REGIONAL DISTRICT OF NANAIMO

Water Service Area Annual Report 2016

French Creek Water Service Area

June 2017

REGIONAL DISTRICT OF NANAIMO
Water & Utility Services Department
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1.0 Introduction

The following annual report describes the French Creek Water Service Area and summarizes the water quality and production data from 2016. This report also includes a summary of inquiries and complaints, completed and proposed maintenance activities, Operator Certification, the Emergency Response Plan, and the Cross Connection Control Program.

This report is to be submitted to Island Health by the Spring of 2017.

2.0 French Creek Water Service Area

The French Creek Water Service Area was established in 1980 and comprises an area west of Drew Road and south of the Island Highway between the City of Parksville and the Town of Qualicum Beach. The water source for the French Creek Water Service Area comes from a series of groundwater wells located nearby. The water source is chlorinated and stored in one reservoir. There are 238 water service connections in the French Creek Water System. In the event of a power failure or water system emergency, back-up water is immediately supplied by the Town of Qualicum Beach through a pressure-sensing valve located on Ormonde Road. A map of the French Creek Water Service Area is provided in Appendix A for reference.

2.1 Groundwater Wells

Six groundwater production wells are present in the French Creek Water Service Area.

Well / Name	Well Depth	In Use	Wellhead Protection	Treated/Untreated with Chlorine
#1	39.6 m	No	Yes	n/a
#2	40.5 m	Yes	Yes	Treated
#4	40.2 m	Yes	Yes	Treated
#5	50.3 m	No	Yes	n/a
#6	52.4 m	No	Yes	n/a
#7	39.6 m	Yes	Yes	Treated

French Creek Well #1 was converted to a monitoring well in 2013 due to low production and high iron levels. Wells #5 and #6 are temporarily not in use due to elevated levels of iron and manganese.

2.2 Reservoirs

One service reservoir (steel construction) is present at 1225 Sunrise Drive, Parksville, B.C. and has a capacity of 364 m^3 (80,000 imperial gallons).

2.3 Distribution System

The water distribution system in the French Creek Water Service Area is summarized in the table below. Fire hydrants (68) are located throughout the water service area.

Watermain Material	Length of mains in service area	Prevalence in service area
Asbestos-concrete:		
150mm or smaller	3.5 km	52%
200mm or larger	0.8 km	12%
PVC:		
150mm or smaller	0.9 km	14%
200mm or larger	1.5 km	22%

Note: 'PVC' is poly-vinylchloride (plastic)

3.0 Water Sampling and Testing Program

Water sampling and testing is carried out weekly in the distribution system. Notably, the chlorine residual levels are tested weekly to ensure the absence of bacterial regrowth in the watermains. The following table includes a summary of all testing.

Timing	Location	Tests
Weekly	RDN (in-house) Laboratory	Total coliforms, E.Coli, Temperature, pH, Conductivity, Chlorine residual, Salinity, TDS, Monthly- Iron and Manganese
Semi-Monthly	BC Centre for Disease Control	Total coliforms, E.Coli
Annual Source Water Testing (every Fall)	Maxxam Labs	Complete potability testing of raw well water, including T-Ammonia
Annual System Water Testing (every Spring)	Maxxam Labs	Complete potability testing of distribution system, including T-Ammonia

4.0 Water Quality - Source Water and Distribution System

Up-to-date water quality reports and lab data are posted monthly on the RDN website at www.rdn.bc.ca in the Services section, under "Water & Utility Services" then "WaterSmart Communities". Tables of water quality testing results for both the source water and distribution system are provided at the end of this report under Appendix B.

5.0 Water Quality Inquiries and Complaints

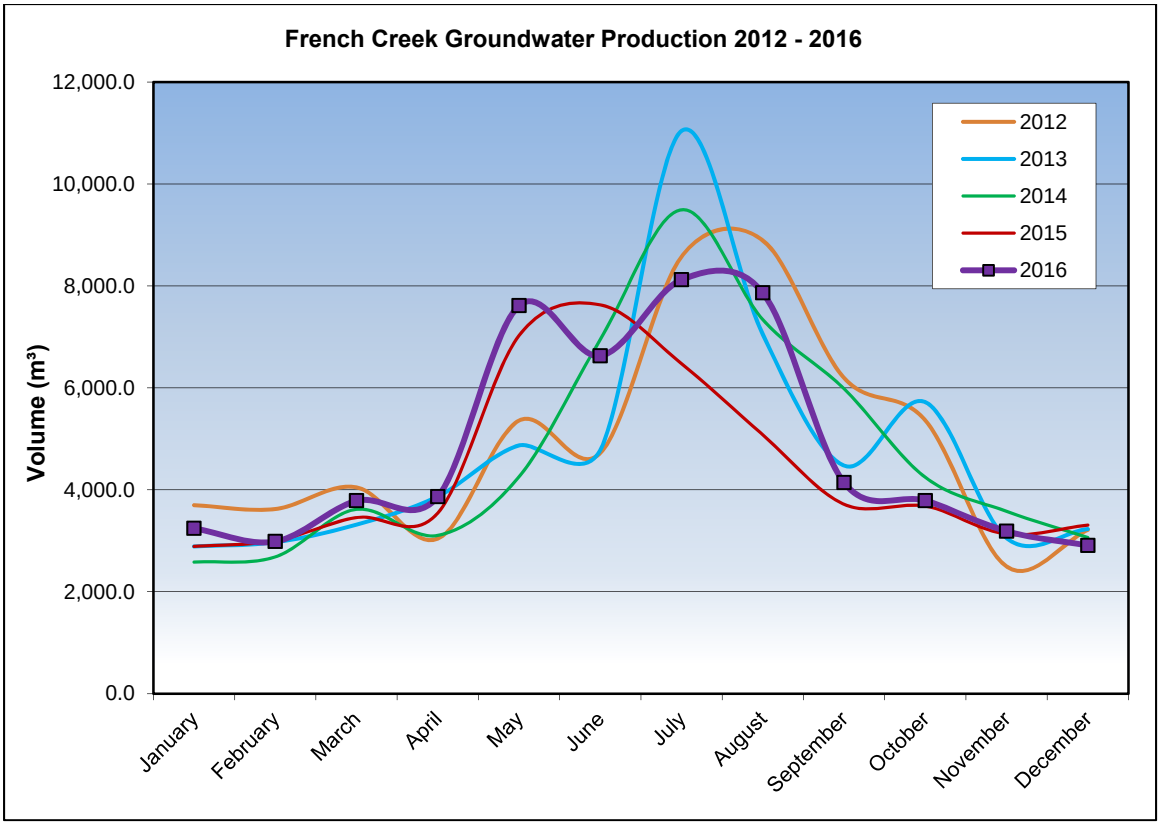
A few complaints and inquiries were received from the French Creek water service area in 2016, and were typically related to isolated incidents of iron discolouration in the water.

A summary of the water system incidents in 2016 is given in the table below.

Activity in 2016	Date(s)	History/Notes
Boil Water Advisories	None	None, ever.
High Turbidity Events	None	None, ever.
Equipment Malfunction	None	None.
Water Main Breaks	None	None.
Pump Failures	None	Temp power outages

6.0 Groundwater Production and Consumption

The monthly groundwater production in the French Creek Water Service Area for the past 5 years is shown in the chart below. Groundwater production in 2016 was characterized by higher than normal use in April and May, followed by a period of lower than normal use from June through October. This pattern may be attributed to unseasonably warm spring temperatures and less-than-average precipitation, which resulted in an early start to the watering season. This was followed by the implementation of heightened watering restrictions in June and July, resulting in lower than normal use.



In the Fall/Winter of 2016, the average usage per home in French Creek was 0.45 cubic metres per day (99 imperial gallons). In the summer, the average water usage was 0.90 cubic metres per day (198 imperial gallons). Based on these figures, the annual consumption per capita is estimated to be 253 L/day (based on 2.4 people per household). This consumption is ***7% less*** than the average of all the other RDN water systems of 271 L/day/capita for 2016.

7.0 Maintenance Program

Weekly pump station inspections are carried out to reduce or eliminate the risk of contamination and system failure, and to ensure the consistent application of chlorine for treatment purposes. Watermains are flushed twice annually: once in the Spring and once in the Fall.

Fire hydrants are serviced once per year (either 'A-level' or 'B-level' maintenance). The water storage reservoir is drained and cleaned once every two years. Twenty-four hour on-call coverage is in place to respond to water system emergencies and alarms.

French Creek
Main Pump House and Reservoir

8.0 Operator Certification

The Regional District Water & Utility Services staff are comprised of one Manager, one Project Engineer, one Engineering Technologist, one Chief Operator, and seven certified Level 2 Water Distribution System Operators. The operators receive ongoing training and certification in:

- ✓ Water Treatment
- ✓ Water Distribution
- ✓ Wastewater Collection
- ✓ Cross Connection Control
- ✓ Asbestos Awareness
- ✓ Chlorine Handling
- ✓ WHMIS (Workplace Hazardous Material Information System)
- ✓ TDG (Transportation of Dangerous Goods)
- ✓ Confined Space Awareness
- ✓ Traffic Control
- ✓ Fall Protection
- ✓ First Aid

9.0 Water Service Area Projects

9.1 2016 Completed Studies & Projects

- Completed an "Existing Use Groundwater Application" to Ministry of Forests, Lands and Natural Resource Operations (FLNRO);
- Drained/cleaned reservoir, and undertook repairs
- Offered irrigation audits to high water users;
- Updated Standard Operating Procedures;
- Updated the Water Services asset database;
- Achieved two Operators' Backflow Assembly Tester re-certification;
- Enforced the outdoor sprinkling regulations;

- Completed annual fire hydrant maintenance;
- Authorized several water bill rebates under the RDN's Leak Policy;
- Carried out a comprehensive water conservation campaign (Team WaterSmart);
- Updated and improved the RDN website at www.rdn.bc.ca;
- Updated the Emergency Response Plan;
- Utilized the Auto E-message service to notify member residents of water service disruptions and upcoming maintenance activities;
- Applied a rainwater harvesting incentive (rain barrels);
- Maintained a high level of water quality;
- Maintained excellent customer complaint and service request response times;
- Continued quality control through regular testing and monitoring of our water systems; and,
- Completed additional educational programs.

9.2 2017 Proposed Projects & Upgrades

- Update the Emergency Response Plan;
- Complete annual fire hydrant maintenance;
- Enforce the outdoor sprinkling regulations;
- Offer more irrigation audits to high water users;
- Continue to offer a rainwater harvesting (rain barrel) and other water-saving incentives;
- Utilize the Auto E-message service to notify member residents of water service disruptions and upcoming maintenance activities;
- Maintain excellent customer complaint and service request response times;
- Continue quality control through regular testing and monitoring of our water systems; and,
- Complete additional educational programs.

10.0 Emergency Response Plan

The Regional District Emergency Response Plan (ERP) contains procedures and contact information to efficiently respond to water system emergencies such as contamination of water supply, loss of supply, and pump failure. The ERP was reviewed and updated in 2016, and copies are available on our website, at each RDN office, in each pumphouse, and in each Water Services vehicle. A copy of the ERP is also attached to this report in Appendix C.

11.0 Cross Connection Control

In 2012, *Regional District of Nanaimo Water Use Regulation Bylaw No. 1654* was adopted which includes enhanced cross connection control and backflow protection wording. A separate Cross Connection Control bylaw was deemed not to be required.

A database of commercial customers was set-up in order to keep track of the maintenance history of testable backflow assemblies at each site. Two RDN Operators achieved their Backflow Assembly Tester re-certification in 2016. The RDN Chief Operator has been designated the Cross Connection Control Manager.

12.0 Closing

An annual report for the year 2017 will be prepared and submitted to Island Health in the Spring of 2018. Annual reports are also available on our website at www.rdn.bc.ca in the SERVICES section, under "Water & Utility Services" then "WaterSmart Communities".

Yambury Road right-of-way near FC Well No.2

APPENDIX A

MAP OF FRENCH CREEK

WATER SERVICE AREA

FRENCH CREEK

WATER SERVICE AREA

APPENDIX B

WATER QUALITY TESTING RESULTS

FRENCH CREEK WATER SERVICE AREA

Facility Location:
1480 Industrial Way
Parksville

Facility Information:

Facility Type: DWT

Facility Sampling History:

Location	Date	Total Coliform	E. Coli
1381 Gilley Crescent, Parksville	14-Dec-2016	L1	L1
French Creek WS, 1228 Sunrise, Parksville	7-Dec-2016	L1	L1
French Creek WS, 1228 Sunrise, Parksville	8-Nov-2016	L1	L1
1381 Gilley Crescent, Parksville	1-Nov-2016	L1	L1
French Creek WS, 1228 Sunrise, Parksville	12-Oct-2016	L1	L1
1381 Gilley Crescent, Parksville	4-Oct-2016	L1	L1
French Creek WS, 1228 Sunrise, Parksville	13-Sep-2016	L1	L1
1381 Gilley Crescent, Parksville	6-Sep-2016	L1	L1
1381 Gilley Crescent, Parksville	9-Aug-2016	L1	L1
French Creek WS, 1228 Sunrise, Parksville	2-Aug-2016	L1	L1
1381 Gilley Crescent, Parksville	12-Jul-2016	L1	L1
French Creek WS, 1228 Sunrise, Parksville	5-Jul-2016	L1	L1
1381 Gilley Crescent, Parksville	14-Jun-2016	L1	L1
French Creek WS, 1228 Sunrise, Parksville	7-Jun-2016	L1	L1
French Creek WS, 1228 Sunrise, Parksville	10-May-2016	L1	L1
1381 Gilley Crescent, Parksville	5-May-2016	L1	L1
1381 Gilley Crescent, Parksville	12-Apr-2016	L1	L1

French Creek WS, 1228 Sunrise, Parksville	4-Apr-2016	L1	L1
French Creek WS, 1228 Sunrise, Parksville	8-Mar-2016	L1	L1
1381 Gilley Crescent, Parksville	1-Mar-2016	L1	L1
French Creek WS, 1228 Sunrise, Parksville	9-Feb-2016	L1	L1
1381 Gilley Crescent, Parksville	2-Feb-2016	L1	L1
French Creek WS, 1228 Sunrise, Parksville	12-Jan-2016	L1	L1

Interpreting Sample Reports

In VIHA, the results of drinking water sampling are reported using the following coding system:

L1 Less than 1 (no detectable bacteria) - Meaning: No bacteria present
OG Overgrown - Meaning: Too many background bacteria to give an accurate count
EST Estimated Count
A Sample not tested; Too long in transit
C Sample leaked/broken in transit
D Sample not tested; No collection date given
T Sample submitted unsatisfactory. Exceeded 30 hours holding time, please resample.
NS No sample received with requisition

REGIONAL DISTRICT OF NANAIMO

French Creek Well # 2 Water Analysis
Behind 1221 Ormonde Road

CDWG=Canadian Drinking Water Guidelines
OG= Operational Guidance Value

MAC=Maximum Acceptable Concentration
AO= Asthetic Objective.

water SMART zero waste

Red font indicates non-compliance with Canadian Drinking Water Guidelines

	Units	CDWG		October 26 2011	October 29 2012	October 31 2013	November 4 2014	October 26 2015	October 27 2016
Miscellaneous Inorganics									
Fluoride	mg/L	1.5	MAC	0.1	0.12	0.11	0.08	0.11	0.11
Alkalinity (total as $CaCO_3$)	mg/L			130	130	140	130	129	133
Anions									
Dissolved Sulphate	mg/L	500	AO	18.2	17.4	23.6	26.9	34.4	35.9
Dissolved Chloride	mg/L	250	AO	4.2	4.3	5.8	6.1	7.2	6.7
Nitrite	mg/L	1	MAC	<0.01	<0.05	<0.05	0.12	<0.0050	<0.0050
Miscellaneous									
Apparent Colour	Colour Unit			<5	8	7	6	10	5
Nutrients									
Total Ammonia	mg/L				0.24	0.24	0.26	0.29	0.3
Physical Properties									
Conductivity	µS/cm			299	293	328	317	337	344
pH	pH	6.5:8.5	AO	7.5	8.1	8.1	8.3	8.35	8.24
TDS	mg/L	500	AO	21	172	184	206	196	190
Turbidity	NTU			<0.5	0.8	0.6	<0.5	0.2	0.48
Microbiological Parameters									
E.coli	MPN/100mL	<1	MAC	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Coliforms	MPN/100mL	<1	MAC	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Calculated Parameters									
Total Hardness ($CaCO_3$)	mg/L			140	130	160	150	148	148
Nitrate	mg/L	10	MAC	<0.01	<0.05	<0.05	<0.05	<0.020	<0.020
Elements									
Total Mercury	mg/L	0.001	MAC	<0.00001	<0.0001	<0.00001	<0.00001	<0.00001	<0.00001
Total Metals									
Total Aluminum	mg/L	0.1	OG	<0.005	0.003	<0.005	<0.005	<0.003	<0.003
Total Antimony	mg/L	0.006	MAC	<0.0002	<0.0001	<0.0002	<0.0001	<0.0005	<0.0005
Total Arsenic	mg/L	0.01	MAC	<0.0002	0.00012	0.0002	0.00015	<0.0001	0.00017
Total Barium	mg/L	1	MAC	0.015	0.0157	0.018	0.0173	0.0174	0.0182
Total Beryllium	mg/L			<0.00004	<0.00005	<0.00004	<0.00005	<0.0001	<0.0001
Total Bismuth	mg/L			<0.001	<0.0001	<0.0010	<0.0001	<0.001	<0.001
Total Boron	mg/L	5	MAC	0.017	0.02	0.018	0.019	<0.050	<0.050
Total Cadmium	mg/L	0.005	MAC	<0.00001	0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Total Chromium	mg/L	0.05	MAC	<0.0004	<0.0005	<0.0004	<0.0005	<0.001	<0.001
Total Cobalt	mg/L			0.00002	<0.0001	0.00004	<0.0001	<0.0005	<0.0005
Total Copper	mg/L	1	AO	<0.001	0.0009	<0.001	0.0005	0.0002	0.00047
Total Iron	mg/L	0.3	AO	0.105	0.158	0.169	0.094	0.0835	0.0585
Total Lead	mg/L	0.01	MAC	0.0002	0.0001	<0.0001	<0.0001	<0.0002	<0.0002
Total Manganese	mg/L	0.05	AO	0.13	0.134	0.151	0.145	0.134	0.133
Total Molybdenum	mg/L			0.0007	0.00087	0.0007	0.00073	<0.001	<0.001
Total Nickel	mg/L			<0.001	<0.0002	<0.001	0.0003	<0.001	<0.001
Total Selenium	mg/L	0.05	MAC	<0.0006	<0.0001	<0.0006	<0.0001	<0.0001	<0.0001
Total Silicon	mg/L			9.64	11.3	10.2	10.7	11.7	10.7
Total Silver	mg/L			<0.00001	<0.00001	<0.00001	<0.00005	<0.00002	<0.00002
Total Strontium	mg/L			0.132	0.131	0.159	0.147	0.146	0.148
Total Thallium	mg/L			<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00005
Total Tin	mg/L			<0.0001	<0.0001	0.0001	0.0011	<0.005	<0.005
Total Titanium	mg/L			<0.001	<0.0005	<0.0010	<0.0005	<0.005	<0.005
Total Uranium	mg/L	0.02	MAC	<0.0004	<0.00001	<0.0004	<0.00001	<0.0001	<0.0001
Total Vanadium	mg/L			0.0002	0.0002	0.0002	0.0002	<0.005	<0.005
Total Zinc	mg/L	5	AO	0.006	0.0264	0.016	0.0074	<0.005	0.0068
Total Zirconium	mg/L							<0.0005	<0.0005
Total Calcium	mg/L			34.5	33.2	38.6	36.8	37.4	36.5
Total Magnesium	mg/L			13.1	12.5	14.7	13.4	13.3	13.8
Total Potassium	mg/L			2.2	2.5	2.56	2.4	2.39	2.32
Total Sodium	mg/L	200	AO	8.95	9.9	10.9	9.2	9.5	8.58
Total Sulphur	mg/L							11.7	12.4

