

Annual Water Quality Report



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front cover photograph location: *‘Mid Town’ water supply pipeline installation on Northfield Road*

## 1. INTRODUCTION

The City of Nanaimo (City) continually strives to provide high quality drinking water to its citizens through responsible operation, monitoring, evaluation and management of its water system.

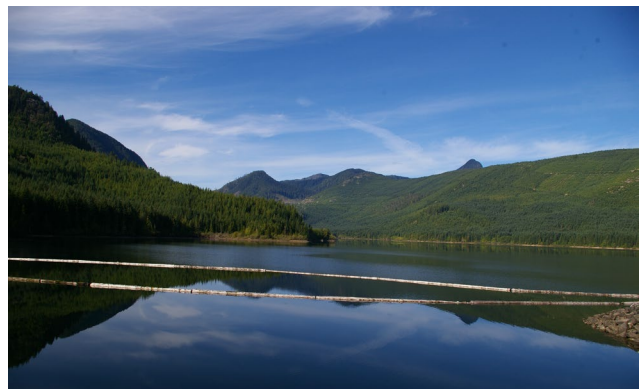
Under the British Columbia Drinking Water Protection Act all water purveyors are required to provide customers (the public) with an annual report on the quality of their drinking water.

This annual report covers the period from January 1, 2023 to December 31, 2023.

The City operates its water system under Water Licences for Jump Creek dam and for South Fork dam issued by the British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD).

## 2. CITY OF NANAIMO - DRINKING WATER SYSTEM

The City's water system originates in a large protected watershed area at the headwaters of the south fork of the Nanaimo River. There are two dams in the watershed which capture precipitation and supply raw water to the City of Nanaimo's South Fork Water Treatment Plant. After treatment, clean potable water is then supplied to the City of Nanaimo, Snuneymuxw First Nation and South West Extension Water District.

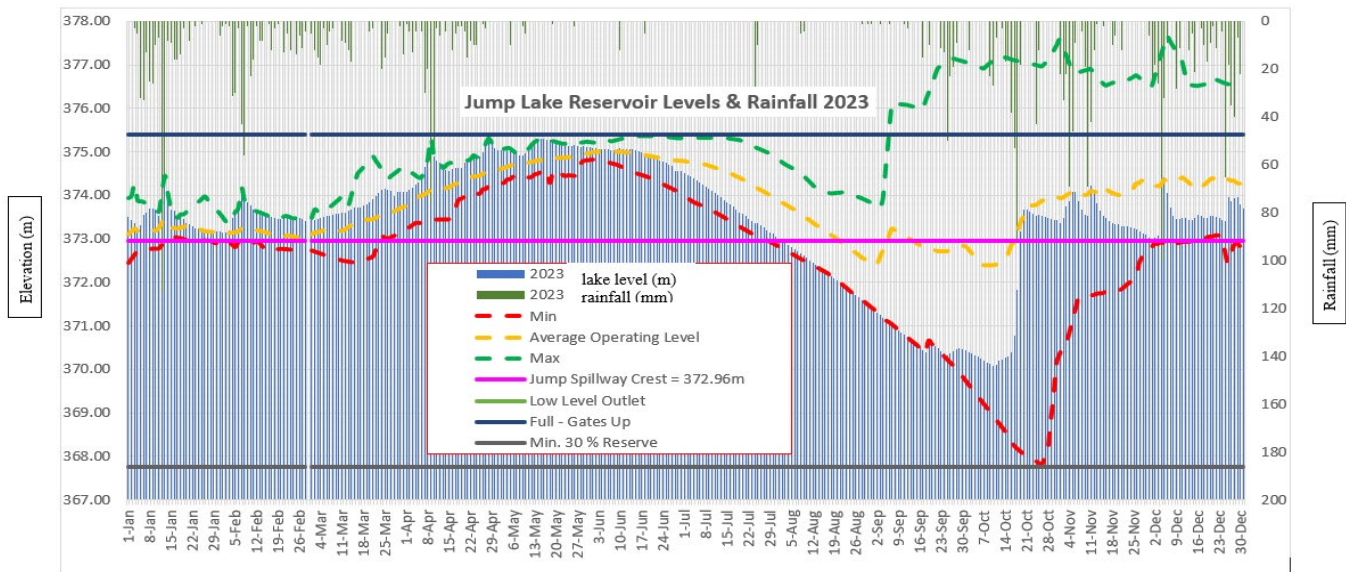


Jump Creek Reservoir

The City can also provide an emergency water supply to Lantzville and North Cedar Improvement District if required.

The watershed catchment area is approximately 230 km<sup>2</sup>, and the land within the watershed is owned by Mosaic Forest Management. The watershed is co-managed with the City and Mosaic and many policies and regulations have been put in place to protect the water quality.

