2021 Annual Drinking Water Quality Report
Facility No. 12-098-00001

April 19, 2022

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1.0 Introduction

The purpose of this report is to provide information on the monitoring and maintenance of the Town of Golden's water distribution system over the course of the last calendar year, as directed in the municipality's Interior Health Water System Operating Permit and mandated by the Drinking Water Protection Act.

The Drinking Water Quality Monitoring program generates data for the continuous trending of the community's water quality, as well as the performance of the entire distribution system in a reliable and systematic way. The program allows for potential health hazards to be quickly identified and corrected and for consumer enquiries to be accurately addressed in a timely manner.

Included in this document is:

- A brief introduction to the Town of Golden's water distribution system;
- 2021 consumption information;
- Drinking water monitoring and testing program information;
- A description of any major improvements made to the system within the last calendar year;
- A brief summary of planned initiatives for the current year; and,
- A summary of all water sample results collected in 2021.

The information contained herein collectively serves to confirm and verify the water system's continued performance in delivering a safe and sufficient supply of drinking water to the community.

2.0 Water Distribution System Overview

Groundwater Wells: Currently there are four production wells in operation with a rated total (100% or 24 hour) pumping capacity of 1333 Imperial Gallons per Minute (Igpm) or 101 Litres per second (Lps) providing water to a common distribution system. One well is located on the north side of the Kicking Horse River[1] and three are located on the south side. Best practices in well pump operation suggest that well pumps be designed to operate at a maximum of eighteen hours per day allowing for maintenance over the work day to occur for example. Based on this premise, the current actual total (75% or 18 hour) pumping capacity that should be relied upon is 1000 Igpm or 76 Lps.

Reservoirs: There are 5 reservoirs located at 3 distinct reservoir sites within the municipality. The total available reservoir storage capacity is 1,530,000 Igal or 6.96 Mega Litres (ML). The first site is located in the North East Bench, the second and third sites are both located on the South East Bench.

Pressure Zones: There are 4 pressure zones throughout the system. Two pressure zones service the NE Bench, one services the SE Bench and the remainder of the community comprises the fourth pressure zone.

Distribution System: Pipe sizes range from 150mm to 300mm. The pipe network includes asbestos cement (AC), polyvinylchloride (PVC), yellow jacket ductile iron (YJDI), ductile iron (DI), cast iron (CI) and polyethylene (PE) types. There are about 180 fire hydrants included in an annual spring

[1] Well 6 (located on the north side of the Kicking Horse River) is currently out of service for an undetermined period of time. Loss of Well 6 has resulted in a pumping capacity loss of about 145 Igpm/11 Lps.

and fall maintenance program. Hydrant reports are required to be forwarded on to operations staff each time a hydrant is used by the fire department. Hydrants are <u>not</u> typically used for filling tankards other than fire trucks; however occasionally select hydrants are used for the purposes of fire department training, or filling the municipal water truck and street sweeper for street cleaning purposes.

13th Street Well: This well is not connected to the distribution system. It is used for non-potable water use by the municipality as well as authorized contractors.

Potable Bulk Water Filling Station: Newly constructed in 2020. The facility serves as a potable filling station for authorized potable water haulers.

Consumption Stats:

Year	Total Pumped		Peak Day			Average Day (estimated)	
	(Igal)	Increase/Decrease Over Prior Year	Date	Volume Pumped	Increase/Decrease Over Prior Year	Volume Pumped	Increase/Decrease Over Prior Year
2012	196,502,771	5.8% decrease	Aug-17	1,075,222	4.8% increase	536,892	6.0% decrease
2013	220,261,364	12.1% increase	Aug-11	1,093,064	1.7% increase	603,056	12.3% increase
2014	228,361,075	3.7% increase	Jul-13	1,304,971	19.4% increase	625,232	3.7% increase
2015	223,125,807	2.3% decrease	Jul-05	1,325,686	1.6% increase	611,394	2.2% decrease
2016	240,422,993	7.8% increase	Aug-17	1,188,284	11.6% decrease	658,693	7.8% increase
2017	277,272,091	15.3% increase	Jul-09	1,434,451	20.7% increase	759,650	15.3% increase
2018	222,444,280	24.6% decrease	Jul-29	1,244,857	13.2% decrease	609,436	24.6% decrease
2019	213,660,331	4.1% decrease	Aug-11	1,107,329	12.4% decrease	585,371	4.1% decrease
2020	212,013,642	1.1% decrease	Aug-02	1,126,713	1.0% increase	580,859	1.0% decrease
2021	235,451,009	11.1% increase	Jun-29	1,373,824	21.9% increase	645,071	11.1% increase