REGIONAL DISTRICT OF NANAIMO

French Creek Well # 4 Water Analysis
SE of 785 York Place

CDWG=Canadian Drinking Water Guidelines
OG= Operational Guidance Value

MAC=Maximum Acceptable Concentration
AO= Asthetic Objective.

water SMART zero waste

Red font indicates non-compliance with Canadian Drinking Water Guidelines

	Units	CDWG		October 26 2011	October 29 2012	October 31 2013	November 4 2014	October 26 2015	October 27 2016
Miscellaneous Inorganics									
Fluoride	mg/L	1.5	MAC	0.1	0.12	0.12	0.09	0.11	0.11
Alkalinity (total as $CaCO_3$)	mg/L			130	130	130	130	125	134
Anions									
Dissolved Sulphate	mg/L	500	AO	10.4	10.8	13.4	18.9	19.4	19.8
Dissolved Chloride	mg/L	250	AO	4.6	4.7	5.2	8.3	6.9	7.2
Nitrite	mg/L	1	MAC	<0.01	<0.05	<0.05	<0.05	<0.0050	<0.0050
Miscellaneous									
Apparent Colour	Colour Unit			5	8	7	6	10	10
Nutrients									
Total Ammonia	mg/L				0.32	0.37	0.4	0.42	0.47
Physical Properties									
Conductivity	µS/cm			285	280	305	309	309	319
pH	pH	6.5:8.5	AO	8.1	8.1	8.1	8.2	8.17	8.27
TDS	mg/L	500	AO	186	162	180	196	194	162
Turbidity	NTU			<0.5	0.5	<0.5	<0.5	0.19	0.27
Microbiological Parameters									
E.coli	MPN/100mL	<1	MAC	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Coliforms	MPN/100mL	<1	MAC	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Calculated Parameters									
Total Hardness ($CaCO_3$)	mg/L			130	130	140	140	135	133
Nitrate	mg/L	10	MAC	<0.01	<0.05	<0.05	<0.05	<0.020	<0.020
Elements									
Total Mercury	mg/L	0.001	MAC	<0.00001	<0.0001	<0.00001	<0.00001	<0.00001	<0.00001
Total Metals									
Total Aluminum	mg/L	0.1	OG	<0.005	0.004	0.005	<0.005	<0.003	<0.003
Total Antimony	mg/L	0.006	MAC	<0.0002	<0.0001	<0.0002	<0.0001	<0.0005	<0.0005
Total Arsenic	mg/L	0.01	MAC	<0.0002	0.00009	<0.0002	0.00013	<0.0001	<0.0001
Total Barium	mg/L	1	MAC	0.012	0.012	0.014	0.014	0.0134	0.0137
Total Beryllium	mg/L			<0.00004	<0.00005	<0.00004	<0.00005	<0.0001	<0.0001
Total Bismuth	mg/L			<0.001	<0.0001	<0.0010	<0.0001	<0.001	<0.001
Total Boron	mg/L	5	MAC	0.02	0.022	0.023	0.023	<0.05	<0.050
Total Cadmium	mg/L	0.005	MAC	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Total Chromium	mg/L	0.05	MAC	<0.0004	<0.0005	<0.0004	<0.0005	<0.001	<0.001
Total Cobalt	mg/L			0.00002	<0.0001	0.00003	<0.0001	<0.0005	<0.0005
Total Copper	mg/L	1	AO	0.002	0.0006	<0.001	0.0009	0.00042	<0.0002
Total Iron	mg/L	0.3	AO	0.109	0.102	0.121	0.122	0.118	0.124
Total Lead	mg/L	0.01	MAC	0.0001	<0.0001	<0.0001	<0.0001	0.00023	<0.0002
Total Manganese	mg/L	0.05	AO	0.133	0.131	0.153	0.15	0.136	0.141
Total Molybdenum	mg/L			0.0004	0.00062	0.0005	0.00054	<0.001	<0.001
Total Nickel	mg/L			<0.001	<0.0002	<0.001	<0.0002	<0.001	<0.001
Total Selenium	mg/L	0.05	MAC	<0.0006	<0.0001	<0.0006	<0.0001	<0.0001	<0.0001
Total Silicon	mg/L			10.8	12.7	12	12.2	13.2	11.9
Total Silver	mg/L			<0.00001	<0.00001	<0.00001	<0.00005	<0.00002	<0.00002
Total Strontium	mg/L			0.114	0.118	0.142	0.135	0.129	0.133
Total Thallium	mg/L			<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00005
Total Tin	mg/L			<0.0001	<0.0001	0.0001	0.0005	<0.005	<0.005
Total Titanium	mg/L			<0.001	<0.0005	<0.0010	<0.0005	<0.005	<0.005
Total Uranium	mg/L	0.02	MAC	<0.0004	<0.00001	<0.0004	<0.00001	<0.0001	<0.0001
Total Vanadium	mg/L			0.0003	0.0003	0.0004	0.0003	<0.005	<0.005
Total Zinc	mg/L	5	AO	0.017	0.0106	0.006	0.0156	0.0061	<0.005
Total Zirconium	mg/L							<0.0005	<0.0005
Total Calcium	mg/L			31.5	30	33.4	34.2	33.1	31.8
Total Magnesium	mg/L			12.8	12.2	13.8	13.1	12.7	12.9
Total Potassium	mg/L			2.2	2.6	2.71	2.6	2.42	2.39
Total Sodium	mg/L	200	AO	10	10.6	12.6	12	10.7	9.45
Total Sulphur	mg/L							5.6	7.2

REGIONAL DISTRICT OF NANAIMO

French Creek Well # 5 Water Analysis
1140 Sunrise Drive
Not sampled in 2016.

CDWG=Canadian Drinking Water Guidelines
OG= Operational Guidance Value
MAC=Maximum Acceptable Concentration
AO= Asthetic Objective.

water SMART zero waste

Red font indicates non-compliance with Canadian Drinking Water Guidelines

	Units	CDWG		October 26 2011	October 29 2012	October 31 2013	November 4 2014	October 26 2015	
Miscellaneous Inorganics									
Fluoride	mg/L	1.5	MAC	0.2	0.16	0.15	0.11	0.16	
Alkalinity (total as $CaCO_3$)	mg/L			130	130	120	120	125	
Anions									
Dissolved Sulphate	mg/L	500	AO	<0.2	<0.5	1	<0.5	<0.50	
Dissolved Chloride	mg/L	250	AO	6.5	6.1	6.1	5.7	7	
Nitrite	mg/L	1	MAC	<0.01	<0.05	<0.05	<0.05	<0.0050	
Miscellaneous									
Apparent Colour	Colour Unit			30	32	29	32	30	
Nutrients									
Total Ammonia	mg/L				1.64	1.48	1.5	1.6	
Physical Properties									
Conductivity	µS/cm			264	262	265	252	260	
pH	pH	6.5:8.5	AO	7.9	7.7	7.8	7.8	8.26	
TDS	mg/L	500	AO	188	166	150	166	166	
Turbidity	NTU			0.7	0.9	0.6	0.9	0.44	
Microbiological Parameters									
E.coli	MPN/100mL	<1	MAC	<1.0	<1.0	<1.0	<1.0	<1.0	
Total Coliforms	MPN/100mL	<1	MAC	<1.0	<1.0	<1.0	<1.0	<1.0	
Calculated Parameters									
Total Hardness ($CaCO_3$)	mg/L			89	85	88	83	80.2	
Nitrate	mg/L	10	MAC	<0.01	<0.05	<0.05	<0.05	<0.020	
Elements									
Total Mercury	mg/L	0.001	MAC	<0.00001	<0.0001	<0.00001	<0.00001	<0.00001	
Total Metals									
Total Aluminum	mg/L	0.1	OG	<0.005	0.002	<0.005	0.007	<0.003	
Total Antimony	mg/L	0.006	MAC	<0.0002	<0.0001	<0.0002	<0.0001	<0.0005	
Total Arsenic	mg/L	0.01	MAC	0.0005	0.00044	0.0004	0.00037	0.00031	
Total Barium	mg/L	1	MAC	0.005	0.00571	0.006	0.0063	0.0055	
Total Beryllium	mg/L			<0.00004	<0.00005	<0.00004	<0.00005	<0.0001	
Total Bismuth	mg/L			<0.001	<0.0001	<0.0010	<0.0001	<0.001	
Total Boron	mg/L	5	MAC	0.052	0.058	0.058	0.057	0.064	
Total Cadmium	mg/L	0.005	MAC	<0.00001	0.00001	0.00001	<0.00001	<0.00001	
Total Chromium	mg/L	0.05	MAC	<0.0004	<0.0005	0.0004	<0.0005	<0.001	
Total Cobalt	mg/L			0.00003	<0.0001	0.00004	<0.0001	<0.0005	
Total Copper	mg/L	1	AO	<0.001	0.0015	0.002	1.71	0.00247	
Total Iron	mg/L	0.3	AO	0.742	0.719	0.711	0.674	0.683	
Total Lead	mg/L	0.01	MAC	0.0002	0.0002	0.0003	0.0001	<0.0002	
Total Manganese	mg/L	0.05	AO	0.194	0.192	0.2	0.18	0.177	
Total Molybdenum	mg/L			0.0006	0.00079	0.0007	0.00073	<0.001	
Total Nickel	mg/L			<0.001	<0.0002	<0.001	<0.0002	<0.001	
Total Selenium	mg/L	0.05	MAC	<0.0006	<0.0001	<0.0006	<0.0001	<0.0001	
Total Silicon	mg/L			16.7	19.8	18.2	18.4	20.5	
Total Silver	mg/L			<0.00001	<0.00001	<0.00001	<0.00005	<0.00002	
Total Strontium	mg/L			0.07	0.0734	0.077	0.0707	0.0656	
Total Thallium	mg/L			<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	
Total Tin	mg/L			<0.0001	<0.0001	0.0002	0.0004	<0.005	
Total Titanium	mg/L			<0.001	0.0008	<0.0010	0.001	<0.005	
Total Uranium	mg/L	0.02	MAC	<0.0004	<0.00001	<0.0004	<0.00001	<0.0001	
Total Vanadium	mg/L			0.0008	0.001	0.001	0.0011	<0.005	
Total Zinc	mg/L	5	AO	0.014	0.0097	0.015	0.0191	0.0173	
Total Zirconium	mg/L							<0.0005	
Total Calcium	mg/L			21.3	20.4	20.6	20.2	19.5	
Total Magnesium	mg/L			8.7	8.36	8.79	7.87	7.67	
Total Potassium	mg/L			2.5	2.9	2.79	2.7	2.61	
Total Sodium	mg/L	200	AO	21.9	24.4	24.8	22.1	23.7	
Total Sulphur	mg/L							<3.0	

REGIONAL DISTRICT OF NANAIMO

French Creek Well # 6 Water Analysis
1108 Wellington Drive

CDWG=Canadian Drinking Water Guidelines
OG= Operational Guidance Value

MAC=Maximum Acceptable Concentration
AO= Asthetic Objective.

water SMART zero waste

Red font indicates non-compliance with Canadian Drinking Water Guidelines

	Units	CDWG		October 26 2011	October 29 2012	October 31 2013	November 4 2014	October 26 2015	October 27 2016
Miscellaneous Inorganics									
Fluoride	mg/L	1.5	MAC	0.1	0.16	0.15	0.09	0.15	0.14
Alkalinity (total as $CaCO_3$)	mg/L			110	110	100	110	106	105
Anions									
Dissolved Sulphate	mg/L	500	AO	<0.2	<0.5	0.8	<0.5	<0.50	<0.50
Dissolved Chloride	mg/L	250	AO	4.3	4	3.9	4.6	4.5	4.1
Nitrite	mg/L	1	MAC	<0.01	<0.05	<0.05	0.12	<0.0050	<0.0050
Miscellaneous									
Apparent Colour	Colour Unit			26	31	28	30	30	30
Nutrients									
Total Ammonia	mg/L				1.24	1.06	1.04	1.2	1.4
Physical Properties									
Conductivity	µS/cm			219	218	220	217	216	217
pH	pH	6.5:8.5	AO	7.8	7.7	7.7	7.8	8.24	8.1
TDS	mg/L	500	AO	168	142	138	126	136	140
Turbidity	NTU			0.7	0.9	0.8	1.2	0.62	0.83
Microbiological Parameters									
E.coli	MPN/100mL	<1	MAC	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Coliforms	MPN/100mL	<1	MAC	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Calculated Parameters									
Total Hardness ($CaCO_3$)	mg/L			83	79	83	78	85.5	72.3
Nitrate	mg/L	10	MAC	<0.01	<0.05	<0.05	<0.05	<0.020	<0.020
Elements									
Total Mercury	mg/L	0.001	MAC	<0.00001	<0.0001	<0.00001	<0.00001	<0.00001	<0.00001
Total Metals									
Total Aluminum	mg/L	0.1	OG	<0.005	0.002	<0.005	<0.005	<0.003	<0.003
Total Antimony	mg/L	0.006	MAC	<0.0002	<0.0001	<0.0002	<0.0001	<0.0005	<0.0005
Total Arsenic	mg/L	0.01	MAC	0.0014	0.00132	0.0013	0.00121	0.00139	0.00118
Total Barium	mg/L	1	MAC	0.004	0.0044	0.005	0.0048	0.0055	0.0044
Total Beryllium	mg/L			<0.00004	<0.00005	<0.00004	<0.00005	<0.0001	<0.0001
Total Bismuth	mg/L			<0.001	<0.0001	<0.0010	<0.0001	<0.001	<0.001
Total Boron	mg/L	5	MAC	0.03	0.033	0.032	0.032	<0.050	<0.050
Total Cadmium	mg/L	0.005	MAC	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Total Chromium	mg/L	0.05	MAC	<0.0004	<0.0005	0.0004	0.0006	<0.001	<0.001
Total Cobalt	mg/L			0.00004	<0.0001	0.00003	<0.0001	<0.0005	<0.0005
Total Copper	mg/L	1	AO	0.001	0.0012	<0.001	0.0024	0.00182	0.00117
Total Iron	mg/L	0.3	AO	0.846	0.813	0.864	0.812	0.873	0.817
Total Lead	mg/L	0.01	MAC	0.0007	0.0006	0.0001	0.0005	0.00089	0.00044
Total Manganese	mg/L	0.05	AO	0.168	0.166	0.177	0.162	0.182	0.157
Total Molybdenum	mg/L			0.0008	0.00094	0.0008	0.00092	<0.001	<0.001
Total Nickel	mg/L			<0.001	<0.0002	<0.001	0.0003	<0.001	<0.001
Total Selenium	mg/L	0.05	MAC	<0.0006	<0.0001	<0.0006	<0.0001	<0.0001	<0.0001
Total Silicon	mg/L			15.5	18	16.9	17	20.6	16.7
Total Silver	mg/L			<0.00001	<0.00001	<0.00001	<0.00005	<0.00002	<0.00002
Total Strontium	mg/L			0.057	0.0581	0.063	0.0571	0.0654	0.0553
Total Thallium	mg/L			<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00005
Total Tin	mg/L			<0.0001	<0.0001	<0.0001	0.0006	<0.005	<0.005
Total Titanium	mg/L			0.001	0.0008	<0.0010	0.0008	<0.005	<0.005
Total Uranium	mg/L	0.02	MAC	<0.0004	<0.00001	<0.0004	<0.00001	<0.0001	<0.0001
Total Vanadium	mg/L			0.0011	0.0012	0.0011	0.0013	<0.005	<0.005
Total Zinc	mg/L	5	AO	0.032	0.0134	0.019	0.0243	0.0262	0.0387
Total Zirconium	mg/L							<0.0005	<0.0005
Total Calcium	mg/L			19.7	18.6	19.3	18.8	20	16.8
Total Magnesium	mg/L			8.28	7.87	8.42	7.5	8.63	7.35
Total Potassium	mg/L			1.9	2.2	2.12	2	2.29	1.86
Total Sodium	mg/L	200	AO	15.5	18	16.9	17	18	13.7
Total Sulphur	mg/L							<3.0	<3.0

REGIONAL DISTRICT OF NANAIMO

French Creek Well # 7 Water Analysis
846 Yambury Road

CDWG=Canadian Drinking Water Guidelines
OG= Operational Guidance Value

MAC=Maximum Acceptable Concentration
AO= Asthetic Objective.

water SMART zero waste

Red font indicates non-compliance with Canadian Drinking Water Guidelines

	Units	CDWG		October 26 2011	October 29 2012	October 31 2013	November 4 2014	October 26 2015	October 27 2016
Miscellaneous Inorganics									
Fluoride	mg/L	1.5	MAC	0.1	0.13	0.1	0.09	0.1	0.1
Alkalinity (total as $CaCO_3$)	mg/L			150	140	140	140	142	150
Anions									
Dissolved Sulphate	mg/L	500	AO	15.1	16.6	36.6	32.4	24.7	26.7
Dissolved Chloride	mg/L	250	AO	4.5	5.1	4.4	4.5	5.6	5.4
Nitrite	mg/L	1	MAC	<0.01	<0.05	<0.05	0.17	<0.0050	<0.0050
Miscellaneous									
Apparent Colour	Colour Unit			<5	5	7	6	10	10
Nutrients									
Total Ammonia	mg/L			0.23	0.22	0.23	0.26	0.29	0.36
Physical Properties									
Conductivity	µS/cm			317	310	357	339	332	348
pH	pH	6.5:8.5	AO	8.2	8.2	8.2	8.2	8.35	8.33
TDS	mg/L	500	AO	208	194	214	210	202	214
Turbidity	NTU			<0.5	0.5	0.5	<0.5	0.16	0.23
Microbiological Parameters									
E.coli	MPN/100mL	<1	MAC	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Coliforms	MPN/100mL	<1	MAC	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Calculated Parameters									
Total Hardness ($CaCO_3$)	mg/L			140	140	180	160	169	154
Nitrate	mg/L	10	MAC	<0.01	<0.05	<0.05	<0.05	<0.020	<0.020
Elements									
Total Mercury	mg/L	0.001	MAC	<0.00001	<0.0001	<0.00001	<0.00001	<0.00001	<0.00001
Total Metals									
Total Aluminum	mg/L	0.1	OG	<0.005	0.003	<0.005	<0.005	<0.003	<0.003
Total Antimony	mg/L	0.006	MAC	<0.0002	<0.0001	<0.0002	<0.0001	<0.0005	<0.0005
Total Arsenic	mg/L	0.01	MAC	<0.0002	0.0001	<0.0002	0.00011	<0.0001	<0.0001
Total Barium	mg/L	1	MAC	0.014	0.0141	0.017	0.016	0.0187	0.016
Total Beryllium	mg/L			<0.00004	<0.00005	<0.00004	<0.00005	<0.0001	<0.0001
Total Bismuth	mg/L			<0.001	<0.0001	<0.0010	<0.0001	<0.001	<0.001
Total Boron	mg/L	5	MAC	0.017	0.02	0.016	0.018	<0.05	<0.050
Total Cadmium	mg/L	0.005	MAC	<0.00001	0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Total Chromium	mg/L	0.05	MAC	<0.0004	<0.0005	<0.0004	<0.0005	<0.001	<0.001
Total Cobalt	mg/L			<0.00002	<0.0001	0.00004	<0.0001	<0.0005	<0.0005
Total Copper	mg/L	1	AO	<0.001	0.0003	<0.001	0.0003	0.00046	0.00025
Total Iron	mg/L	0.3	AO	0.12	0.104	0.149	0.121	0.125	0.123
Total Lead	mg/L	0.01	MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002
Total Manganese	mg/L	0.05	AO	0.131	0.13	0.155	0.143	0.148	0.139
Total Molybdenum	mg/L			0.0005	0.0006	0.0006	0.00057	<0.001	<0.001
Total Nickel	mg/L			<0.001	<0.0002	<0.001	0.0008	<0.001	<0.001
Total Selenium	mg/L	0.05	MAC	<0.0006	<0.00001	<0.0006	<0.0001	<0.0001	<0.0001
Total Silicon	mg/L			10.6	12.3	11.2	11.6	13.5	11.7
Total Silver	mg/L			<0.00001	<0.00001	<0.00001	<0.00005	<0.00002	<0.00002
Total Strontium	mg/L			0.133	0.134	0.168	0.15	0.169	0.147
Total Thallium	mg/L			<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00005
Total Tin	mg/L			<0.0001	<0.0001	0.0001	0.0008	<0.005	<0.005
Total Titanium	mg/L			0.002	<0.0005	<0.0010	<0.0005	<0.005	<0.005
Total Uranium	mg/L	0.02	MAC	<0.0004	<0.00001	<0.0004	<0.00001	<0.0001	<0.0001
Total Vanadium	mg/L			0.0002	0.0002	0.0002	0.0002	<0.005	<0.005
Total Zinc	mg/L	5	AO	0.002	0.0009	0.005	0.0049	<0.005	<0.005
Total Zirconium	mg/L							<0.0005	<0.0005
Total Calcium	mg/L			37.7	35.1	42.3	40.2	40.1	37.5
Total Magnesium	mg/L			14.6	13.6	16.9	14.8	16.8	14.7
Total Potassium	mg/L			2.3	2.6	2.7	2.5	2.66	2.34
Total Sodium	mg/L	200	AO	9.35	10.4	10.9	9.5	10.9	8.89
Total Sulphur	mg/L							8.7	8.7

