloromethane	< 0.001	N/A	0.001 mg/L	N/A	2016-05-05	
Surrogate: Toluene-d8	95		70-130 %	N/A	2016-05-05	
Surrogate: 4-Bromofluorobenzene	92		70-130 %	N/A	2016-05-05	

## THM Analysis

# Appendix F



## SAMPLE ANALYTICAL DATA

**REPORTED TO PROJECT** Parksville, City of  
361341 - THM Quarterly (Island Health)

**WORK ORDER REPORTED** 6080151  
2016-08-10

Analyte	Result / Recovery	Standard / Guideline	MRL / Units Limits	Prepared	Analyzed	Notes
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**Sample ID: Works Yard (6080151-01) [Water] Sampled: 2016-08-02 10:30**

**Calculated Parameters**

Total Trihalomethanes	0.012	N/A	0.004 mg/L	N/A	N/A	
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**Volatile Organic Compounds (VOC)**

Bromodichloromethane	0.002	N/A	0.001 mg/L	N/A	2016-08-07	
Bromoform	< 0.001	N/A	0.001 mg/L	N/A	2016-08-07	
Chloroform	0.010	N/A	0.001 mg/L	N/A	2016-08-07	
Dibromochloromethane	< 0.001	N/A	0.001 mg/L	N/A	2016-08-07	
Surrogate: Toluene-d8	96		70-130 %	N/A	2016-08-07	
Surrogate: 4-Bromofluorobenzene	100		70-130 %	N/A	2016-08-07	

**Sample ID: Parkview (6080151-02) [Water] Sampled: 2016-08-02 09:50**

**Calculated Parameters**

Total Trihalomethanes	0.020	N/A	0.004 mg/L	N/A	N/A	
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**Volatile Organic Compounds (VOC)**

Bromodichloromethane	0.004	N/A	0.001 mg/L	N/A	2016-08-07	
Bromoform	< 0.001	N/A	0.001 mg/L	N/A	2016-08-07	
Chloroform	0.016	N/A	0.001 mg/L	N/A	2016-08-07	
Dibromochloromethane	< 0.001	N/A	0.001 mg/L	N/A	2016-08-07	
Surrogate: Toluene-d8	93		70-130 %	N/A	2016-08-07	
Surrogate: 4-Bromofluorobenzene	95		70-130 %	N/A	2016-08-07	

**Sample ID: Temple 859 (6080151-03) [Water] Sampled: 2016-08-02 09:15**

**Calculated Parameters**

Total Trihalomethanes	0.007	N/A	0.004 mg/L	N/A	N/A	
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**Volatile Organic Compounds (VOC)**

Bromodichloromethane	0.002	N/A	0.001 mg/L	N/A	2016-08-07	
Bromoform	0.001	N/A	0.001 mg/L	N/A	2016-08-07	
Chloroform	0.002	N/A	0.001 mg/L	N/A	2016-08-07	
Dibromochloromethane	0.002	N/A	0.001 mg/L	N/A	2016-08-07	
Surrogate: Toluene-d8	93		70-130 %	N/A	2016-08-07	
Surrogate: 4-Bromofluorobenzene	98		70-130 %	N/A	2016-08-07	

**Sample ID: Ermineskin 760 (6080151-04) [Water] Sampled: 2016-08-02 09:35**

**Calculated Parameters**

Total Trihalomethanes	< 0.004	N/A	0.004 mg/L	N/A	N/A	
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**Volatile Organic Compounds (VOC)**

Bromodichloromethane	< 0.001	N/A	0.001 mg/L	N/A	2016-08-07	
Bromoform	< 0.001	N/A	0.001 mg/L	N/A	2016-08-07	
Chloroform	< 0.001	N/A	0.001 mg/L	N/A	2016-08-07	
Dibromochloromethane	< 0.001	N/A	0.001 mg/L	N/A	2016-08-07	
Surrogate: Toluene-d8	96		70-130 %	N/A	2016-08-07	
Surrogate: 4-Bromofluorobenzene	99		70-130 %	N/A	2016-08-07	