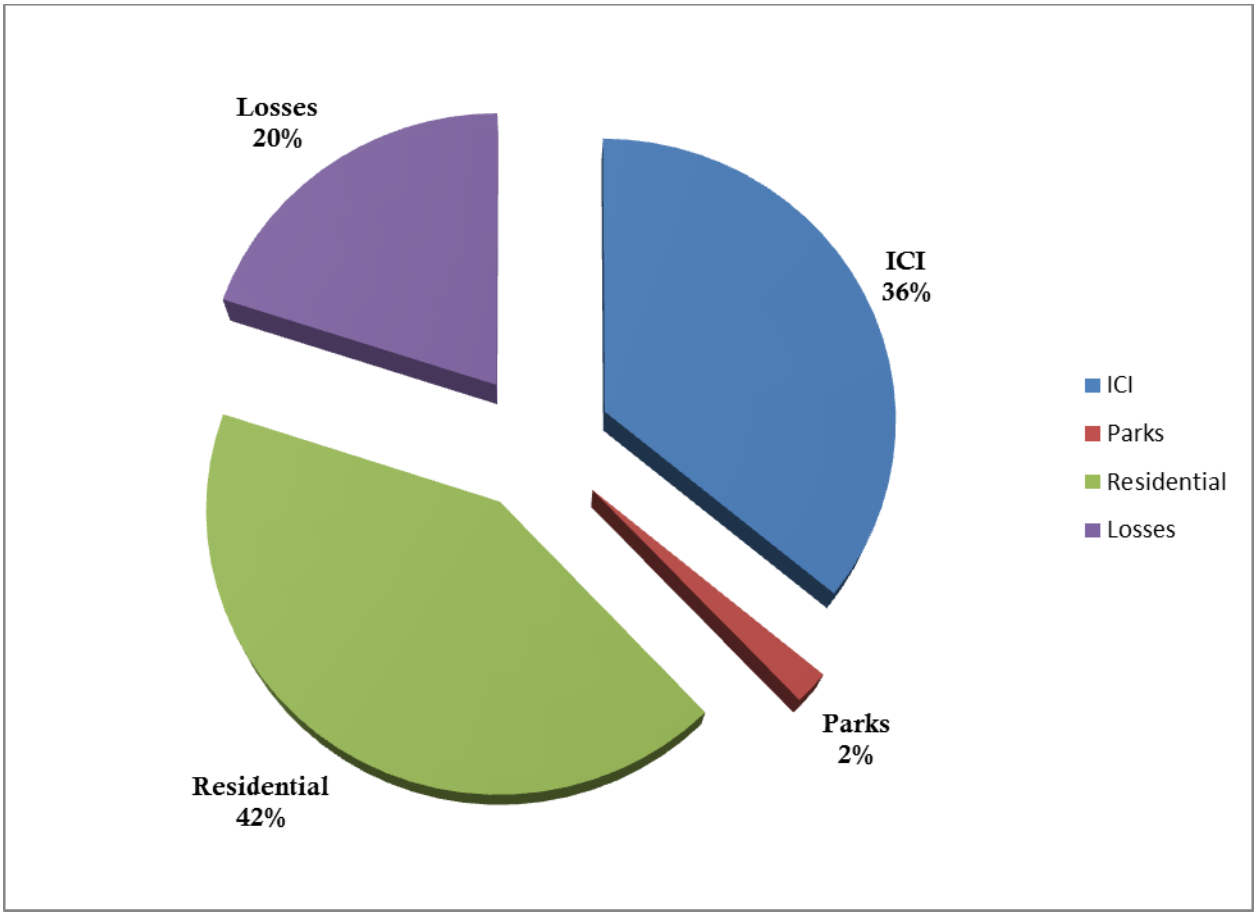
In 2021, Peak Day demand increased by 21.9%, while overall consumption increased by 11.1% from 2020. The 2021 Peak Day figure is typically assumed to be reflective of residential and municipal irrigating as extensive irrigating on a given day would be a main contributor to Peak Day consumption. Weather conditions leading up and occurring on the Peak Day are thought to be a main factor influencing this demand figure as well. In 2021 the significant increase in Peak Day demand over previous years can likely be attributed in large part to the "heat dome" experienced through much of the lower part of the province during the end of June.

In 2021, Industrial, Commercial, Institutional (ICI) demand accounted for about 35.9% of the total water pumped (in 2020 ICI demand was recorded as 38.0% of the total water pumped; overall, the 2021 ICI demand component of total water pumped decreased 2.1% as compared to 2020).

Municipal parks demand accounted for about 1.9% of the total water pumped (in 2020 municipal irrigation demand was recorded as 1.6% of the total water pumped).

The remaining portion of the total volume pumped, represented as 62.2%, is in large part residential demand; of that percentage about 20%[2] is considered attributable to leakage and other unaccounted for water usage (such as fire flow demand or municipal and contractor usage from hydrants for example). Therefore, approximately 42.2% of the total water pumped is residential demand (in 2020 residential demand was reported as being approximately 40.4% of the total water pumped; overall, 2021 residential demand is assumed to have increased by approximately 1.8%).

[2] Based on the 2021 Total Pumped volume, 20% represents about 129,014 Igpd or about 90 Igpm.



3.0 Testing and Monitoring Program

The water quality monitoring program includes source and distribution system monitoring.

Routine weekly samples are collected at each well head and at alternating reservoir sites. These samples are collected by Town of Golden staff and forwarded to a private lab for microbiological testing. Lab results along with consumption and turbidity are reported to the Public Health inspector on a monthly basis.

In 2021 a total of 229 samples were analyzed for total coliforms and E.coli. with two (2) samples testing positive with total coliform counts of one (1) or more. The TC>1 samples were related to sample sets taken from the NE Yellow Reservoir in both instances. As per schedule B of the Drinking Water Protection Act, the Town of Golden is required to analyze four (4) samples per month. To emphasize the commitment to providing safe drinking water the number of samples analyzed in 2021 averaged nineteen (19) per month.

The Town of Golden also conducts full spectrum analyses on each well source on an annual basis for physical and chemical parameters; there results are summarized in the appendix.

4.0 System Maintenance and Repairs

The Town of Golden has adopted an operations and maintenance (O&M) program that includes reservoir disinfections, draining, cleaning and inspections on an approximate 5-year cycle. In 2021,

however, all reservoirs with the exception of the Hypalon were inspected with a Remotely Operated Vehicle (ROV). Hydrant inspections and maintenance, valve exercising, and dead end main flushing occur on an annual basis.

In spring 2021, Well 5 experienced a well-pump motor Variable Frequency Drive (VFD) failure which was replaced on a priority basis.

Current and historic maintenance records are available. The Town of Golden has a GIS Mapserver which is under continuous development and is intended to be used to access maintenance information by Systems staff. All of the Town's visible water infrastructure (i.e. water main valves, fire hydrant service valves and fire hydrants) were surveyed by Global Position Satellite (GPS) and added to the mapping data base.

5.0 System Improvements and Updates

13th Street Well Investigation / Well 6 Status:

Well 6 remained non-operational in 2021.

With Council concurrence pumping-to-waste work to reduce turbidity ceased at Well 6 in favour of investigating the practicality of using the 13th Street Well as a domestic water source.

