REGIONAL DISTRICT OF NANAIMO

Water Service Area Annual Report 2020

Surfside Water Service Area

June 2021

REGIONAL DISTRICT OF NANAIMO
Water & Utility Services Department
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Table of Contents

1. Introduction

The following annual report describes the Surfside Water Service Area and summarizes the water quality and production data from 2020. 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 2021.

2. Surfside Water Service Area

The Surfside Water Service Area was established in 1986 and comprises an area northwest of Qualicum Beach on Surfside Drive and part of McFeely Drive. There are 38 water service connections in the Surfside Water Service Area. The water source comes from two groundwater wells located nearby. The water source is chlorinated (as of September 2012) and pumped into the system on demand via two pressure tanks. A back-up generator is present at the pumphouse, should it be required. A map of the Surfside Water Service Area is provided in Appendix A for reference.

2.1 Groundwater Wells

Two groundwater production wells are present in the well field at 3547 West Island Highway, north of Qualicum Beach, B.C.

Well / Name	Well Depth	Wellhead Protection In Place	Treated/Untreated with Chlorine
#1	9.4 m	Yes	Treated
#2	9.8 m	Yes	Treated

2.2 Reservoirs

There is no reservoir in the Surfside Water Service Area. Water supply is pumped into the system via a dual pressure tank arrangement. A water storage cistern was moved to the Surfside well site in 2020, but it is not yet used to store drinking water.

2.3 Distribution System

The water distribution system in Surfside is summarized in the table below. Flushouts are present, but there are no fire hydrants on the system.

Watermain Material	Length of mains in Surfside Water Service Area	Prevalence in Water Service Area
AC: 150mm or smaller AC: 200mm or larger	0.8 km none	72.5% n/a
PVC: 150mm or smaller PVC: 200mm or larger	0.006 km 0.3 km	0.5% 27%

Note: 'AC' is Asbestos-Concrete, 'PVC' is poly-vinylchloride (plastic)

3. Water Sampling and Testing Program

Water sampling and testing is carried out weekly in the distribution system. Notably, an in-line chorine analyzer was installed in 2020 that monitors chlorine residual in the drinking water constantly, and will send alarm to RDN Operators when chlorine level drops below the operating level. Chlorine residual levels are maintained in order 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 Free chlorine residual, Salinity, TDS
Weekly (or as required)	BC Centre for Disease Control	Total coliforms, E.Coli
Monthly/Quarterly (well water only)	Bureau Veritas	Monthly- Chloride Quarterly- Chloride, Sodium, Conductivity, TDS
Annual Source Water Testing (every Fall)	Bureau Veritas	Complete potability testing of raw well water, including T-Ammonia
Annual System Water Testing (every Spring)	Bureau Veritas	Complete potability testing of distribution system , including T-Ammonia

4. 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/surfside. 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. Water Quality Inquiries and Complaints

Very few complaints and inquiries were received from the Surfside water service area, and were typically related to high water bill inquiries.

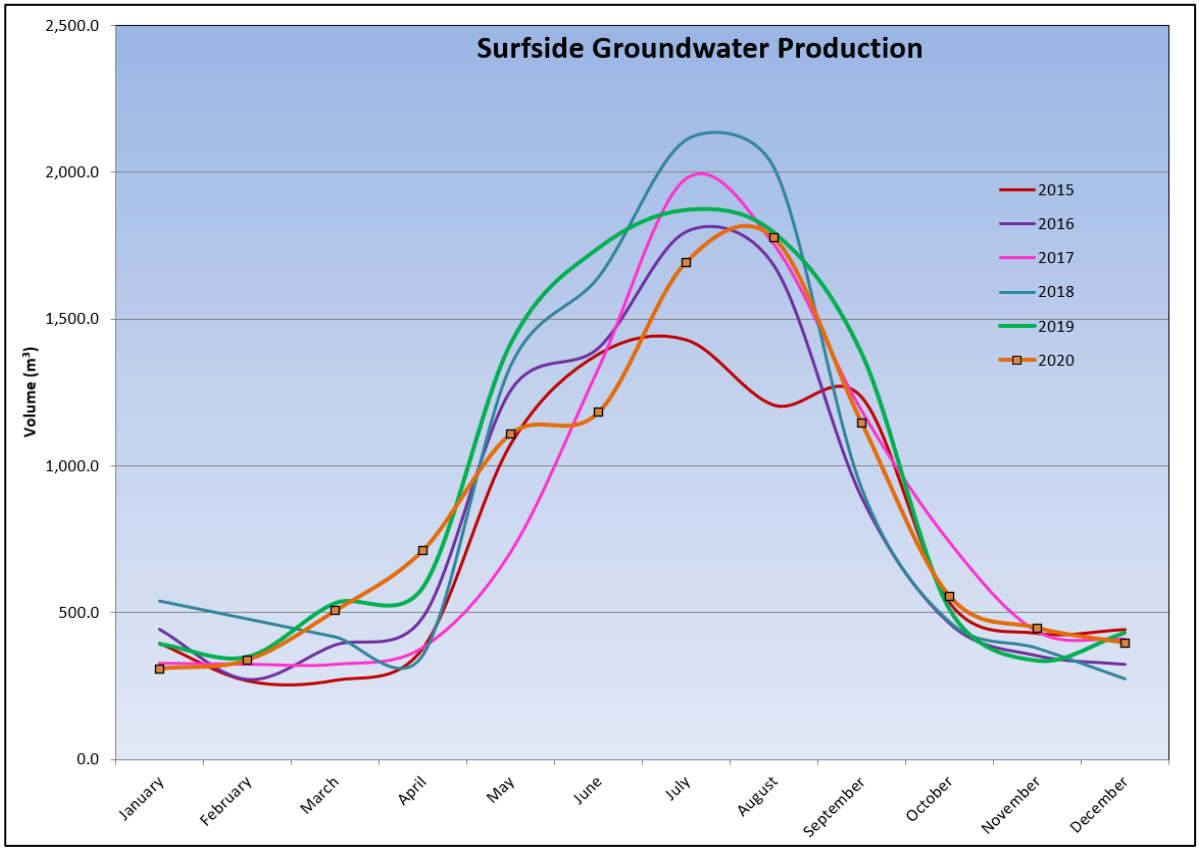
Surfside Pumphouse

A summary of the water system incidents in 2020 is given in the table below.

Activity in 2020	Date(s)	History/Notes
Boil Water Advisories	February 2020	Chlorine injection pump failure. See below.
High Turbidity Events	None	None
Equipment Malfunction	February 4, 2020	Peristaltic pump tube ruptured on chlorine pump. No chlorine injected into drinking water for ~24 hrs. Boil Water Advisory hand-delivered to all residents. Replaced pump tube, flushed system until free chlorine residual >0.2 mg/L present. Bacteria samples collected Feb 5 & 6, 2020. Boil Water Advisory lifted once test results came back with 0 coliforms and 0 E.Coli.
Water Main Breaks	None	None
Pump Failures	None	None

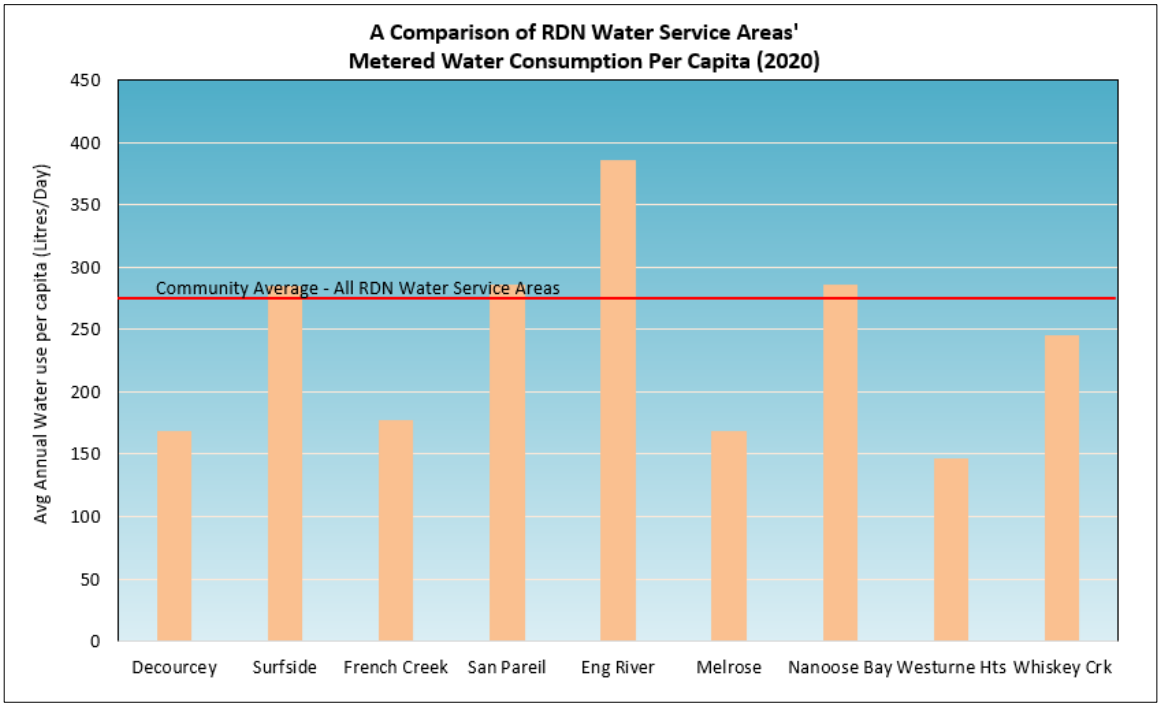
6. Groundwater Production

Monthly groundwater production in the Surfside Water Service Area for the past 6 years is shown in the chart below. Groundwater production in 2020 was about average in comparison to previous years.