REGIONAL DISTRICT OF NANAIMO

French Creek Distribution Water Analysis
1228 Sunrise Drive

CDWG=Canadian Drinking Water Guidelines
OG= Operational Guidance Value
MAC=Maximum Acceptable Concentration
AO= Asthetic Objective.

water SMART zero waste

Red font indicates non-compliance with Canadian Drinking Water Guidelines

	Units	CDWG		May 16 2012	June 5 2013	May 13 2014	May 19 2015	May 10 2016	
Miscellaneous Inorganics									
Fluoride	mg/L	1.5	MAC	0.11	0.1	0.1	0.11	0.11	
Alkalinity (total as $CaCO_3$)	mg/L			140	130	140	128	141	
Anions									
Dissolved Sulphate	mg/L	500	AO	14.6	15.4	25.8	22	29.5	
Dissolved Chloride	mg/L	250	AO	8.7	9.8	9.4	11	12	
Nitrite	mg/L	1	MAC	<0.05	<0.05	<0.05	<0.0050	<0.0050	
Miscellaneous									
Apparent Colour	Colour Unit			31	37	36	10	30	
Nutrients									
Total Ammonia	mg/L			0.09	0.02	<0.02	0.0099	0.016	
Physical Properties									
Conductivity	µS/cm			313	297	337	331	350	
pH	pH	6.5:8.5	AO	8.3	8.1	8.2	8.17	8.29	
TDS	mg/L	500	AO	176	200	222	194	188	
Turbidity	NTU			1.2	1	1.1	1.3	1.29	
Microbiological Parameters									
E.coli	MPN/100mL	<1	MAC	<1.0	<1.0	<1.0	<1.0	<1.0	
Total Coliforms	MPN/100mL	<1	MAC	<1.0	<1.0	<1.0	<1.0	<1.0	
Calculated Parameters									
Total Hardness ($CaCO_3$)	mg/L			140	140	160	135	145	
Nitrate	mg/L	10	MAC	<0.05	<0.05	<0.05	<0.020	<0.020	
Elements									
Total Mercury	mg/L	0.001	MAC	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	
Total Metals									
Total Aluminum	mg/L	0.1	OG	<0.005	<0.005	<0.025	<0.003	<0.003	
Total Antimony	mg/L	0.006	MAC	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	
Total Arsenic	mg/L	0.01	MAC	<0.0002	<0.0002	<0.00025	<0.00012	<0.0001	
Total Barium	mg/L	1	MAC	0.013	0.015	0.0169	0.0151	0.016	
Total Beryllium	mg/L			<0.00004	<0.00004	<0.00025	<0.0001	<0.0001	
Total Bismuth	mg/L			<0.001	<0.0010	<0.0005	<0.001	<0.001	
Total Boron	mg/L	5	MAC	0.023	0.021	0.027	<0.050	<0.050	
Total Cadmium	mg/L	0.005	MAC	<0.00001	<0.00001	<0.00005	<0.00001	<0.00001	
Total Chromium	mg/L	0.05	MAC	0.0004	<0.0004	<0.0025	<0.001	<0.001	
Total Cobalt	mg/L			0.0001	0.00076	<0.0005	<0.0005	<0.0005	
Total Copper	mg/L	1	AO	0.002	0.002	0.0025	0.00148	0.00069	
Total Iron	mg/L	0.3	AO	0.137	0.125	0.143	0.113	0.117	
Total Lead	mg/L	0.01	MAC	0.0001	0.0001	<0.0005	<0.0002	<0.0002	
Total Manganese	mg/L	0.05	AO	0.145	0.124	0.139	0.125	0.123	
Total Molybdenum	mg/L			0.0005	0.0006	0.00056	<0.001	<0.001	
Total Nickel	mg/L			<0.001	<0.001	<0.0010	<0.001	<0.001	
Total Selenium	mg/L	0.05	MAC	<0.0006	<0.0006	<0.0005	<0.0001	<0.0001	
Total Silicon	mg/L			11.6	11.5	12.5	11.5	12.4	
Total Silver	mg/L			<0.00001	<0.00001	<0.00025	<0.00002	<0.00002	
Total Strontium	mg/L			0.132	0.138	0.146	0.136	0.146	
Total Thallium	mg/L			<0.00001	<0.00001	<0.00005	<0.00005	<0.00005	
Total Tin	mg/L			<0.0001	0.0002	<0.0005	<0.005	<0.005	
Total Titanium	mg/L			<0.001	<0.0010	<0.0025	<0.005	<0.005	
Total Uranium	mg/L	0.02	MAC	<0.0004	<0.0004	<0.00005	<0.0001	<0.0001	
Total Vanadium	mg/L			0.0003	0.0003	<0.0005	<0.005	<0.005	
Total Zinc	mg/L	5	AO	0.002	0.002	0.0188	<0.005	<0.005	
Total Zirconium	mg/L						<0.0005	<0.0005	
Total Calcium	mg/L			35.2	34.3	39	34	34.6	
Total Magnesium	mg/L			13.6	13.4	15.1	12.2	14.2	
Total Potassium	mg/L			2.6	2.68	2.6	2.29	2.48	
Total Sodium	mg/L	200	AO	13.2	13.6	15.4	11.3	12.5	
Total Sulphur	mg/L						8.8	8.8	

Regional District of Nanaimo - Water Services Department

French Creek Water Analysis - 2016 Monthly Report

		Health Department		In-House									
Date	Sample Location (Address)	E. coli *	Total Coliform *	E.coli *	Total Coliform *	Temp. (°C)	pH	Free Chlorine Residual (mg/L)	Total Dissolved Solids (mg/L)	Salinity (%)	Conductivity (µS/cm)	Total Iron (mg/L)	Manganese (mg/L)
7-Dec-16	1228 Sunrise	0	0	0	0	10	7.63	0.36	174.3	0.17	363.0	0.07	0.163
14-Dec-16	1381 Gilley	0	0	0	0	8	7.67	0.36	173.7	0.17	360.0		
	Average	0	0	0	0	9.0	7.7	0.36	174.0	0.2	361.5	0.07	0.163
	Maximum	0	0	0	0	10	7.67	0.36	174.3	0.17	363	0.07	0.163
	Minimum	0	0	0	0	8	7.63	0.36	173.7	0.17	360	0.07	0.163

Red font indicates non-compliance with Canadian Drinking Water Guidelines

Aesthetic Objective for Iron is ≤0.3 mg/L **Aesthetic Objective for Manganese is ≤0.05mg/L**

***Coliforms are measured in colony forming units (CFU) per 100 millilitres of water (CFU/100mL)**

Yellow Column Coliform tests are completed by Health Department

Blue column tests are completed by RDN

Comments:

Iron and manganese are found naturally in drinking water. Levels found in these samples are not a health concern.

Regional District of Nanaimo - Water Services Department

French Creek Water Analysis - 2016 Monthly Report

		Health Department		In-House									
Date	Sample Location (Address)	E. coli *	Total Coliform *	E.coli *	Total Coliform *	Temp. (°C)	pH	Free Chlorine Residual (mg/L)	Total Dissolved Solids (mg/L)	Salinity (%)	Conductivity (µS/cm)	Total Iron (mg/L)	Manganese (mg/L)
1-Nov-16	1381 Gilley	0	0	0	0	14	7.60	0.39	175.9	0.17	367.0	0.07	0.122
7-Nov-16	1228 Sunrise	0	0	0	0	12	7.27	0.48	172.1	0.17	357.0		
14-Nov-16	1381 Gilley			0	0	13	7.55	0.45	176.6	0.18	367.0		
22-Nov-16	1228 Sunrise			0	0	9	7.38	0.53	173.9	0.17	362.0		
29-Nov-16	1381 Gilley			0	0	10	7.51	0.58	175.9	0.18	364.0		
	Average	0	0	0	0	11.6	7.5	0.49	174.9	0.2	363.4	0.07	0.122
	Maximum	0	0	0	0	14	7.6	0.58	176.6	0.18	367	0.07	0.122
	Minimum	0	0	0	0	9	7.27	0.39	172.1	0.17	357	0.07	0.122

Red font indicates non-compliance with Canadian Drinking Water Guidelines

Aesthetic Objective for Iron is ≤0.3 mg/L **Aesthetic Objective for Manganese is ≤0.05mg/L**

***Coliforms are measured in colony forming units (CFU) per 100 millilitres of water (CFU/100mL)**

Yellow Column Coliform tests are completed by Health Department

Blue column tests are completed by RDN

Comments:

Iron and manganese are found naturally in drinking water. Levels found in these samples are not a health concern.

Regional District of Nanaimo - Water Services Department

French Creek Water Analysis - 2016 Monthly Report

		Health Department		In-House									
Date	Sample Location (Address)	E. coli *	Total Coliform *	E.coli *	Total Coliform *	Temp. (°C)	pH	Free Chlorine Residual (mg/L)	Total Dissolved Solids (mg/L)	Salinity (%)	Conductivity (µS/cm)	Total Iron (mg/L)	Manganese (mg/L)
4-Oct-16	1381 Gilley	0	0	0	0	13	7.69	0.38	176.7	0.18	368.0	0.06	0.124
12-Oct-16	1228 Sunrise	0	0	0	0	9	7.61	0.70	170.8	0.17	355.0		
18-Oct-16	1381 Gilley			0	0	12	7.60	0.23	176.3	0.18	367.0		
24-Oct-16	1228 Sunrise			0	0	10	7.44	0.53	174.3	0.17	361.0		
	Average	0	0	0	0	11.0	7.6	0.46	174.5	0.2	362.8	0.06	0.124
	Maximum	0	0	0	0	13	7.69	0.7	176.7	0.18	368	0.06	0.124
	Minimum	0	0	0	0	9	7.44	0.23	170.8	0.17	355	0.06	0.124

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Aesthetic Objective for Iron is ≤0.3 mg/L **Aesthetic Objective for Manganese is ≤0.05mg/L**

***Coliforms are measured in colony forming units (CFU) per 100 millilitres of water (CFU/100mL)**

Yellow Column Coliform tests are completed by Health Department

Blue column tests are completed by RDN

Comments:

Iron and manganese are found naturally in drinking water. Levels found in these samples are not a health concern.

Regional District of Nanaimo - Water Services Department

French Creek Water Analysis - 2016 Monthly Report

		Health Department		In-House									
Date	Sample Location (Address)	E. coli *	Total Coliform *	E.coli *	Total Coliform *	Temp. (°C)	pH	Free Chlorine Residual (mg/L)	Total Dissolved Solids (mg/L)	Salinity (%)	Conductivity (µS/cm)	Total Iron (mg/L)	Manganese (mg/L)
6-Sep-16	1381 Gilley	0	0	0	0	16.5	7.48	0.42	176.6	0.18	364.0	0.08	0.130
13-Sep-16	1228 Sunrise	0	0	0	0	14	7.49	0.35	171.3	0.17	358.0		
20-Sep-16	1381 Gilley			0	0	16.5	7.65	0.39	175.5	0.17	365.0		
27-Sep-16	1228 Sunrise			0	0	11	7.54	0.44	174.6	0.17	363.0		
	Average	0	0	0	0	14.5	7.5	0.40	174.5	0.2	362.5	0.08	0.130
	Maximum	0	0	0	0	16.5	7.65	0.44	176.6	0.18	365	0.08	0.130
	Minimum	0	0	0	0	11	7.48	0.35	171.3	0.17	358	0.08	0.130

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Date	Sample Location (Address)	E. coli *	Total Coliform *	E.coli *	Total Coliform *	Temp. (°C)	pH	Free Chlorine Residual (mg/L)	Total Dissolved Solids (mg/L)	Salinity (%)	Conductivity (µS/cm)	Total Iron (mg/L)	Manganese (mg/L)
2-Aug-16	1228 Sunrise	0	0	0	0	14	7.31	0.58	174.5	0.17	363.0	0.10	0.161
9-Aug-16	1381 Gilley	0	0	0	0	18	7.31	0.59	174.6	0.17	364.0		
16-Aug-16	1228 Sunrise			0	0	13	7.34	0.49	171.8	0.17	359.0		
23-Aug-16	1381 Gilley			0	0	18	7.35	0.47	173.3	0.17	360.0		
29-Aug-16	1228 Sunrise			0	0	13	7.42	0.54	173.5	0.17	361.0		
	Average	0	0	0	0	15.2	7.3	0.53	173.5	0.2	361.4	0.10	0.161
	Maximum	0	0	0	0	18	7.42	0.59	174.6	0.17	364	0.1	0.161
	Minimum	0	0	0	0	13	7.31	0.47	171.8	0.17	359	0.1	0.161

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		Health Department		In-House									
Date	Sample Location (Address)	E. coli *	Total Coliform *	E.coli *	Total Coliform *	Temp. (°C)	pH	Free Chlorine Residual (mg/L)	Total Dissolved Solids (mg/L)	Salinity (%)	Conductivity (µS/cm)	Total Iron (mg/L)	Manganese (mg/L)
5-Jul-16	1228 Sunrise	0	0	0	0	12	7.42	0.62	123.0	0.12	257.0	0.10	0.129
12-Jul-16	1381 Gilley	0	0	0	0	16	7.51	0.49	175.4	0.17	365.0		
18-Jul-16	1228 Sunrise			0	0		7.37	0.61	174.1	0.17	363.0		
26-Jul-16	1381 Gilley			0	0	16	7.35	0.51	174.4	0.17	363.0		
	Average	0	0	0	0	14.7	7.4	0.56	161.7	0.2	337.0	0.10	0.129
	Maximum	0	0	0	0	16	7.51	0.62	175.4	0.17	365	0.1	0.129
	Minimum	0	0	0	0	12	7.35	0.49	123	0.12	257	0.1	0.129

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		Health Department		In-House									
Date	Sample Location (Address)	E. coli *	Total Coliform *	E.coli *	Total Coliform *	Temp. (°C)	pH	Free Chlorine Residual (mg/L)	Total Dissolved Solids (mg/L)	Salinity (%)	Conductivity (µS/cm)	Total Iron (mg/L)	Manganese (mg/L)
7-Jun-16	1228 Sunrise	0	0	0	0	13	7.65	0.72	171.6	0.17	354.0	0.08	0.157
14-Jun-16	1381 Gilley	0	0	0	0	15	7.00	0.29	173.9	0.17	362.0		
21-Jun-16	1228 Sunrise			0	0	12	7.36	0.74	172.2	0.17	359.0		
27-Jun-16	1381 Gilley			0	0	17	7.47	0.63	175.5	0.17	367.0		
	Average	0	0	0	0	14.3	7.4	0.60	173.3	0.2	360.5	0.08	0.157
	Maximum	0	0	0	0	17	7.65	0.74	175.5	0.17	367	0.08	0.157
	Minimum	0	0	0	0	12	7	0.29	171.6	0.17	354	0.08	0.157

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Date	Sample Location (Address)	E. coli *	Total Coliform *	E.coli *	Total Coliform *	Temp. (°C)	pH	Free Chlorine Residual (mg/L)	Total Dissolved Solids (mg/L)	Salinity (%)	Conductivity (µS/cm)	Total Iron (mg/L)	Manganese (mg/L)
4-May-16	1381 Gilley	0	0	0	0	13	7.79	0.37	174.1	0.17	362.0		
10-May-16	1228 Sunrise	0	0	0	0	12	7.87	0.69	172.7	0.17	360.0	0.10	0.162
17-May-16	1381 Gilley			0	0	13	7.49	0.42	174.3	0.17	364.0		
25-May-16	1228 Sunrise			0	0	14	7.05	0.54	171.3	0.17	357.0		
31-May-16	1331 Gilley			0	0	15	7.40	0.40	171.3	0.17	356.0		
	Average	0	0	0	0	13.4	7.5	0.48	172.7	0.2	359.8	0.10	0.162
	Maximum	0	0	0	0	15	7.87	0.69	174.3	0.17	364	0.10	0.162
	Minimum	0	0	0	0	12	7.05	0.37	171.3	0.17	356	0.10	0.162

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4-Apr-16	1228 Sunrise	0	0	0	0	11	7.47	0.51	170.3	0.17	354.0	0.06	0.183
12-Apr-16	1381 Gilley	0	0	0	0	10	7.74	0.28	173.2	0.17	361.0		
19-Apr-16	1228 Sunrise			0	0	12	7.89	0.36	172.8	0.17	360.0		
25-Apr-16	1381 Gilley			0	0		7.71	0.41	176.6	0.18	361.0		
	Average	0	0	0	0	11.0	7.7	0.39	173.2	0.2	359.0	0.06	0.183
	Maximum	0	0	0	0	12	7.89	0.51	176.6	0.18	361	0.06	0.183
	Minimum	0	0	0	0	10	7.47	0.28	170.3	0.17	354	0.06	0.183

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1-Mar-16	1381 Gilley	0	0	0	0	8	7.42	0.28	171.4	0.17	357.0	0.08	0.151
8-Mar-16	1228 Sunrise	0	0	0	0	10	7.77	0.55	172.2	0.17	359.0		
15-Mar-16	1381 Gilley			0	0	9	7.81	0.39	172.8	0.17	358.0		
22-Mar-16	1228 Sunrise			0	0	11	7.54	0.46	172.0	0.17	358.0		
29-Mar-16	1381 Gilley			0	0	9	7.69	0.30	173.1	0.17	360.0		
	Average	0	0	0	0	9.4	7.6	0.40	172.3	0.2	358.4	0.08	0.151
	Maximum	0	0	0	0	11	7.81	0.55	173.1	0.17	360	0.08	0.151
	Minimum	0	0	0	0	8	7.42	0.28	171.4	0.17	357	0.08	0.151

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Date	Sample Location (Address)	E. coli *	Total Coliform *	E.coli *	Total Coliform *	Temp. (°C)	pH	Free Chlorine Residual (mg/L)	Total Dissolved Solids (mg/L)	Salinity (%)	Conductivity (µS/cm)	Total Iron (mg/L)	Manganese (mg/L)
2-Feb-16	1381 Gilley	0	0	0	0	8	7.59	0.57	174.7	0.17	363.0	0.06	0.099
9-Feb-16	1228 Sunrise	0	0	0	0	10	7.49	0.57	170.9	0.17	356.0		
16-Feb-16	1381 Gilley			0	0	8	7.46	0.32	170.1	0.17	355.0		
23-Feb-16	1228 Sunrise			0	0	10	7.33	0.66	170.9	0.17	355.0		
	Average	0	0	0	0	9.0	7.5	0.53	171.7	0.2	357.3	0.06	0.099
	Maximum	0	0	0	0	10	7.59	0.66	174.7	0.17	363	0.06	0.099
	Minimum	0	0	0	0	8	7.33	0.32	170.1	0.17	355	0.06	0.099

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Date	Sample Location (Address)	E. coli *	Total Coliform *	E.coli *	Total Coliform *	Temp. (°C)	pH	Free Chlorine Residual (mg/L)	Total Dissolved Solids (mg/L)	Salinity (%)	Conductivity (µS/cm)	Total Iron (mg/L)	Manganese (mg/L)
4-Jan-16	1381 Gilley	0	0	0	0	10	7.60	0.42	168.6	0.17	351.0	0.04	0.123
12-Jan-16	1228 Sunrise	0	0	0	0	9	7.27	0.75	171.3	0.17	356.0		
20-Jan-16	1381 Gilley			0	0	8	7.45	0.46	173.9	0.17	362.0		
26-Jan-16	1228 Sunrise			0	0	10	7.32	0.65	172.7	0.17	362.0		
	Average	0	0	0	0	9.3	7.4	0.57	171.6	0.2	357.8	0.04	0.123
	Maximum	0	0	0	0	10	7.6	0.75	173.9	0.17	362	0.04	0.123
	Minimum	0	0	0	0	8	7.27	0.42	168.6	0.17	351	0.04	0.123

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APPENDIX C

EMERGENCY RESPONSE PLAN

REGIONAL DISTRICT OF NANAIMO

EMERGENCY RESPONSE PLAN

REGIONAL DISTRICT OF NANAIMO

WATER SYSTEMS

water SMART zero waste

REVISION DATE – MAY 2017

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Contents

Prime Responsibilities

- Provide safe drinking water.
- Provide potable water for sanitation purposes.
- Provide water for fire suppression.
- Prevent unnecessary loss of stored water.
- Restore the integrity of the entire water system as soon as possible.
- Maintain integrity and quality of supply.