Enough hydrogeological and civil consulting work occurred in 2021 for both locations to develop options for next steps associated with regaining lost system pumping capacity.

Developed options with associated costs included:

- Next steps necessary in the continued investigation of 13th Street Well as a possible replacement source for Well 6;
- Drilling a new well at the Well 6 site and tying it into the existing well building.

Kicking Horse River Watermain Crossing:

In 2021 the Town was notified by the Province of an unsuccessful Investing in Canada Infrastructure Program funding application for construction of a second river crossing. The initiative will not be further pursued at this time.

Potable Bulk Water Filling Station:

2021 marked the first full year of operation of the potable bulk water filling station constructed to serve the needs of potable bulk water haulers and regional residents affected by the Trans-Canada Highway Phase 4 Project.

Supervisory Control and Data Acquisition (SCADA) Equipment, Radio Equipment and Programmable Logic Controller (PLC) System Upgrades:

2021 marked the second year of a five year program to undertake upgrades to all water system SCADA infrastructure including associated communications radio equipment, and PLC systems.

Above ground Pressure Reducing Valve (PRV) Station Planning:

Design work required to relocate one PRV station above ground, complete with a construction cost estimate was completed in 2021. Construction of above ground stations are identified within the current 5-year capital financial plan.

Reservoir Fall Protection Works:

Worker safety at heights above 25 feet (7.6m) was addressed in 2021 with the completion of fall restraint infrastructure on four reservoirs.

Metering/Cross Connection Control:

In 2021 work continued with the replacement of non-radio frequency (RF) compatible water meters with approximately 10 units replaced. With the exception of register head replacements, for each new install or meter replacement, cross connection control devices were also installed according to assessed cross connection hazard level. Work continues with meter updating with priority given to meters which are difficult to access or where high hazard cross connection control can be addressed along with a meter update/retrofit.

Confined Space Entry Program Update:

In 2021 a safety consultant was engaged to renew and update the Town's Confined Space Entry Program. Work includes ensuring Worksafe compliance and worker safety when entering the numerous confined spaces associated with the water distribution system. Project completion is scheduled for mid-2022.

Water Conservation Plan:

A new Water Conservation Plan was produced for Golden in 2021 replacing the recently expired Water Smart Action Plan.

Source Protection Plan:

Work continued with Golder and Associates on source protection in 2021.

Golder (now acquired by WSP) provides the annual update to the Municipal Water Supply Contingency Plan, and provides sentry well monitoring support with lab analysis data review. Golder is also available for ongoing contaminated site report reviews/guidance, as well as development reviews with groundwater resource impact potential on an as needed basis.

Emergency Response Plan (ERP):

The ERP is integral to the overarching Water Supply Contingency Plan. Both are reviewed annually with all contacts updated as necessary for delivery with this report to Interior Health.

Leak Detection Work:

One major incident requiring leak detection work involved the December 2021 fire system connection failure at Lady Grey Elementary School. System leak repairs collectively contribute towards overall measured demand reduction. This one incident represented an approximate loss of 800,000 Igal of water from the system in 2021.

6.0 Operator Education and Training

The Town of Golden has an established training program that follows Environmental Operator Certification Program (EOCP) guidelines for required training and certification maintenance. Operators maintain EOCP certifications through a variety of EOCP accredited and relevant training opportunities typically available from a variety of sources on an annual basis.

EOCP Current Certification:

Employee	*Certification #*	*Level*
Alan Taylor - Systems Chief Operator	6101	WD-III, CCC Tester
Ryan Robison – Systems Operator	1000185	WD-1, CCC Tester

7.0 Cross Connection Control (CCC)

Both Systems operators are certified tester's and carry out tests on all municipally-owned backflow assemblies. The Town of Golden currently tests and tracks 34 backflow assembly devices (all testable devices) located on various Town owned/operated facilities.

It is policy that the Town confirms the proper device for any new construction. After construction, backflow devices installed in private buildings are added to our database so that we can track and record the testing history of each assembly installed within the Town.

The Town is a client of Maintenance Training Systems (MTS) and is using their FAST software for our CCC program. More information on this software can be found at: http://www.mtsinc.ca/index.php?m=public&p=software&s=fast&v=features

In 2021 the Town of Golden advanced its CCC program and installed or replaced existing backflow devices on approximately ten (10) ICI service connections. Work continues with the CCC program with priority given to all high and prioritized medium-hazard service connections.

8.0 SCADA System

Within the Supervisory Control and Data Acquisition (SCADA) system numerous control parameters are in place allowing Town of Golden staff to make changes on an as-needed basis according to ongoing process changes. All trending is done on a daily basis and is in "real time". Trending and reporting continues to be compiled into monthly and yearly reports.

The following facilities listings itemize all currently in-place SCADA control parameters.

SE Booster Station:
Discharge flow in GPM's as well as total flow
Discharge pressure
Room temperature
Reservoir Levels
Reservoir Hatch Intrusion alarm
Booster Pump Run Times
Flood alarm

NE Booster Station:
Discharge flow in GPM's
Room Temperature
Suction Pressure
Booster Pump Run Times
Reservoir Levels
Reservoir Hatch Intrusion alarm
Discharge Pressure
Flood alarm
Generator Run Status

Well Stations:
Flow totalizers in Gallons
Pump Run Times
Distribution system Pressure Transducers in "psi" at all wells
Level Transducers at Wells 4, 5, and 6
Room Temperatures
Flood alarms
Generator Run Status (where applicable)

Bulk Water Filling Station:
No flow, valve not closing
Room temperature
Flood alarm
Intrusion alarm
Power/communication failure

9.0 Events/Emergency Response

Over the course of 2021 a major system water loss occurred due to a fire system connection failure at Lady Grey Elementary School (private infrastructure). This resulted in an emergency response from Public Works due to a resulting low reservoir alarm. The crew was able to troubleshoot the system and determine the source of water loss after about six hours. No distribution system main breaks occurred in 2021.