Consumption

In the Fall/Winter of 2020, the average usage per home in Surfside was 0.43 cubic metres per day (94.6 imperial gallons). In the summer, the average water usage was 1.18 cubic metres per day (260 imperial gallons). Based on these figures, the annual consumption per capita is estimated to be 285 L/day (based on 2.4 people/household). This consumption is *2% more* than all the other RDN system averages of 278 L/day/capita in 2020.



7. Maintenance Program

A weekly pump station inspection is 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 once annually in the spring. There are no fire hydrants in this water service area due to insufficient supply and capacity for fire flows. Twenty-four hour on-call coverage is in place to respond to water system emergencies and alarms.

8. Operator Certification

The Regional District Water & Utility Services staff is comprised of one Manager, one Project Engineer, one Engineering Technologist, one Chief Operator, one Engineering Technician, and seven certified 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
- ✓ Silica Awareness

9. Water Service Area Projects

9.1 2020 Completed Studies & Projects

- Installed an in-line chlorine analyzer;
- Updated asset database with new assets;
- Calibrated and serviced all Hach spectrophotometer lab equipment;
- Completed a Water System Condition Assessment report and Capital Plan;
- Corresponded with residents regarding water conservation;
- Enforced outdoor sprinkling regulations;
- Completed irrigation checks for high-water users;
- Advised residents regarding water leak repairs;
- Completed the 2020-2030 Water Conservation Plan;
- Implemented a Water Systems SCADA Master Plan;
- Completed regular watermain flushing;
- Continued quality control through regular testing and monitoring of water system; and
- Maintained a high level of water quality.

Waterfront access from Surfside Drive

9.2 2021 Proposed Projects & Upgrades

- Replace 17 residential water meters;
- Design pumphouse upgrades;
- Update well controls;
- Install a water storage reservoir;
- Continue watermain flushing program;
- Continue implementing the Water Systems SCADA Master Plan;
- Implement the 2020-2030 DWWP Water Conservation Plan;
- Review well protection plan; and
- Continue to offer numerous water-saving incentives via rebates.

10. 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, pump failure, and drought management. The ERP was reviewed and updated in 2020, and copies are available on our website, at each RDN office, in each pump house, and in each Water Services vehicle. A copy of the ERP is also attached to this report in Appendix C.

11. Cross Connection Control

The RDN's Cross Connection Control Program was put in place to protect the public health by reducing the risk of contaminants flowing back into the public water supply. The RDN Manager of Water Services is the designated Cross Connection Control Manager.

The RDN's Cross Connection Control Program addresses cross connection threats through operating policies and procedures, as well as assisting customers with backflow preventer selection, installation, testing, maintenance and reporting. The program receives its authority from *RDN Cross Connection Control Regulation Bylaw No. 1788*, and the *British Columbia Building Code, Part 7*, which requires that potable water be protected from contamination. Additionally, a webpage has been established at https://rdn.bc.ca/cross-connection-control-program to educate RDN water service customers about cross connection hazards, and lists the relevant links to current standards and resources.

Two of the RDN's water system operators received certification as backflow assembly testers through the British Columbia Water & Waste Association (BCWWA).

12. Cyber Security

The RDN uses a multi-level approach to cyber-security. Corporate network security is employed via a universal threat management gateway that implements various methods of data security, which includes daily definition updates to block known cyber threats. In addition, all RDN PC's are protected with anti-virus software. RDN water systems are connected to the corporate network via IP-Sec VPN's for remote management by information technology and equipment operators. Future infrastructure upgrades will see our water systems located on segregated networks to limit the vulnerability from cybersecurity threats.

13. Closing

An annual report for the year 2021 will be prepared and submitted to Island Health in the spring of 2022. Annual reports are also available on our website at: www.rdn.bc.ca/surfside.

Surfside Well #2

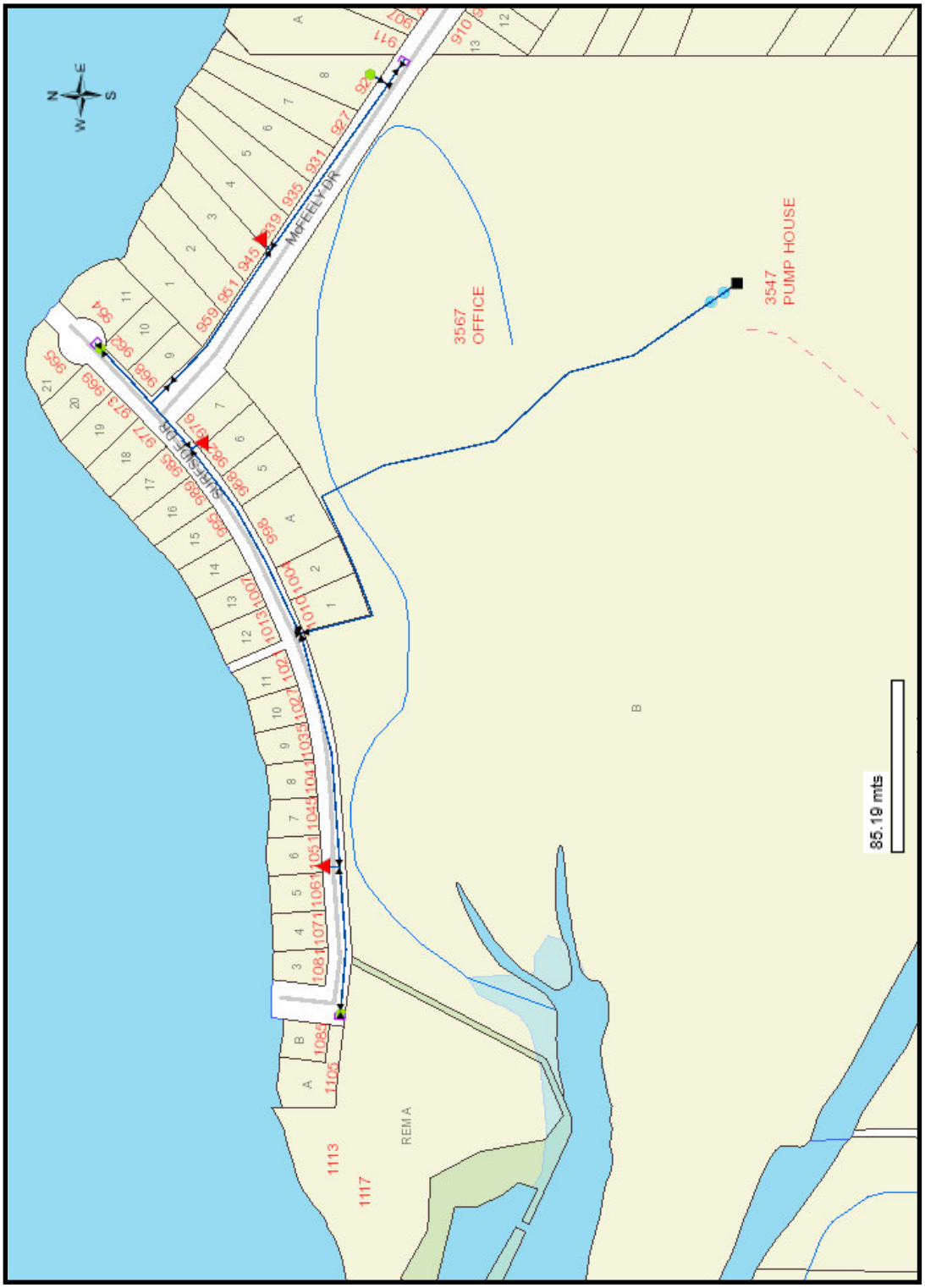
APPENDIX A

MAP OF SURFSIDE

WATER SERVICE AREA

SURFSIDE

WATER SERVICE AREA



APPENDIX B

WATER QUALITY TESTING RESULTS

SURFSIDE
WATER SERVICE AREA

Facility Location:
3547 Island Highway West, Qualicum Beach

Facility Information: Facility Type: 15-300 connections DWC

Facility Sampling History:

Location	Date	Total Coliform	E. Coli
Surfside Sample Port, 962 Surfside Dr	14-Dec-2020	LT1	LT1
Surfside Sample Port, 923 McFeely Dr	7-Dec-2020	LT1	LT1
Surfside Sample Port, 1105 Surfside Dr	1-Dec-2020	LT1	LT1
Surfside Sample Port, 962 Surfside Dr	16-Nov-2020	LT1	LT1
Surfside Sample Port, 923 McFeely Dr	9-Nov-2020	LT1	LT1
Surfside Sample Port, 1105 Surfside Dr	2-Nov-2020	LT1	LT1
Surfside Sample Port, 962 Surfside Dr	19-Oct-2020	LT1	LT1
Surfside Sample Port, 923 McFeely Dr	13-Oct-2020	LT1	LT1
Surfside Sample Port, 1105 Surfside Dr	5-Oct-2020	LT1	LT1
Surfside Sample Port, 962 Surfside Dr	14-Sep-2020	LT1	LT1
Surfside Sample Port, 923 McFeely Dr	8-Sep-2020	LT1	LT1
Surfside Sample Port, 1105 Surfside Dr	2-Sep-2020	LT1	LT1
Surfside Sample Port, 962 Surfside Dr	17-Aug-2020	LT1	LT1
Surfside Sample Port, 1105 Surfside Dr	4-Aug-2020	LT1	LT1
Surfside Sample Port, 962 Surfside Dr	20-Jul-2020	LT1	LT1
Surfside Sample Port, 923 McFeely Dr	13-Jul-2020	LT1	LT1
Surfside Sample Port, 1105 Surfside Dr	8-Jul-2020	LT1	LT1
Surfside Sample Port, 962 Surfside Dr	15-Jun-2020	LT1	LT1
Surfside Sample Port, 923 McFeely Dr	8-Jun-2020	LT1	LT1
Surfside Sample Port, 1105 Surfside Dr	1-Jun-2020	LT1	LT1
Surfside Sample Port, 962 Surfside Dr	20-May-2020	LT1	LT1
Surfside Sample Port, 923 McFeely Dr	11-May-2020	LT1	LT1
Surfside Sample Port, 1105 Surfside Dr	4-May-2020	LT1	LT1
Surfside Sample Port, 962 Surfside Dr	20-Apr-2020	LT1	LT1
Surfside Sample Port, 923 McFeely Dr	14-Apr-2020	LT1	LT1
Surfside Sample Port, 1105 Surfside Dr	6-Apr-2020	LT1	LT1
Surfside Sample Port, 962 Surfside Dr	16-Mar-2020	LT1	LT1
Surfside Sample Port, 923 McFeely Dr	9-Mar-2020	LT1	LT1
Surfside Sample Port, 1105 Surfside Dr	2-Mar-2020	LT1	LT1

Location	Date	Total Coliform	E. Coli
Surfside Sample Port, 923 McFeely Dr	24-Feb-2020	LT1	LT1
Surfside Sample Port, 962 Surfside Dr	18-Feb-2020	LT1	LT1
Surfside Sample Port, 1105 Surfside Dr	3-Feb-2020	LT1	LT1
Surfside Sample Port, 923 McFeely Dr	28-Jan-2020	LT1	LT1
Surfside Sample Port, 962 Surfside Dr	20-Jan-2020	L1	L1
Surfside Sample Port, 923 McFeely Dr	13-Jan-2020	L1	L1
Surfside Sample Port, 1105 Surfside Dr	6-Jan-2020	L1	L1

Interpreting Sample Reports

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

LT1 Less than 1 (no detectable bacteria) - Meaning: No bacteria present

L1 Less than 1 (no detectable bacteria) - Meaning: No bacteria present

Regional District of Nanaimo - Water Services Department

Surfside Water Analysis - 2020 Monthly Report

		BC Centre for Disease Control		RDN In-House Laboratory and Spectrophotometer									
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-Dec-20	1105 Surfside	0	0	0	0	8	6.71	0.34	68.4	0.07	144.5	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/surfside	
7-Dec-20	923 McFeely	0	0	0	0	9	6.66	0.38	54.6	0.06	136.7		
14-Dec-20	962 Surfside	0	0	0	0	9	6.85	0.90	66.7	0.07	141.0		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	**0.02** AO **0.12** MAC

Legend:

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

Orange font indicates non-compliance with the Aesthetic Objective (AO) in the Canadian Drinking Water Guidelines (CDWG)

Red font indicates non-compliance with the Maximum Acceptable Concentration (MAC) in the CDWG

Comments:

Iron and Manganese are no longer being tested in-house.

A full potability scan is completed once per year at an external lab that includes metals and minerals.

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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-Nov-20	1105 Surfside	0	0	0	0	12	6.80	0.21	77.9	0.08	163.9	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/surfside	
9-Nov-20	923 McFeely	0	0	0	0	11	6.62	0.26	6.1	0.07	139.6		
16-Nov-20	962 Surfside	0	0	0	0	10	6.66	0.34	68.4	0.07	144.1		
23-Nov-20	1105 Surfside			0	0	10	6.77	0.28	80.3	0.08	168.4		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	**0.02** AO **0.12** MAC

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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)
5-Oct-20	1105 Surfside	0	0	0	0	16	6.75	0.26	71.7	0.07	151.3	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/surfside	
13-Oct-20	923 McFeely	0	0	0	0	15	6.68	0.24	69.1	0.07	146.2		
19-Oct-20	962 Surfside	0	0	0	0	14	6.69	0.29	71.4	0.07	150.8		
26-Oct-20	1105 Surfside			0	0	12	6.75	0.19	77.4	0.08	163.4		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	**0.02** AO **0.12** MAC

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2-Sep-20	1105 Surfside	0	0	0	0	19	6.65	0.22	85.1	0.08	179.4	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/surfside	
8-Sep-20	923 McFeely	0	0	0	0	18	6.69	0.32	84.6	0.08	181.1		
14-Sep-20	962 Surside	0	0	0	0	17	6.70	0.28	86.1	0.07	180.0		
21-Sep-20	962 Surfside			0	0	17	6.80	0.32	93.2	0.09	196.2		
28-Sep-20	1105 Surfside			0	0	17	6.82	0.20	87.3	0.09	184.0		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	**0.02** AO **0.12** MAC

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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-Aug-20	1105 Surfside	0	0	0	0	18	6.67	0.31	78.2	0.08	165.0	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/surfside	
10-Aug-20	923 McFeely	0	0	0	0	19	6.55	0.32	70.4	0.07	147.6		
17-Aug-20	962 Surfside	0	0	0	0	17	6.54	0.40	78.5	0.08	165.5		
26-Aug-20	1105 Surfside			0	0	16	6.66	0.39	83.3	0.08	175.6		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	**0.02** AO **0.12** MAC

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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)
6-Jul-20	1105 Surfside	0	0	0	0	16	6.90	0.35	79.9	0.08	155.4	0.04	0.011
13-Jul-20	923 McFeely	0	0	0	0	16	6.51	0.32	73.1	0.07	154.2		
20-Jul-20	962 Surfside	0	0	0	0	15	6.53	0.34	74.0	0.07	156.2		
27-Jul-20	1105 Surfside			0	0	18	6.79	0.31	74.6	0.07	157.3		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	**0.02** AO **0.12** MAC

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Comments:

Notes below about Manganese (2019) from: https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html

Type	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Comments
I = Inorganic chemical parameter	Manganese (2019)	0.12	AO: <0.02	Dissolution of naturally-occurring minerals commonly found in soil and rock. Other sources include industrial discharge, mining activities and leaching from landfills.	**Health Basis of MAC:** Effects on neurological development and behaviour; deficits in memory, attention, and motor skills. **Other:** Formula-fed infants (where water containing manganese at levels above the MAC is used to prepare formula) may be especially at risk.	AO based on minimizing the occurrence of discoloured water, consumer complaints and staining of laundry.

Regional District of Nanaimo - Water Services Department

Surfside Water Analysis - 2020 Monthly Report

		BC Centre for Disease Control		RDN In-House Laboratory and Spectrophotometer									
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-Jun-20	1105 Surfside	0	0	0	0	15	6.70	0.32	76.8	0.08	161.8	0.04	0.014
8-Jun-20	923 McFeely	0	0	0	0	16	6.70	0.31	77.1	0.08	166.1		
15-Jun-20	962 Surfside	0	0	0	0	14	6.81	0.35	72.0	0.07	152.1		
22-Jun-20	1105 Surfside			0	0	15	6.86	0.26	75.7	0.08	159.3		
29-Jun-20	962 Surfside			0	0	16	6.64	0.33	73.4	0.07	154.7		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	**0.02** AO **0.12** MAC

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Type	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Comments
I = Inorganic chemical parameter	Manganese (2019)	0.12	AO: <0.02	Dissolution of naturally-occurring minerals commonly found in soil and rock. Other sources include industrial discharge, mining activities and leaching from landfills.	**Health Basis of MAC:** Effects on neurological development and behaviour; deficits in memory, attention, and motor skills. **Other:** Formula-fed infants (where water containing manganese at levels above the MAC is used to prepare formula) may be especially at risk.	AO based on minimizing the occurrence of discoloured water, consumer complaints and staining of laundry.

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Surfside Water Analysis - 2020 Monthly Report

		BC Centre for Disease Control		RDN In-House Laboratory and Spectrophotometer									
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-20	1105 Surfside	0	0	0	0	11	6.72	0.74	78.8	0.08	166.2	0.06	0.020
13-May-20	923 McFeely	0	0	0	0	12	6.69	0.48	74.7	0.07	157.7		
20-May-20	962 Surfside	0	0	0	0	13	7.11	0.33	74.5	0.07	157.2		
25-May-20	1105 Surfside			0	0	14	6.63	0.29	76.0	0.08	160.4		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	**0.02** AO **0.12** MAC

Legend:

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

Orange font indicates non-compliance with the Aesthetic Objective (AO) in the Canadian Drinking Water Guidelines (CDWG)

Red font indicates non-compliance with the Maximum Acceptable Concentration (MAC) in the CDWG

Comments:

Notes below about Manganese (2019) from: https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html

Type	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Comments
I = Inorganic chemical parameter	Manganese (2019)	0.12	AO: <0.02	Dissolution of naturally-occurring minerals commonly found in soil and rock. Other sources include industrial discharge, mining activities and leaching from landfills.	**Health Basis of MAC:** Effects on neurological development and behaviour; deficits in memory, attention, and motor skills. **Other:** Formula-fed infants (where water containing manganese at levels above the MAC is used to prepare formula) may be especially at risk.	AO based on minimizing the occurrence of discoloured water, consumer complaints and staining of laundry.