Emergency Response and Recovery Actions

- Analyze the type and severity of the emergency.
- Provide emergency assistance to save lives.
- Reduce the probabilities of additional injuries or damage.
- Provide situational reporting to appropriate agencies as required.
- Perform emergency repairs based on priority demand.
- Return system to normal levels. (recovery)
- Evaluate response and preparedness plan.
- Revise plan as necessary.
- Provide maps, notices, and direction necessary for water recovery.

Communication Checklist

In an emergency it will be important to contact the key people shown below. This will help reduce confusion and assist in ensuring any important messaging is done so correctly and quickly.

IF REQUIRED, CONTACT EMBC or Island Health BEFORE MAKING THE FOLLOWING CONTACTS AS PER THE EMERGENCY PLANS

RDN Priority Contacts

MANAGER OF WATER SERVICES	**CHRIS MIDGLEY (250) 729-5173**
WATER SERVICES PROJECT ENGINEER	**GERALD ST. PIERRE (250) 713-6957**
MGR. REGIONAL & COMMUNITY UTILITIES	**RANDY ALEXANDER (250) 729-5073**
COMMUNICATIONS COORDINATOR	**CHRISTINA GRAY (250) 390-4111**
EMERGENCY COORDINATOR (or alternate)	**ERICA BEAUCHAMP (250) 668-2167**

Key Communication Options

Management Support

- Contact Electoral Area Director
- Contact the local radio station and provide a brief message if public health and safety are at risk. Follow up with a press release.

Field Staff Support

- Post notices on household front doors.
- Attach warning signs to existing Watering Restriction signs in each community.
- Put up roadside signage at the entrance to the community.

Administrative Support

- Provide information message on the RDN web site & social media.
- Review after hours office and voice mail messaging.
- Provide notification to other RDN staff.

Emergency Contact Numbers

Personnel Contacts

Name	*Position*	*Phone / Cell*
Dave Welz	Chief Operator	(250) 248-4914
Heather Dorken	Utilities Technician III	(250) 248-4914
Brian Hale	Utilities Technician III	(250) 248-4914
Randy Stearman	Utilities Technician II	(250) 248-4914
Brad Lancaster	Utilities Technician II	(250) 248-4914
Lyndon Jaworski	Utilities Technician II	(250) 248-4914
Greg Roberts	Utilities Technician II	(250) 248-4914
Shane Phillips	Utilities Technician II	(250) 248-4914
Chris Midgley	Manager of Water Services	(250) 390-6560
Gerald St. Pierre	Project Engineer, Water Services	(250) 390-6560
Deb Churko	Engineering Technologist	(250) 390-6560
Jack Eubank	Bylaw Officer *(Emerg. Coord. Alternate- 24hrs)*	(250) 713-4872
Brian Brack	Bylaw Officer (*Emerg. Coord. Alternate- 24hrs)*	(250) 714-3987

Electoral Area Directors

Electoral Area	Director	Phone	E-mail Address
A	Alec McPherson	250-722-9472	alecmcpherson@shaw.ca
B	Howard Houle	250-247-8250	howard.houle@rdn.bc.ca
C	Maureen Young	250-754-5896	maureen_young@shaw.ca
E	Bob Rogers	250-468-9986	bob.rogers@rdn.bc.ca
F	Julian Fell	250-248-4296	fjfell.at.rdn@gmail.com
G	Joe Stanhope	250-248-6401	jstanhope@shaw.ca
H (Chair)	Bill Veenhof	778-424-2810	bill.veenhof@shaw.ca

Government Agency Contacts

Ministry of Environment	Nanaimo	(250) 751-3100
Department of Fisheries and Oceans	Nanaimo	(250) 754-0230
Emergency Management BC (EMBC) and Dangerous Goods Spills (formerly PEP)	Victoria	1-800-663-3456
Island Health (Environmental Health Officer)	Parksville	(250) 947-8222
• Bill Wrathall- French Creek and San Pareil Water Systems		
• Elizabeth Thomson- Surfside, Melrose, Whiskey Creek, Westurne Heights, and Horne Lake Water Systems		
Island Health (Environmental Health Officer)	Nanaimo	(250) 755-6215
• Tim Bilyk- Decourcey Water System		
• Anthony Griffin- Englishman River Community Water System and Nanoose Bay Peninsula Water System		
• Jill Lucko- Descanso Bay and Rollo McClay Water Systems		
• Murray Sexton, Public Health Engineer		(250) 755-6293
• Dr. Paul Hasselback, Medical Health Officer		(250) 739-6304
	or after hours	1-800-204-6166
City of Parksville		(250) 248-5412
• Chief Operator, Scott Churko		(250) 927-1856 (cell)
Town of Qualicum Beach		(250) 752-6921
• Foreman, Cam Purdon		(250) 927-1144 (cell)
District of Lantzville		(250) 390-4006
• Superintendent, Fred Spears		(250) 713-0980 (cell)
North Cedar Improvement District		(250) 722-3711

Government Agency Contacts Cont'd

Islands Trust Organization (Main office)	Gabriola Isl	(250) 247-2063
• Trustee Melanie Mamoser	Gabriola Isl	(250) 247-2008
• Trustee Heather O'Sullivan	Gabriola Isl	(250) 247-9574

Emergency Services

Hospital	Nanaimo	(250) 754-2141
	Parksville ph.	(250) 248-2332 (Nan hospital)
	Oceanside Ctr	(250) 951-9550
	Gabriola Clinic	(250) 247-9922
Ambulance	Nanaimo	911 or (250) 758-8181
	Parksville	911 or (250) 248-3511
Police	Nanaimo	911 or (250) 754-2345
	Parksville	911 or (250) 248-6111
	Gabriola Isl	911 or (250) 247-8333
Fire Department	Parksville	911 or (250) 248-3242
	Coombs-Hilliers	911 or (250) 752-2144
	Nanoose Bay	911 or (250) 468-7141
	Qualicum Beach	911 or (250) 752-6921
	Cedar	911 or (250) 722-3122
	Gabriola Isl	911 or (250) 247-5601

Priority Services

BC Hydro (Qualicum Beach number)	(250) 752-8012 or
BC Hydro (Power Outages & Electrical Emergencies)	1-888-769-3766
Telus	(250) 811-2323 or
• Paul McGrath cell 248-0983	(250) 741-7713 or 741-7716
FortisBC (Teresen Gas)	(250) 248-4880
Shaw Cable (Nanaimo)	(250) 754-5571
CP Rail	1-800-716-9132
French Creek Pollution Control Centre	(250) 248-5794
Chlorine Manufacturer (Brentagg)	1-800-661-1830

Community Contacts

District 69 School Board Office		(250) 248-4241
Nanoose Bay School		(250) 468-7414
Nanoose Children's Centre		(250) 468-1784
Nanoose Place		(250) 468-5339
Nanoose Post Office		(250) 468-7722
Canadian Forces Base Nanoose		(250) 756-5021 or 468-5004
	or	(250) 468-2260 (MP Stn-24hr)
Descanso Bay Reg Park Operator(1)- Calvin Nguyen		(250) 713-4571
Descanso Bay Reg Park Operator(2)- Jessica Sedlock		(778) 806-0897
Horne Lake Reg Park Operator- Bill Woodhouse		(250) 927-4790

Excavation Services

Shoreline Equipment (Doug Penny)	(250) 468-7759 or 755-9502
Rite on Time Excavation & Trucking (Cody)	(250) 927-1645
Degnen Excavators (Gabriola Isl)	(250) 247-8817

Electrical Contractors

Canem Electric	(250) 468-1887
HPS Power Ltd. (Harvey Sommerfeld)	(250) 954-7463
TC Trades (Tom Frenette)	(250) 756-0077 or 668-0078
Ron Ruckman (Descanso Bay/Gabriola Isl)	(250) 247-0050

Other Services

Plumbing Services (Maci Motor - Pump Repair)	(250) 248-4423
JC Plumbing (Descanso Bay/Gabriola Isl)	(250) 247-7574 or 713-6700
EPCOR (Parksville)	(250) 951-2460
Sand and Gravel (Ozero)	(250) 752-1482
Sand and Gravel (Lussier & Sons)	(250) 468-9994
Sand and Gravel (DBL)	(250) 248-3693
EMCON Road Maintenance (Gabriola Isl)	(250) 247-9420
EMCON (Parksville) After Hours Emerg 1-866-353-3136 or	(250) 248-6212
EMCON (Nanaimo/Cedar)	(250) 722-9494

Other Services

Pump Truck (Action Tank Service)	(250) 248-3833
Pump Truck (Coast Environmental)	(250) 390-5080
Pump Truck and Toilet Rentals (A-1 Septic)	(250) 248-4438
Portable Washrooms (Coast Toilet Rentals)	(250) 753-7552
Bulk water supply (BC Water Service)	(250) 954-3628
Running Water Enterprises (Red Williams)	(250) 947-5197
Bottled water supply (Water Pure & Simple)	(250) 752-1373
Island H2O Services	(250) 754-4721
Summer Rain Water Delivery (Gabriola Isl)	(250) 247-9136
Kalicum Drilling	(250) 245-1220
RDN- Use our own water hauling tank and truck	(250) 248-4914

Suppliers

Four Star Waterworks (piping)	(250) 954-3546
EMCO Water Works	(250) 756-3344
Corix Water Products	(250) 746-8877
Andrew Sheret (Parksville)	(250) 954-9997
Andrew Sheret (Nanaimo)	(250) 758-7383
Hwy Four Rentals (equipment & pumps)	(250) 248-1100
Irritex Pumps and Irrigation – (pumps)	(250) 248-7028
Windsor Plywood (miscellaneous building supplies)	(250) 752-3122
Albertsons Hardware (miscellaneous building supplies)	(250) 248-6888
Robinson Rentals	(250) 753-2465
United Rentals	(250) 758-3911

Media Services

Christina Gray, RDN Communications Coordinator	1-877-607-4111 or 713-1075
Radio Station (CKWV) Nanaimo and Parksville	(250) 758-1131
TV Station (CHEK)	(250) 383-2435
Newspaper (PQ News and The Weekender)	(250) 248-4341
Gabriola Sounder	(250) 247-9337

Emergency Response Plans

Contamination of Source (Turbidity Events over 1 NTU, Spills, Accidents, Vandalism)

Actions:

- Notify Environmental Health Officer Ph. 250-947-8222 (or after-hours Medical Health Officer at 1-800-204-6166)
- Shut down pump
- Notify EMBC (Emergency Management BC)
- Notify all users if necessary under direction of Health Unit
- Contact government agencies for advice and assistance
- Contact local media for public service announcements
- Post signs and deliver notices to homes and businesses. (See attached samples)
- Arrange alternate source if necessary – i.e., bottled or bulk water
- Advise RDN supervisory personnel
- Advise local fire dept not to use fire hydrants

Contacts:

- Island Health
- EMBC (Emergency Management BC), and RCMP
- Ministry of Environment
- All schools and community centers – see *"Priority Contacts"* List
- RCMP if there has been vandalism

Loss of Source (Loss Of Reservoir or Supply Lines)

Actions:

- Ensure pumps are shut off. (To protect pump)
- Notify all users
- Notify Environmental Health Officer Ph. 250-947-8222 (or after-hours Medical Health Officer at 1-800-204-6166)
- Arrange alternate source – i.e., bottled water, bulk water, storage tank
- Advise RDN supervisory personnel if necessary

Contacts:

- Island Health
- Ministry of Environment

Emergency Response Plans Cont'd

Broken Water Main

Actions:

- Shut pump off when backflow conditions have been prevented
- Call for repairs as required – i.e. excavator, backhoe
- Notify all users of interruption of service
- Notify Environmental Health Officer Ph. 250-947-8222 (or after-hours Medical Health Officer at 1-800-204-6166)
- Arrange alternate source if necessary
- Advise RDN supervisory personnel

Contacts:

- Island Health

Chlorination Failure

Actions:

- Notify Environmental Health Officer Ph. 250-947-8222 (or after-hours Medical Health Officer at 1-800-204-6166)
- Shut off well pumps. Monitor reservoir levels.
- Notify all users to boil water for two minutes or take other disinfection procedures in accordance with recommendations of local health officials
- Post signs or deliver notices if necessary. (See attached samples)
- Arrange chlorinator repairs
- Arrange for alternate disinfection if necessary
- Advise RDN supervisory personnel

Contacts:

- Island Health
- Chlorinator manufacturer

Pump Failure

Actions:

- Notify all users of interruption of service
- Call for repairs: pump manufacturer if necessary
- Notify Environmental Health Officer Ph. 250-947-8222 (or after-hours Medical Health Officer at 1-800-204-6166) (if interruption is not short term)
- Arrange alternate source if necessary – bottled or bulk water, etc.
- Advise RDN supervisory personnel if necessary

Contacts:

- Island Health

Emergency Response Plans Cont'd

Power Failure

Actions:

- Call BC Hydro. Find out when power will be restored
- Start back-up generator or arrange to get one
- Notify all users about interruption of service if backup not capable of maintaining supply
- Post signs or deliver notices if necessary. (See attached samples)
- Notify Environmental Health Officer Ph. 250-947-8222 (or after-hours Medical Health Officer at 1-800-204-6166)
- Arrange alternate source if necessary – bottled or bulk water, etc.
- Advise RDN supervisory personnel

Contacts:

- Island Health

Backflow or Back Siphonage

Actions:

- Notify Environmental Health Officer Ph. 250-947-8222 (or after-hours Medical Health Officer at 1-800-204-6166)
- Notify all users to boil water for two minutes or take other disinfection procedures in accordance with recommendations of local health officials. (See attached samples)
- Purge and disinfect lines as directed, after corrections have been made
- Post signs or deliver notices if necessary. (See attached samples)
- Advise RDN supervisory personnel

Contacts:

- Island Health

Bacteria Count (RDN Lab)

Actions:

- Notify Medical Health Officer Ph. 250-739-6304 (or after-hours 1-800-204-6166)
- Follow procedures in accordance with recommendations of local health officials
- Post signs or deliver notices if necessary. (See attached samples)
- Check if UV unit is working at Descanso Bay Reg Park, clean the UV bulb
- Arrange for alternate disinfection at Descanso Bay Reg Park if the UV unit is not working
- Advise RDN supervisory personnel

Contacts:

- Island Health

Emergency Response Plans Cont'd

Flood Conditions:

Actions:

- Notify Environmental Health Officer Ph. 250-947-8222 (or after-hours Medical Health Officer at 1-800-204-6166)
- Notify all users regarding the potential for water contamination, loss of pump, power, etc, Users should be advised to store some drinking water in advance, and to boil any suspect water for two minutes or disinfect with chlorine when flood conditions exist
- Phone government contacts
- Contact local media for public service announcement when customers can not be reached by phone
- Post signs or deliver notices if necessary. (See attached samples)
- Arrange alternate source if possible – i.e. bottled water, bulk hauler or storage tank
- Advise RDN supervisory personnel

Contacts:

- Island Health
- EMBC (Emergency Management BC)
- Ministry of Environment

Drought Management Plan:

Actions:

- Monitor local well levels, streamflow, provincial drought rating, and provincial wildfire danger class rating
- Review historical water usage patterns to predict potential shortages
- Notify users early in the Spring/Summer about conservation strategies
- Manage water supply and maintain storage for fire flows
- Implement Stage 3 or Stage 4 watering restrictions, as required
- Reduce flows from all wells and from the Craig Bay Pump Station, if required
- Adjust chlorine dosing levels accordingly
- Notify Environmental Health Officer Ph. 250-947-8222 (or after-hours Medical Health Officer at 1-800-204-6166)
- Notify users in each affected water service area via roadside signage, hand-delivered notices, website alerts, e-messages, newspaper ads, radio/tv ads, and other means necessary

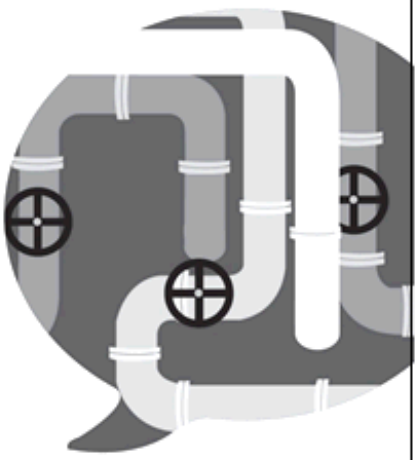
Contacts:

- Island Health
- EMBC (Emergency Management BC)

APPENDICES

REGIONAL DISTRICT OF NANAIMO
WATER SERVICES

SAMPLE



BOIL WATER NOTICE

_____ Water Service Area

Effective Date: _____

Please note that all water used for domestic purposes (drinking, cooking, etc.) should be boiled before consumption. The boiling should be at a rolling boil and for a minimum of two (2) minutes.

RDN Water Services staff are continually monitoring the water supply system and will provide updates as they become available.

Watch for information updates at www.rdn.bc.ca (Water Services) and listen to your local radio station for more information.

This order will be in effect until further notice.

WATER SERVICES DEPT. CONTACT INFO:
Administration ph. (250) 954-3792 or
Field Office ph. (250) 248-4914 or
E-mail: rcu@rdn.bc.ca

water SMART zero waste

BOIL WATER NOTICE INFORMATION FOR THE GENERAL PUBLIC
DURING A BOIL WATER NOTICE CAUSED BY:
INADEQUATE DISINFECTION

This information is provided as a guide to help individuals reduce the risk of becoming ill from ingesting non-potable water. Individuals who follow these guidelines will greatly reduce their chance of becoming ill.

