



REGIONAL
DISTRICT
OF NANAIMO



MADRONA

Water Local Service Area

Annual Report

2008



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Appendix A - Map of Madrona Water Local Service Area

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1. Introduction

The following annual report describes the Madrona Water Local Service Area and summarizes the water quality and production data from 2008. This report also includes a summary of inquiries and complaints, completed and proposed maintenance activities, the Emergency Response Plan, and the Cross Connection Control Program.

This report is to be submitted to the Vancouver Island Health Authority by the Spring of 2009.

2. Madrona Water System

The Madrona Water Service Area was established in 1973 and comprises an area located between Northwest Bay Road and Madrona Point on the Nanoose Peninsula. During the winter months, the water source for the Madrona Water System comes from Madrona Well #4 and Well #8 (chlorinated) located nearby. The water supply is supplemented, when required, with chlorinated water from the Fairwinds Water System. From May to October each year, the water source to Madrona is replaced by surface water from the Englishman River, which has been chlorinated. Both the groundwater and surface water sources are stored in one reservoir. A map of the Madrona Water System is provided in Appendix A for reference.

The Madrona Water System was incorporated into the boundaries of the Nanoose Bay Peninsula Water Service Area in 2005, along with six other small water systems that the RDN operates in Nanoose Bay. The RDN is currently working with the local Vancouver Island Health Authority (VIHA) to combine these seven RDN water systems under one VIHA Operating Permit, to be known as the Nanoose Bay Peninsula Water Service Area (NBPWSA).

2.1 Groundwater Wells

Three groundwater production wells are present in the Madrona Water System. Well #4 is located in Block 563 (Island Timberlands property), south of Northwest Bay Road. Well #7 is located on Northwest Bay Road near Terrien Road, and Well #8 is located on Stone Lake Drive, Nanoose Bay, B.C.

Well / Name	Well Depth	Wellhead Protection	Treated/Untreated with Chlorine
Madrona #4	52.1 m	Yes	Untreated
Madrona #7	16.9 m	Yes	Not in use (yet)
Madrona #8	17.1 m	Yes	Treated

2.2 Reservoirs

One concrete service reservoir is present in Block 563, near Northwest Bay Road, and has a capacity of 485 m³ (100,000 imperial gallons).

2.3 Distribution System

The water distribution system in Madrona is comprised of 100mm and 150mm asbestos-concrete watermains, and 150mm and 200mm PVC watermains. Fire hydrants are located throughout the system.

3. Water Sampling and Testing Program

Water sampling and testing is carried out weekly in the distribution system. 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 Total Dissolved Solids Iron, Manganese
Weekly (Health Dept. Requirement)	North Island Labs	Total, Fecal coliforms
Annual Source Water Testing	North Island Labs	Complete potability testing of each well
Annual System Water Testing	North Island Labs	Complete potability testing of distribution system

4. Water Quality - Source Water and Distribution System

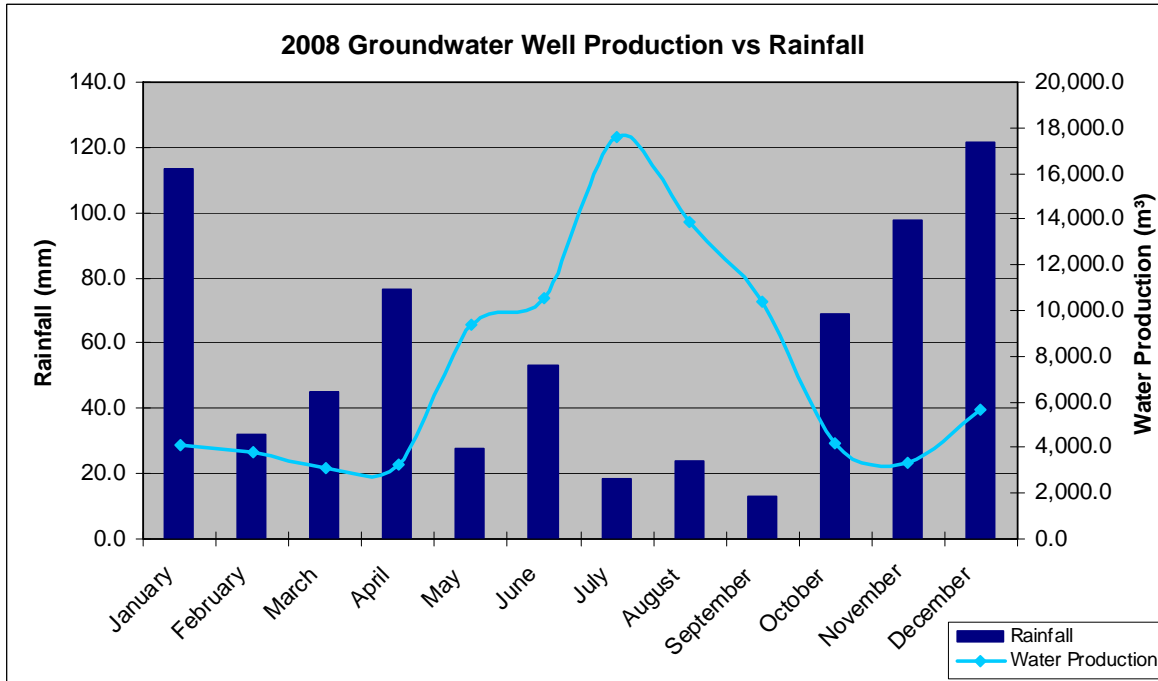
Up-to-date water quality reports and lab data are posted monthly on the RDN website at www.rdn.bc.ca in the WaterSmart section, under “Communities”. Tables of water quality testing results for both the source water and distribution system are provided at the end of this report under Appendix B.