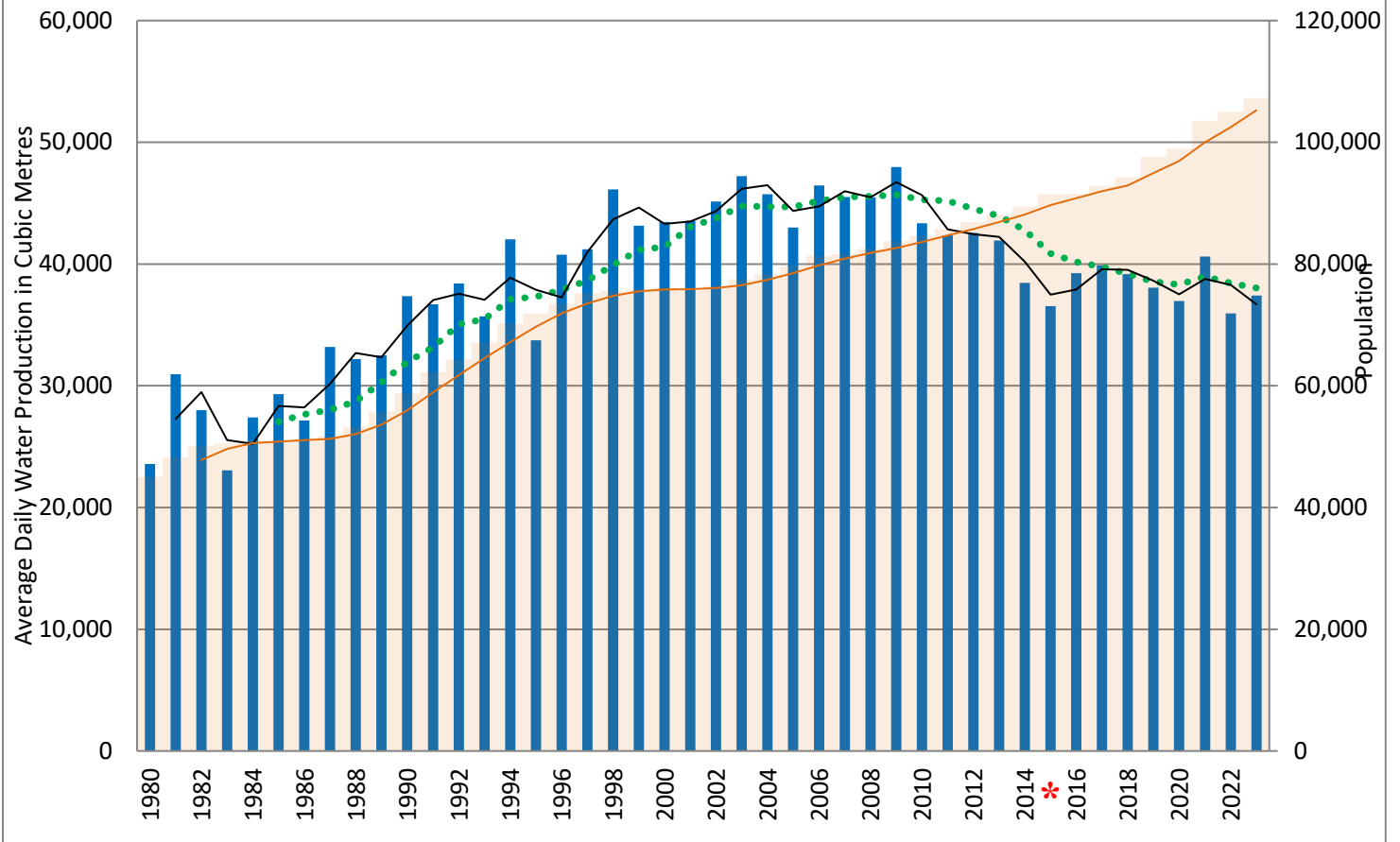
The majority of the watershed's surface water is collected and stored at Jump Creek Dam that impounds approximately 17,000 million litres (ML) of live storage. A second dam, South Fork Dam, is located 9km downstream of Jump Creek Dam and this dam impounds approximately 2,000 ML of raw surface water.



From South Fork Dam the raw water is transported to the South Fork Water Treatment Plant via two parallel pipelines 750 mm and 1200 mm diameter. The treatment plant has the ability to treat and supply peak day flows of 116 ML per day.

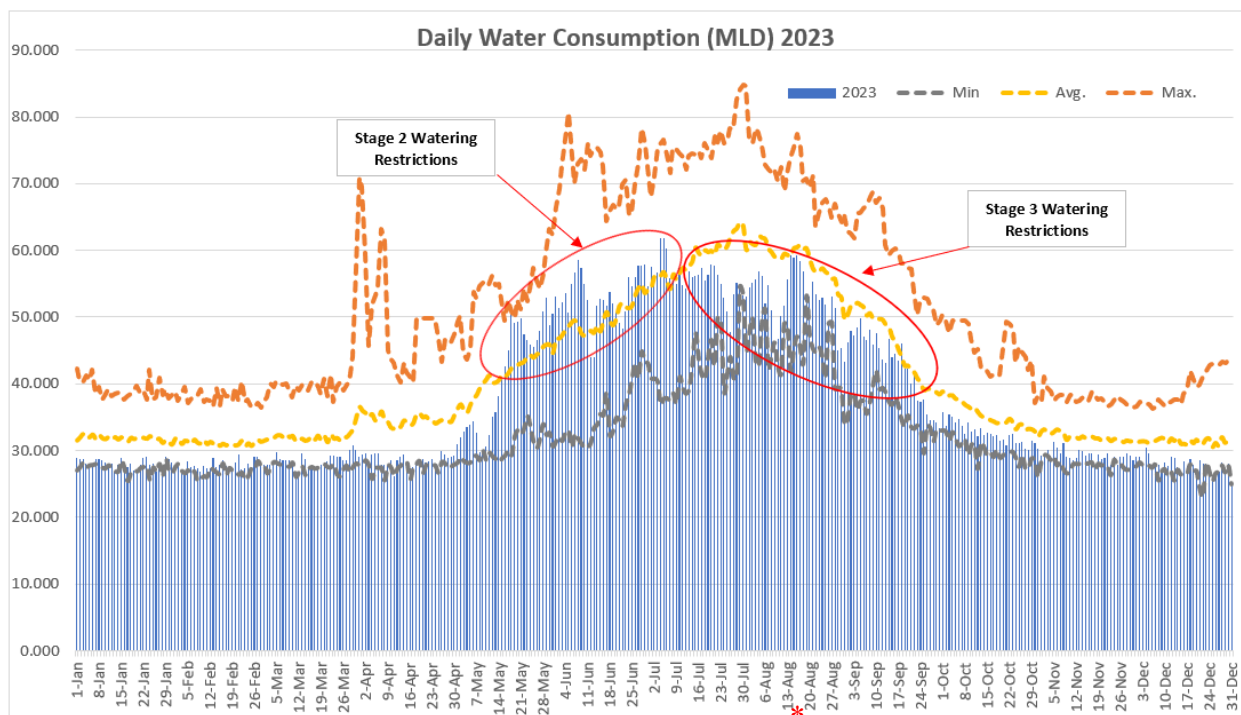
After treatment, the potable water is then distributed through approximately 30 kilometres of secondary supply pipelines to 9 balancing tanks located throughout the City. These tanks collectively contain approximately 50 ML of *treated storage* and act to maintain system pressures during peak hour flows and to provide water for emergency fire flows. The City used up to 61.8 million litres per day during peak summer flows in 2023. Peak hour flows can exceed the daily average flows by two times and are supplied from the tanks. The average daily flow to the City in 2023 was 38.5 ML/day, and this annual average daily flow rose slightly (+4%) compared to the previous year. A warmer and drier summer in 2023 is the rationale for the slight increase in water consumption in 2023.