Regional District of Nanaimo - Water Services Department

Surfside Water Analysis - 2020 Monthly Report

		BC Centre for Disease Control		RDN In-House Laboratory and Spectrophotometer									
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-Apr-20	1105 Surfside	0	0	0	0	8	6.77	0.28	90.1	0.09	186.4	0.04	0.021
14-Apr-20	923 McFeely	0	0	0	0	9	6.65	0.31	73.4	0.07	155.1		
20-Apr-20	962 Surfside	0	0	0	0	11	6.69	0.41	73.7	0.07	135.4		
27-Apr-20	1105 Surfside			0	0	11	6.68	0.50	81.3	0.08	171.4		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	**0.02** AO **0.12** MAC

Legend:

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

Orange font indicates non-compliance with the Aesthetic Objective (AO) in the Canadian Drinking Water Guidelines (CDWG)

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Comments:

Notes below about Manganese (2019) from: https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html

Type	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Comments
I = Inorganic chemical parameter	Manganese (2019)	0.12	AO: <0.02	Dissolution of naturally-occurring minerals commonly found in soil and rock. Other sources include industrial discharge, mining activities and leaching from landfills.	**Health Basis of MAC:** Effects on neurological development and behaviour; deficits in memory, attention, and motor skills. **Other:** Formula-fed infants (where water containing manganese at levels above the MAC is used to prepare formula) may be especially at risk.	AO based on minimizing the occurrence of discoloured water, consumer complaints and staining of laundry.

Regional District of Nanaimo - Water Services Department

Surfside Water Analysis - 2020 Monthly Report

		BC Centre for Disease Control		RDN In-House Laboratory and Spectrophotometer									
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-Mar-20	1105 Surfside	0	0	0	0	7	6.74	0.25	89.3	0.09	188.1	0.03	0.027
9-Mar-20	923 McFeely	0	0	0	0	8	6.72	0.30	71.5	0.07	151.1		
16-Mar-20	962 Surfside	0	0	0	0	7	6.71	0.42	73.2	0.07	154.0		
23-Mar-20	1105 Surfside			0	0	7	6.79	0.32	76.9	0.08	162.7		
30-Mar-20	962 Surfside			0	0	8	6.55	0.37	74.9	0.07	157.9		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	**0.02** AO **0.12** MAC

Legend:

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

Orange font indicates non-compliance with the Aesthetic Objective (AO) in the Canadian Drinking Water Guidelines (CDWG)

Red font indicates non-compliance with the Maximum Acceptable Concentration (MAC) in the CDWG

Comments:

Notes below about Manganese (2019) from: https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html

Type	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Comments
I = Inorganic chemical parameter	Manganese (2019)	0.12	AO: <0.02	Dissolution of naturally-occurring minerals commonly found in soil and rock. Other sources include industrial discharge, mining activities and leaching from landfills.	**Health Basis of MAC:** Effects on neurological development and behaviour; deficits in memory, attention, and motor skills. **Other:** Formula-fed infants (where water containing manganese at levels above the MAC is used to prepare formula) may be especially at risk.	AO based on minimizing the occurrence of discoloured water, consumer complaints and staining of laundry.

Regional District of Nanaimo - Water Services Department

Surfside Water Analysis - 2020 Monthly Report

		BC Centre for Disease Control		RDN In-House Laboratory and Spectrophotometer									
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)
3-Feb-20	1105 Surfside	0	0	0	0	6	6.68	0.37	89.8	0.09	188.7	0.05	0.016
10-Feb-20	923 McFeely			0	0	6	6.61	0.86	39.7	0.04	84.2		
18-Feb-20	962 Surfside	0	0	0	0	7	6.94	0.44	76.7	0.08	161.3		
24-Feb-20	923 McFeely	0	0	0	0	6	6.71	0.40	71.7	0.07	151.7		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	**0.02** AO **0.12** MAC

Legend:

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

Orange font indicates non-compliance with the Aesthetic Objective (AO) in the Canadian Drinking Water Guidelines (CDWG)

Red font indicates non-compliance with the Maximum Acceptable Concentration (MAC) in the CDWG

Comments:

Notes below about Manganese (2019) from: https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html

Type	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Comments
I = Inorganic chemical parameter	Manganese (2019)	0.12	AO: <0.02	Dissolution of naturally-occurring minerals commonly found in soil and rock. Other sources include industrial discharge, mining activities and leaching from landfills.	**Health Basis of MAC:** Effects on neurological development and behaviour; deficits in memory, attention, and motor skills. **Other:** Formula-fed infants (where water containing manganese at levels above the MAC is used to prepare formula) may be especially at risk.	AO based on minimizing the occurrence of discoloured water, consumer complaints and staining of laundry.

Regional District of Nanaimo - Water Services Department

Surfside Water Analysis - 2020 Monthly Report

		BC Centre for Disease Control		RDN In-House Laboratory and Spectrophotometer									
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-Jan-20	1105 Surfside	0	0	0	0	8	6.71	0.36	89.5	0.09	188.9	0.03	0.036
13-Jan-20	923 McFeely	0	0	0	0	6	6.53	0.41	78.1	0.08	164.7		
20-Jan-20	962 Surfside	0	0	0	0	8	6.70	0.42	80.9	0.09	171.2		
27-Jan-20	1105 Surfside			0	0	7	6.61	0.38	87.7	0.09	184.6		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	0.02 AO 0.12 MAC

Legend:

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

Orange font indicates non-compliance with the Aesthetic Objective (AO) in the Canadian Drinking Water Guidelines (CDWG)

Red font indicates non-compliance with the Maximum Acceptable Concentration (MAC) in the CDWG

Comments:

Notes below about Manganese (2019) from: https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html

Type	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Comments
I = Inorganic chemical parameter	Manganese (2019)	0.12	AO: <0.02	Dissolution of naturally-occurring minerals commonly found in soil and rock. Other sources include industrial discharge, mining activities and leaching from landfills.	**Health Basis of MAC:** Effects on neurological development and behaviour; deficits in memory, attention, and motor skills. **Other:** Formula-fed infants (where water containing manganese at levels above the MAC is used to prepare formula) may be especially at risk.	AO based on minimizing the occurrence of discoloured water, consumer complaints and staining of laundry.

REGIONAL DISTRICT OF NANAIMO

Surfside Distribution (Tap Water) Analysis
1105 Surfside Drive

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

Orange font indicates non-compliance with the Aesthetic Objective in the Canadian Drinking Water Guidelines (CDWG)

Red font indicates non-compliance with the Maximum Acceptable Concentration (MAC) in the CDWG

	Units	CDWG		May 13 2014	May 19 2015	May 10 2016	May 8 2017	May 7 2018	May 13 2019	May 20 2020
Miscellaneous Inorganics										
Fluoride	mg/L	1.5	MAC	<0.05	0.024	0.026	0.029	0.026	0.025	<0.05
Alkalinity (total as $CaCO_3$)	mg/L			54	53.7	61.4	66.7	51.8	57.2	51
Anions										
Dissolved Sulphate	mg/L	500	AO	4.1	5.19	5.38	5.11	5.7	4.5	4.1
Dissolved Chloride	mg/L	250	AO	9	10	8.6	13	11	10	11
Nitrite	mg/L	1	MAC	<0.05	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.005
Miscellaneous										
Apparent Colour	Colour Unit			<5	<5	10	10	5	<2	5
Nutrients										
Total Ammonia	mg/L			0.02	0.017	0.017	0.091	<0.020	<0.015	0.021
Physical Properties										
Conductivity	µS/cm			161	154	157	184	157	153	150
pH	pH	7.0:10.5	AO	7	7.68	7.55	7.85	7.72	7.32	7.09
TDS	mg/L	500	AO	126	90	78	108	98	100	90
Turbidity	NTU			<0.5	<0.10	0.2	0.17	0.27	0.2	<0.1
Microbiological Parameters										
E.coli	MPN/100mL	<1	MAC	<1.0	<1.0	<1.0	<1.0	<1.0	0	0
Total Coliforms	MPN/100mL	<1	MAC	<1.0	<1.0	<1.0	<1.0	<1.0	0	0
Calculated Parameters										
Total Hardness ($CaCO_3$)	mg/L			66	59.4	60	85.3	61	59.2	58.9
Nitrate	mg/L	10	MAC	0.71	0.533	0.555	0.529	0.637	0.633	0.85
Elements										
Total Mercury	mg/L	0.001	MAC	<0.00001	<0.00001	<0.00001	<0.00001	<0.000002	<0.000002	<0.0000019
Total Metals										
Total Aluminum	mg/L	0.1	OG	<0.025	0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Total Antimony	mg/L	0.006	MAC	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Total Arsenic	mg/L	0.01	MAC	<0.00025	<0.0001	<0.0001	<0.001	<0.0001	<0.0001	<0.0001
Total Barium	mg/L	1	MAC	0.00357	0.0011	0.0017	0.0035	0.0018	0.0018	0.0011
Total Beryllium	mg/L			<0.00025	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Bismuth	mg/L			<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Boron	mg/L	5	MAC	0.023	<0.050	<0.050	<0.050	<0.050	<0.05	<0.05
Total Cadmium	mg/L	0.005	MAC	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Total Chromium	mg/L	0.05	MAC	<0.0025	<0.001	<0.001	<0.001	<0.001	0.001	<0.001
Total Cobalt	mg/L			<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
Total Copper	mg/L	1	AO	0.0088	0.00594	0.00898	0.00451	0.00513	0.00789	0.00638
Total Iron	mg/L	0.3	AO	0.068	0.011	0.0288	0.0483	0.0137	0.0296	0.0223
Total Lead	mg/L	0.01	MAC	0.0019	0.00054	0.00101	0.0003	0.00034	0.00048	0.00044
Total Manganese	mg/L	0.02 0.12	AO MAC	<0.0050	<0.001	<0.001	<0.001	<0.001	<0.001	0.0011
Total Molybdenum	mg/L			<0.00025	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Nickel	mg/L			<0.0010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Selenium	mg/L	0.05	MAC	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Silicon	mg/L			8.18	7.91	8.16	10.4	7.87	7.66	7.69
Total Silver	mg/L			0.00031	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Total Strontium	mg/L			0.065	0.0495	0.0551	0.0799	0.0549	0.0517	0.0466
Total Thallium	mg/L			<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001
Total Tin	mg/L			<0.0005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Titanium	mg/L			<0.0025	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Uranium	mg/L	0.02	MAC	<0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Vanadium	mg/L			<0.0005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Zinc	mg/L	5	AO	0.0229	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Zirconium	mg/L				<0.0005	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium	mg/L			22.8	18.9	19.4	29.7	20	19.5	18.5
Total Magnesium	mg/L			2.31	2.96	2.81	2.69	2.69	2.54	3.06
Total Potassium	mg/L			<0.5	0.355	0.404	0.569	0.386	0.411	0.381
Total Sodium	mg/L	200	AO	8.2	6.63	7.03	8.58	6.48	6.71	6.53
Total Sulphur	mg/L				<3.0	<3.0	<3.0	<3.0	<3	<3