What is a Boil Water Notice?

A Boil Water Notice is a public announcement advising water system users that they should boil their tap water for drinking and other domestic purposes. It is a notice intended to protect the Publics' health from waterborne infectious agents that could be present or are known to be present in the community's drinking water supply.

What is the difference between a Boil Water Notice and a Boil Water Order?

A Boil Water Notice is a notice issued to the public as a health warning. In most cases it is the water supplier who notifies the public.

A Boil Water Order is legal document issued to the water supplier by the Health Authority requiring the water supplier to notify the public of a boil water notice.

What are the health risks during a Boil Water Notice?

The health risks are associated with ingesting water that contains microbiological agents that can cause disease. These pathogenic (disease causing) agents could include *Giardia, Cryptosporidia, E. coli, Campylobacter, Salmonella* and *Hepatitis A*. Boiling tap water for one minute is sufficient to destroy pathogens that could be present in the water.

There are numerous factors that influence whether a person becomes ill. First, there must be pathogens present in the water you consume. Not every glass of water is likely to contain pathogens. Even if the water you consume contains pathogens, those pathogens that are present must be viable. That is, they must be in a state where they can cause an illness and they must be present in large enough numbers to cause an illness. The number of pathogens needed to cause illness depends on the type of pathogen present, a person's size, age, and immune status.

The incubation period (time for symptoms to develop) will vary depending on the type of pathogen. For example, Giardia (beaver fever) could take up to four weeks to develop symptoms whereas E. coli could take up to ten days and as little as two days. For more information on waterborne diseases go to the following BC Health File;

http://www.bchealthguide.org/healthfiles/hfile49a.stm

Any persons believing that they are ill should see their doctor. Patients are sometimes requested to submit samples for laboratory analysis to assist in waterborne outbreak investigations.

It is important to note that Boil Water Notices are specific to microbiological threats. They are not appropriate to address threats from chemical contamination. Boiling chemically contaminated water will only result in the chemical becoming more concentrated or release the chemical into the air where it could be inhaled.

When there is a threat to a water supply from a chemical contaminated a more appropriate public health notice of "Do Not Drink the Water" would be issued.

What am I trying to kill when I'm boiling the water?

Boiling water is recommended to kill pathogenic microbes that may be present in contaminated water. Bacteria such as E. coli and Salmonella are killed rapidly at temperatures over 60°C and a temperature of 72.4°C for 1 minute is needed to inactivate cryptosporidium. *Hepatitis A* and *Norovirus* are rapidly inactivated at temperatures above 65°C.

Based on the above information there is no need to boil water for prolonged periods of time. Although heating water to boiling is not needed it is the only end point easily recognized by the public without the use of thermometers. It is therefore recommended that the public bring the water to a rolling boil for one minute to ensure that all pathogens have been inactivated.

One minute should be added to the above boiling times if the water is cloudy or highly colored to ensure proper mixing and that all pathogens have been exposed to the high temperature. When boiling water at altitudes above 2000m (6,500 ft), water should be boiled for 2 minutes.

How can the water become contaminated?

The water can become contaminated in a variety of ways.
Some of these include:

- Heavy rainfall can wash contaminants into the water source
- Accidental spills in the water supply
- Breakdown of the disinfection process
- Break in water supply mains
- Vandalism
- Connections within the water system between potable and non-potable piping.

Is it necessary to boil all the water in the home during a boil water notice?

No, it is not necessary to boil all your water. Water used for bathing, showering, laundry, toilet flushing and mopping of floors does not need to be boiled. During bathing, young children should be cautioned against swallowing the bath water or alternatively young children could be sponge bathed.

All other water should be boiled. Simply put, any water that has a chance of being ingested should be boiled. This would include water used for drinking, beverage concentrates, ice cubes, washing fruits and vegetables, or brushing teeth.

Severely immune-compromised individuals should always boil their tap water for the purposes above. See the link to BC Health Files number 56, December 2003.

http://www.bchealthguide.org/healthfiles/hfile56.stm.

Infant formulas should always be prepared by using boiled tap water or bottled water that is boiled. See the link to BC Health Files number 69b, May 2006.

http://www.bchealthguide.org/healthfiles/hfile69b.stm.

Drinking water for pets including dogs, cats, birds and reptiles should also be boiled.

How should tap water be boiled properly?

Tap water should be boiled for at least one minute. Use any clean pot or kettle. Kettles that have automatic shut offs are acceptable.

How should tap water be boiled properly? *(continued)*

Health Canada suggests that microwave ovens can also be used using microwave-safe containers but cautions against forming superheated water (water heated above its boiling point without the formation of steam). When using microwaves, Health Canada suggests inserting a glass rod, wooden or plastic spoon in the container to prevent forming superheated water.

After boiling, let the water cool by leaving it on the counter or in the refrigerator in covered containers. Once the water is boiled, it can be stored in food grade containers at room temperature or in the refrigerator.

Shaking the water in the container or pouring the water between two containers and/or adding a pinch of salt can bring back flavor after boiling.

Are there alternatives to boiling water?

Yes, there are. Although there are alternatives, not all of them will be feasible or practical in all situations. In part, it will depend on how much water you need and what you need it for. Safe alternatives to boiling water include:

- Using commercially prepared bottled water
- Obtaining water from an approved source that is not on a boil water notice, or
- Using bleach to disinfect small quantities of tap water. See the following chart or website for a guide to using bleach.

http://www.bchealthguide.org/healthfiles/hfile49b.stm

Disinfection using unscented household bleach (5% chlorine) works best with warm water. Add bleach to the water, shake or stir for thorough mixing and then let it stand for at least 30 minutes before drinking.

Gallons of water to disinfect (equivalent shown in brackets)	Amount of Household bleach (5%) to add*
1 gal. (4.5 litres)	2 drops (0.18 mL)
2 ½ gal. (10 litres)	5 drops (0.4 mL)
5 gal. (23 litres)	11 drops (0.9 mL)
10 gal. (45 litres)	22 drops (1.8 mL)
22 gal. (100 litres)	¾ teaspoon (4 mL)
45 gal. (205 litres)	1 ½ teaspoons (8 mL)
50 gal. (230 litres)	1 ¾ teaspoons (9 mL)
100 gal. (450 litres)	3 ½ teaspoons (18 mL)
220 gal. (1000 litres)	8 teaspoons (40 mL)
500 gal. (2200 litres)	6 tablespoons (90 mL)
1000 gal. (4550 litres)	6 ½ ounces or 12 tablespoons (180 mL)

A slight chlorine odour should still be noticeable at the end of the 30-minute waiting period if you have added enough bleach. If not, repeat the dosage and allow the water to stand an additional 15 minutes. If the water has too strong a chlorine taste, allow the water to stand exposed to the air for a few hours or pour it from one clean container to another several times.

The disinfection action of bleach depends as much on the waiting time after mixing as to the amount used. The longer the water is left to stand after adding bleach, the more effective the disinfection process will be.

NOTE: Bleach does not work well in killing off *Cryptosporidium* parasites.

The amount of bleach needed to kill *Cryptosporidium* makes the water almost impossible to drink. If *Cryptosporidium* is in the water, boiling is the best way to ensure that the water is safe to drink.

I have my own water treatment device do I still need to boil my water?

If the device is designed to improve taste or reduce odour such as an activated carbon filter the answer is **YES** you should still boil your water.

If the device is designed to improve the chemical quality of the water such as reducing the iron content then the answer is **YES** you should still boil your water.

If the device is designed to improve water that is already potable the answer again is **YES** you should still boil your water.

There are numerous filters on the market designed to remove microorganisms and particulates. Most of these filters are not capable of removing viruses. Therefore, you should boil your water if you have a unit that cannot remove viruses.

If the device is designed to disinfect (destroy pathogens) water such as in an ultraviolet light (UV) disinfection unit you **might not** need to boil your water. There are numerous ultraviolet units; some are designed to disinfect raw water and some are designed to disinfect water that has already been disinfected at a central facility. For example, if the unit is classified by the National Sanitation Foundation (NSF) as meeting NSF Standard 55 Class A, it is designed to disinfect raw water. However, if the water within the distribution system is too turbid or cloudy, even a UV unit meeting NSF Standard 55 Class A may not work properly and you should still boil your water.

Reverse osmosis (RO) units are designed to filter water at the molecular level and should provide water that is free of pathogens. Thus, you **do not** have to boil your water if you have a reverse osmosis water treatment device.

There are many types of units on the market each designed to address specific water quality issues. It is recommended that you check with the unit's manufacturer to know exactly what your unit can do.

Can I purchase water from vending machines?

It depends on how the water is treated. Local vending machines that use local water would only be acceptable if the vending machine can kill pathogens that might be present in the water. Check with the store or manufacturer to see if the unit is capable of providing water that is safe to drink.

Warning signs should be posted on vending units that are not capable of providing safe water. Alternatively, the machine should be turned off.

Are there any people or groups of people at higher risk?

Yes. These people include any individual whose immune system is not fully developed or whose immune system is under stress such as infants, the elderly, immune compromised individuals and individuals already suffering from an illness. For more information go to the following BC Ministry of Health websites:

BC Health File: weakened immune systems
http://www.bchealthguide.org/healthfiles/hfile56.stm.

BC Health File: preparing infant formula
http://www.bchealthguide.org/healthfiles/hfile69b.stm.

Boil water or provide an alternative safe supply of water that is used for:

- Drinking purposes- This includes all beverage concentrates such as fruit juice and iced tea
- Food preparation- This includes washing of fruits and vegetables
- Food contact surfaces

Boil water or provide an alternative safe supply of water that is used for: *(continued)*

Food contact surfaces are all those surfaces that food comes into contact with during the food preparation process. These surfaces include counter tops, cutting boards and chopping blocks. Food contact surfaces should be washed with clean water and then sanitized using an acceptable sanitizing agent. Sanitizing agents for food contact surfaces include bleach (12-15 mL of 5% bleach per litre of water), iodophors, quaternary ammonia compounds or hydrogen peroxide (3% solution).

- Oral hygiene (brushing teeth)
- Infant formula; see BC Health File; preparing infant formula at http://www.bchealthguide.org/healthfiles/hfile69b.stm.
- Ice making

It is important to note that freezing does not destroy most pathogens. Bacteria and viruses can survive in frozen products for long periods of time. Discard any ice made from contaminated or potentially contaminated water.

Hand washing

Using warm water and soap should be sufficient. Applying a hand sanitizer after washing with tap water would add an extra barrier of protection.

Dishwashing by hand

Dishes washed by hand should be sanitized for two minutes in a separate sink using a bleach solution (2 mL of bleach per litre of water) after the dishes have been washed and rinsed. The dishes should then be left to **air dry** prior to being used. Attempting to wash and sanitize dishes in the same sink at the same time is not recommended because soap, grease and food particles interfere with the sanitizing process.

Mechanical dishwashers

Most residential home-style dishwashers do not provide a high enough temperature to kill all pathogens. Dishwashing units that reach 82 degrees Celsius (180 Fahrenheit) for twelve seconds (or an equivalent time-temperature relationship) during the final rinse cycle will destroy pathogens.

To optimize the disinfection process while using a residential dishwasher you should consider:

1. Using the highest temperature setting possible.
2. Running dishes through the dishwasher twice.
3. Sanitizing dishes afterwards in a sink containing a weak bleach solution(see dishes washed by hand above).
4. Letting the dishes air dry prior to use

Fruit and vegetable washing

Thoroughly wash all produce with potable water especially those that are going to be eaten raw. This is a common sense practice that should be applied even when there is no public boil water notice.

Coffee Machines

Coffee machines usually produce water around 70 to 80 degrees Celsius, which is sufficient to destroy pathogens. However, a sufficient amount of time is needed to ensure that all harmful organisms are destroyed. Therefore, let the coffee stand for at least five minutes before drinking.

Home canning

To be safe, postpone home canning until the boil water notice has been rescinded.

Beer and wine making

To be safe, postpone beer and wine making until the boil water notice has been rescinded.

When will the Boil Water Notice be rescinded?

Only when the water supplier can provide potable water will the Health Authority rescind the Boil Water Notice. Once or more of the following usually achieves confirmation that the water is once again safe to drink.

These include:

- Identifying and fixing the source or sources of the problem,
- Implementing procedures to eliminate or reduce the chance for reoccurrence
- Performing water quality tests
- Flushing and disinfecting distribution lines and water storage facilities

Precautions to consider when the Boil Water Notice is lifted

- Flush all water-using fixtures for 1 minute
- Run cold-water faucets and drinking fountains for 1 minute before using water
- Drain and flush all ice-making machines in your refrigerator
- Run water softeners through a regeneration cycle
- Drain and refill hot water heaters set below 45 deg C (normal setting is 60 deg C)
- Change any pre-treatment filters (under sink style and refrigerator water filters, carbon block, activated carbon, sediment filters, etc.)

Can I speak to a person in Public Health if I have a question about the Boil Water Notice?

Yes you can. For further information contact Island Health Officers at the following locations:

- Victoria ph. 250-519-3401
- Nanaimo ph. 250-755-6215
- Parksville ph. 250-947-8222
- Courtenay ph. 250-331-8518
- Island Health Office 6475 Metral Drive, Nanaimo, BC
- Island Health Office 489 Alberni Hwy, Parksville BC

After hours Medical Health Officer on call is 1-800-204-6166.

Additional information can be found at the following BC, Canadian and US websites. These are:

BC Health File; how to disinfect drinking water
http://www.bchealthguide.org/healthfiles/hfile49b.stm

BC Health File; weekend immune systems and water-borne infections
http://www.bchealthguide.org/healthfiles/hfile56.stm

BC Health File; waterborne disease in BC
http://www.bchealthguide.org/healthfiles/hfile49a.stm

BC Health File; cryptosporidiois
http://www.bchealthguide.org/healthfiles/hfile48.stm

BC Health File; giardiasis
http://www.bchealthguide.org/healthfiles/hfile10.stm

BC Health File; safely preparing and storing baby formula
http://www.bchealthguide.org/healthfiles/hfile69b.stm

US EPA how to boil water and use bleach
http://www.epa.gov/ogwdw000/faq/emerg.html

US Centre for Disease Control; preventing cryptosporidiosis infection
http://www.cdc.gov/ncidod/dpd/parasites/cryptosporidiosis/default.htm

US Centre for Disease Control; Giardia fact sheet
http://www.cdc.gov/ncidod/dpd/parasites/giardiasis/factsht_giardiasis.htm#prevention

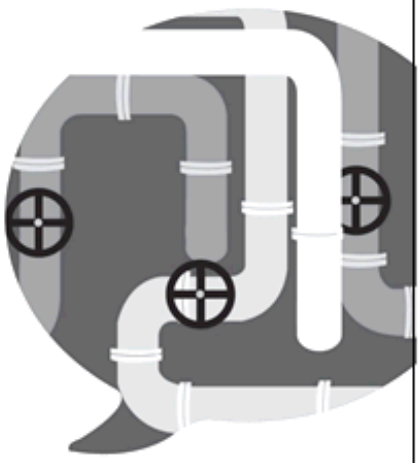
US Centre for Disease Control; Preventing Cryptosporidium; a guide to water filters & bottled water
http://www.cdc.gov/ncidod/dpd/parasites/cryptosporidiosis/factsht_crypto_prevent_water.htm

Information sources for developing this package includes

- BC Ministry of Health
- Health Canada
- Alberta Environmental Health
- Washington State Department of Health
- BC Centre for Disease Control
- US EPA (Environmental Protection Agency)
- US Center for Disease Control
- NSF (National Sanitation Foundation)
- DWO (Drinking Water Officer's) Guide

REGIONAL DISTRICT OF NANAIMO
WATER SERVICES

SAMPLE



NOTICE

BOIL WATER ORDER

_____ Water Service Area

Effective Date: _____

Please note that all water used for domestic purposes (drinking, cooking, etc.) should be boiled before consumption. The boiling should be at a rolling boil and for a minimum of two (2) minutes.

RDN Water Services staff are continually monitoring the water supply system and will provide updates as they become available.

Watch for information updates at www.rdn.bc.ca (Water Services) and listen to your local radio station for more information.

This order will be in effect until further notice.

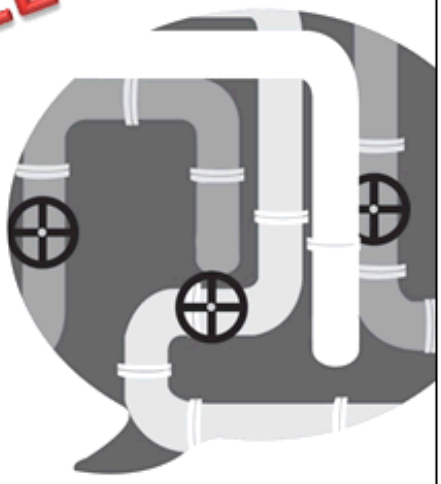
For further information, please contact us at the numbers below.

WATER SERVICES DEPT. CONTACT INFO:
Administration ph. (250) 954-3792 or
Field Office ph. (250) 248-4914 or
E-mail: rcu@rdn.bc.ca

water SMART zero waste

REGIONAL DISTRICT OF NANAIMO

SAMPLE



WARNING

This water is considered **UNFIT** for drinking or domestic use

EFFECTIVE _____

For further information, please contact us at the numbers below.

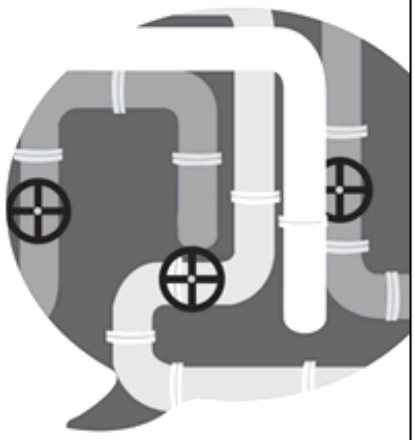
WATER SERVICES DEPT. CONTACT INFO:
Administration ph. (250) 954-3792 or
Field Office ph. (250) 248-4914 or
E-mail: rcu@rdn.bc.ca

Printed: June 10, 2016

water SMART zero waste

REGIONAL DISTRICT OF NANAIMO

SAMPLE



NOTICE

WATER SUPPLY SERVICE INTERRUPTION

_____ Service Area

Date: _____

Location: _____

Hours: _____

The Regional District of Nanaimo wishes to notify you that while improvements to the water system are in progress, water service will be interrupted.
The above time period is not definite, as the RDN will endeavor to keep you in service for as long as possible and have the water back in service as quickly as possible after the initial shutdown occurs.

When service is resumed, the water may be discoloured. This is due to disturbed deposits in the pipes and is not harmful. The RDN is not responsible for any damage resulting from interrupted service.