### 2023 Average Daily Water Production



In the drier months (from 1<sup>st</sup> May to 30<sup>th</sup> September inclusive) to conserve more water at our dams during hot summer months, the City implements level 2 water restrictions.

Due to a warm spring and prolonged dry summer weather more stringent water restrictions (level 3) were implemented in the City in 2023 which led to enhanced conservation measures. However water production increased overall in 2023 resulting in a larger average annual daily flow.



\* additional water restrictions (level 3) in the summer of 2023

Approximately 75% of the water reaches the customer by gravity. The City also operates several pump stations that are used to supply water to higher elevations in the City or boost pressures during peak flows. The pump stations and tanks also act to give the system a safety factor for fighting fires and redundancy for possible system failures or watermain breaks.

The distribution of water from the tanks to the consumers is provided by the City of Nanaimo (and South West Extension Water District) through approximately 648 kilometres of supply and distribution watermains serving a population of approximately 108,000.

The water system facilities are monitored on a 24-hour basis. Abnormal conditions are reported to Public Works electronically and immediate action is taken to correct the condition.

### 3. REGULATORY REQUIREMENTS

The Drinking Water Protection Act is the legislation governing safe drinking water in the Province. This legislation requires that the water supplier monitors the drinking water source and distribution system to ensure compliance with the *Drinking Water Protection Regulation* and report all results to Island Health.

As a condition of its Operating Permit, the City is required to meet the following standards:

1. All water supply systems in the Island Health jurisdiction that use *surface water* will ensure a minimum level of treatment and disinfection so the following criteria are met:
  - i. 4-log reduction (99.99%) removal/ inactivation of viruses and bacteria
  - ii. 3-log reduction (99.9%) removal/ inactivation of giardia lamblia cysts and cryptosporidium oocysts

- iii. 2 log reduction (99%) removal/ inactivation of viruses
  - iv. 1 NTU turbidity (maximum) in finished water
2. The ultrafiltration primary membranes shall operate to achieve a turbidity level of less than or equal to 0.1 NTU in at least 99% of the measurements per operational filter period.
  3. The ultrafiltration secondary membranes and ultra violet disinfection system shall operate to achieve a turbidity level of less than or equal to 0.1 NTU in at least 99% of the measurements per operational filter period.
  4. The chlorine disinfection system shall ensure the 4-log reduction (99.99%) inactivation of viruses.
  5. The finished potable water produced shall meet or be lower than the concentration limits listed in the Canadian Drinking Water Regulations. There shall be no detectable *Escherichia coli* bacteria per 100 mL and no detectable total coliform bacteria per 100 mL.

**The South Fork Water Treatment Plant met and exceeded these requirements during 2023.**

#### **4. WATER QUALITY MONITORING**

Water sampling and testing is carried out regularly; at the source, at the South Fork Water Treatment Plant and throughout the water supply and distribution piping system to ensure the drinking water remains safe and meets legislated drinking water requirements.

The *Guidelines for Canadian Drinking Water Quality* are based on current, published scientific research related to health effects, aesthetic effects, and operational considerations. Health-based guidelines are established on the basis of comprehensive review of the known health effects associated with each contaminant, on exposure levels and on the availability of treatment and analytical techniques. Operational considerations are factored in when the presence of a substance may interfere with or impair a treatment process or technology (e.g. turbidity interfering with chlorination) or adversely affect drinking water infrastructure (e.g. corrosion in pipes).

In general the highest priority guidelines are those dealing with microbiological contaminants such as *bacteria*, *protozoa* and *viruses*. Any measures taken to reduce concentrations of chemical contaminants should not compromise the effectiveness of *disinfection*.

The City's *finished potable water* quality sampling and testing program has been set up in conjunction with Island Health. The program samples water quality at reservoirs, tanks, low, medium and high flow watermains, dead end watermains and various pressure zones.

Collected water samples are uniquely identified and sent to Provincially approved laboratories for testing. Test results are uploaded by the lab into WaterTrax (a water quality data management system) which provides the City with comprehensive access to all the test

results. In addition, WaterTrax incorporates a notification alert system to supply the City with information if a sample failure is detected and exceeds the stipulated standards.

At the South Fork Water Treatment Plant multiple tests are carried out by certified water treatment operators on a daily basis (as per the Canadian Drinking Water Regulations) of the raw and treated potable water and a summary of these results can be found in Appendix A of this report.

In addition, at each sample location in the water supply and distribution system a pocket chlorimeter is used by staff to determine the *free chlorine* residual which is an indicator of the effectiveness of disinfection in the distribution system. When indicators of adverse samples are found, corrective action is taken and Island Health is notified when necessary.

## 5. WATER QUALITY RESULTS

According to the Guidelines for Canadian Drinking Water Quality parameters are either health-based and listed as *Maximum Acceptable Concentrations (MAC)*, based on aesthetic considerations and listed as *Aesthetic Objectives (AO)* or established based on operational considerations and listed as *Operational Guidance Values (OG)*.