REGIONAL DISTRICT OF NANAIMO

Surfside #1 Raw Well Water Analysis
3547 Island Highway

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

Orange font indicates non-compliance with the Aesthetic Objective in the Canadian Drinking Water Guidelines (CDWG)
Red font indicates non-compliance with the Maximum Acceptable Concentration (MAC) in the CDWG

	Units	CDWG		September 18 2017	October 25 2018	October 3 2019	October 21 2020
Miscellaneous Inorganics							
Fluoride	mg/L	1.5	MAC	0.026	0.023	<0.05	<0.05
Alkalinity (total as CaCO)	mg/L			55.3	53.4	53	50
Anions							
Dissolved Sulphate	mg/L	500	AO	6.2	4.8	4.1	4.4
Dissolved Chloride	mg/L	250	AO	14	11	22	9
Nitrite	mg/L	1	MAC	<0.0050	<0.0050	<0.005	<0.005
Miscellaneous							
Apparent Colour	Colour Unit			5	5	<5	5
Nutrients							
Total Ammonia	mg/L			<0.020	<0.020	0.045	<0.015
Physical Properties							
Conductivity	µS/cm			170	149	190	140
pH	pH	7.0:10.5	OG	7.56	7.75	**6.95**	7.03
TDS	mg/L	500	AO	120	94	130	100
Turbidity	NTU			0.23	<0.10	<0.1	0.13
Microbiological Parameters							
E.coli	MPN/100mL	<1	MAC	<1.0	<1.0	0	0
Total Coliforms	MPN/100mL	<1	MAC	**17**	<1.0	0	0
Calculated Parameters							
Total Hardness (CaCO)	mg/L			64.6	60.6	77.4	57.8
Nitrate	mg/L	10	MAC	0.519	0.525	0.609	0.597
Elements							
Total Mercury	mg/L	0.001	MAC	<0.00001	0.0000053	<0.000002	<0.0000019
Total Metals							
Total Aluminum	mg/L	0.1	OG	<0.003	<0.003	<0.003	<0.003
Total Antimony	mg/L	0.006	MAC	<0.0005	<0.0005	<0.0005	<0.0005
Total Arsenic	mg/L	0.01	MAC	<0.0001	<0.0001	<0.0001	<0.0001
Total Barium	mg/L	1	MAC	<0.001	<0.001	<0.001	<0.001
Total Beryllium	mg/L			<0.0001	<0.0001	<0.0001	<0.0001
Total Bismuth	mg/L			<0.001	<0.001	<0.001	<0.001
Total Boron	mg/L	5	MAC	<0.050	<0.050	<0.05	<0.05
Total Cadmium	mg/L	0.005	MAC	<0.00001	<0.00001	<0.00001	<0.00001
Total Chromium	mg/L	0.05	MAC	<0.001	<0.001	<0.001	<0.001
Total Cobalt	mg/L			<0.0002	<0.0002	<0.0002	<0.0002
Total Copper	mg/L	1	AO	0.00235	0.00339	0.00301	0.00366
Total Iron	mg/L	0.3	AO	0.0072	0.0067	0.0054	<0.005
Total Lead	mg/L	0.01	MAC	<0.0002	0.00044	0.00041	0.00048
Total Manganese	mg/L	0.02 0.12	AO MAC	<0.001	<0.001	<0.001	<0.001
Total Molybdenum	mg/L			<0.001	<0.001	<0.001	<0.001
Total Nickel	mg/L			<0.001	<0.001	<0.001	<0.001
Total Selenium	mg/L	0.05	MAC	<0.0001	<0.0001	<0.0001	<0.0001
Total Silicon	mg/L			7.54	7.37	7.76	7.76
Total Silver	mg/L			<0.00002	<0.00002	<0.00002	<0.00002
Total Strontium	mg/L			0.0463	0.0429	0.0536	0.0406
Total Thallium	mg/L			<0.00001	<0.00001	<0.00001	<0.00001
Total Tin	mg/L			<0.005	<0.005	<0.005	<0.005
Total Titanium	mg/L			<0.005	<0.005	<0.005	<0.005
Total Uranium	mg/L	0.02	MAC	<0.0001	<0.0001	<0.0001	<0.0001
Total Vanadium	mg/L			<0.005	<0.005	<0.005	<0.005
Total Zinc	mg/L	5	AO	<0.005	<0.005	0.0062	0.0089
Total Zirconium	mg/L			<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium	mg/L			19.4	18.4	23.6	17
Total Magnesium	mg/L			3.92	3.56	4.5	3.5
Total Potassium	mg/L			0.403	0.349	0.389	0.35
Total Sodium	mg/L	200	AO	6.25	5.21	6.64	5.29
Total Sulphur	mg/L			<3.0	<3.0	<3.0	<3

REGIONAL DISTRICT OF NANAIMO

Surfside #2 Raw Well Water Analysis
3547 Island Highway

*resampled Metals only

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

Orange font indicates non-compliance with the Aesthetic Objective in the Canadian Drinking Water Guidelines (CDWG)

Red font indicates non-compliance with the Maximum Acceptable Concentration (MAC) in the CDWG

	Units	CDWG		Nov 29 2016*	September 18 2017	October 25 2018	October 3 2019	October 21 2020
Miscellaneous Inorganics								
Fluoride	mg/L	1.5	MAC		0.023	0.02	<0.05	<0.05
Alkalinity (total as CaCO)	mg/L				56.6	49.6	49	48
Anions								
Dissolved Sulphate	mg/L	500	AO		9.8	5.8	6.4	5.3
Dissolved Chloride	mg/L	250	AO		32	11	47	9.9
Nitrite	mg/L	1	MAC		<0.0050	<0.0050	<0.005	<0.005
Miscellaneous								
Apparent Colour	Colour Unit				5	<5.0	<5.0	5
Nutrients								
Total Ammonia	mg/L				<0.020	<0.020	0.058	<0.015
Physical Properties								
Conductivity	µS/cm				243	142	270	150
pH	pH	7.0:10.5	OG		7.51	7.51	7.38	**6.99**
TDS	mg/L	500	AO		170	74	160	100
Turbidity	NTU				<0.10	0.1	<0.1	0.17
Microbiological Parameters								
E.coli	MPN/100mL	<1	MAC		<1.0	<1.0	0	0
Total Coliforms	MPN/100mL	<1	MAC		<1.0	<1.0	0	0
Calculated Parameters								
Total Hardness (CaCO)	mg/L				85.2	55.4	96.8	54.8
Nitrate	mg/L	10	MAC		0.463	0.498	0.542	0.525
Elements								
Total Mercury	mg/L	0.001	MAC		<0.00001	0.0000044	<0.000002	<0.0000019
Total Metals								
Total Aluminum	mg/L	0.1	OG	<0.003	<0.003	<0.003	<0.003	<0.003
Total Antimony	mg/L	0.006	MAC	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Total Arsenic	mg/L	0.01	MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Barium	mg/L	1	MAC	<0.001	<0.001	<0.001	<0.001	<0.001
Total Beryllium	mg/L			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Bismuth	mg/L			<0.001	<0.001	<0.001	<0.001	<0.001
Total Boron	mg/L	5	MAC	<0.050	<0.050	<0.050	<0.050	<0.05
Total Cadmium	mg/L	0.005	MAC	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Total Chromium	mg/L	0.05	MAC	<0.001	<0.001	<0.001	<0.001	<0.001
Total Cobalt	mg/L			<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
Total Copper	mg/L	1	AO	0.00159	0.00368	0.00277	0.00217	0.00204
Total Iron	mg/L	0.3	AO	0.0101	0.0087	0.0154	0.0152	0.0097
Total Lead	mg/L	0.01	MAC	0.00061	0.00104	0.00073	0.00047	0.00023
Total Manganese	mg/L	0.02 0.12	AO MAC	<0.001	<0.001	<0.001	<0.001	<0.001
Total Molybdenum	mg/L			<0.001	<0.001	<0.001	<0.001	<0.001
Total Nickel	mg/L			<0.001	<0.001	<0.001	<0.001	<0.001
Total Selenium	mg/L	0.05	MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Silicon	mg/L			7.46	7.81	7.03	7.66	7.26
Total Silver	mg/L			<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Total Strontium	mg/L			0.0404	0.0651	0.0409	0.0805	0.0413
Total Thallium	mg/L			<0.00005	<0.00001	<0.00001	<0.00001	<0.00001
Total Tin	mg/L			<0.005	<0.005	<0.005	<0.005	<0.005
Total Titanium	mg/L			<0.005	<0.005	<0.005	<0.005	<0.005
Total Uranium	mg/L	0.02	MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Vanadium	mg/L			<0.005	<0.005	<0.005	<0.005	<0.005
Total Zinc	mg/L	5	AO	0.006	0.0303	0.0107	0.0083	0.0052
Total Zirconium	mg/L			<0.0005	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium	mg/L			17.5	26	16.8	29.7	16.5
Total Magnesium	mg/L			3.51	4.95	3.24	5.48	3.31
Total Potassium	mg/L			0.321	0.459	0.314	0.455	0.328
Total Sodium	mg/L	200	AO	7.2	12.1	6.41	13.6	7.06
Total Sulphur	mg/L			<3.0	<3.0	<3.0	<3.0	<3