5. Water Quality Inquiries and Complaints

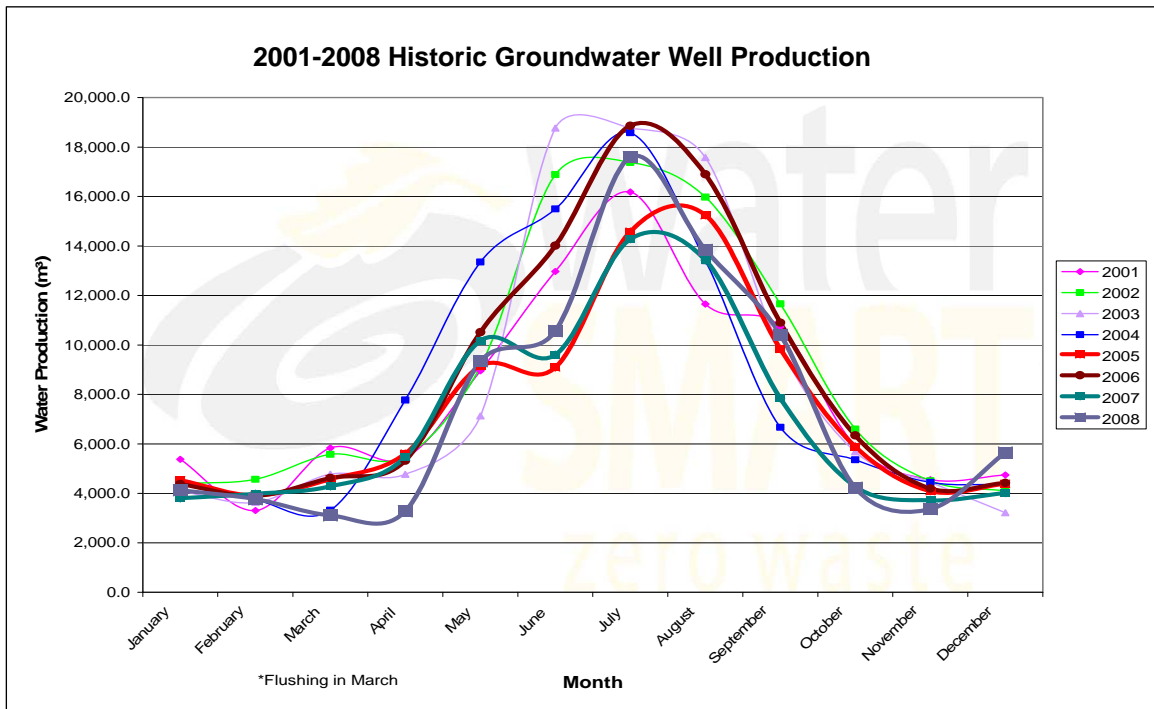
No complaints or inquiries were received from the Madrona water system in 2008.

6. Groundwater Production and Consumption

The 2008 monthly groundwater production for the Madrona Water System is shown in the chart below. There are 303 water connections in the Madrona Water System. Groundwater production has been charted against rainfall data from the City of Parksville website to show the correlation between rainfall and water consumption.



The monthly groundwater production for Madrona for the past 8 years is shown in the chart below. Groundwater production in 2008 was average in comparison to previous years.



Consumption

In the Fall/Winter of 2008, the average usage per home in Madrona was 0.49 cubic metres per day (108 imperial gallons). In the summer, the average water usage was 1.14 cubic metres per day (251 imperial gallons). Based on these figures, the annual consumption per capita is estimated to be 302 L/day. This consumption is 1.2% more than the RDN system average of 298.4 L/day/capita for 2008.

7. Maintenance Program

Regular maintenance and inspections are completed around the wellhead area to reduce or eliminate the risk of contamination and system failure. Watermains are flushed once annually in the Spring.

8. Water System Projects

8.1 2008 Completed Studies & Projects

- Completed the Nanoose Bay Peninsula Capital Plan.
- Replaced all facility signs.
- Began keyless door entry installation (card lock) at the Water Services field office, and all pumphouse sites.
- Re-keyed all gates and points of entry.
- Established electrical connections for the mobile generator at key sites.
- Completed 'B' fire hydrant maintenance.
- Completed annual watermain flushing.
- Completed a comprehensive water conservation program (**Team WaterSmart**) from May to October.
- Initiated the WaterSmart school program in partnership with Nanaimo Recycling Exchange.
- Updated and improved the RDN **WaterSmart** website.
- Updated the Emergency Response Plan.
- Expanded the Operating Procedures binder.
- Completed the SCADA (Supervisory Control and Data Acquisition) Study.
- Completed the Innovative Water Supply and Re-Use study.
- Completed the *Action for Water* referendum process.
- Achieved Backflow Prevention Tester's Certification for 3 Operations staff.
- Renewed the water supply agreement with the City of Parksville.
- Created the Auto E-Message notification sign-up on the RDN website.

8.2 2009 Proposed Projects & Upgrades

- Complete the well sequencing program to improve water quality.
- Establish the Drinking Water Protection Advisory Committee.
- Review the SCADA report and options for implementation.
- Complete the keyless door entry installations at all field sites.
- Commence the 2009 **Team WaterSmart** education program.
- Develop a rebate / incentive program.
- Develop the *Well Aware* well safety program.
- Convert one well to an observation well.
- Install a stand-alone water sampling station.