Appendix A summarizes results of the City's water quality testing and monitoring program results for 2023. Results in the tables that are preceded with '<' indicates results are below detectable limits.

### **Turbidity**

The City's water *turbidity* is continuously measured throughout the water system. customers.

As a condition of its Island Health Operating Permit, the City is required to meet the following standard:

- *A turbidity level less than or equal to 0.1 NTU in at least 99% of treated water measurements per operational filter period per month.*

## 6. WATER QUALITY CONCERNS

Occasionally the City of Nanaimo receives concerns from the public regarding the quality of their drinking water. During the course of 2023, the City received 7 such enquiries and the most common issues of concern related to water colour, smell and taste. Every individual enquiry was investigated by the City's water supply and distribution operations staff and the appropriate action was taken to resolve the appropriate water quality issue. The majority of concerns were resolved following additional flushing of the distribution main lines. In some instances, it was necessary to adjust air valves and replace broken water appurtenances. All of the concerns received last year were rectified within 24 hours of the City being notified. Despite these water quality concerns being noted, at no time is the general health of the public put at risk.



Typical examples of water quality concerns (most notably dirty water) arise as a result of the following;

- water mains flushing
- fire fighting
- water main breaks
- local construction in the area (i.e. watermain tie-ins by developers)
- a build up of algae in reservoirs in the summer months during warm weather
- reservoir turnover in early autumn when season rain commences
- garden hoses being permanently connected to external hose bib taps
- older residential property plumbing fixtures

## 7. WATER TREATMENT PLANT

The South Fork Water Treatment Plant has been operational and producing clear clean drinking water since December 2015.

South Fork Water Treatment Plant treats raw water using the following process: coarse screening, fine screening, flocculation and chemical mixing (if required), ultra membrane filtration, ultra violet irradiation (secondary membranes only) and chlorine injection.

## 8. WATER CONSUMPTION STATISTICS

The following summarizes City water consumption data for 2023.

Total volume delivered: 13,656 million litres (ML)

Population served: 108,277 (BC government statistics 2023)

Average consumption (all uses \*): 345 litres/person/day (Canadian average 401 litres/person/day)

Average residential only consumption: 190 litres/person/day

(Canadian average 223 litres/ person/day in 2021 for properties that utilize water metres)

Average daily amount: 37.41 million litres / day

Summer peak day demand: 61.81 million litres on July 4, or 577 litres/person/day

(All uses \* includes residential, commercial, industrial and institutional water demands.)

Winter minimum day demand: 24.97 million litres on December 31, or 233 litres/person/day

Statistic	Water Audit		2023
	2012	2017	
Annual Production	15,575,392 m <sup>3</sup>	13,775,700 m <sup>3</sup>	13,656,315 m <sup>3</sup>
Population (census data)	84,741	91,506	107,000
Revenue (billed from water generated)	72.00%	78.30%	N/A
Electricity Generated & Sold to BC Hydro	0 MWh	880 MWh	749 MWh
Infrastructure Leakage Index	1.54	1.13	N/A
Real Losses (leakage)	9.83%	8.27%	N/A
Apparent Losses (unauthorized consumption, meter inaccuracies & data handling errors)	438 ML	302 ML	N/A
Bulk Water Sales	84 ML	123 ML	99 ML
Length of Watermains	615 km	636 km	648 km
Number of Water Meters	24,276	26,119	27,610

## **10. MAINTENANCE AND FLUSHING PROGRAM**

Regular inspections, maintenance and water quality testing is performed weekly by certified water operators (as per the Canadian Drinking Water Regulations) to ensure optimal operation of the City's water system.

The City performs systematic flushing of the entire water supply and distribution piping system in the spring of each year. Flushing is a process of sending a rapid flow of water through the water pipes to clean them. This helps to maintain water quality by removing sediments and stagnant stale water from low points in the pipe network and at watermain dead ends. Flushing takes place in spring when the watershed lakes are full from winter rains and there typically is some snowpack on the surrounding mountains.

Flushing activities may cause a temporary discoloration of your water in your home. While the discoloration is unpleasant, it is not harmful. If this happens wait thirty to sixty minutes, then turn on your cold water taps and let them run for ten to fifteen minutes.

## **11. CROSS CONNECTION CONTROL**

In the interest of maintaining safe drinking water, the City of Nanaimo has implemented a Cross Connection Control Program. The purpose of this program (adopted on March 19, 2018) is to ensure that non-potable water cannot be introduced into the City of Nanaimo water supply system due to a backflow situation.

The Cross Connection Control Coordinator performs assessments on existing facilities to determine whether there is a potential for contaminated water to flow back into the water distribution system. Backflow prevention devices are installed to stop this possible contamination.

Backflow Prevention devices are documented and tracked to ensure they are receiving annual testing. This annual testing must be carried out by a certified Cross Connection Control Backflow Assembly Tester.