Date	Chloride	Sodium
	(mg/L)	(mg/L)
Jun-05	7.60	6.00
Sep-05	11.90	4.50
Dec-05	8.50	4.90
Mar-06	6.60	4.90
Jun-06	5.90	5.10
Sep-06	36.00	7.00
Dec-06	55.00	6.90
Mar-07	13.60	6.30
Jun-07	9.30	5.40
Sep-07	8.10	6.30
Dec-07	6.40	5.70
Mar-08	6.50	6.54
Jun-08	7.50	5.80
Sep-08	33.10	11.40
Dec-08	15.1	6.34
Mar-09	11.40	5.77
Jun-09	11.90	5.63
Sep-09	37.30	7.87
Dec-09	20.2	6.12
Mar-10	10.7	5.41
Jun-10	8.1	6.3
Oct-10	17.8	16.4
Dec-10	11.2	4.26
Mar-11	7.4	5.64
Jun-11	7.5	5.64
Oct-11	7.5	5.87
Dec-11	5.8	5.11
Mar-12	5.8	5.15
Jun-12	6.9	5.1
Sep-12	14.3	6.4
Dec-12	10.8	5.9
Mar-13	6.8	6.1
Jun-13	6.3	6.43
Sep-13	18.5	5.15
Dec-13	9.6	5.9
Mar-14	5.5	5.1
Jun-14	8.52	5.6
Sep-14	40.8	10.8
Dec-14	21.8	6.2
Mar-15	10	5.76
Jun-15	9.8	5.86
Sep-15	21	7.52
Dec-15	12	6.87
Mar-16	7.6	5.77
Jun-16	9.8	5.85
Sep-16	23	6.97
Dec-16	8.7	5.91
Mar-17	7.5	5.5
Jun-17	11	5.94
Sep-17	14	6.25
Dec-17	9.1	5.69
Mar-18	9.5	5.22
Jun-18	10	5.61
Sep-18		5.59
Dec-18	8.4	5.78
Mar-19	7.5	4.91
Jun-19	12	7.04
Sep-19	24	7.11
Oct-19	22	6.67
Dec-19	12	5.92
Mar-20	9.1	5.71
Jun-20	10	5.38
Sep-20	9	5.5
Dec-20	7.3	5.47