10.0 Recurring and 2022 Initiatives

- Continue to conduct in-house leak detection/repair work as needed;
- Continue with CCC Program and prioritize installs of back flow devices, concentrating first on those facilities with a high hazard rating. Remove and replace existing water meters with new meters that use e-coders for totalizing and billing;
- Continue with public education campaign relating to source-to-tap education, water conservation tips and tricks, education and enforcement relating to sprinkling bylaw regulations through newspaper advertising, social media and the Town website;
- Continue with school classroom visits and/or systems tours by staff – pending COVID-19 allowances;
- Pursue replacement of the damaged Well 6;
- Minor system upgrades and service repairs on an as-required basis;
- Continue to advance the Groundwater Protection Program; proceed with recommendations contained within the Groundwater Monitoring Plan, Protection Strategy, and Screening Study for Potential Groundwater at Risk of Pathogens (GARP) where and when practicable to do so;
- Continue in year three of a 5-year program of updating the current telemetry radio system and SCADA hardware and software systems;
- Complete updates to the Confined Space Entry Program;
- Renew well water meters[3];
- Solicit proposals for a multi-phased community-wide leak detection program[3].

[3] Per recommendations contained within the 2021 Water Conservation Plan Report.

11.0 Sample Analysis Results

DATE	WELLS					RESERVOIRS		
	#2	#3	#4	#5	#6	NE (yellow)	NE (green)	BEARS PAW
Jan 5	<1	<1	<1	<1	Offline	<1		<1
Jan 11	<1	<1	<1	<1			<1	<1
Jan 18	<1	<1	<1	<1		<1		<1
Feb 1	<1	<1	<1	<1			<1	<1
Feb 8	<1	<1	<1	<1		T-2 E<1		<1
Feb 22	<1	<1	<1	<1		<1		<1
Mar 1	<1	<1	<1	<1			<1	<1
Mar 8	<1	<1	<1	<1		<1		<1
Mar 15	<1	<1	Offline	<1			<1	<1
Mar 22	<1	<1	Offline	<1		<1		<1
Mar 29	<1	<1	<1	Offline			<1	<1
Apr 12	<1	<1	<1	Offline		<1		<1
Apr 26	<1	<1	<1	Offline			<1	<1
May 3	<1	<1	<1	Offline		<1		<1
May 10	<1	<1	<1	Offline			<1	<1
May 17	<1	<1	<1	<1		<1		<1
May 31	<1	<1	<1	<1			<1	<1
Jun 7	<1	<1	<1	<1		<1		<1
Jun 14	<1	<1	<1	<1			<1	<1
Jun 21	<1	<1	<1	<1		<1		<1
Jun 28	<1	<1	<1	<1			<1	<1
Jul 6	<1	<1	<1	<1		<1		<1
Jul 5	<1	<1	<1	<1			<1	<1
Jul 12	<1	<1	<1	<1		<1		<1
Jul 19	<1	<1	<1	<1			<1	<1
Aug 9	<1	<1	<1	<1		<1		<1
Aug 16	<1	<1	<1	<1			<1	<1
Aug 23	<1	<1	<1	<1		<1		<1
Aug 30	<1	<1	<1	Offline			<1	<1
Sep 13	<1	<1	<1	Offline		<1		<1
Sep 20	<1	<1	<1	Offline			<1	<1
Sep 27	<1	<1	<1	Offline		T-3 E<1		<1
Oct 4	<1	<1	<1	Offline		<1	<1	<1
Oct 18	<1	<1	<1	<1		<1		<1
Oct 25	<1	<1	<1	<1			<1	<1
Nov 1	<1	<1	<1	<1		<1		<1
Nov 8	<1	<1	<1	<1			<1	<1
Nov 22	<1	<1	<1	<1		<1		<1
Nov 29	<1	<1	<1	<1			<1	<1
Dec 6	<1	<1	<1	<1		<1		<1
Dec 13	<1	<1	<1	<1		<1		<1

12.0 Turbidity Analysis (NTU)

DATE	WELL#2	WELL#3	WELL#4	WELL#5	WELL#6
Jan 5	0.05	0.05	0.05	0.05	offline
Jan 11	0.05	0.05	0.06	0.05	
Jan 18	0.06	0.05	0.05	0.06	
Feb 8	0.06	0.05	0.06	0.06	
Mar 1	0.05	0.06	0.05	0.06	
Mar 8	0.05	0.06	0.06	0.05	
Mar 15	0.06	0.05	off	0.05	
Mar 29	0.06	0.06	0.05	off	
Apr 12	0.05	0.06	0.06	off	
Apr 26	0.06	0.05	0.07	off	
May 10	0.06	0.05	0.06	off	
May 17	0.07	0.09	0.07	0.07	
May 31	0.06	0.07	0.06	0.06	
Jun 7	0.07	0.06	0.07	0.05	
Jun 14	0.05	0.06	0.06	0.05	
Jun 21	0.06	0.06	0.07	0.07	
Jul 5	0.05	0.05	0.06	0.06	
Jul 12	0.06	0.05	0.05	0.05	
Jul 26	0.06	0.06	0.06	0.06	
Aug 9	0.06	0.06	0.06	0.05	
Aug 23	0.07	0.08	0.06	0.07	
Aug 30	0.06	0.07	0.06	0.06	
Sept 20	0.05	0.05	0.05	off	
Sept 27	0.06	0.07	0.06	off	
Oct 4	0.05	0.05	0.05	off	
Oct 18	0.06	0.05	0.05	off	
Oct 25	0.07	0.09	0.08	0.09	
Nov 8	0.05	0.05	0.08	0.05	
Nov 22	0.05	0.05	0.06	0.06	
Nov 29	0.07	0.05	0.05	0.05	
Dec 6	0.05	0.05	0.07	0.06	
Dec 13	0.08	0.06	0.06	0.07	
Average	0.06	0.06	0.06	0.06	
Hi	0.08	0.09	0.08	0.09	
Low	0.05	0.05	0.05	0.05	

13.0 Summary

The Town of Golden has worked with Interior Health Officials since 2002 to develop and maintain a water quality monitoring program that exceeds the Drinking Water Regulation. The Town will continue with this monitoring program as part of its commitment to deliver a safe potable water supply to the community.