CARO Analytical Services  
Rev 2016-06-24

Page 3 of 6

THM Analysis

# Appendix F



## SAMPLE ANALYTICAL DATA

REPORTED TO Parksville, City of  
PROJECT 361341 - THM Quarterly (Island Health)

WORK ORDER 6111040  
REPORTED 2016-11-22

Analyte	Result / Recovery	Standard / Guideline	MRL / Units Limits	Prepared	Analyzed	Notes
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Sample ID: Temple (6111040-01) [Water] Sampled: 2016-11-14 09:20

**Calculated Parameters**

Total Trihalomethanes	0.005	N/A	0.004 mg/L	N/A	N/A	
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**Volatile Organic Compounds (VOC)**

Bromodichloromethane	0.001	N/A	0.001 mg/L	N/A	2016-11-16	
Bromoform	0.001	N/A	0.001 mg/L	N/A	2016-11-16	
Chloroform	< 0.001	N/A	0.001 mg/L	N/A	2016-11-16	
Dibromochloromethane	0.002	N/A	0.001 mg/L	N/A	2016-11-16	
Surrogate: Toluene-d8	106		70-130 %	N/A	2016-11-16	
Surrogate: 4-Bromofluorobenzene	106		70-130 %	N/A	2016-11-16	

Sample ID: Ermines Kin (6111040-02) [Water] Sampled: 2016-11-14 08:30

**Calculated Parameters**

Total Trihalomethanes	< 0.004	N/A	0.004 mg/L	N/A	N/A	
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**Volatile Organic Compounds (VOC)**

Bromodichloromethane	< 0.001	N/A	0.001 mg/L	N/A	2016-11-16	
Bromoform	< 0.001	N/A	0.001 mg/L	N/A	2016-11-16	
Chloroform	< 0.001	N/A	0.001 mg/L	N/A	2016-11-16	
Dibromochloromethane	0.001	N/A	0.001 mg/L	N/A	2016-11-16	
Surrogate: Toluene-d8	107		70-130 %	N/A	2016-11-16	
Surrogate: 4-Bromofluorobenzene	107		70-130 %	N/A	2016-11-16	

Sample ID: Corfield (6111040-03) [Water] Sampled: 2016-11-14 08:40

**Calculated Parameters**

Total Trihalomethanes	0.015	N/A	0.004 mg/L	N/A	N/A	
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**Volatile Organic Compounds (VOC)**

Bromodichloromethane	0.004	N/A	0.001 mg/L	N/A	2016-11-17	
Bromoform	0.002	N/A	0.001 mg/L	N/A	2016-11-17	
Chloroform	0.004	N/A	0.001 mg/L	N/A	2016-11-17	
Dibromochloromethane	0.004	N/A	0.001 mg/L	N/A	2016-11-17	
Surrogate: Toluene-d8	116		70-130 %	N/A	2016-11-17	
Surrogate: 4-Bromofluorobenzene	116		70-130 %	N/A	2016-11-17	

Sample ID: Works Yard (6111040-04) [Water] Sampled: 2016-11-14 09:00

**Calculated Parameters**

Total Trihalomethanes	0.006	N/A	0.004 mg/L	N/A	N/A	
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**Volatile Organic Compounds (VOC)**

Bromodichloromethane	0.002	N/A	0.001 mg/L	N/A	2016-11-17	
Bromoform	0.001	N/A	0.001 mg/L	N/A	2016-11-17	
Chloroform	0.001	N/A	0.001 mg/L	N/A	2016-11-17	
Dibromochloromethane	0.002	N/A	0.001 mg/L	N/A	2016-11-17	
Surrogate: Toluene-d8	112		70-130 %	N/A	2016-11-17	
Surrogate: 4-Bromofluorobenzene	111		70-130 %	N/A	2016-11-17	

# Appendix G



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:   
Environmental Health Officer

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

Place Decal Here

Water System Operating Conditions

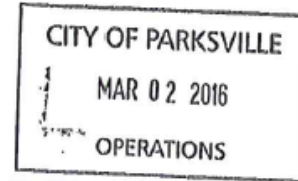
## Appendix G

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](mailto: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.