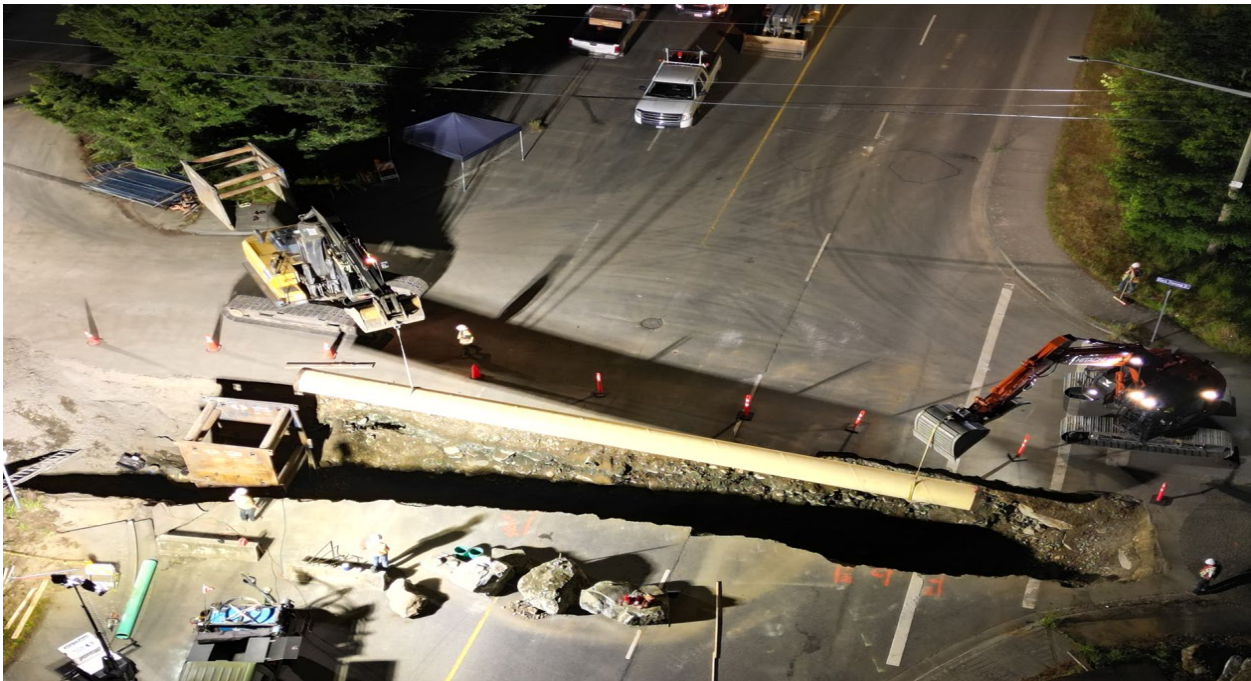
By the end of 2023 a number of industrial, commercial and institutional facilities across the city were identified as requiring backflow prevention devices installed. A total of 405 on site surveys have now been carried out and it was found that 149 of these facilities still require plumbing upgrades to conform to the cross connection control by-law.

## **12. CAPITAL IMPROVEMENTS TO THE WATER SUPPLY SYSTEM**

The significant water supply main on Bowen Road failed in April 2020 leaving many residents, businesses and the hospital without water. The critical infrastructure that is to be replaced is located under Bowen Road from Pryde Avenue to the Labieux Road roundabout.

The scope of work is to upgrade and replace the water supply system entirely in the middle of the City. The water supply system will have redundancy and flexibility which gives the City resiliency in providing the water supply for the growth projections of the City Plan and recommendations of the Water Supply Strategy as well as an adequate supply of water for emergency fire flows.

The Water Supply Capital Plan was reprioritized and the project was accelerated including the conceptual alignment review, detailed design and early contractor engagement. Two years after the failure, construction started for this multi-year significant project in 2022. Throughout 2023 new pipeline construction continued along Northfield Road, Nanaimo Parkway and East Wellington Road.



Construction of the new steel pipeline crossing in Jingle Pot Road, June 2024

### **13 AVAILABILITY OF THE REPORT**

This report may be found on the City’s website at [www.nanaimo.ca](http://www.nanaimo.ca) / Departments / Engineering/Public Works / Water Supply / Water Quality and Treatment / 2023 Water Quality Report.

If you have any questions regarding this report, please contact the staff members above.  
or e-mail: [public.worksinfo@nanaimo.ca](mailto:public.worksinfo@nanaimo.ca) phone: (250) 758-5222  
or write to us at: City of Nanaimo, Public Works, 2020 Labieux Road, Nanaimo, V9T 6J9.

## 14. APPENDIX A – ANALYTICAL TEST RESULTS

\*There were no adverse laboratory test results for the City of Nanaimo Water Resources & Supply during 2023

Analytical Test Results: (All values are reported in mg/L unless otherwise noted)

### Microbiological Parameters:

Microbiological Parameters	MAC or IMAC	No. of Samples	No. of Detectable Results	No. of Adverse Results	Method	Sampling Date	Results		Comments
							Min.	Max.	
Total Coliform (counts/100ml) *	Not Detectable	1026	1	0	Membrane Filtration	Jan - Dec	<1	1	Parameter sampled is used to test for the possible presence of fecal matter. Zero detectable test results indicates that Total Coliforms were not detected.
<i>E. Coli</i> (counts/100ml) *	Not Detectable	1026	0	0	Membrane Filtration	Jan - Dec	<1	<1	Parameter sampled is used to test for the possible presence of fecal matter. Zero detectable test results indicates that <i>E. Coli</i> was not detected.

## Operational Parameters:

Operational Parameters	MAC or IMAC	Objective AO/OG	No. of Samples	Sampling Date	Results			Comments
					Min.	Max.	Avg.	
Chlorine Residual <sup>1,2</sup> , Free (mg/L)		0.2 to 4.0	Continuous monitoring plus 1 grab sample per day	Jan - Dec	0.67	1.17	0.90	The maintenance of an adequate free chlorine residual is essential to the protection of public health. Values reported are based on the 6 daily grab samples. The regulated minimum for free chlorine residual concentration in a water distribution system is 0.2 mg/L at a pH 8.5 or less.
Chlorine Residual <sup>1</sup> , Total (mg/L)			Continuous monitoring plus 1 grab sample per day	Jan - Dec	0.70	1.33	0.96	The maintenance of an adequate total chlorine residual is essential to the protection of public health. Values reported are based on daily grab samples.
Colour (TCU)		5	1 grab samples per day	Jan - Dec	0	13	1.7	Values reported are based on daily grab samples.
pH <sup>1</sup> (no units)		6.5 – 8.5	Continuous monitoring plus 1 grab sample per day	Jan - Dec	6.97	8.11	7.46	Values reported are based on daily grab samples.
Turbidity <sup>1</sup> (NTU)	1.0		Continuous monitoring plus 1 grab sample per day	Jan - Dec	0.017	0.08	0.0427	Turbidity (cloudiness) of water is an indication of the presence of particles in the water. If excessive, it may interfere with proper disinfection. Values reported are based on daily grab samples.
Aluminum (mg/L)		0.2	1 grab sample per day	Jan - Dec	0.031	0.031	0.031	Aluminum levels are slightly elevated during treatment as a result of the use of ACH to help in the removal of particulates & dissolved organics.
UV Transmittance <sup>1</sup> (%) (UV254)			Continuous monitoring plus 1 grab sample per day	Jan - Dec	87	98.4	94.3	UV Transmittance is a direct indicator of dissolved organics in water. If values begin to drop, chlorine demand will increase which could result in elevated levels of disinfection by-products (DBP's).