This report will be posted on the Town of Golden's website for public information after it has been received by Council for information.

Respectfully,

Chris Cochran, AScT,
Director of Public Works

Attachment

Drinking Water Package - ALS Environmental

Well #2										
Year	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**RDL**	**Units**	**GCDWQ**
Misc. Inorganics										
Fluoride (F)	0.08	0.09	0.09	0.09	0.070	0.068	0.065	0.02	mg/L	1.5
ANIONS										
Nitrite (N)	<0.005	<0.005	<0.005	<0.010	<0.0010	<0.0010	<0.0010	0.001	mg/L	1
Calculated Parameters										
Total Hardness (CaCO3)	148	147	142		138	158	153	0.50	mg/L	
Nitrate (N)	0.27	0.25	0.24	0.21	0.22	0.209	0.222	0.005	mg/L	10
Misc. Inorganics										
Alkalinity (Total as CaCO3)	121	130	141	130	142	134	141	1.0	mg/L	
Alkalinity (PP as CaCO3)	<0.5	<0.5	<1.0	<1.0	<2.0	<2.0	<1.0	2.0	mg/L	
Bicarbonate (HCO3)	148	159	172	160	142	134	141	1.0	mg/L	
Carbonate (CO3)	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	mg/L	
Hydroxide (OH)	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	mg/L	
Anions										
Dissolved Sulphate (SO4)	16	19.8	19.7	20	18.5	18.2	16.4	0.3	mg/L	500
Dissolved Chloride (Cl)	11	9.8	8.4	11	10.4	8.08	8.75	0.5	mg/L	250
MISCELLANEOUS										
True Colour	<5	<5	<5	<2	<5	<5.0	<5.0	5.0	TCU	15
Nutrients										
Nitrate plus Nitrite (N)	0.27	0.25	0.24	0.21	0.216	0.209	0.222	0.005	mg/L	
Physical Properties										
Conductivity	312	308	314	310	303	295	306	2.0	uS/cm	
pH	8.3	8	8.2	8.2	8.15	8.11	8.09	0.1	pH Units	7.0-10.5
Physical Properties										
Total Dissolved Solids	192	186	156	200	174	189	158	20	mg/L	500
Turbidity	<0.1	0.1	0.3	<0.1	<0.1	<0.10	<0.10	0.1	NTU	1
Total Metals by Atomic Spectroscopy										
Total Aluminum (Al)	<0.003	<0.003	0.012	0.012	0.0041	0.0039	<0.0030	0.003	mg/L	0.1
Total Antimony (Sb)	<0.0005	<0.0005	<0.0005	<0.0006	<0.0001	<0.00010	<0.00010	0.0001	mg/L	0.006
Total Arsenic (As)	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.00010	<0.00010	0.0001	mg/L	0.01
Total Barium (Ba)	0.053	0.054	0.054		0.0552	0.0553	0.0572	0.0001	mg/L	1
Total Boron (B)	<0.05	<0.05	<0.05		<0.010	<0.010	<0.010	0.01	mg/L	5
Total Cadmium (Cd)	<0.00001	<0.00001	<0.00001	0.00003	<0.000005	<0.0000050	<0.0000050	0.000005	mg/L	0.005
Total Chromium (Cr)	<0.001	<0.001	<0.001	<0.001	0.00019	38.0	<0.00050	0.0001	mg/L	0.05
Total Cobalt (Co)	<0.0005	<0.0005	<0.0002	<0.0003	<0.00010	0.00018	<0.00010	0.00010	mg/L	
Total Copper (Cu)	0.001	0.0007	0.0011	0.0009	0.00112	<0.00010	0.00127	0.00050	mg/L	1
Total Iron (Fe)	<0.005	<0.005	<0.005		<0.010	0.00108	<0.010	0.010	mg/L	0.3
Total Lead (Pb)	<0.0002	<0.0002	<0.0002	<0.0002	0.000056	<0.00005	<0.000050	0.000050	mg/L	0.01
Total Manganese (Mn)	<0.001	<0.001	<0.001		<0.00010	<0.00010	<0.00010	0.00010	mg/L	0.05
Total Mercury (Hg)	<0.00001	<0.00001	<0.00001	<0.0020	<0.0000050	<0.0000050	<0.0000050	0.0000050	mg/L	0.001
Total Molybdenum (Mo)	<0.001	<0.001	<0.001	0.00076	0.000575	0.000614	0.000673	0.000050	mg/L	
Total Nickel (Ni)	<0.001	<0.001	<0.001	<0.0005	<0.00050	<0.00050	<0.00050	0.00050	mg/L	
Total Selenium (Se)	<0.0001	<0.0001	<0.0001	<0.0002	<0.000050	<0.000050	<0.000050	0.000050	mg/L	0.05
Total Silver (Ag)	<0.00002	<0.00002	<0.00002	<0.0001	<0.000010	<0.000010	<0.000010	0.000010	mg/L	
Total Uranium (U)	0.0005	0.0005	0.0005	0.00054	0.000481	0.000540	0.000511	0.000010	mg/L	0.02
Total Vanadium (V)	<0.005	<0.005	<0.005	<0.001	<0.00050	<0.00050	<0.00050	0.00050	mg/L	
Total Zinc (Zn)	<0.005	<0.005	<0.005	<0.003	<0.0030	<0.0030	<0.0030	0.0030	mg/L	5
Total Calcium (Ca)	35.7	35.4	34.9		32.7	38.0	35.9	0.050	mg/L	
Total Magnesium (Mg)	14.3	14.2	13.4		13.7	15.2	15.4	0.0050	mg/L	
Total Potassium (K)	0.56	0.54	0.55		0.562	0.535	0.572	0.050	mg/L	
Total Sodium (Na)	7.3	6.4	5.9		6.74	6.46	7.38	0.050	mg/L	200
Total Sulphur (S)	6.3	6.3	6.7		6.01	6.56	6.63	0.50	mg/L	