8.3 2009 Proposed Studies

- Complete the well re-development study.

9. **Emergency Response Plan**

The Emergency Response Plan (ERP) was reviewed and updated in 2008. A copy of the ERP is attached in Appendix C.

10. **Cross Connection Control**

A formalized Cross Connection Control Program was initiated in 2007. Cross connection controls in-place include dual check valves at each service connection, fire hydrant use permits, and water supply bylaws noting discontinued service if a threat to the water supply is perceived by staff.

In 2008, a review and comparison of successful cross-connection control programs in other small water systems nearby was undertaken. A database of commercial customers was set-up in order to keep track of the maintenance history of testable backflow prevention assemblies at each site. Three RDN Operations staff achieved Backflow Prevention Tester's certification.

The program in 2009 will include:

- A survey of existing and potential cross-connections,
- An audit of RDN-owned facilities in each water service area,
- The preparation of a draft bylaw to allow enforcement of the Cross Connection Control Program.

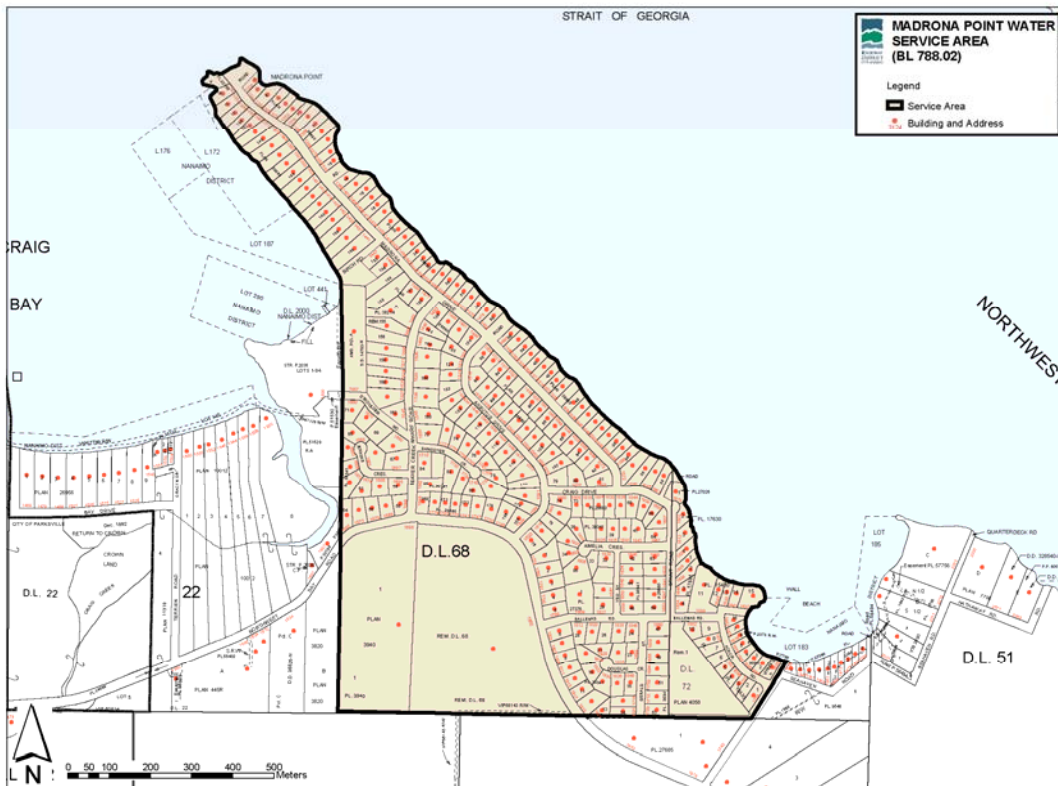
11. **Closing**

An annual report for the year 2009 will be prepared and submitted to the Vancouver Island Health Authority in the Spring of 2010. Annual reports are also available on our website at www.rdn.bc.ca in the WaterSmart section, under "Communities".

APPENIDX A

**MAP OF MADRONA
WATER LOCAL SERVICE AREA**

MADRONA WATER LOCAL SERVICE AREA



APPENDIX B

WATER QUALITY TESTING RESULTS

Distribution Potability Test Results - Madrona

(Treated Drinking Water)