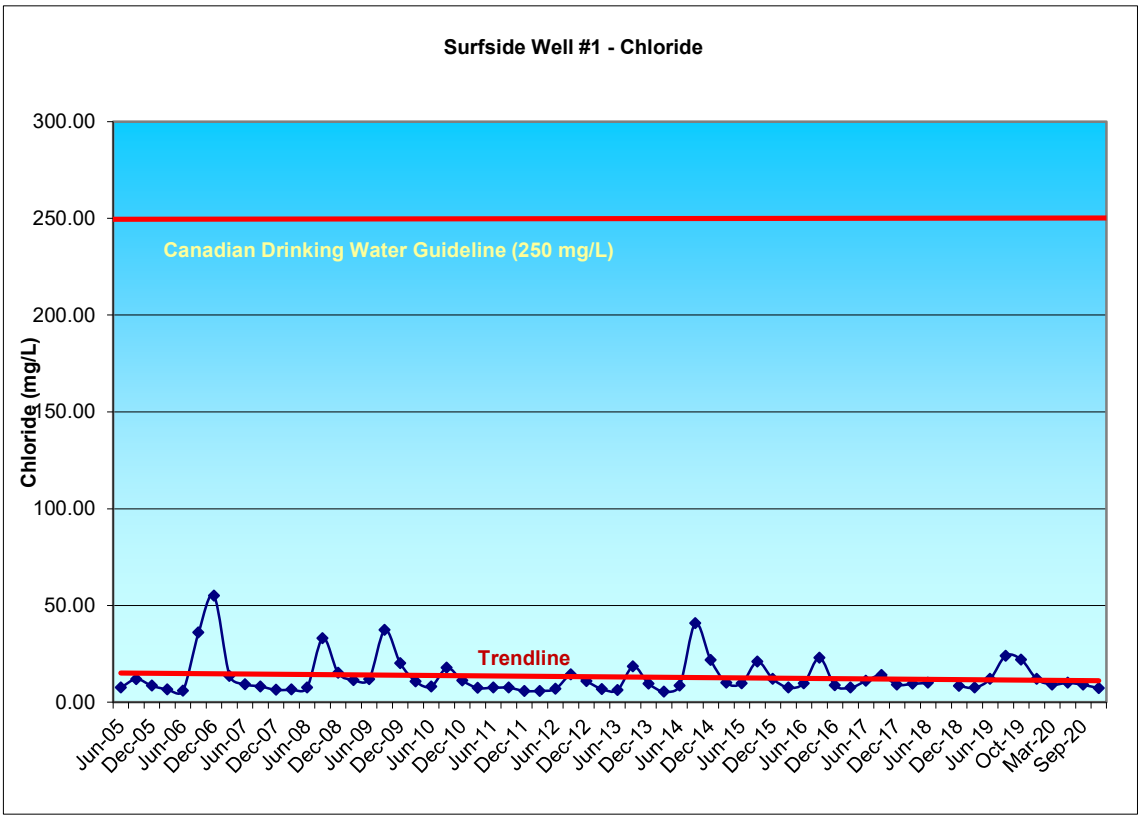
REGIONAL DISTRICT OF NANAIMO

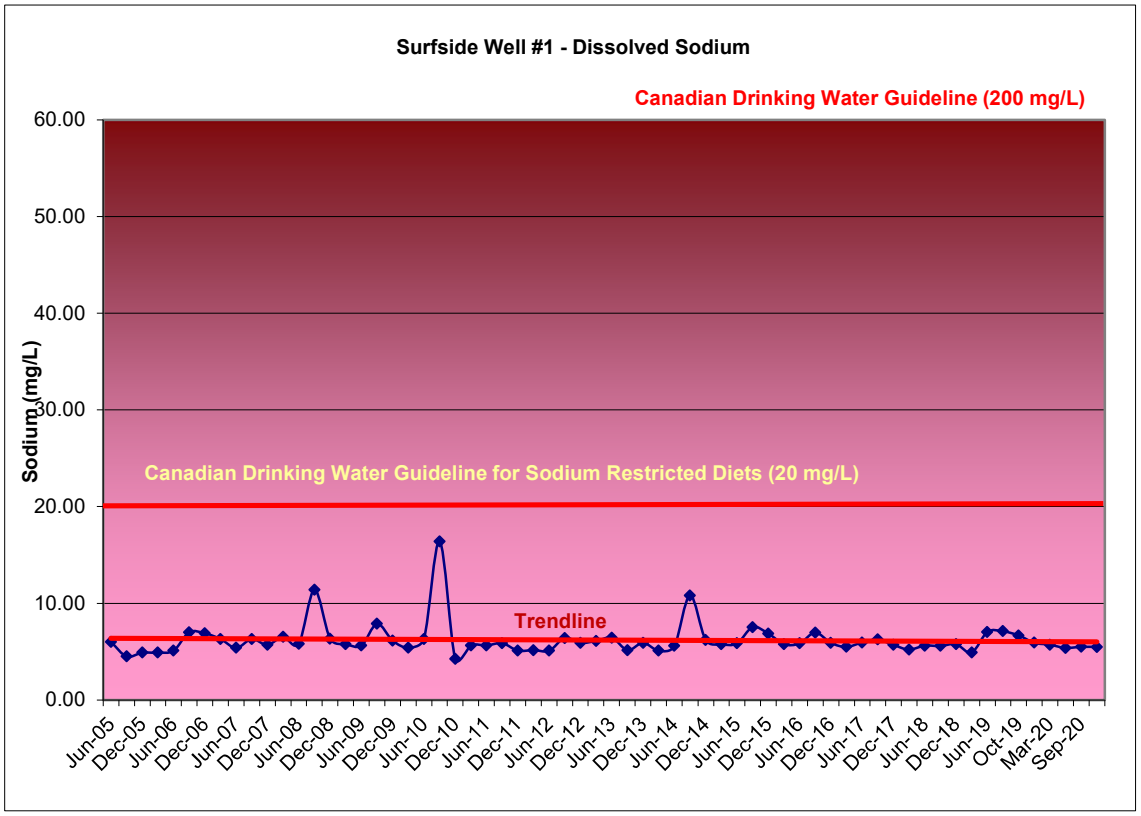
Lab Analysis - Surfside Well #1

Quarterly **Chloride - Sodium Comparison**

Chloride - CDWG = 250 mg/L

Diss. Sodium - CDWG = 200 mg/L





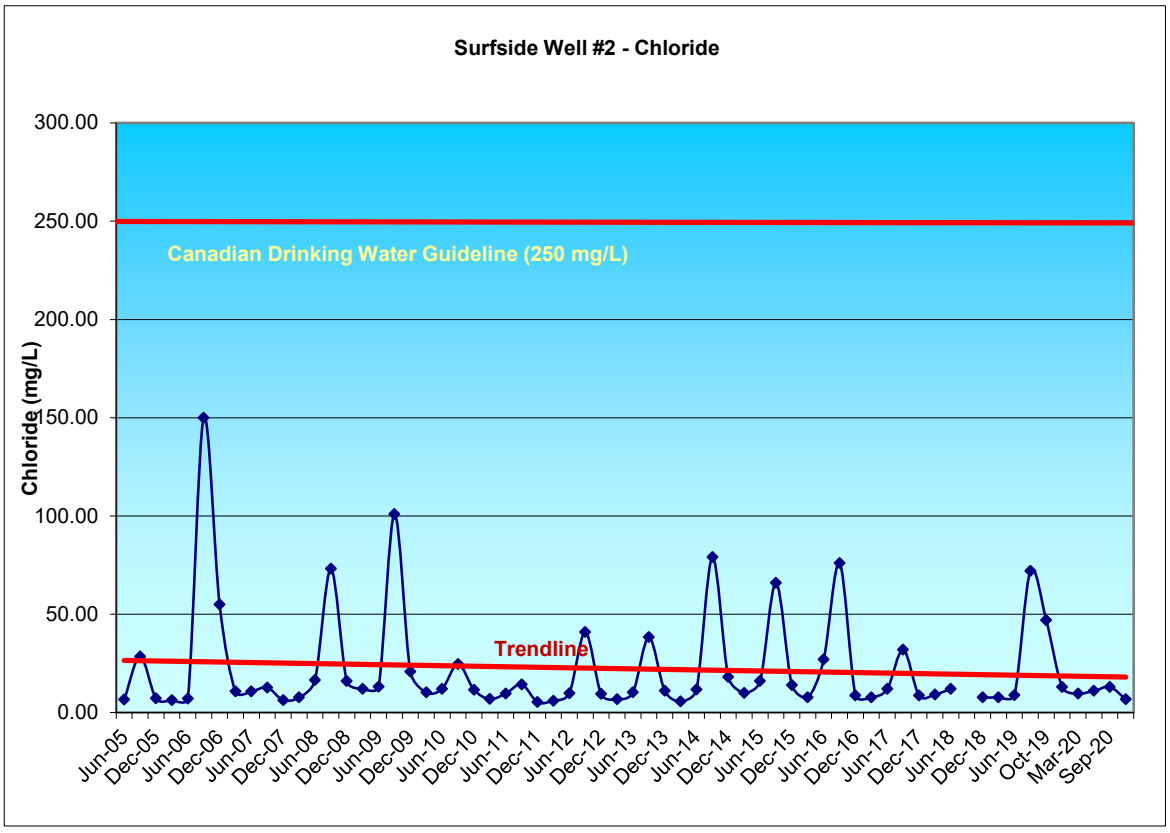
Date	Chloride	Sodium
	(mg/L)	(mg/L)
Jun-05	6.60	7.00
Sep-05	28.50	8.80
Dec-05	7.2	4.8
Mar-06	6.30	4.80
Jun-06	7.10	5.00
Sep-06	150.00	30.00
Dec-06	55.00	13.00
Mar-07	10.70	5.90
Jun-07	10.70	7.70
Sep-07	12.70	10.20
Dec-07	6.3	6.6
Mar-08	7.70	6.91
Jun-08	16.50	8.30
Sep-08	73.20	24.40
Dec-08	16	8.16
Mar-09	12.10	6.30
Jun-09	13.10	7.85
Sep-09	101.00	24.20
Dec-09	20.8	7.34
Mar-10	10.2	5.85
Jun-10	12.1	8.41
Oct-10	24.7	22.1
Dec-10	11.6	7.4
Mar-11	6.9	5.96
Jun-11	9.6	7.64
Oct-11	14.3	10.1
Dec-11	5.3	5.74
Mar-12	6	5.59
Jun-12	9.8	6.5
Sep-12	40.9	13.3
Dec-12	9.4	7.2
Mar-13	6.7	6.3
Jun-13	10.2	8.31
Sep-13	38.3	9.06
Dec-13	11.1	7.4
Mar-14	5.6	5.5
Jun-14	11.7	8.5
Sep-14	79	22.3
Dec-14	18.1	7.5
Mar-15	10	6.08
Jun-15	16	9.03
Sep-15	66	17
Dec-15	14	9.25
Mar-16	7.7	6.45
Jun-16	27	8.9
Sep-16	76	18.5
Dec-16	8.7	6.41
Mar-17	7.7	5.61
Jun-17	12	7.13
Sep-17	32	12.1
Dec-17	8.6	6.17
Mar-18	9.2	5.8
Jun-18	12	7.06
Sep-18		8.73
Dec-18	7.7	6.77
Mar-19	7.7	5.05
Jun-19	8.9	5.49
Sep-19	72	16.9
Oct-19	47	13.6
Dec-19	13	6.83
Mar-20	9.7	5.76
Jun-20	11	6.35
Sep-20	13	8.05
Dec-20	6.8	5.93