Maximum Acceptable Concentration
Interem Maximum Allowable Concentration
Operation Guidline
Asthetic Objective

RDL - Reported Detection Limit
mg/L - Milligrams Per Litre
TCU - True Colour Unit
mS/cm - Microsiemens Per Centimeter
NTU - Nephelometric Colour Unit

Well #3										
Year	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**RDL**	**Units**	**GCDWQ**
Misc. Inorganics										
Fluoride (F)	0.08	0.09	0.09	0.10	0.071	0.069	0.064	0.02	mg/L	1.5
ANIONS										
Nitrite (N)	<0.005	<0.005	<0.005	<0.010	<0.0010	<0.0010	<0.0010	0.001	mg/L	1
Calculated Parameters										
Total Hardness (CaCO3)	167	165	165		163	184	178	0.50	mg/L	
Nitrate (N)	0.54	0.54	0.55	0.61	0.589	0.636	0.550	0.005	mg/L	10
Misc. Inorganics										
Alkalinity (Total as CaCO3)	139	149	152	150	159	151	162	1.0	mg/L	
Alkalinity (PP as CaCO3)	1.24	<0.5	<1.0	<1.0	<2.0	<2.0	<1.0	2.0	mg/L	
Bicarbonate (HCO3)	167	182	185	180	159	151	162	1.0	mg/L	
Carbonate (CO3)	1.49	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	mg/L	
Hydroxide (OH)	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	mg/L	
Anions										
Dissolved Sulphate (SO4)	16.7	19.1	18.1	20.0	18.4	18.9	17.8	0.3	mg/L	500
Dissolved Chloride (Cl)	12	12	13	19	15.3	15.4	15.2	0.5	mg/L	250
MISCELLANEOUS										
True Colour	<5	<5	9.2	<2	<5	<5.0	<5.0	5.0	TCU	15
Nutrients										
Nitrate plus Nitrite (N)	0.54	0.54	0.55	0.61	0.589	0.636	0.550	0.005	mg/L	
Physical Properties										
Conductivity	349	346	349	360	303	347	358	2.0	uS/cm	
pH	8.3	8.1	8.3	8.1	8.20	8.18	8.10	0.1	pH Units	7.0-10.5
Physical Properties										
Total Dissolved Solids	216	182	182	220	189	181	182	20	mg/L	500
Turbidity	0.1	<0.1	0.26	<0.1	<0.1	<0.10	<0.10	0.1	NTU	1
Total Metals by Atomic Spectroscopy										
Total Aluminum (Al)	<0.003	<0.003	0.011	0.004	0.0049	0.0030	<0.0030	0.003	mg/L	0.1
Total Antimony (Sb)	<0.0005	<0.0005	<0.0005	<0.0006	<0.0001	<0.00010	<0.00010	0.0001	mg/L	0.006
Total Arsenic (As)	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.00010	<0.00010	0.0001	mg/L	0.01
Total Barium (Ba)	0.121	0.118	0.117		0.1290	0.127	0.144	0.0001	mg/L	1
Total Boron (B)	<0.05	<0.05	<0.05		<0.010	<0.010	<0.010	0.01	mg/L	5
Total Cadmium (Cd)	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.0000050	<0.0000050	0.000005	mg/L	0.005
Total Chromium (Cr)	<0.001	<0.001	<0.001	<0.0010	0.00057	0.00055	0.00050	0.0001	mg/L	0.05
Total Cobalt (Co)	<0.0005	<0.0005	<0.0002	<0.0003	<0.00010	<0.00010	<0.00010	0.00010	mg/L	
Total Copper (Cu)	0.001	0.0006	0.0009	0.0009	0.00132	0.00061	0.00097	0.00050	mg/L	1
Total Iron (Fe)	<0.005	<0.005	<0.005		<0.010	<0.010	<0.010	0.010	mg/L	0.3
Total Lead (Pb)	<0.0002	<0.0002	<0.0002	<0.0002	0.000065	<0.000050	<0.000050	0.000050	mg/L	0.01
Total Manganese (Mn)	<0.001	<0.001	<0.001		<0.00010	<0.00010	<0.00010	0.00010	mg/L	0.05
Total Mercury (Hg)	<0.00001	<0.00001	<0.00001	<0.0020	<0.0000050	<0.0000050	<0.0000050	0.0000050	mg/L	0.001
Total Molybdenum (Mo)	<0.001	<0.001	<0.001	0.001	0.000573	0.000590	0.000631	0.000050	mg/L	
Total Nickel (Ni)	<0.001	<0.001	<0.001	<0.0005	<0.00050	<0.00050	<0.00050	0.00050	mg/L	
Total Selenium (Se)	<0.0001	<0.0001	<0.0001	<0.0002	<0.000050	<0.000050	<0.000050	0.000050	mg/L	0.05
Total Silver (Ag)	<0.00002	<0.00002	<0.00002	<0.0001	<0.000010	3.16	<0.000010	0.000010	mg/L	
Total Uranium (U)	0.0007	0.0007	0.0007	0.00070	0.000656	0.000693	0.000666	0.000010	mg/L	0.02
Total Vanadium (V)	<0.005	<0.005	<0.005	0.0014	<0.00050	<0.00050	<0.00050	0.00050	mg/L	
Total Zinc (Zn)	<0.005	<0.005	<0.005	<0.003	<0.0030	<0.0030	<0.0030	0.0030	mg/L	5
Total Calcium (Ca)	33.2	31.5	31.3		30.8	34.8	33.5	0.050	mg/L	
Total Magnesium (Mg)	20.4	20.9	21.2		20.8	23.6	22.8	0.0050	mg/L	
Total Potassium (K)	0.79	0.73	0.73		0.817	0.852	0.761	0.050	mg/L	
Total Sodium (Na)	7.6	7.2	7.0		9.85	11.0	9.82	0.050	mg/L	200
Total Sulphur (S)	6.5	6.1	6.4		6.17	6.79	7.17	0.50	mg/L	