Date

Test	Water Quality Guidelines				1999	2000	2001	2002	2003	2004	2005	May 17 2006 ¹	May 22 2007 ¹	May 27 2008
	Units	CDWG	BCAWQG											
Color	CU	15	</=15	AO		7	4	4	9	16	6	7	11	6
Conductivity	uS		700	MAC		300	321	324	320	357	356	55.6	62.5	339
TDS	mg/L	500	</=500	AO		191	180	173	173	233	230	53	38	214
Hardness (CaCO3)	mg/L	80-100	</=500	AO		77	124.4	29.5	37.3	51	62	21	27	110
pH	pH units	6.5-8.5	6.5-8.5	AO		8.02	7.92	8.35	8.28	8.1	7.9	6.3	6.8	7.76
Turbidity	NTU's	5	1	MAC		0.11	<.05	0.52	0.07	0.5	<0.5	0.6	<0.5	<0.5
Alkalinity	mg/L					141	131	132	136	140	140	19	21	140
Chloride	mg/L	250	</=250	AO		14.8	15.5	27.82	24.7	23.3	22.9	4.2	4.4	16.7
Fluoride	mg/L	1.5	1.5	MAC		0.07	0.09	0.16	0.1	<1.0	<1.0	<0.1	<1.0	<1.0
Sulfate	mg/L	500	</=500	AO		5.9	12.4	2.52	3.33	10.5	2.6	1.3	<2.0	6.6
Nitrate	mg/L	10	10	MAC		0.18	<.004	<.002	0.19	0.2	<0.1	0.03	<0.1	0.7
Nitrite	mg/L	1				<.002	<.002	<.006	<0.01	<0.1	<0.1	<0.01	<0.1	<0.1
T-Aluminum	mg/L		0.2	MAC		0.083	0.043	0.046	0.006	0.007	0.008	0.024	0.03	<0.05
T-Antimony	mg/L		0.006	MAC			<.006	<.006	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001
T-Arsenic	mg/L	0.025	0.025	IMAC		0.005	<.01	0.01	0.0093	0.0093	0.0069	0.0002	<0.0002	0.005
T-Barium	mg/L	1.0	1	MAC		0.012	0.014	0.0099	0.008	0.012	0.008	0.005	0.005	0.007
T-Boron	mg/L	5.0	5	MAC		0.09	0.047	0.187	0.175	0.167	0.13	0.006	0.008	0.05
T-Cadmium	mg/L	0.005				<.0002	<.0006	<.0006	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.0003
T-Calcium	mg/L					20.1	32.5	8.1	10	13.6	16	6.7	8.1	27.8
T-Chromium	mg/L	0.05	0.05	MAC		<.001	<.0009	<.0009	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.003
T-Copper	mg/L	1.0	</=1	MAC		0.008	0.001	0.004	0.007	0.082	0.004	0.013	0.01	<0.005
T-Iron	mg/L	0.3	</=0.3	AO		<.05	0.032	0.066	<0.1	0.7	0.1	<0.1	<0.1	0.12
T-Lead	mg/L	0.01	0.01	MAC		<.001	<.002	<.002	0.0003	0.0049	0.0003	0.0002	0.0003	<0.0005
T-Magnesium	mg/L		</=700	AO		7.23	10.5	2.26	3	4.2	5.4	1	1.6	8.8
T-Manganese	mg/L	0.05	</=0.05	AO		0.038	0.0964	0.0154	0.017	0.101	0.055	0.006	<0.005	0.0788
T-Mercury	mg/L	0.001	0.001	MAC		<.05	<.0001	<.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.01
T-Potassium	mg/L					1.21	1.1	1.7	1.7	1.8	2	<0.4	<0.4	1.5
T-Selenium	mg/L	0.01	0.01	MAC		<.002	0.005	<.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.003
T-Sodium	mg/L	200	</=200	AO		33.3	11.5	66.9	61.5	59.8	53.3	2.3	2.5	26.5
T-Uranium	mg/L	0.1	0.1	MAC		<.0005	<.06	<.02	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.002
T-Zinc	mg/L	5	<5	AO		<.005	0.0018	0.0053	0.002	0.006	0.007	0.006	0.015	<0.005
Total Coliform	cfu/100ml	<1	<1	cfu/100ml		<2	<1	n/a	n/a	<1	<1	<1	*12	<1.0
Fecal Coliform	cfu/100ml	<1	<1	cfu/100ml		<2	<1	n/a	n/a	<1	<1	<1	<1	
E.coli	cfu/100ml	<1	<1	cfu/100ml								<1	<1	<1.0
Tannins & Lignins						n/a	n/a	0.2	n/a	n/a	n/a	n/a	n/a	n/a
Trihalomethanes	mg/l	0.1		MAC		n/a	n/a	n/a	n/a	n/a	n/a	0.032	n/a	n/a

BCAWQG - BC approved water quality guidelines

MAC - maximum acceptable concentrations

IMAC - interim maximum acceptable concentrations

AO - aesthetic objective

Red font indicates non-compliance.

¹ Sample is Bulk Water

Note: Total coliforms can be an indicator of adverse water quality if the result in the re-sample is confirmed positive. (United States Environmental Protection Agency (EPA), 2008)

RDN water samples are always tested for Fecal coliform bacteria at the same time as Total coliforms to rule out the presence of harmful pathogens.

* Re-sampled and had <1 for all Coliforms

Madrona Well #4 Water Analysis Results

Canadian Drinking Water Guidelines Package

Red font indicates non-compliance with Canadian Drinking Water Guidelines

MAC=Maximum Acceptable Concentration.

IMAC= Interim Maximum Acceptable Concentration.

AO= Aesthetic Objective.