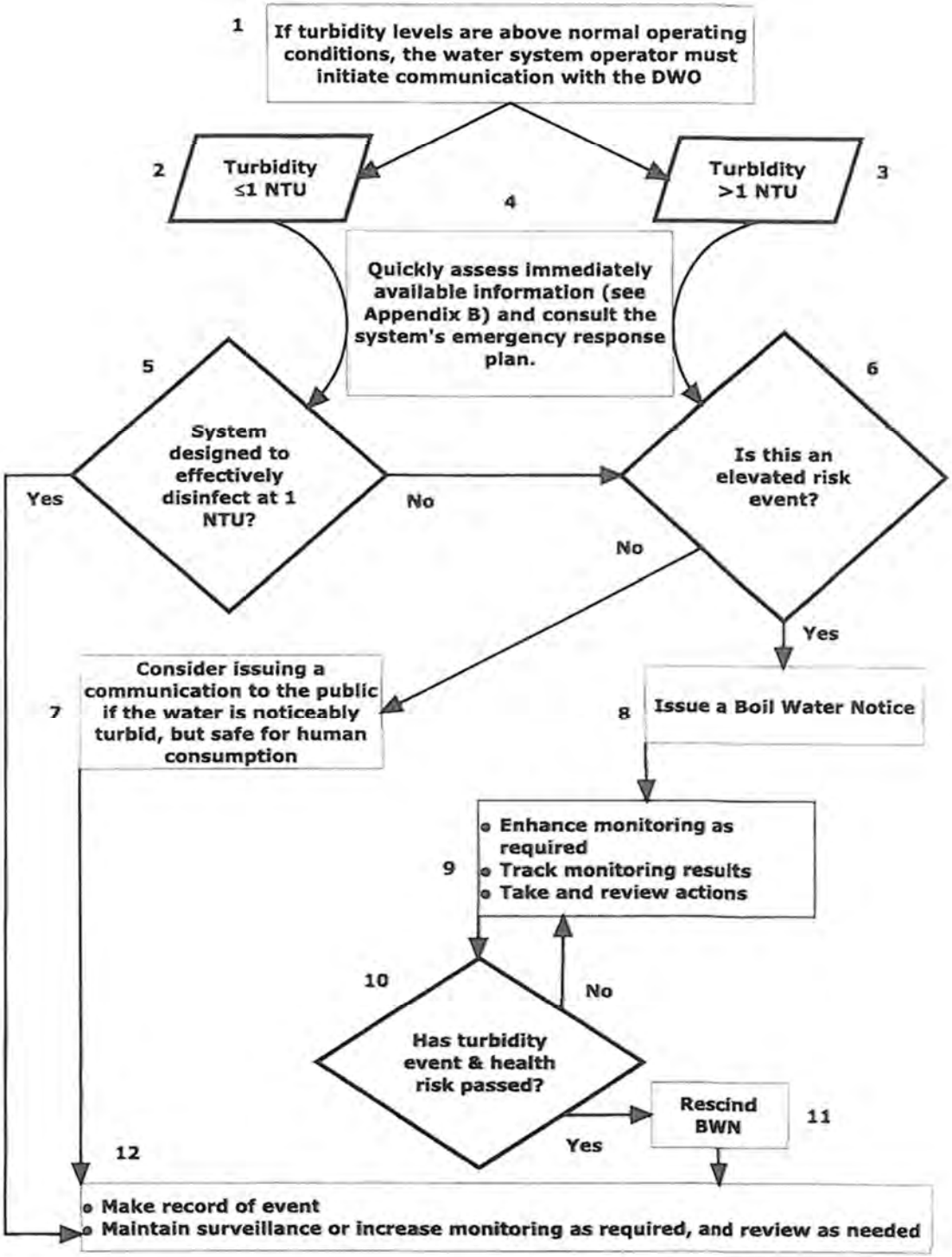
If you have any questions or require further information, please contact us at the numbers provided below.

WATER SERVICES DEPT. CONTACT INFO:
Administration ph. (250) 954-3792 or
Field Office ph. (250) 248-4914 or
E-mail: rcu@rdn.bc.ca