Inorganic Parameters:

Inorganic Parameters		MAC or IMAC (mg/L)	Objective AO/OG	Required Frequency of Testing (months)	2023				Reportable Detection Limit (mg/L)	Comments
					Q1	Q2	Q3	Q4		
1.	Antimony	0.006		12	NT	NT	NT	0.00007	0.00002	
2.	Arsenic	0.010		12	NT	NT	NT	0.0001	0.0001	
3.	Barium	1.0		12	NT	NT	NT	0.0071	0.00001	
4.	Boron	5.0		12	NT	NT	NT	0.004	0.0002	
5.	Cadmium	0.005		12	NT	NT	NT	0.000002	0.000001	
6.	Chromium	0.05		12	NT	NT	NT	0.00007	0.00005	
7.	Mercury	0.001		12	NT	NT	NT	ND	0.00002	
8.	Selenium	0.05		12	NT	NT	NT	ND	0.001	
9.	Uranium	0.02		12	NT	NT	NT	0.00003	0.00001	

## Organic Parameters:

Organic Parameters		MAC or IMAC (mg/L)	Objective AO/OG	Required Frequency of Testing (months)	2023				Reportable Detection Limit (mg/L)	Comments
					Q1	Q2	Q3	Q4		
1.	Alachlor	0.005		12	NT	NT	NT	ND	0.00002	Herbicide
2.	Aldicarb			12	NT	NT	NT	ND	0.00001	Insecticide
3.	Aldrin + Dieldrin			12	NT	NT	NT	ND	0.00001	Insecticide
4.	Azinphos-methyl	0.02		12	NT	NT	NT	ND	0.00002	Insecticide
5.	Bendiocarb			12	NT	NT	NT	ND	0.00001	Insecticide
6.	Benzene	0.005		12	NT	NT	NT	ND	0.00032	An aromatic hydrocarbon present in gasoline
7.	Benzo(a)pyrene	0.00001		12	NT	NT	NT	ND	0.000004	A polycyclic aromatic hydrocarbon (PAH) that forms during the combustion of organic matter (e.g. emissions from burning fossil fuels)
8.	Carbaryl	0.09		12	NT	NT	NT	ND	0.00001	Insecticide
9.	Carbofuran	0.09		12	NT	NT	NT	ND	0.00001	Insecticide
10.	Carbon Tetrachloride	0.005		12	NT	NT	NT	ND	0.00016	An organic liquid that is primarily released from man-made sources; used in industrial and agricultural process
11.	Chlorpyrifos	0.09		12	NT	NT	NT	ND	0.00002	Pesticide
12.	Diazinon	0.02		12	NT	NT	NT	ND	0.00002	Insecticide
13.	1,2-Dichlorobenzene	0.2	0.003	12	NT	NT	NT	ND	0.00041	An organic compound used in both industrial and commercial products (coolant, degreaser, solvent)

Organic Parameters		MAC or IMAC (mg/L)	Objective AO/OG	Required Frequency of Testing (months)	2023				Reportable Detection Limit (mg/L)	Comments
					Q1	Q2	Q3	Q4		
14.	1,4-Dichlorobenzene	0.005	0.001	12	NT	NT	NT	ND	0.00036	An organic compound used in both industrial and commercial products (deodorizer, fungicide, lubricant)
15.	1,2-Dichloroethane	0.005		12	NT	NT	NT	ND	0.00035	An organic chemical with many industrial and commercial applications (solvent, fumigant, ingredient in plastics etc.)
16.	1,1-Dichloroethylene (vinylidene chloride)	0.014		12	NT	NT	NT	ND	0.00033	Volatile organic compound; imported for use in the food packaging and textile industries
17.	Dichloromethane (Methylene Chloride)	0.05		12	NT	NT	NT	ND	0.00035	Volatile organic compound used in a variety of industries (electronics, textiles, pharmaceuticals, plastics etc.)
18.	Diclofop-methyl	0.009		12	NT	NT	NT	ND	0.0004	Herbicide
19.	Dimethoate	0.02		12	NT	NT	NT	ND	0.00003	Insecticide
20.	Heptachlor + Heptachlor Epoxide	0.003		12	NT	NT	NT	ND	0.00001	Insecticide
21.	Lindane (Total)			12	NT	NT	NT	ND	0.00001	Pesticide
22.	Malathion	0.19		12	NT	NT	NT	ND	0.00002	Insecticide
23.	Methoxychlor			12	NT	NT	NT	ND	0.00001	Insecticide
24.	Metolachlor	0.05		12	NT	NT	NT	ND	0.00001	Herbicide
25.	Metribuzin	0.08		12	NT	NT	NT	ND	0.00002	Herbicide
26.	Parution	0.05		12	NT	NT	NT	ND	0.00002	Insecticide
27.	Pentachlorophenol	0.06		12	NT	NT	NT	ND	0.00015	An organic compound; used as a pesticide and wood preservative (manufacture and use banned since the 1980's)
28.	Phorate	0.002		12	NT	NT	NT	ND	0.00001	Insecticide