Parameter	Units	CDWG	BCAWQG		2002	2003	2004	2005	Oct 24 2006	Oct 23 2007	Oct 23 2008
Color	CU	15	<=15	AO	8	13	6	5	<5	8	7
Conductivity	µS		700	MAC	275	363	357	340	311	339	338
Total Dissolved Solids	mg/L	500	<=500	AO	127	207	220	280	200	207	228
Hardness (CaCO3)	mg/L	80-100	<=500	AO	37.2	30	28	25	27	30	33
pH	pH units	6.5-8.5	6.5-8.5	AO	8.50	8.48	8.7	8.50	8.4	8.34	8.64
Turbidity	NTU's	5	1	MAC	0.10	0.41	<0.5	<0.5	0.6	<0.5	<0.5
Alkalinity	mg/L				126	160	140	140	130	130	130
Chloride	mg/L	250	<=250	AO	15.35	22.6	23.9	20.5	17.1	19.1	21.3
Fluoride	mg/L	1.5	1.5	MAC	0.13	<0.6	<1.0	<1.0	<1.0	<1.0	1.3
Sulfate	mg/L	500	<=500	AO	1.90	1.70	<2	4.80	3.6	4.5	5
Nitrate (N)	mg/L	10	10	MAC	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrite (N)	mg/L	1			<0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
T-Aluminum	mg/L		0.2	MAC	0.024	<0.005	0.017	<0.005	0.027	0.007	<0.005
T-Antimony	mg/L		0.006	MAC	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	<0.0002
T-Arsenic	mg/L	0.025	0.025	IMAC	0.0103	0.0106	0.0113	0.0099	0.0089	0.0088	0.0089
T-Barium	mg/L	1.0	1	MAC	0.010	0.011	0.011	0.010	0.009	0.01	0.009
T-Boron	mg/L	5.0	5	MAC	0.119	0.185	0.212	0.192	0.16	0.18	0.171
T-Cadmium	mg/L	0.005			<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.00001	<0.00001
T-Calcium	mg/L				10.3	8.1	<0.2	6.6	7.5	7.9	8.61
T-Chromium	mg/L	0.05	0.05	MAC	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.0005	<0.0004
T-Copper	mg/L	1.0	<=1	MAC	0.002	0.002	0.004	<0.001	<0.002	<0.001	<0.001
T-Iron	mg/L	0.3	<=0.3	AO	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.02
T-Lead	mg/L	0.01	0.01	MAC	0.0002	0.0004	0.0016	0.0002	<0.0002	<0.0001	0.0002
T-Magnesium	mg/L		<=700	AO	2.8	2.3	2.4	2	2.1	2.4	2.77
T-Manganese	mg/L	0.05	<=0.05	AO	0.030	0.015	0.018	0.012	0.02	0.013	0.0138
T-Mercury	mg/L	0.001	0.001	MAC	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.01
T-Potassium	mg/L				1.5	1.4	1.6	1.4	1.5	1.6	1.6
T-Selenium	mg/L	0.01	0.01	MAC	<0.0002	<0.0002	0.0009	<0.0002	<0.0004	0.0002	<0.0006
T-Sodium	mg/L	200	<=200	AO	48.8	63.1	70.9	68.5	57.1	62.4	63
T-Uranium	mg/L	0.1	0.1	MAC	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.0005	<0.0004
T-Zinc	mg/L	5	<5	AO	0.014	0.003	0.034	0.014	0.028	0.006	0.01
Total Coliforms	cfu/100ml	<1	<1	cfu/100ml			<1	<1	<1	<1	<1
Fecal Coliforms	cfu/100ml	<1	<1	cfu/100ml			<1	<1	<1	<1	<1
E.coli	cfu/100ml	<1	<1	cfu/100ml					<1	<1	<1

Madrona Well #7 Water Analysis Results

Canadian Drinking Water Guidelines Package

Red font indicates non-compliance with Canadian Drinking Water Guidelines

MAC=Maximum Acceptable Concentration.

IMAC= Interim Maximum Acceptable Concentration.

AO= Aesthetic Objective.

Parameter	Units	CDWG	BCAWQG		Oct 23 2008	2009	2010	2011	2012	2013	2014
Color	CU	15	<=15	AO	<5						
Conductivity	µS		700	MAC	331						
Total Dissolved Solids	mg/L	500	<=500	AO	208						
Hardness (CaCO3)	mg/L	80-100	<=500	AO	140						
pH	pH units	6.5-8.5	6.5-8.5	AO	8.22						
Turbidity	NTU's	5	1	MAC	<0.5						
Alkalinity	mg/L				160						
Chloride	mg/L	250	<=250	AO	7.9						
Fluoride	mg/L	1.5	1.5	MAC	1.6						
Sulfate	mg/L	500	<=500	AO	6.60						
Nitrate (N)	mg/L	10	10	MAC	<.01						
Nitrite (N)	mg/L	1			<.01						
T-Aluminum	mg/L		0.2	MAC	<0.005						
T-Antimony	mg/L		0.006	MAC	<0.0002						
T-Arsenic	mg/L	0.025	0.025	IMAC	0.0029						
T-Barium	mg/L	1.0	1	MAC	0.014						
T-Boron	mg/L	5.0	5	MAC	0.051						
T-Cadmium	mg/L	0.005			<0.00001						
T-Calcium	mg/L				35						
T-Chromium	mg/L	0.05	0.05	MAC	<0.0004						
T-Copper	mg/L	1.0	<=1	MAC	0.003						
T-Iron	mg/L	0.3	<=0.3	AO	<0.02						
T-Lead	mg/L	0.01	0.01	MAC	0.0006						
T-Magnesium	mg/L		<=700	AO	12.6						
T-Manganese	mg/L	0.05	<=0.05	AO	0.107						
T-Mercury	mg/L	0.001	0.001	MAC	<0.01						
T-Potassium	mg/L				1.4						
T-Selenium	mg/L	0.01	0.01	MAC	<0.0006						
T-Sodium	mg/L	200	<=200	AO	20.5						
T-Uranium	mg/L	0.1	0.1	MAC	<0.0004						
T-Zinc	mg/L	5	<5	AO	0.016						
Total Coliforms	cfu/100ml	<1	<1	cfu/100ml	<1						
Fecal Coliforms	cfu/100ml	<1	<1	cfu/100ml	<1						
E.coli	cfu/100ml	<1	<1	cfu/100ml	<1						

Madrona Well #8 Water Analysis Results
Canadian Drinking Water Guidelines Package

Red font indicates non-compliance with Canadian Drinking Water Guidelines

MAC=Maximum Acceptable Concentration.