Printed: June 10, 2016

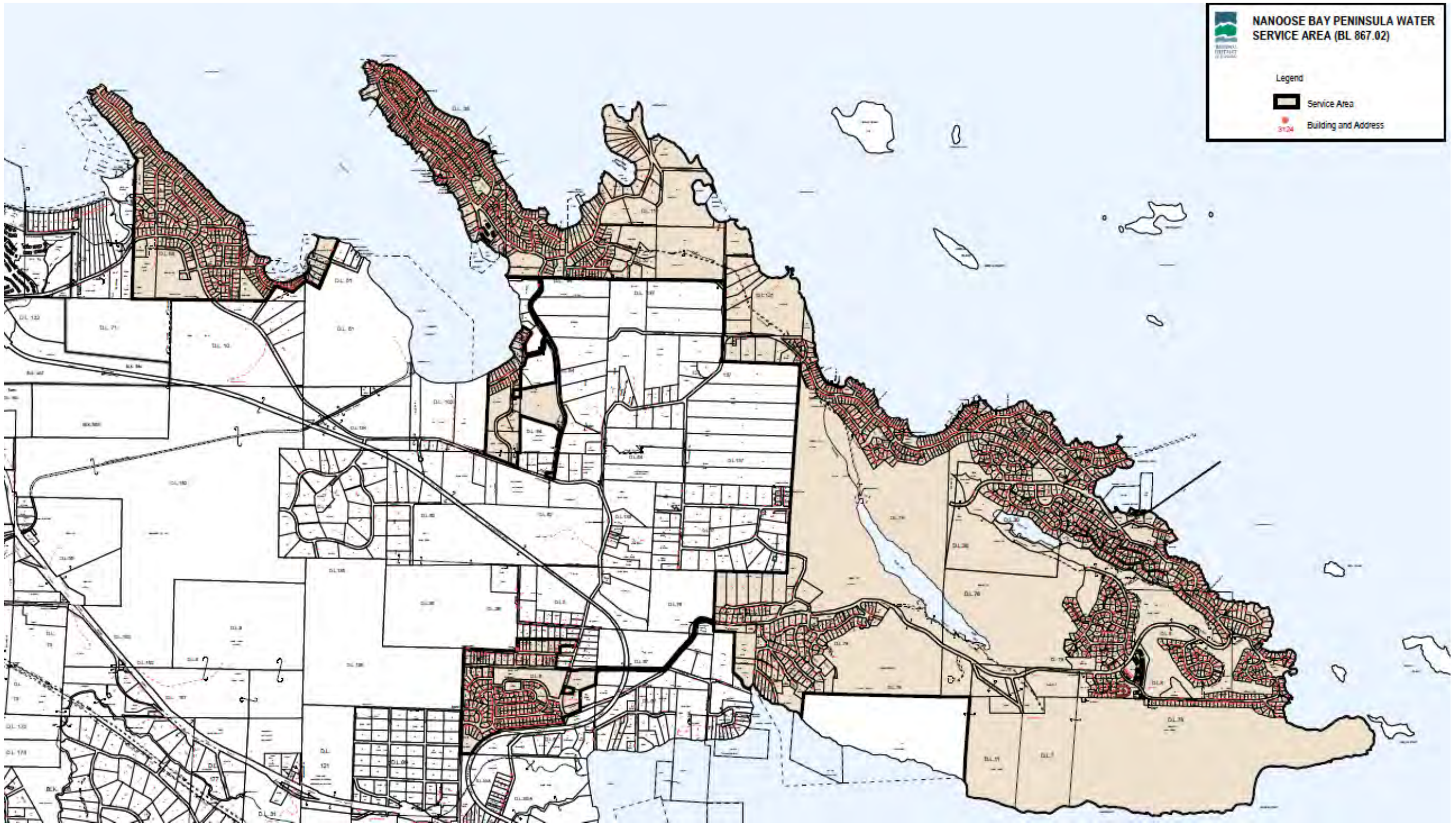
water SMART zero waste

Decision Tree for Responding to a Turbidity Event in Unfiltered Drinking Water



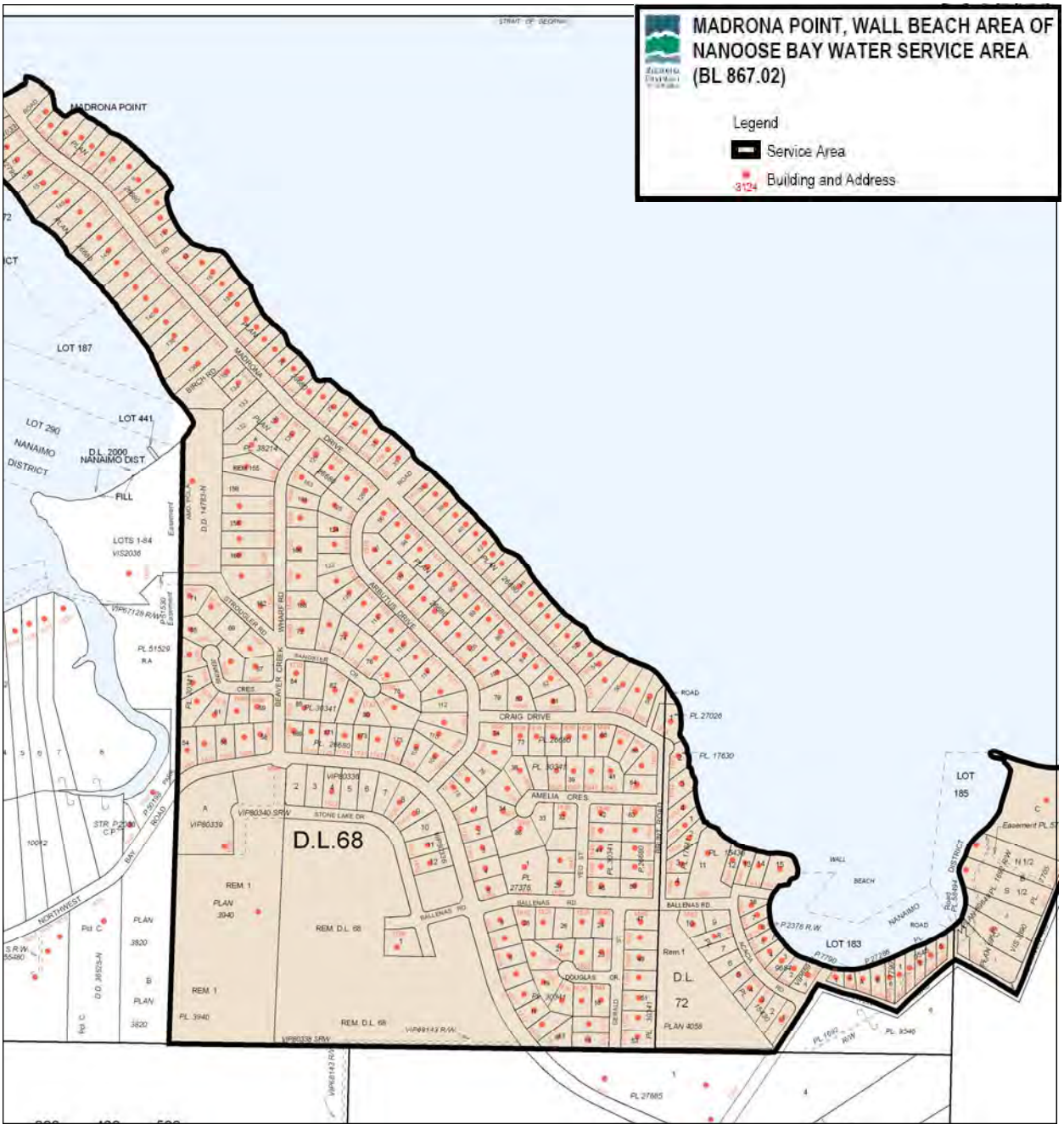
MAPS

Water Service Areas



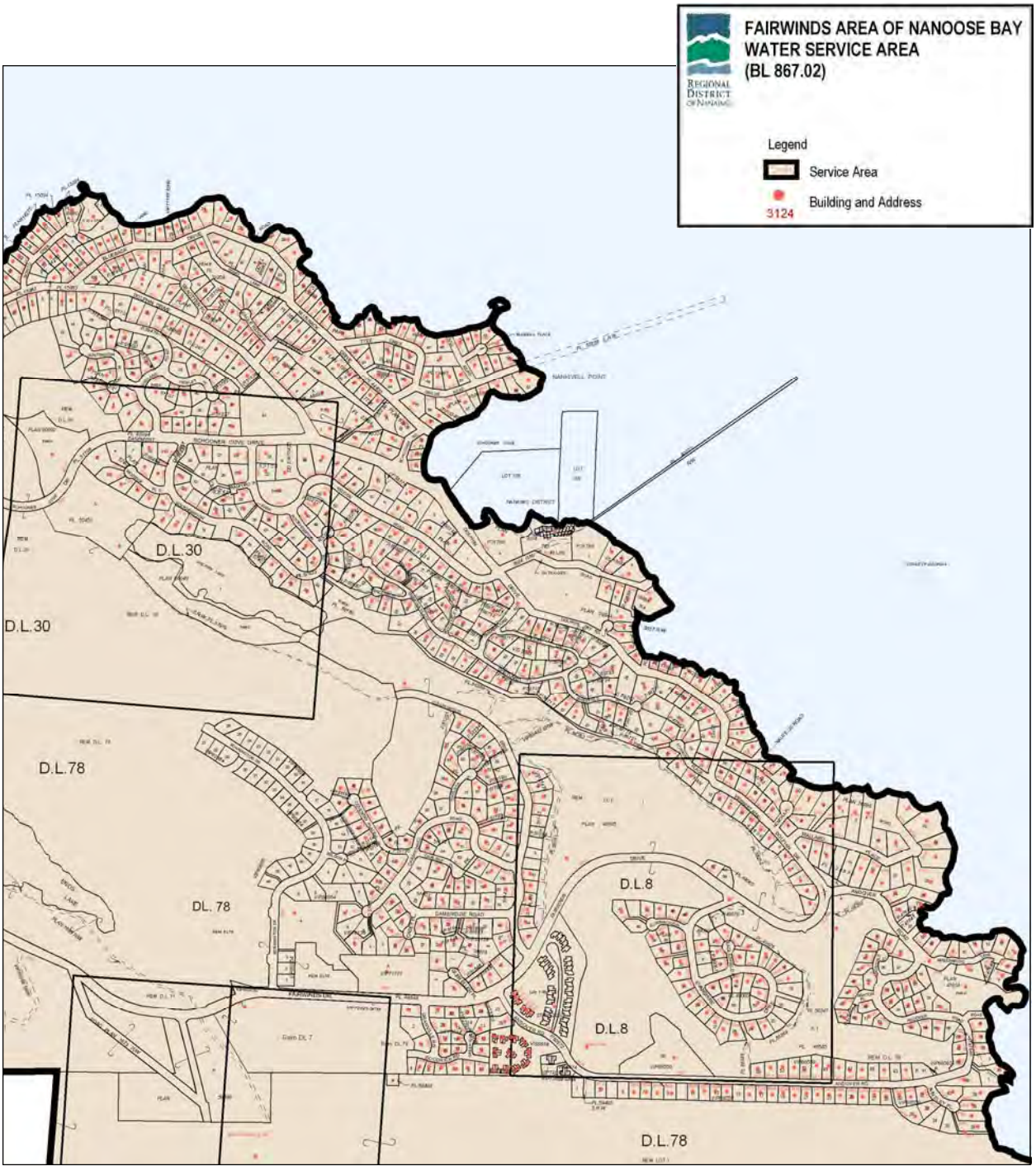
MAP 1 NANOOSE BAY PENINSULA

MAP 2 MADRONA / WALL BEACH



REGIONAL DISTRICT OF NANAIMO

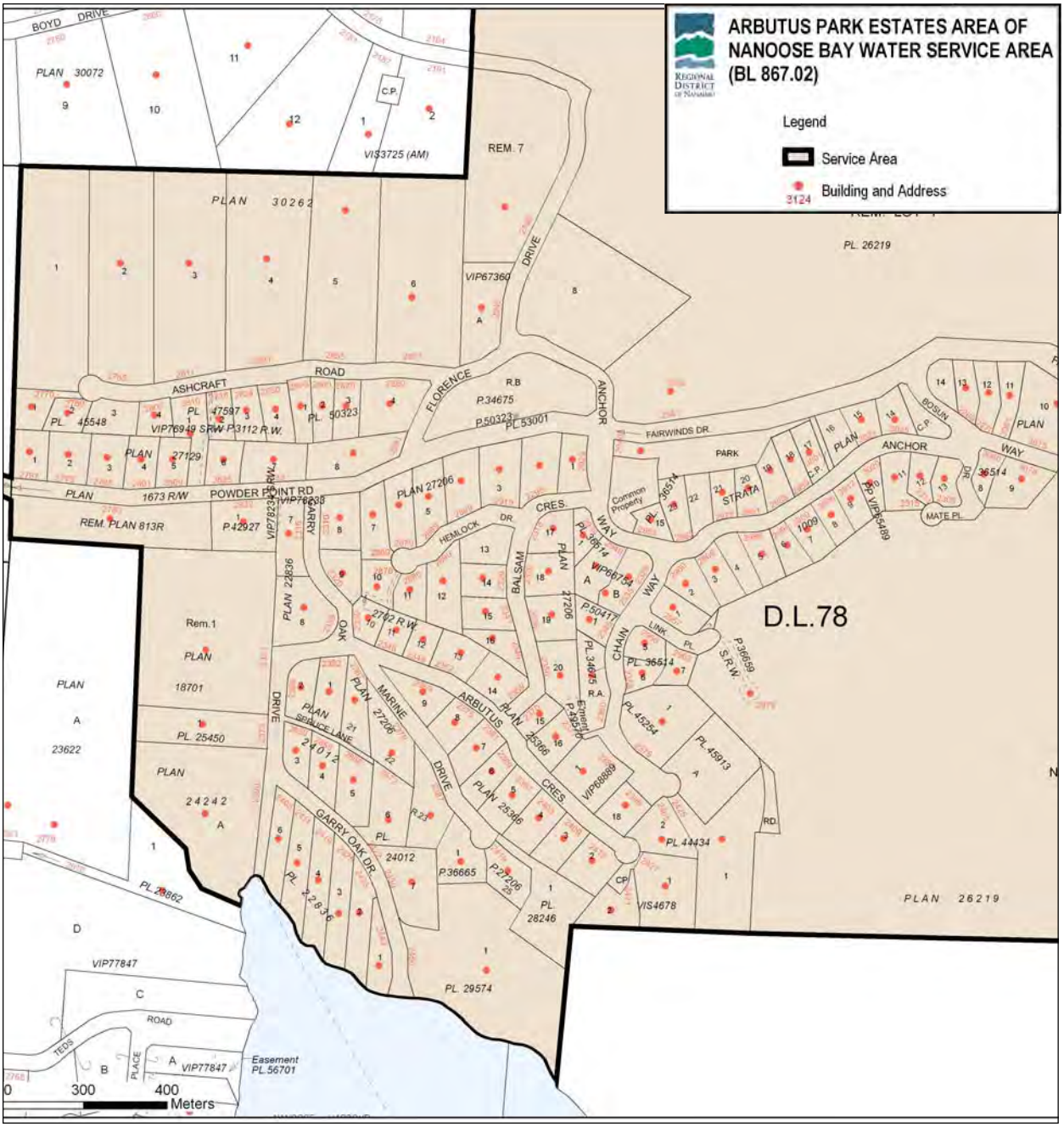
EMERGENCY RESPONSE PLAN
WATER SYSTEMS



MAP 3 FAIRWINDS

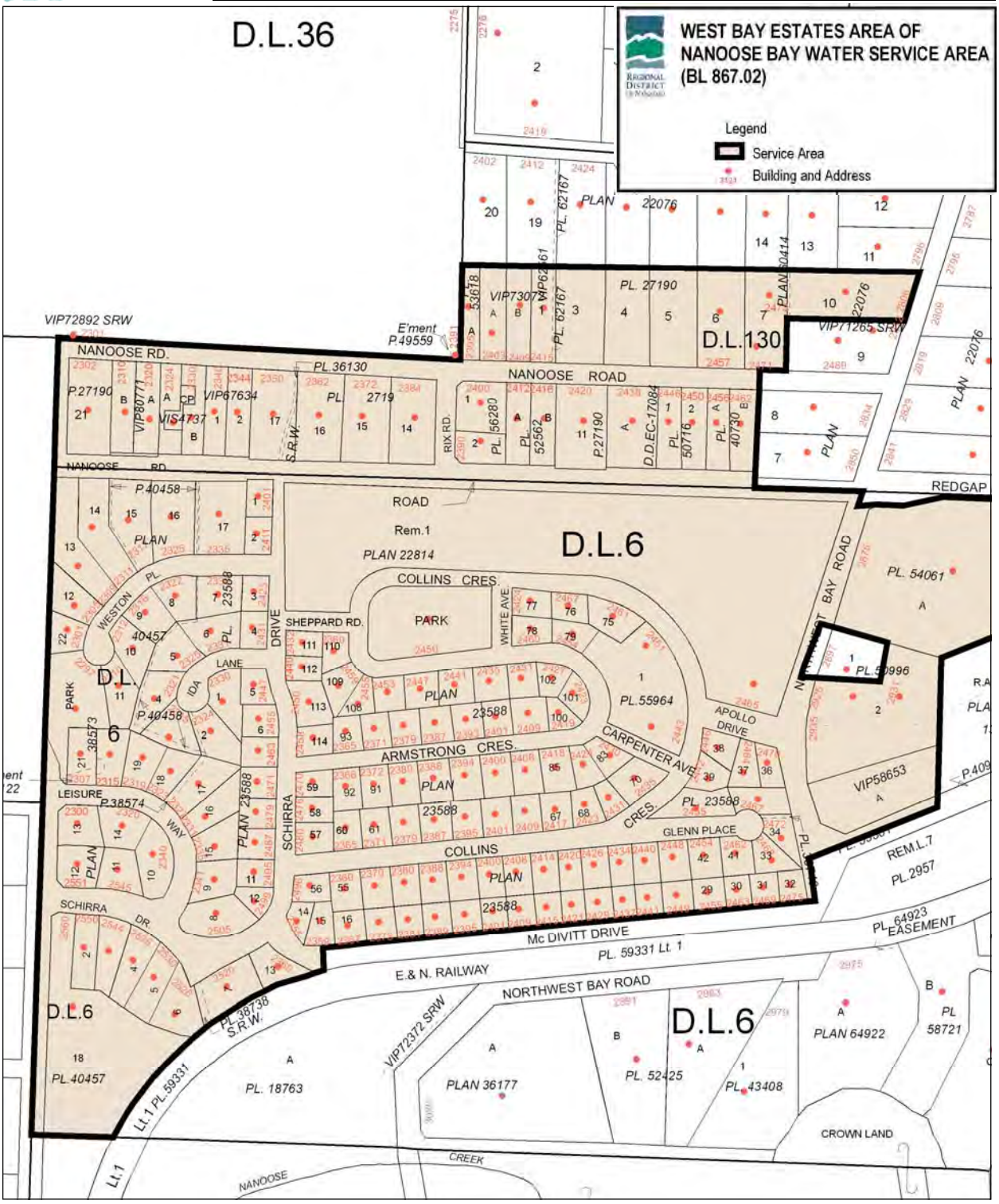
waterSMART zero waste

MAP 4 ARBUTUS PARK



REGIONAL DISTRICT OF NANAIMO

EMERGENCY RESPONSE PLAN
WATER SYSTEMS

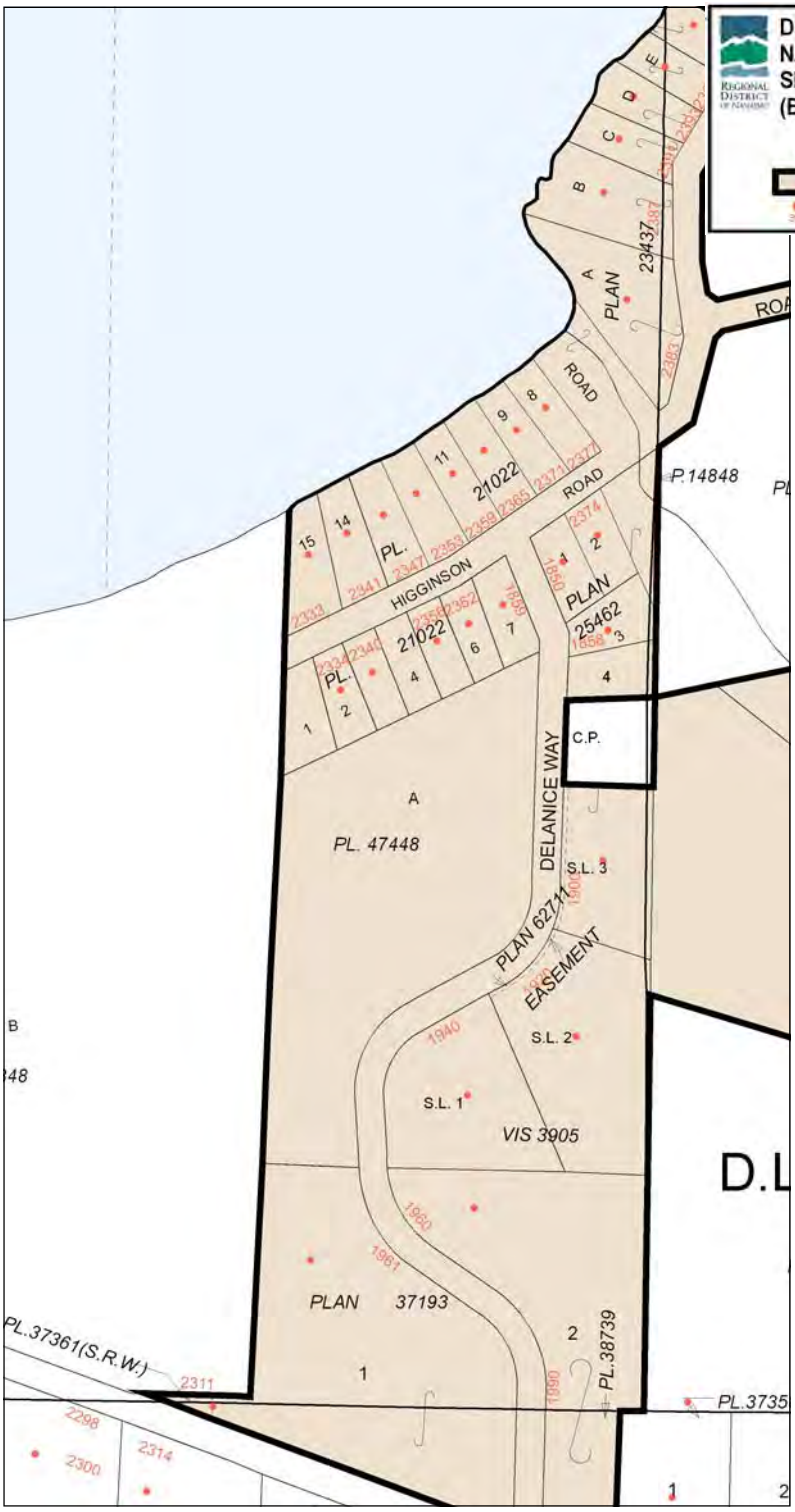


MAP 5 WEST BAY

water SMART zero waste

REGIONAL DISTRICT OF NANAIMO

EMERGENCY RESPONSE PLAN
WATER SYSTEMS

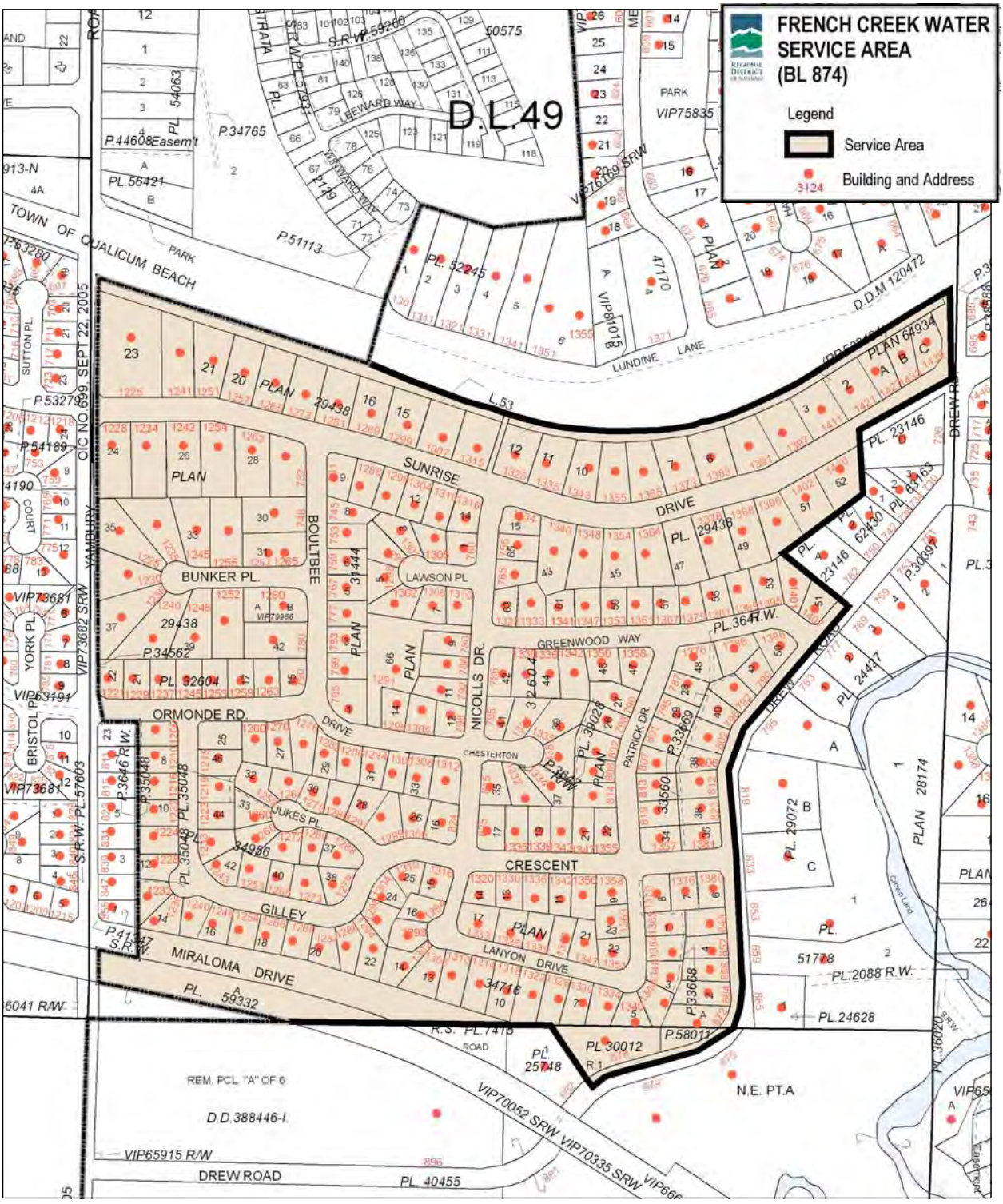


MAP 6 DRIFTWOOD

waterSMART zero waste

REGIONAL DISTRICT OF NANAIMO

EMERGENCY RESPONSE PLAN
WATER SYSTEMS



MAP 7 FRENCH CREEK

waterSMART zero waste

REGIONAL DISTRICT OF NANAIMO

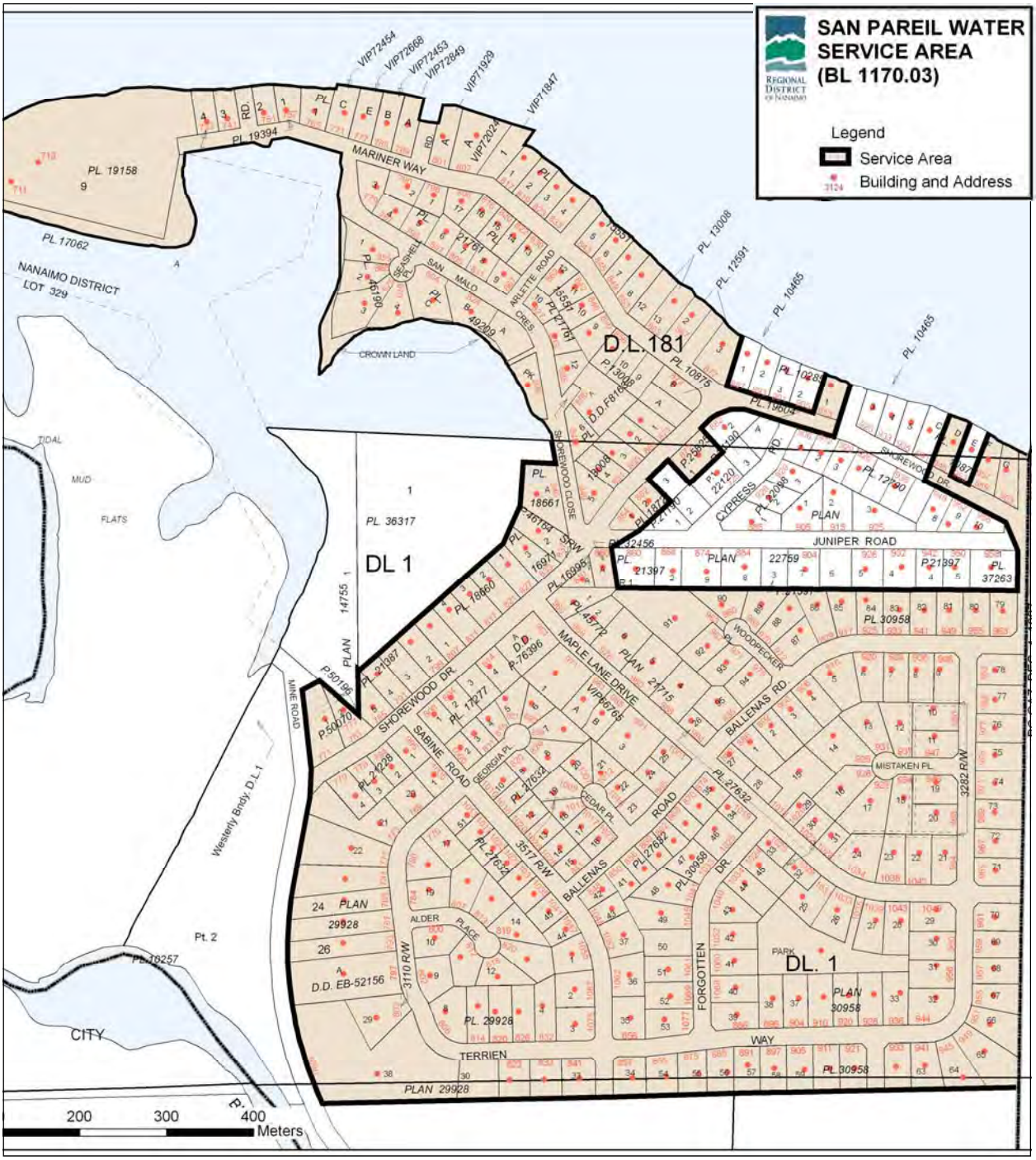