Maximum Acceptable Concentration
Interem Maximum Allowable Concentration
Operation Guidline
Asthetic Objective

RDL - Reported Detection Limit
mg/L - Milligrams Per Litre
TCU - True Colour Unit
mS/cm - Microsiemens Per Centimeter
NTU - Nephelometric Colour Unit

Well #4										
Year	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**RDL**	**Units**	**GCDWQ**
Misc. Inorganics	OFFLINE									
Fluoride (F)		0.06	0.06		0.036	0.041	0.037	0.02	mg/L	1.5
ANIONS										
Nitrite (N)		<0.005	<0.005	<0.03	<0.0010	<0.0010	<0.0010	0.001	mg/L	1
Calculated Parameters										
Total Hardness (CaCO3)		383	396		420	424	411	0.50	mg/L	
Nitrate (N)		1.44	1.64	7.8	1.76	1.75	1.73	0.005	mg/L	10
Misc. Inorganics										
Alkalinity (Total as CaCO3)		338	356	370	362	351	358	1.0	mg/L	
Alkalinity (PP as CaCO3)		<0.5	<1.0	<1.0	<2.0	<2.0	<1.0	2.0	mg/L	
Bicarbonate (HCO3)		412	434	450	362	351	358	1.0	mg/L	
Carbonate (CO3)		<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	mg/L	
Hydroxide (OH)		<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	mg/L	
Anions										
Dissolved Sulphate (SO4)		41.5	42.8	41	39.2	39.7	38.1	0.3	mg/L	500
Dissolved Chloride (Cl)		97	110	110	101.0	99.5	98.7	0.5	mg/L	250
MISCELLANEOUS										
True Colour		<5	17.3	2.2	<5	<5.0	<5.0	5.0	TCU	15
Nutrients										
Nitrate plus Nitrite (N)		1.44	1.64	1.8	1.760	1.75	1.73	0.005	mg/L	
Physical Properties										
Conductivity		959	1050	1000	968	922	984	2.0	uS/cm	
pH		7.77	8.26	7.9	7.95	8.14	8.04	0.1		7.0-10.5
Physical Properties										
Total Dissolved Solids		506	580	560	544	557	494	20	mg/L	500
Turbidity		0.15	1.03	<0.1	0.17	0.12	<0.10	0.1	NTU	1
Total Metals by Atomic Spectroscopy										
Total Aluminum (Al)		<0.003	0.010	0.0035	<0.003	<0.0030	<0.0030	0.003	mg/L	0.1
Total Antimony (Sb)		<0.0005	<0.0005	<0.0006	<0.0001	<0.00010	<0.00010	0.0001	mg/L	0.006
Total Arsenic (As)		<0.0001	<0.0001	<0.0002	<0.0001	<0.00010	<0.00010	0.0001	mg/L	0.01
Total Barium (Ba)		0.21	0.24		0.2290	0.209	0.245	0.0001	mg/L	1
Total Boron (B)		<0.05	<0.05		0.014	0.012	0.014	0.01	mg/L	5
Total Cadmium (Cd)		<0.00001	<0.00001	<0.00002	<0.000005	<0.0000050	<0.0000050	0.000005	mg/L	0.005
Total Chromium (Cr)		<0.001	<0.001	<0.001	0.00012	0.00012	<0.00050	0.0001	mg/L	0.05
Total Cobalt (Co)		<0.0005	<0.0002	<0.0003	<0.00010	<0.00010	<0.00010	0.00010	mg/L	
Total Copper (Cu)		0.0012	0.0016	0.0023	0.00654	0.00250	0.00338	0.00050	mg/L	1
Total Iron (Fe)		<0.005	<0.005		<0.010	<0.010	<0.010	0.010	mg/L	0.3
Total Lead (Pb)		<0.0002	<0.0002	<0.0002	0.000697	0.000314	0.000401	0.000050	mg/L	0.01
Total Manganese (Mn)		<0.001	<0.001		<0.00010	<0.00010	<0.00010	0.00010	mg/L	0.05
Total Mercury (Hg)		<0.00001	<0.00001	<0.0020	<0.0000050	<0.0000050	<0.0000050	0.0000050	mg/L	0.001
Total Molybdenum (Mo)		<0.001	<0.001	<0.0002	0.000243	0.000173	0.000235	0.000050	mg/L	
Total Nickel (Ni)		<0.001	<0.001	<0.0005	<0.00050	<0.00050	<0.00050	0.00050	mg/L	
Total Selenium (Se)		<0.0001	<0.0001	<0.0002	0.000101	<0.000050	0.000111	0.000050	mg/L	0.05
Total Silver (Ag)		<0.00002	<0.00002	<0.0001	<0.000010	<0.000010	<0.000010	0.000010	mg/L	
Total Uranium (U)		0.0012	0.0013	0.0014	0.00128	0.00124	0.00118	0.000010	mg/L	0.02
Total Vanadium (V)		<0.005	<0.005	0.001	<0.00050	<0.00050	<0.00050	0.00050	mg/L	
Total Zinc (Zn)		<0.005	<0.005	0.005	0.0217	0.0121	0.0143	0.0030	mg/L	5
Total Calcium (Ca)		85.4	89.7		95.1	97.8	93.1	0.050	mg/L	
Total Magnesium (Mg)		41.2	41.7		44.3	43.7	43.4	0.0050	mg/L	
Total Potassium (K)		1.89	1.96		2.02	1.89	1.91	0.050	mg/L	
Total Sodium (Na)		51.1	59.0		62.0	59.8	61.0	0.050	mg/L	200
Total Sulphur (S)		14.1	15.5		14.6	14.8	14.8	0.50	mg/L	