IMAC= Interim Maximum Acceptable Concentration.

AO= Aesthetic Objective.

Parameter	Units	CDWG	BCAWQG		Oct 23 2008	2009	2010	2011	2012	2013	2014
Color	CU	15	<=15	AO	<5						
Conductivity	µS		700	MAC	325						
Total Dissolved Solids	mg/L	500	<=500	AO	222						
Hardness (CaCO3)	mg/L	80-100	<=500	AO	160						
pH	pH units	6.5-8.5	6.5-8.5	AO	8.17						
Turbidity	NTU's	5	1	MAC	<0.5						
Alkalinity	mg/L				140						
Chloride	mg/L	250	<=250	AO	10.3						
Fluoride	mg/L	1.5	1.5	MAC	1.7						
Sulfate	mg/L	500	<=500	AO	10.80						
Nitrate (N)	mg/L	10	10	MAC	1.4						
Nitrite (N)	mg/L	1			<0.1						
T-Aluminum	mg/L		0.2	MAC	<0.005						
T-Antimony	mg/L		0.006	MAC	<0.0002						
T-Arsenic	mg/L	0.025	0.025	IMAC	0.0016						
T-Barium	mg/L	1.0	1	MAC	0.007						
T-Boron	mg/L	5.0	5	MAC	0.016						
T-Cadmium	mg/L	0.005			<0.00001						
T-Calcium	mg/L				44.3						
T-Chromium	mg/L	0.05	0.05	MAC	0.0007						
T-Copper	mg/L	1.0	<=1	MAC	0.006						
T-Iron	mg/L	0.3	<=0.3	AO	<0.02						
T-Lead	mg/L	0.01	0.01	MAC	0.0004						
T-Magnesium	mg/L		<=700	AO	12.7						
T-Manganese	mg/L	0.05	<=0.05	AO	0.000						
T-Mercury	mg/L	0.001	0.001	MAC	<0.01						
T-Potassium	mg/L				0.7						
T-Selenium	mg/L	0.01	0.01	MAC	<0.0006						
T-Sodium	mg/L	200	<=200	AO	7.8						
T-Uranium	mg/L	0.1	0.1	MAC	<0.0004						
T-Zinc	mg/L	5	<5	AO	0.008						
Total Coliforms	cfu/100ml	<1	<1	cfu/100ml	<1						
Fecal Coliforms	cfu/100ml	<1	<1	cfu/100ml	<1						
E.coli	cfu/100ml	<1	<1	cfu/100ml	<1						



Regional District of Nanaimo - Utilities Department

Madrona Water Analysis - Monthly Report



Date	Sample Location (Address)	Fecal Coli * Health Dep	Total Coli * Health Dep	Total Coli RDN	E Coli RDN	Temp ° C	pH	Cl ₂ ppm	TDS ppm	Sal %	Cond uS/cm	Fe ppm	Mn ppm
08-Jan	1358 Madrona Dr	0	0	0	0	8	7.1	0.02	160	0.2	337	0.01	0.008
15-Jan	1819 NW Bay Rd	0	0	0	0	8	7.4	0.02	143	0.1	308		
22-Jan	1566 Arbutus Dr	0	0			7	7.1	0.02	143	0.1	311		
	Average	0	0	0	0	7.7	7.2	0.02	148.7	0.1	318.7	0.01	0.008
	Maximum	0	0	0	0	8	7.4	0.02	160	0.2	337	0.01	0.008
	Minimum	0	0	0	0	7	7.1	0.02	143	0.1	308	0.01	0.008

Red font indicates non-compliance with Canadian Drinking Water Guidelines / BC Approved Water Quality Guidelines

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

* Yellow Column Coliform tests are done by Health Department

Green 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 - Utilities Department

Madrona Water Analysis - Monthly Report



Date	Sample Location (Address)	Fecal Coli * Health Dep	Total Coli * Health Dep	Total Coli RDN	E Coli RDN	Temp ° C	pH	Cl ₂ ppm	TDS ppm	Sal %	Cond uS/cm	Fe ppm	Mn ppm
Feb-08													
05-Feb	1819 NW Bay Rd	0	0	0	0	8	7.4	0.05	143	0.1	308	0.01	0.007
12-Feb	1358 Madrona Dr	0	0	0	0	7	7.2	0.03	156	0.2	333		
20-Feb	1566 Arbutus Dr	0	0	0	0	8	6.9	0.05	166	0.2	352		
26-Feb	1819 NW Bay Rd			0	0	9	7.3	0.06	149	0.1	316		
	Average	0	0	0	0	8.0	7.2	0.05	153.5	0.2	327.3	0.01	0.007
	Maximum	0	0	0	0	9	7.4	0.06	166	0.2	352	0.01	0.007
	Minimum	0	0	0	0	7	6.9	0.03	143	0.1	308	0.01	0.007

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Comments:

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Regional District of Nanaimo - Utilities Department