Organic Parameters	MAC or IMAC (mg/L)	Objective AO/OG	Required Frequency of Testing (months)	2023				Reportable Detection Limit (mg/L)	Comments	
				Q1	Q2	Q3	Q4			
29.	Polychlorinated Biphenyls (PCB)			12	NT	NT	NT	ND	0.00004	An organic compound; used in electrical equipment and as a fire retardant (use has been banned since the 1980's)
30.	Prometryn	0.001		12	NT	NT	NT	ND	0.00003	Herbicide
31.	Terbufos	0.001		12	NT	NT	NT	ND	0.00001	Insecticide
32.	Tetrachloroethylene (perchloroethylene)	0.030		12	NT	NT	NT	ND	0.00035	An organic compound; used as a solvent in dry cleaning and metal cleaning industries
33.	Triallate			12	NT	NT	NT	ND	0.00001	Herbicide
34.	Trichloroethylene	0.05		12	NT	NT	NT	ND	0.00044	Volatile organic compound; used in metal degreasing operations and chemical manufacturing
35.	Trifluralin	0.045		12	NT	NT	NT	ND	0.00002	Herbicide
36.	Vinyl Chloride	0.002		12	NT	NT	NT	ND	0.00017	Volatile organic compound; Used in making PVC (polyvinyl chloride) plastic items

## General Chemistry and Physical Parameters:

General Chemistry and Physical Parameters	MAC or IMAC (mg/L)	Objective AO/OG (mg/L)	Required Frequency of Testing (months)	2023				Reportable Detection Limit (mg/L)	Comments
				Q1	Q2	Q3	Q4		
Alkalinity (Total as CaCO <sub>3</sub> )		30 – 500	12	NT	NT	NT	14	2	
Chloride		250	12	NT	NT	NT	3.79	0.05	
Copper		1.0	12	NT	NT	NT	0.0009	0.0002	
Dissolved Organic Carbon (mg/L as C)		5	12	NT	NT	NT	1.2	0.1	
Ethylbenzene		0.0024	12	NT	NT	NT	ND	0.1	
Geosmin (ng/L)			NR	NT	NT	NT	NT	3.0 ng/L	Geosmin is an Organic Compound which indicates possible offensive taste & odor in drinking water
Haloacetic Acids (2450 Northfield Rd.)		0.080	3				0.0326	0.0053	The standard is expressed as a running annual average of quarterly samples measured at a point reflecting the maximum residence time in the distribution system. Running annual average: mg/L
Haloacetic Acids (3600 Place Rd.)		0.080	3				0.0301	0.0053	The standard is expressed as a running annual average of quarterly samples measured at a point reflecting the maximum residence time in the distribution system. Running annual average: mg/L
Haloacetic Acids (34 Turnabout View)		0.080	3				0.0364	0.0053	The standard is expressed as a running annual average of quarterly samples measured at a point reflecting the maximum residence time in the Running annual average: mg/L

General Chemistry and Physical Parameters	MAC or IMAC (mg/L)	Objective AO/OG (mg/L)	Required Frequency of Testing (months)	2023				Reportable Detection Limit (mg/L)	Comments
				Q1	Q2	Q3	Q4		
Haloacetic Acids (907 Yee Place)		0.080	3				0.0394	0.0053	The standard is expressed as a running annual average of quarterly samples measured at a point reflecting the maximum residence time in the distribution system. Running annual average: mg/L
Hardness (mg/L as CaCO <sub>3</sub> )			12	NT	NT	NT	13	5	
Iron		0.30	12	NT	NT	NT	0.017	0.002	
Lead	0.005		12	NT	NT	NT	0.00002	0.00001	
Manganese		0.05	12	NT	NT	NT	0.002	0.001	
2-Methylisoborneol (MIB) (ng/L)			NR	NT	NT	NT	NT	3.0 ng/L	MIB is an Organic Chemical and indicator of the presence of Algae.
Nitrate	10.0		3	NT	NT	NT	0.04	0.01	Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen)
Nitrite	1.0		3	NT	NT	NT	ND	0.01	Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen)
Sodium		20	12	NT	NT	NT	3.9	0.1	The local Medical Officer of Health must be notified when the sodium concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium-restricted diets.
Sulphate		500	12	NT	NT	NT	1.0	0.1	
Sulfide		0.05	12	NT	NT	NT	ND	0.002	

General Chemistry and Physical Parameters	MAC or IMAC (mg/L)	Objective AO/OG (mg/L)	Required Frequency of Testing (months)	2023				Reportable Detection Limit (mg/L)	Comments
				Q1	Q2	Q3	Q4		
Toluene		0.024	12	NT	NT	NT	ND	0.0002	
Total Dissolved Solids		500	12	NT	NT	NT	94	5	
Trihalomethanes (2450 Northfield Rd.)	0.100		3				0.0627	0.00037	The standard is expressed as a running annual average of quarterly samples measured at a point reflecting the maximum residence time in the distribution system. Running annual average: mg/L
Trihalomethanes (3600 Place Rd.)	0.100		3				0.0583	0.00037	The standard is expressed as a running annual average of quarterly samples measured at a point reflecting the maximum residence time in the distribution system. Running annual average: mg/L
Trihalomethanes (34 Turnabout View)	0.100		3				0.0601	0.00037	The standard is expressed as a running annual average of quarterly samples measured at a point reflecting the maximum residence time in the distribution system. Running annual average: mg/L
Trihalomethanes (907 Yee Place)	0.100		3				0.0604	0.00037	The standard is expressed as a running annual average of quarterly samples measured at a point reflecting the maximum residence time in the distribution system. Running annual average: mg/L
Xylenes		0.3	12	NT	NT	NT	ND	0.1	
Zinc		5.0	12	NT	NT	NT	0.016	0.0005	

### Discussion of Analytical Results:

\* Indicator of adverse water quality

<sup>1</sup> In addition to the analytical samples noted above, chlorine residual, pH, UV Transmittance, and turbidity are measured on a continuous basis at the treatment facility using on-line instrumentation.