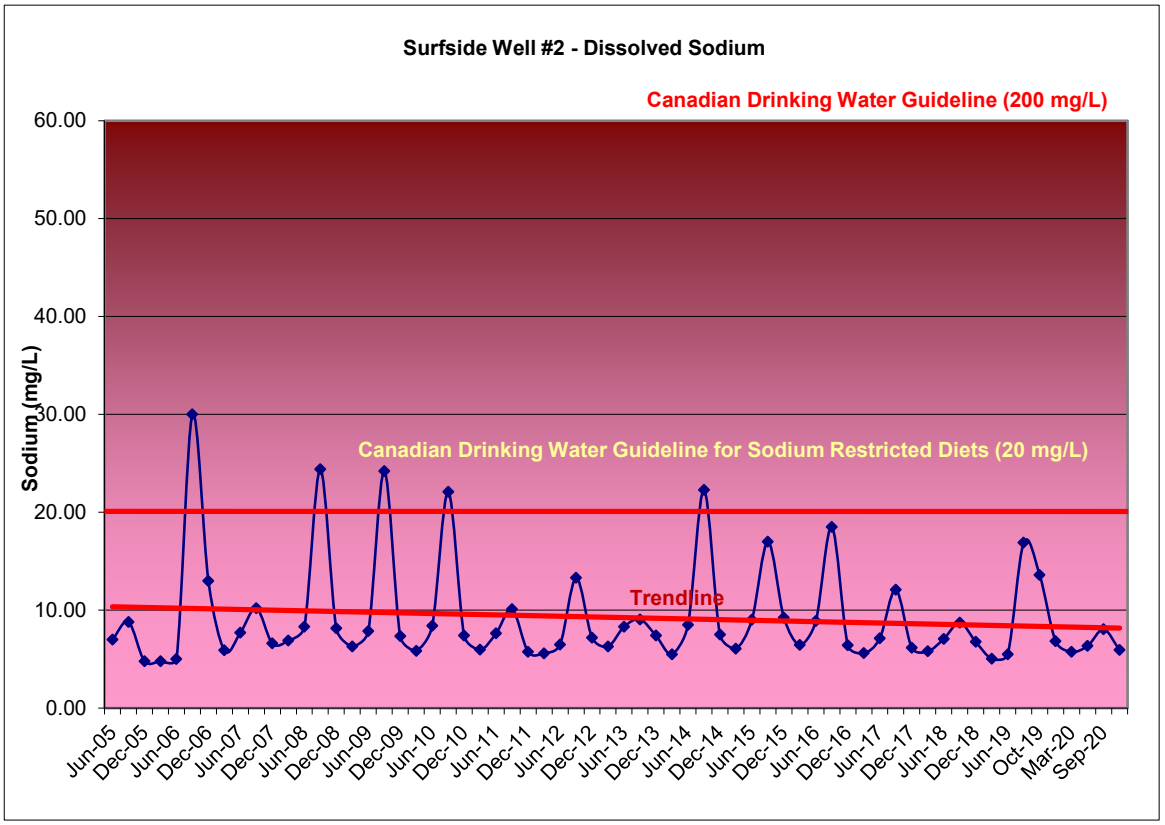
REGIONAL DISTRICT OF NANAIMO

Lab Analysis - Surfside Well #2

Quarterly **Chloride - Sodium Comparison**

Chloride - CDWG = 250 mg/L
Diss. Sodium - CDWG = 200 mg/L

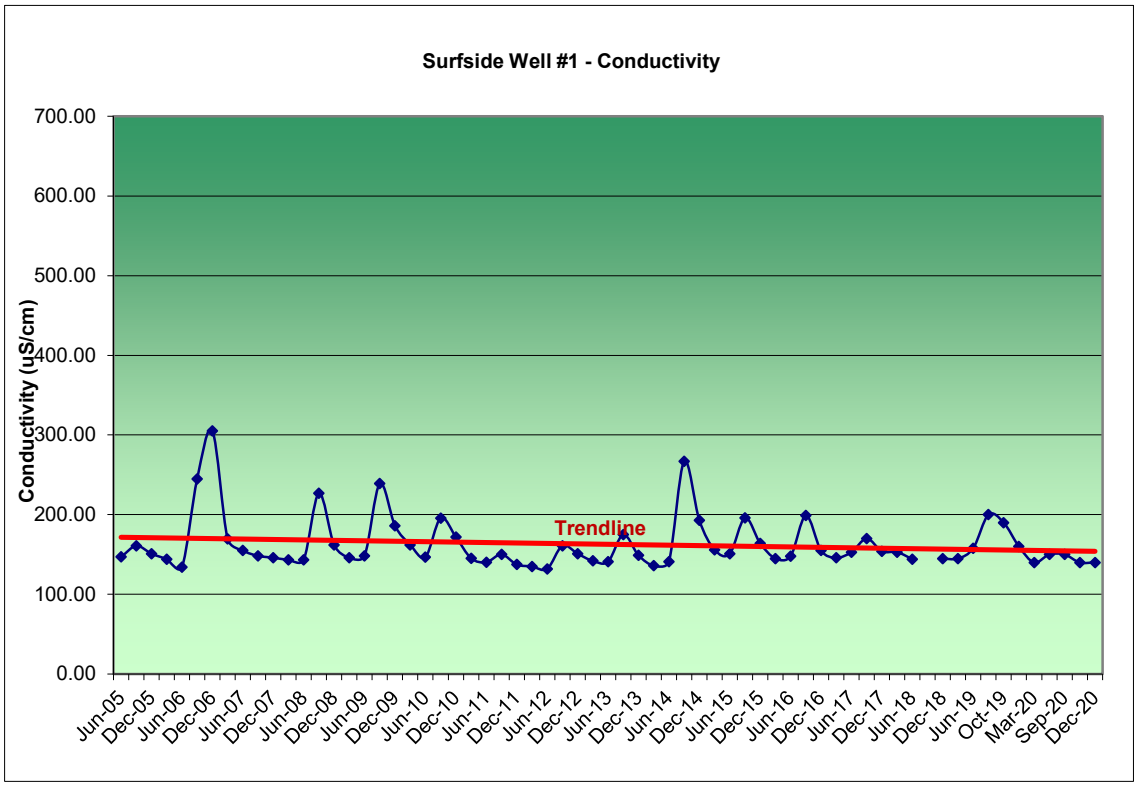


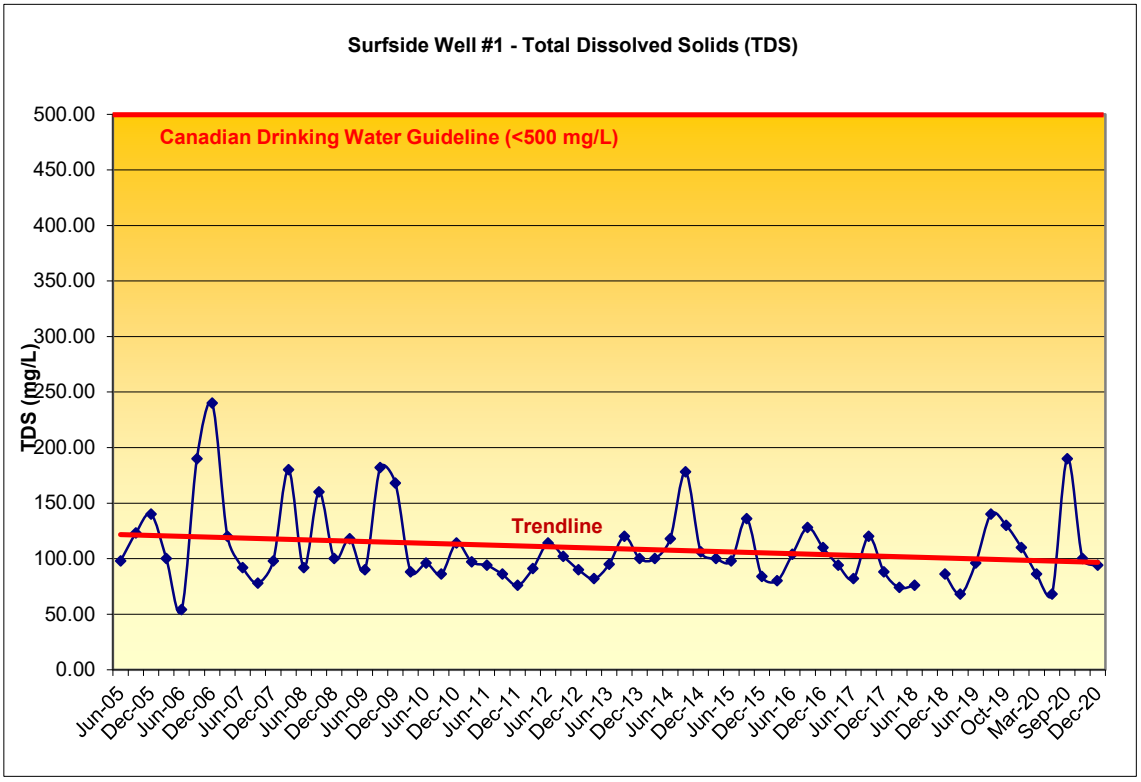


Lab Analysis - Surfside Well #1

TDS - CDWG = <500 mg/L

Date	Cond.	TDS
	(µS)	(mg/L)
Jun-05	147.00	98.00
Sep-05	160.80	123.00
Dec-05	151.00	140.00
Mar-06	144.00	100.00
Jun-06	134.10	54.00
Sep-06	245.00	190.00
Dec-06	305.00	240.00
Mar-07	169.60	120.00
Jun-07	155.00	92.00
Sep-07	148.30	78.00
Dec-07	146.00	98.00
Mar-08	143.40	180.00
Jun-08	143.40	92.00
Sep-08	227.00	160.00
Dec-08	162.00	100.00
Mar-09	146.00	118.00
Jun-09	148.40	90.00
Sep-09	239.00	182.00
Dec-09	186.1	168
Mar-10	162.2	88
Jun-10	146.9	96
Oct-10	195.7	86
Dec-10	172	114
Mar-11	145.3	97
Jun-11	140.4	94
Oct-11	150.1	86
Dec-11	137.4	76
Mar-12	135	91
Jun-12	132	114
Sep-12	161	102
Dec-12	151	90
Mar-13	142	82
Jun-13	141	95
Sep-13	175	120
Dec-13	149	100
Mar-14	136	100
Jun-14	141	118
Sep-14	267	178
Dec-14	193	106
Mar-15	156	100
Jun-15	151	98
Sep-15	196	136
Dec-15	164	84
Mar-16	145	80
Jun-16	148	104
Sep-16	199	128
Dec-16	155	110
Mar-17	146	94
Jun-17	153	82
Sep-17	170	120
Dec-17	154	88
Mar-18	153	74
Jun-18	144	76
Sep-18		
Dec-18	145	86
Mar-19	145	68
Jun-19	158	96
Sep-19	200	140
Oct-19	190	130
Dec-19	160	110
Mar-20	140	86
Jun-20	150	68
Sep-20	150	190
Oct-20	140	100
Dec-20	140	94





Lab Analysis - Surfside Well #2

TDS - CDWG = <500 mg/L

Date	Cond.	TDS
	(µS)	(mg/L)
Jun-05	137.40	95.00
Sep-05	223.00	179.00
Dec-05	139.20	80.00
Mar-06	139.80	93.00
Jun-06	135.20	84.00
Sep-06	650.00	446.00
Dec-06	315.00	220.00
Mar-07	160.80	90.00
Jun-07	158.60	110.00
Sep-07	177.00	82.00
Dec-07	139.00	92.00
Mar-08	134.10	246.00
Jun-08	180.60	118.00
Sep-08	372.00	294.00
Dec-08	164.00	288.0
Mar-09	141.00	110.00
Jun-09	154.50	90.00
Sep-09	467.00	388.00
Dec-09	185.6	134
Mar-10	156.9	80
Jun-10	162.9	106
Oct-10	222	124
Dec-10	171	94
Mar-11	140.3	94
Jun-11	146.1	98
Oct-11	185.5	96
Dec-11	130.8	68
Mar-12	127	74
Jun-12	142	170
Oct-12	259	162
Dec-12	146	90
Mar-13	137	78
Jun-13	130	87
Sep-13	244	164
Dec-13	153	104
Mar-14	127	98
Jun-14	153	98
Sep-14	407	292
Dec-14	180	98
Mar-15	151	90
Jun-15	176	106
Sep-15	348	276
Dec-15	172	84
Mar-16	140	94
Jun-16	200	136
Sep-16	377	274
Dec-16	152	116
Mar-17	143	92
Jun-17	156	78
Sep-17	243	170
Dec-17	146	80
Mar-18	144	86
Jun-18	155	90
Sep-18		
Dec-18	139	90
Mar-19	139	74
Jun-19	144	88
Sep-19	360	290
Oct-19	270	160
Dec-19	160	100
Mar-20	140	70
Jun-20	140	66
Sep-20	160	120
Oct-20	150	100
Dec-20	130	94