Maximum Acceptable Concentration
Interem Maximum Allowable Concentration
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RDL - Reported Detection Limit
mg/L - Milligrams Per Litre
TCU - True Colour Unit
mS/cm - Microsiemens Per Centimeter
NTU - Nephelometric Colour Unit

Well #5										
Year	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**RDL**	**Units**	**GCDWQ**
Misc. Inorganics										
Fluoride (F)	0.08	0.09	0.09		0.065	0.067	0.063	0.02	mg/L	1.5
ANIONS										
Nitrite (N)	<0.005	<0.005	<0.005	<0.033	<0.0010	<0.0010	<0.0010	0.001	mg/L	1
Calculated Parameters										
Total Hardness (CaCO3)	181	182	174		177	199	199	0.50	mg/L	
Nitrate (N)	0.46	0.45	0.52	2.1	0.497	0.520	0.552	0.005	mg/L	10
Misc. Inorganics										
Alkalinity (Total as CaCO3)	150	162	168	160	174	172	192	1.0	mg/L	
Alkalinity (PP as CaCO3)	0.83	<0.5	<1.0	<1.0	<2.0	<2.0	<1.0	2.0	mg/L	
Bicarbonate (HCO3)	181	198	205	190	174	172	192	1.0	mg/L	
Carbonate (CO3)	1	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	mg/L	
Hydroxide (OH)	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	mg/L	
Anions										
Dissolved Sulphate (SO4)	18.8	22.6	21.2	23	20.8	21.3	20.3	0.3	mg/L	500
Dissolved Chloride (Cl)	14	14	15	16	17.0	18.0	21.3	0.5	mg/L	250
MISCELLANEOUS										
True Colour	<5	<5	5		<5	<5.0	<5.0	5.0	TCU	15
Nutrients										
Nitrate plus Nitrite (N)	0.46	0.45	0.52	0.47	0.497	0.52	0.552	0.005	mg/L	
Physical Properties										
Conductivity	379	382	390	390	391	374	433	2.0	uS/cm	
pH	8.32	8.06	8.29	8.13	8.23	8.20	8.16	0.1		7.0-10.5
Physical Properties										
Total Dissolved Solids	228	206	200	190	222	218	214	20	mg/L	500
Turbidity	0.14	<0.1	0.3		<0.1	<0.10	<0.10	0.1	NTU	1
Total Metals by Atomic Spectroscopy										
Total Aluminum (Al)	<0.003	<0.003	0.012	0.005	0.0088	0.0036	<0.0030	0.003	mg/L	0.1
Total Antimony (Sb)	<0.0005	<0.0005	<0.0005	<0.0006	<0.0001	<0.00010	<0.00010	0.0001	mg/L	0.006
Total Arsenic (As)	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.00010	<0.00010	0.0001	mg/L	0.01
Total Barium (Ba)	0.074	0.073	0.076		0.0762	0.0796	0.0834	0.0001	mg/L	1
Total Boron (B)	<0.05	<0.05	<0.05		<0.010	<0.010	<0.010	0.01	mg/L	5
Total Cadmium (Cd)	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.0000050	<0.0000050	0.000005	mg/L	0.005
Total Chromium (Cr)	<0.001	<0.001	<0.001	<0.001	0.00033	0.00038	<0.00050	0.0001	mg/L	0.05
Total Cobalt (Co)	<0.0005	<0.0005	<0.0002	<0.0003	<0.00010	<0.00010	<0.00010	0.00010	mg/L	
Total Copper (Cu)	0.0006	0.0006	0.0007	0.0007	0.00142	0.00062	0.00129	0.00050	mg/L	1
Total Iron (Fe)	<0.005	<0.005	<0.010		0.011	<0.010	<0.010	0.010	mg/L	0.3
Total Lead (Pb)	<0.0002	<0.0002	<0.0002	<0.0002	0.000057	<0.000050	<0.000050	0.000050	mg/L	0.01
Total Manganese (Mn)	<0.001	<0.001	<0.001		0.00012	<0.00010	<0.00010	0.00010	mg/L	0.05
Total Mercury (Hg)	<0.00001	<0.00001	<0.00001	<0.0020	<0.0000050	<0.0000050	<0.0000050	0.0000050	mg/L	0.001
Total Molybdenum (Mo)	<0.001	<0.001	<0.001	0.0005	0.000528	0.000502	0.000773	0.000050	mg/L	
Total Nickel (Ni)	<0.001	<0.001	<0.001	<0.0005	<0.00050	<0.00050	<0.00050	0.00050	mg/L	
Total Selenium (Se)	<0.0001	<0.0001	<0.0001	<0.0002	0.000055	<0.000050	0.000069	0.000050	mg/L	0.05
Total Silver (Ag)	<0.00002	<0.00002	<0.00002	<0.0001	<0.000010	<0.000010	<0.000010	0.000010	mg/L	
Total Uranium (U)	0.0006	0.0006	0.0006	0.00063	0.00058	0.000570	0.000600	0.000010	mg/L	0.02
Total Vanadium (V)	<0.005	<0.005	<0.005	0.002	<0.00050	<0.00050	<0.00050	0.00050	mg/L	
Total Zinc (Zn)	<0.005	<0.005	<0.005	<0.003	0.0038	<0.0030	<0.0030	0.0030	mg/L	5
Total Calcium (Ca)	43.6	42.6	41.0		40.9	45.1	45.9	0.050	mg/L	
Total Magnesium (Mg)	17.4	18.3	17.3		18.3	21.1	20.5	0.0050	mg/L	
Total Potassium (K)	0.92	0.92	0.91		0.98	1.01	1.04	0.050	mg/L	
Total Sodium (Na)	9.46	9.66	9.23		10.6	12.1	13.7	0.050	mg/L	200
Total Sulphur (S)	7.1	7.6	6.4		7.04	7.03	8.20	0.50	mg/L	

Maximum Acceptable Concentration
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