NT – Not Tested

NR – Not Required

ND – Not Detected

**\*There were no adverse laboratory test results for the City of Nanaimo Water Resources & Water Supply during 2022**

**Analytical Test Results: (All values are reported in mg/L unless otherwise noted)**

## Monthly Water Quality Results:

### South Fork Water Treatment Plant

#### Monthly Summary of Water Quality, Testing and Operating Data 2023

	<u>January</u>	<u>February</u>	<u>March</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>	<u>October</u>	<u>November</u>	<u>December</u>
	q1	q1	q1	q2	q2	q2	q3	q3	q3	q4	q4	q4
<b><u>FLOW (m<sup>3</sup>)</u></b>												
Raw Water	928,308.00	827,520.00	943,882.00	900,104.00	1,385,913.00	1,648,553.00	1,789,651.00	1,678,357.00	1,310,546.00	1,000,197.00	903,046.00	887,416.00
Treated Water (To Customer)	880,725.00	784,392.00	899,389.00	877,682.00	1,354,771.00	1,635,559.00	1,781,582.00	1,670,955.00	1,305,893.00	993,645.00	892,826.00	879,490.00
Backpulse Water	6,217.46	5,697.17	10,834.71	10,711.45	11,068.50	20,646.62	22,855.89	21,537.35	16,087.03	12,451.87	13,082.69	13,082.52
Raw peak day flow - 2022	34,448.00	30,753.00	30,208.00	29,903.00	37,449.00	52,678.00	62,592.00	61,836.00	58,031.00	50,019.00	36,559.00	35,006.00
Raw peak day flow - 2023	31,939.00	31,500.00	33,317.00	32,639.00	55,179.00	64,412.00	63,961.00	60,878.00	50,805.00	36,519.00	32,088.00	31,473.00
Raw average day flow	29,945.42	29,554.29	30,447.81	30,003.47	44,706.87	54,951.77	57,730.68	54,140.55	43,684.87	33,339.90	30,101.53	28,626.32
Neutralized Discharge	1,226.80	1,142.00	1,463.50	1,604.80	1,734.30	2,038.40	1,985.40	1,981.80	1,634.50	1,794.00	2,087.70	2,067.00
Treated peak day flow (To Customer)	30,568.00	30,461.00	32,022.00	33,678.00	54,794.00	62,584.00	63,615.00	60,400.00	50,406.00	34,956.00	31,306.00	30,721.00
Treated average day flow (To Customer)	28,410.48	28,014.00	29,012.55	29,256.07	43,702.29	54,518.63	57,470.39	53,901.77	43,529.77	31,806.00	29,760.87	28,370.65
<b><u>RAW WATER (Lab Results)</u></b>												
Average pH	6.92	7.08	7.09	7.20	7.09	6.96	6.90	6.91	6.86	7.11	7.22	7.22
Average Temperature (°C)												
Average Turbidity (NTU)	0.65	0.36	0.19	0.36	0.35	0.40	0.56	0.56	0.63	0.41	0.31	0.47
Average Colour (TCU)	10.00	9.70	7.50	8.00	7.00	6.00	7.00	7.00	7.00	11.00	11.70	111.00
Average UVT (%)	84.80	87.30	86.80	87.64	88.70	90.70	90.00	90.40	90.40	85.90	84.90	84.50

	<u>January</u>	<u>February</u>	<u>March</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>	<u>October</u>	<u>November</u>	<u>December</u>
	q1	q1	q1	q2	q2	q2	q3	q3	q3	q4	q4	q4
<b><u>TREATED WATER (Lab Results)</u></b>												
Total Bacteria - number of safe samples				4	5							
Total Bacteria - number of unsafe samples				0	0							
Average Colour (TCU)	2.80	2.20	2.00	2.00	2.00	1.00	1.10	1.00	1.00	2.00	2.00	2.00
Average Free Chlorine Residual (mg/L)	0.91	0.93	0.91	0.94	0.94	0.93	0.91	0.88	0.93	0.81	0.85	0.83
Average pH	7.42	7.51	7.41	7.39	7.39	7.21	7.21	7.31	7.26	7.48	7.54	7.47
Average Turbidity (NTU)	0.038	0.046	0.033	0.047	0.035	0.034	0.041	0.045	0.048	0.048	0.052	0.059
Average UVT (%)	93.10	93.30	93.50	93.30	93.40	95.50	96.10	96.30	97.20	94.30	93.80	92.40

<b><u>POTABLE WATER (SCADA Results)</u></b>												
Free Chlorine - Min (mg/L)	0.68	0.82	0.84	0.83	0.81	0.75	0.67	0.74	0.70	0.67	0.75	0.72
Free Chlorine - Max (mg/L)	1.06	1.01	0.97	1.10	1.04	1.06	1.06	1.04	1.17	1.07	0.96	0.96
Total Chlorine - Min (Lab Results) (mg/L)	0.73	0.87	0.87	0.86	0.84	0.82	0.70	0.82	0.78	0.74	0.82	0.74
Total Chlorine - Max (Lab Results) (mg/L)	1.12	1.08	1.04	1.27	1.12	1.13	1.14	1.15	1.33	1.13	1.10	0.99
Turbidity - Max (NTU)	0.060	0.047	0.059	0.080	0.058	0.060	0.080	0.070	0.068	0.080	0.070	0.080
pH - Min	6.97	7.38	7.14	7.25	7.29	7.04	7.02	7.02	7.05	7.09	7.41	7.29
pH - Max	7.61	7.64	7.63	7.50	7.55	7.44	7.44	7.58	7.52	7.83	8.11	7.59