EMERGENCY RESPONSE PLAN
WATER SYSTEMS

MAP 8 SURFSIDE

waterSMART zero waste

REGIONAL DISTRICT OF NANAIMO

EMERGENCY RESPONSE PLAN
WATER SYSTEMS



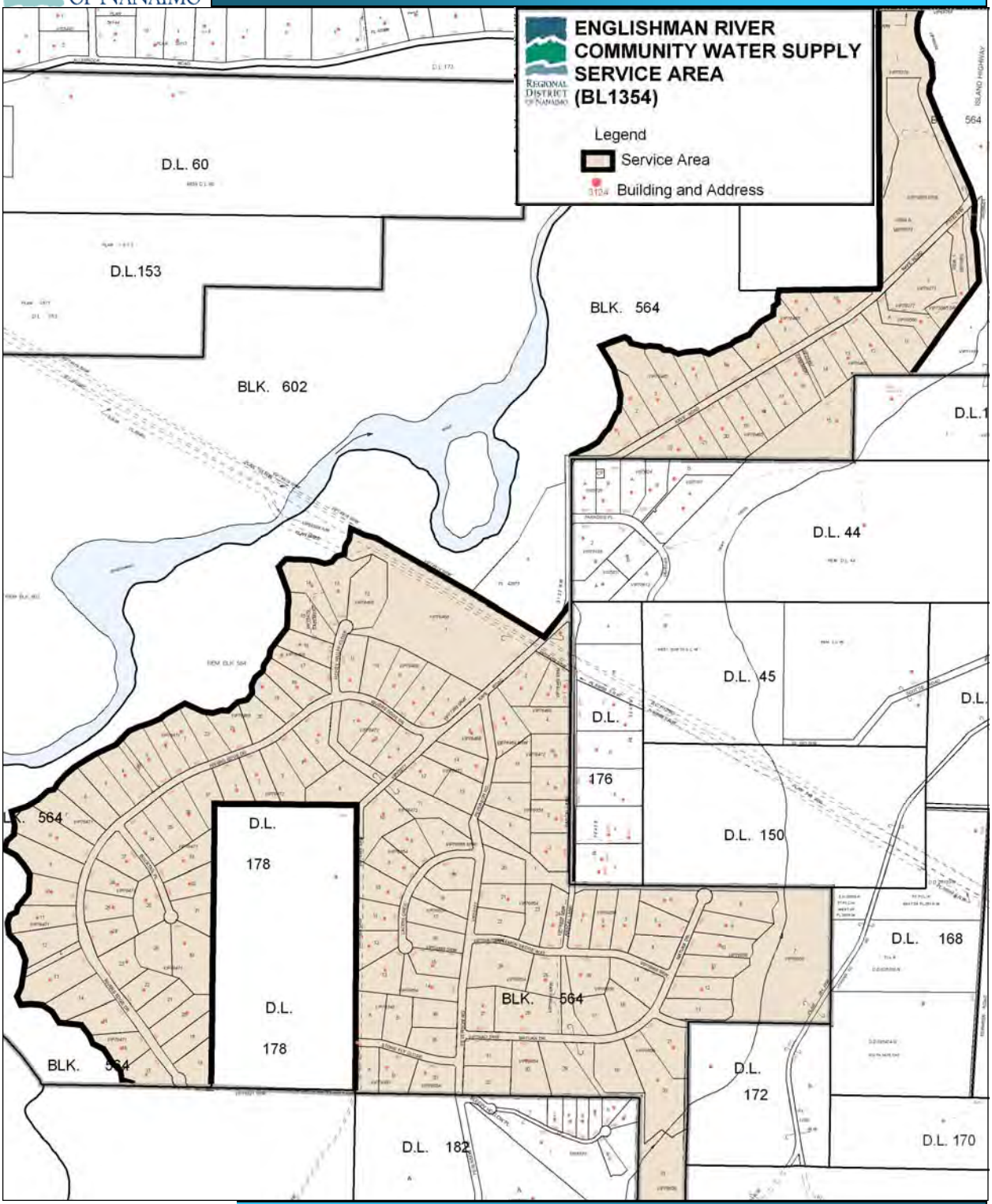
MAP 9 SAN PAREIL

waterSMART zero waste

REGIONAL DISTRICT OF NANAIMO

EMERGENCY RESPONSE PLAN

WATER SYSTEMS

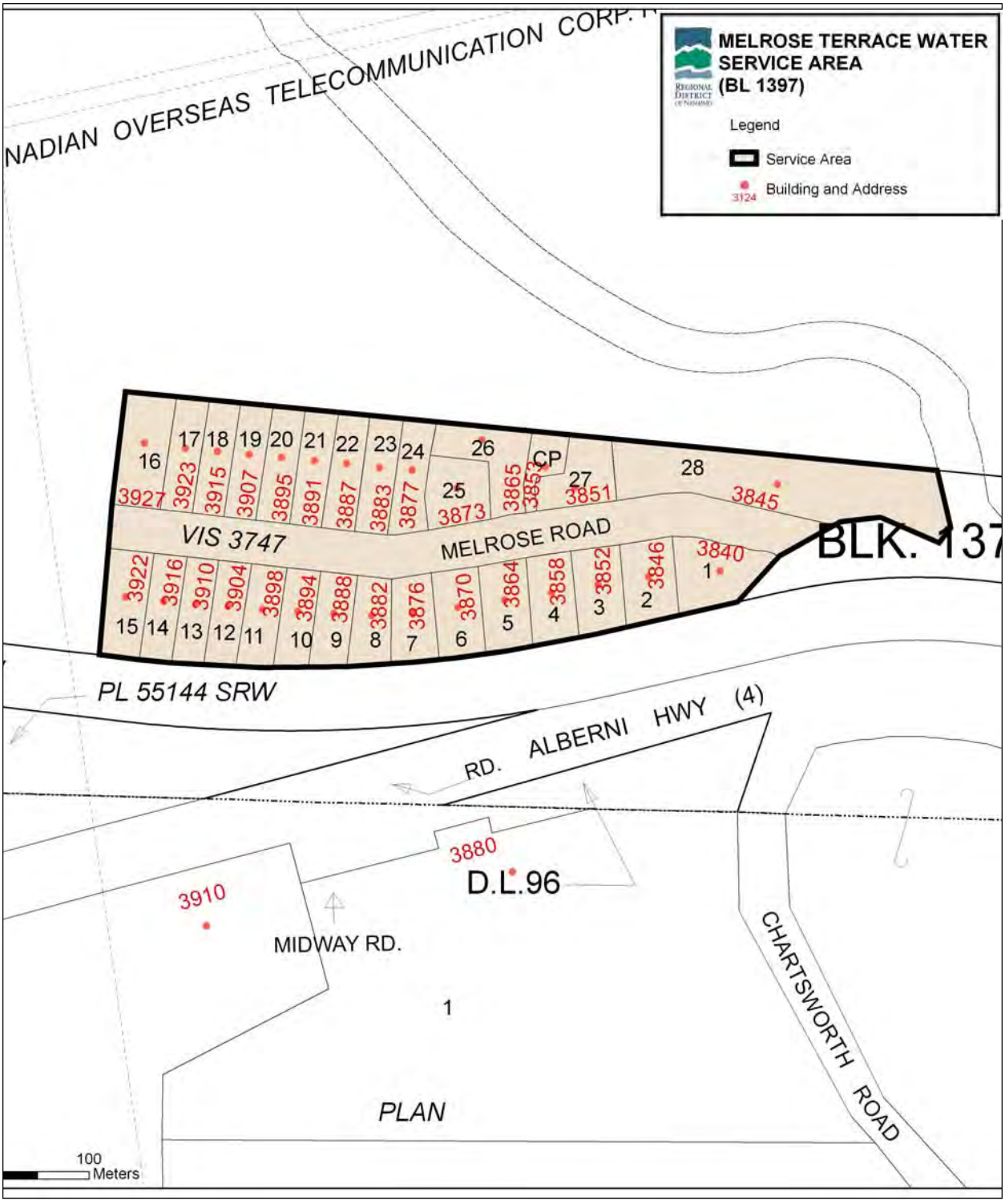


MAP 10 ENGLISHMAN RIVER

waterSMART zero waste

REGIONAL DISTRICT OF NANAIMO

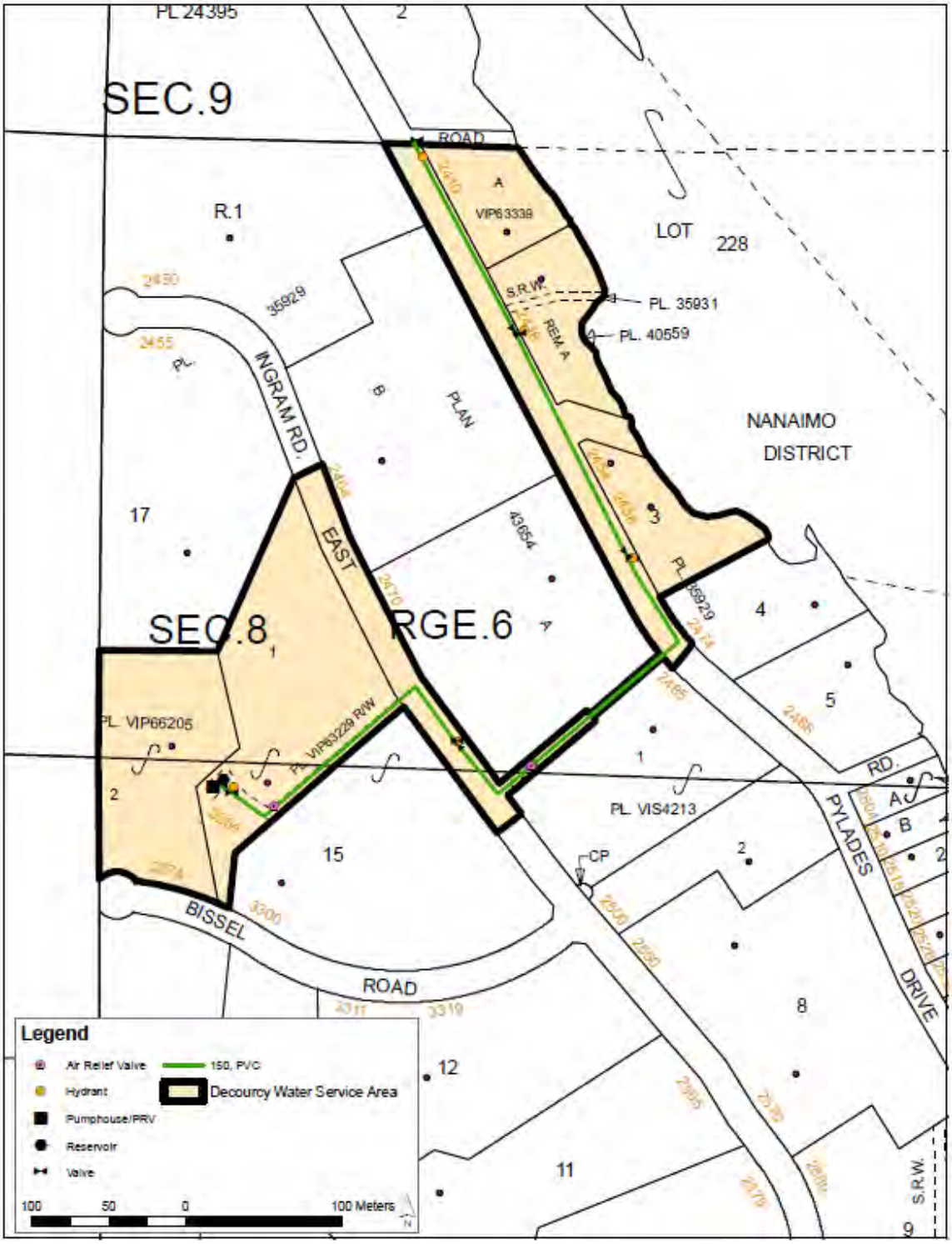
EMERGENCY RESPONSE PLAN
WATER SYSTEMS



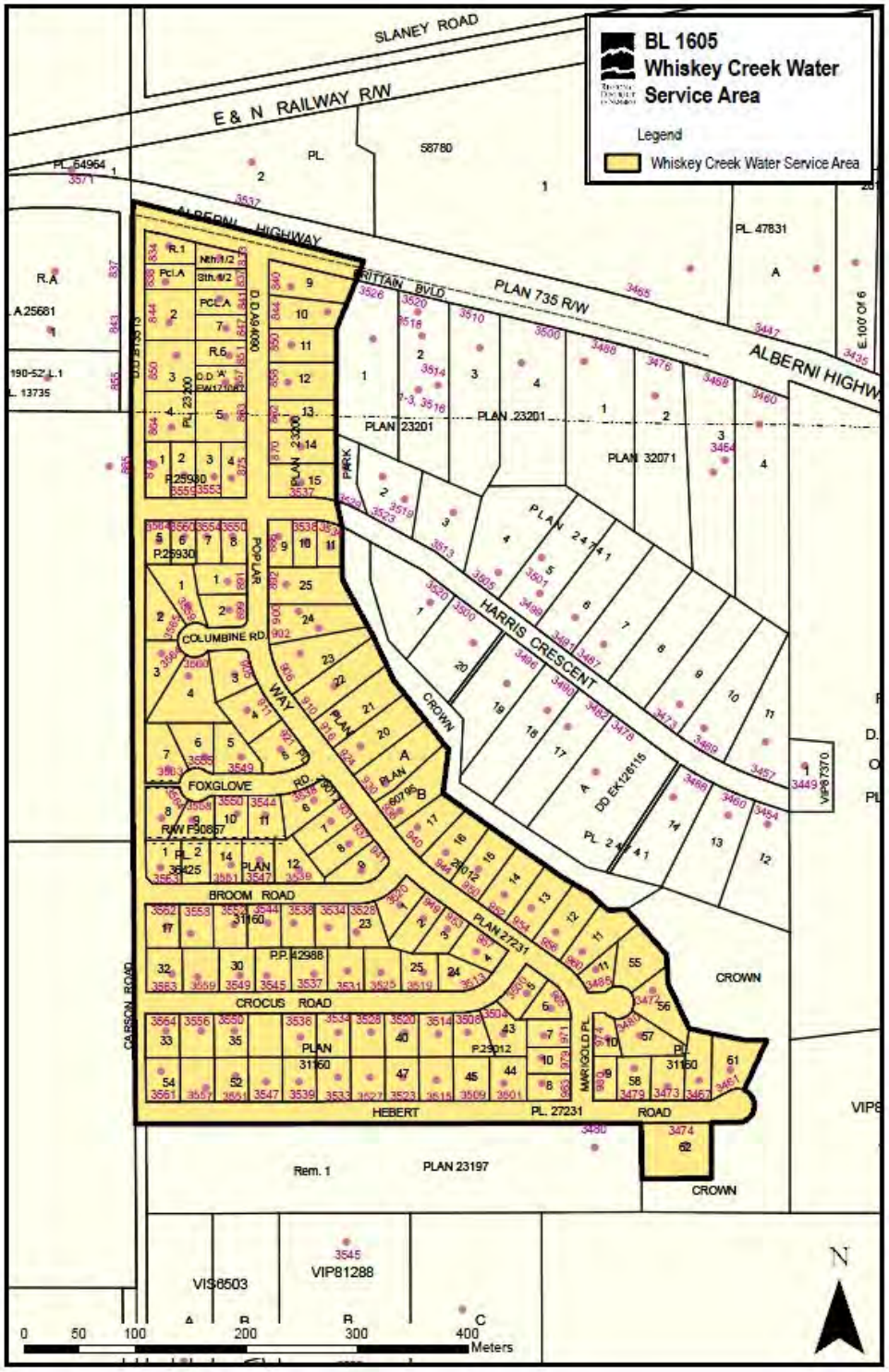
MAP 11 MELROSE

water SMART zero waste

MAP 12 DECOURCEY

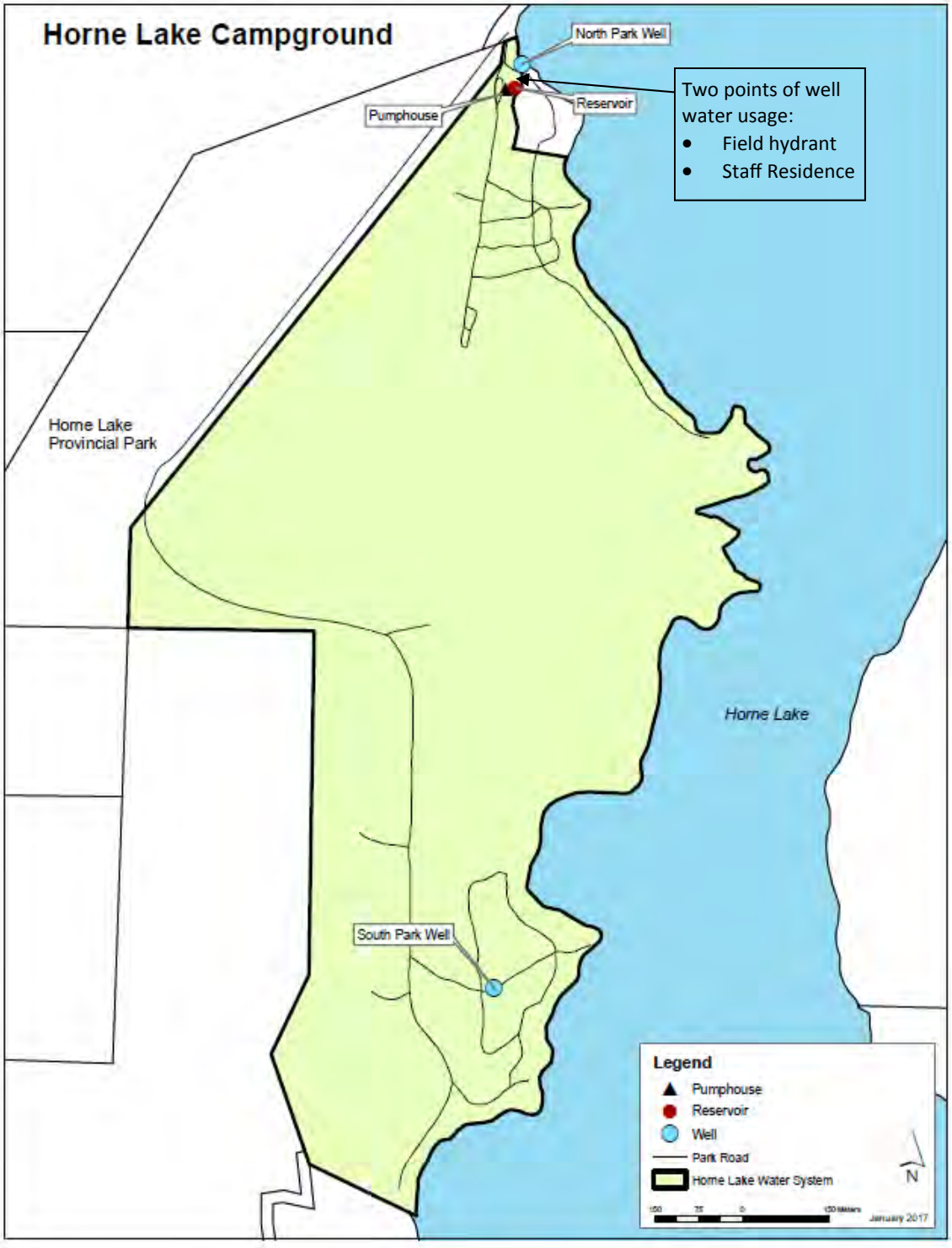


MAP 13 WHISKEY CREEK

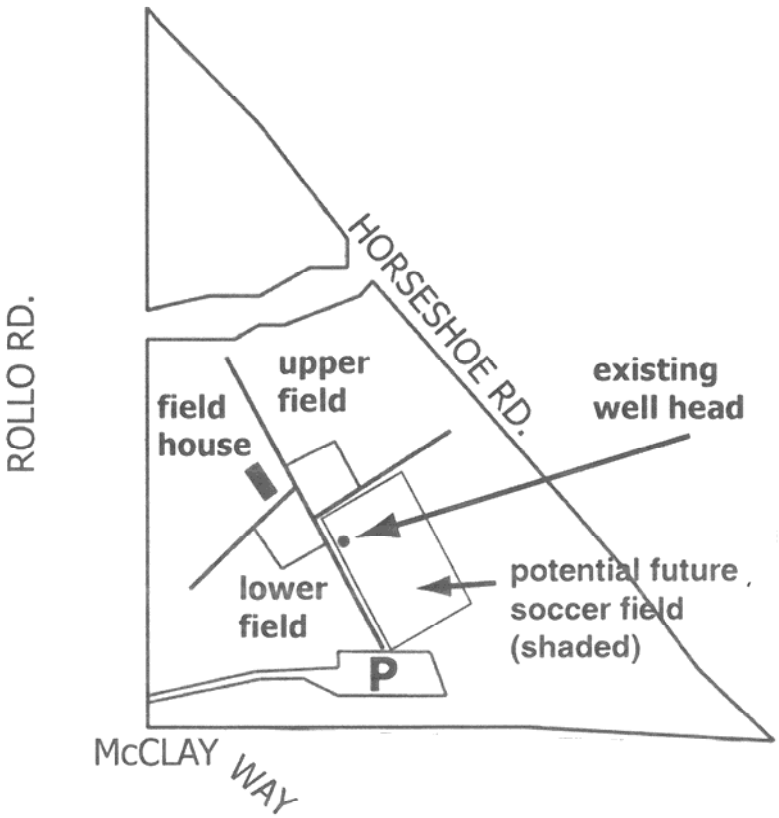


MAP 14 DESCANSO BAY REG. PARK

MAP 15 HORNE LAKE REG. PARK

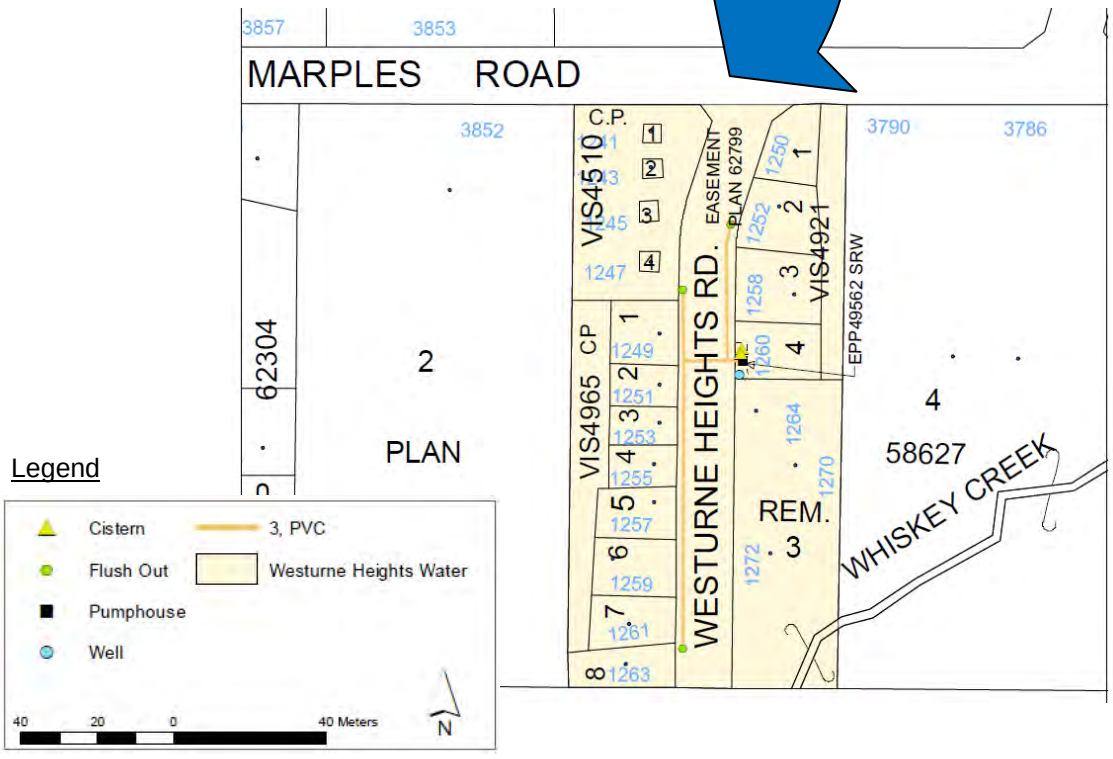


MAP 16 ROLLO McCLAY COMM. PARK



Site Plan (not to scale)

MAP 17 WESTURNE HEIGHTS



Legend

- Cistern
- Flush Out
- Pumphouse
- Well
- 3, PVC
- Westurne Heights Water

40 20 0 40 Meters

N