Madrona Water Analysis - Monthly Report



Date	Sample Location (Address)	Fecal Coli * Health Dep	Total Coli * Health Dep	Total Coli RDN	E Coli RDN	Temp ° C	pH	Cl ₂ ppm	TDS ppm	Sal %	Cond uS/cm	Fe ppm	Mn ppm
04-Mar	1566 Arbutus Dr	0	0	0	0	8	7	0.23	132	0.1	279	0.04	0.009
12-Mar	1819 NW Bay Rd	0	0	0	0	10	6.9	0.21	140	0.1	294		
18-Mar	1358 Madrona Dr	0	0	0	0	9	7	0.04	151	0.2	321		
26-Mar	1819 NW Bay Rd					9	7	0.05	135	0.1	290		
Average		0	0	0	0	9.0	7.0	0.13	139.5	0.1	296.0	0.04	0.009
Maximum		0	0	0	0	10	7	0.23	151	0.2	321	0.04	0.009
Minimum		0	0	0	0	8	6.9	0.04	132	0.1	279	0.04	0.009

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

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Comments:

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



Regional District of Nanaimo - Utilities Department

Madrona Water Analysis - Monthly Report



Date Apr-08	Sample Location (Address)	Fecal Coli * Health Dep	Total Coli * Health Dep	Total Coli RDN	E Coli RDN	Temp ° C	pH	Cl ₂ ppm	TDS ppm	Sal %	Cond uS/cm	Fe ppm	Mn ppm
02-Apr	1819 NW Bay Rd	0	0	0	0	10	6.9	0.9	134	0.1	284	0.02	
08-Apr	1566 Arbutus Dr	0	0	0	0	9	7	0.03	140	0.1	299		
15-Apr	1358 Madrona Dr	0	0	0	0	10	6.9	0.04	150	0.1	317		0.013
22-Apr	1819 NW Bay Rd			0	0	10	7	0.99	141	0.1	298		
	Average	0	0	0	0	9.8	7.0	0.49	141.3	0.1	299.5	0.02	0.013
	Maximum	0	0	0	0	10	7	0.99	150	0.1	317	0.02	0.013
	Minimum	0	0	0	0	9	6.9	0.03	134	0.1	284	0.02	0.013

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

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Green 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 - Utilities Department

Madrona Water Analysis - Monthly Report



Date May-08	Sample Location (Address)	Fecal Coli * Health Dep	Total Coli * Health Dep	Total Coli RDN	E Coli RDN	Temp ° C	pH	Cl ₂ ppm	TDS ppm	Sal %	Cond uS/cm	Fe ppm	Mn ppm
06-May	1819 NW Bay Rd	0	0	0	0	11	7.3	0.09	149	0.1	314	0.02	0.011
21-May	1566 Arbutus Dr	0	0	0	0	12	6.8	0.06	156	0.2	327		
27-May	1358 Madrona Dr	0	0	0	0	13	6.9	0.09	150	0.1	315		
	Average	0	0	0	0	12.0	7.0	0.08	151.7	0.1	318.7	0.02	0.011
	Maximum	0	0	0	0	13	7.3	0.09	156	0.2	327	0.02	0.011
	Minimum	0	0	0	0	11	6.8	0.06	149	0.1	314	0.02	0.011

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

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Comments:

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Regional District of Nanaimo - Utilities Department

Madrona Water Analysis - Monthly Report



Date Jun-08	Sample Location (Address)	Fecal Coli * Health Dep	Total Coli * Health Dep	Total Coli RDN	E Coli RDN	Temp ° C	pH	Cl ₂ ppm	TDS ppm	Sal %	Cond uS/cm	Fe ppm	Mn ppm
04-Jun	1819 NW Bay Rd	0	0	0	0	12	7.1	0.08	144	0.1	303	0.01	0.012
11-Jun	1566 Arbutus Dr	0	0	0	0	14	6.7	0.06	61	0.1	128		
17-Jun	1358 Madrona Dr	0	0	0	0	14	6.7	0.03	54	0.1	115		
24-Jun	1819 NW Bay Rd			0	0	13	7.1	0.03	140	0.1	293		
	Average	0	0	0	0	13.3	6.9	0.05	99.8	0.1	209.8	0.01	0.012
	Maximum	0	0	0	0	14	7.1	0.08	144	0.1	303	0.01	0.012
	Minimum	0	0	0	0	12	6.7	0.03	54	0.1	115	0.01	0.012

Red font indicates non-compliance with Canadian Drinking Water Guidelines / BC Approved Water Quality Guidelines

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

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Green 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 - Utilities Department

Madrona Water Analysis - Monthly Report



Date Jul-08	Sample Location (Address)	Fecal Coli * Health Dep	Total Coli * Health Dep	Total Coli RDN	E Coli RDN	Temp ° C	pH	Cl ₂ ppm	TDS ppm	Sal %	Cond uS/cm	Fe ppm	Mn ppm
02-Jul	1819 NW Bay Rd	0	0										
09-Jul	1566 Arbutus Dr	0	0	0	0	16	6.7	0.05	56	0.1	119	0.13	0.024
15-Jul	1358 Madrona Dr	0	0	0	0	17	6.8	0.04	64	0.1	135		
22-Jul	1819 NW Bay Rd			0	0	14	6.9	0.06	143	0.1	298	0.02	0.015
29-Jul	1566 Arbutus Dr			0	0	18	6.7	0.03	72	0.1	151	0.04	0.015
	Average	0	0	0	0	16.3	6.8	0.05	83.8	0.1	175.8	0.06	0.018
	Maximum	0	0	0	0	18	6.9	0.06	143	0.1	298	0.13	0.024
	Minimum	0	0	0	0	14	6.7	0.03	56	0.1	119	0.02	0.015

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

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Comments:

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



Regional District of Nanaimo - Utilities Department

Madrona Water Analysis - Monthly Report



Date Aug-08	Sample Location (Address)	Fecal Coli * Health Dep	Total Coli * Health Dep	Total Coli RDN	E Coli RDN	Temp ° C	pH	Cl ₂ ppm	TDS ppm	Sal %	Cond uS/cm	Fe ppm	Mn ppm
06-Aug	1819 NW Bay Rd	0	0	0	0	13	7	0.08	146	0.1	307	0.02	0
12-Aug	1358 Madrona Dr	0	0	0	0	18	6.7	0.03	71	0.1	149	0.02	0.012
19-Aug	1566 Arbutus	0	0	0	0	19	6.6	0.11	60	0.1	127.9	0.03	0.001
26-Aug	1819 NW Bay Rd			0	0	15	7	0.01	149	0.1	313		0.008
	Average	0	0	0	0	16.3	6.8	0.06	106.5	0.1	224.2	0.02	0.0053
	Maximum	0	0	0	0	19	7	0.11	149	0.1	313	0.03	0.012
	Minimum	0	0	0	0	13	6.6	0.01	60	0.1	127.9	0.02	0

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

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Comments:

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



Regional District of Nanaimo - Utilities Department

Madrona Water Analysis - Monthly Report



Date Sep-08	Sample Location (Address)	Fecal Coli * Health Dep	Total Coli * Health Dep	Total Coli RDN	E Coli RDN	Temp ° C	pH	Cl ₂ ppm	TDS ppm	Sal %	Cond uS/cm	Fe ppm	Mn ppm
03-Sep	1358 Madrona	0	0										
09-Sep	1819 NW Bay	0	0										
16-Sep	1566 Arbutus	0	0	0	0	16	6.6	0.09	43	0	91	0.14	0.021
	Average	0	0	0	0	16.0	6.6	0.09	43.0	0.0	91.0	0.14	0.021
	Maximum	0	0	0	0	16	6.6	0.09	43	0	91	0.14	0.021
	Minimum	0	0	0	0	16	6.6	0.09	43	0	91	0.14	0.021

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

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Comments:

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Regional District of Nanaimo - Utilities Department

Madrona Water Analysis - Monthly Report



Date Oct-08	Sample Location (Address)	Fecal Coli * Health Dep	Total Coli * Health Dep	Total Coli RDN	E Coli RDN	Temp ° C	pH	Cl ₂ ppm	TDS ppm	Sal %	Cond uS/cm	Fe ppm	Mn ppm
07-Oct	1819 NW Bay Rd	0	0	0	0	14	7.1	0.04	149	0.1	314	0.03	0.017
15-Oct	1358 Madrona Dr	0	0	0	0	12	6.9	0.05	93	0.1	196		
21-Oct	1566 Arbutus Dr	0	0	0	0	13	7	0.16	121	0.1	256		
29-Oct	1819 NW Bay Rd			0	0	12	7	0.51	150	0.1	315		
	Average	0	0	0	0	12.8	7.0	0.19	128.3	0.1	270.3	0.03	0.017
	Maximum	0	0	0	0	14	7.1	0.51	150	0.1	315	0.03	0.017
	Minimum	0	0	0	0	12	6.9	0.04	93	0.1	196	0.03	0.017

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Comments:

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



Regional District of Nanaimo - Utilities Department

Madrona Water Analysis - Monthly Report



Date Nov-08	Sample Location (Address)	Fecal Coli * Health Dep	Total Coli * Health Dep	Total Coli RDN	E Coli RDN	Temp ° C	pH	Cl ₂ ppm	TDS ppm	Sal %	Cond uS/cm	Fe ppm	Mn ppm
04-Nov	1819 NW Bay Rd	0	0	0	0	11	7.3	0.22	150	0.1	317	0.01	0.007
12-Nov	1566 Arbutus Dr	0	0	0	0	12	7.1	0.05	155	0.2	327		
18-Nov	1358 Madrona Dr	0	0	0	0	12	6.8	0.07	161	0.2	339		
25-Nov	1819 NW Bay Rd			0	0	10	7.2	0.14	148	0.1	313		
	Average	0	0	0	0	11.3	7.1	0.12	153.5	0.2	324.0	0.01	0.007
	Maximum	0	0	0	0	12	7.3	0.22	161	0.2	339	0.01	0.007
	Minimum	0	0	0	0	10	6.8	0.05	148	0.1	313	0.01	0.007

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Comments:

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



Regional District of Nanaimo - Utilities Department

Madrona Water Analysis - Monthly Report



Date	Sample Location (Address)	Fecal Coli * Health Dep	Total Coli * Health Dep	Total Coli RDN	E Coli RDN	Temp ° C	pH	Cl ₂ ppm	TDS ppm	Sal %	Cond uS/cm	Fe ppm	Mn ppm
02-Dec	1819 NW Bay Rd	0	0	0	0	10	7	0.17	149	0.1	315	0.02	0.011
09-Dec	1566 Arbutus Dr	0	0	0	0	10	6.8	0.09	163	0.2	344		
16-Dec	1358 Madrona Dr	0	0										
	Average	0	0	0	0	10.0	6.9	0.13	156.0	0.2	329.5	0.02	0.011
	Maximum	0	0	0	0	10	7	0.17	163	0.2	344	0.02	0.011
	Minimum	0	0	0	0	10	6.8	0.09	149	0.1	315	0.02	0.011

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APPENDIX C

EMERGENCY RESPONSE PLAN

* Emergency Response Plan not included in Public Copy.