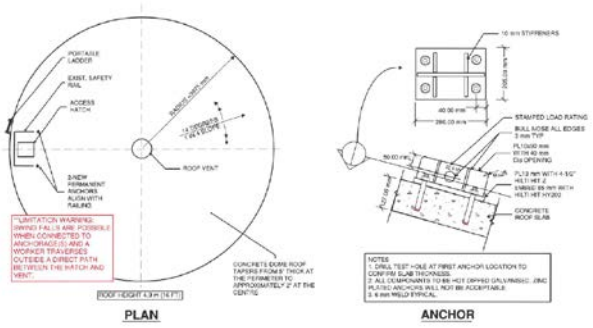
2020 Annual Drinking Water Quality Report
Facility No. 12-098-00001

April 20, 2020

Above-ground Pressure Reducing Station Planning



Reservoir Fall Protection Works

Potable Bulk Water Filling Station

13th Street Well Investigation

Table of Contents **Page**

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;
- 2020 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 2020.

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: There are 5 wells with a combined total pumping capacity of 1478 Imperial Gallons per Minute (Igpm) or 112 Litres per second (Lps) providing water to a common distribution system. Two wells are located on the north side of the Kicking Horse River[1] and three are located on the south side.

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 176 fire hydrants included in an annual spring and fall maintenance program. Hydrant reports are 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

[1] Well 6 (located on the north side of the Kicking Horse River) is currently out of service for an undetermined period of time.

Trucks; however, occasionally, select hydrants are used for the purposes of 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

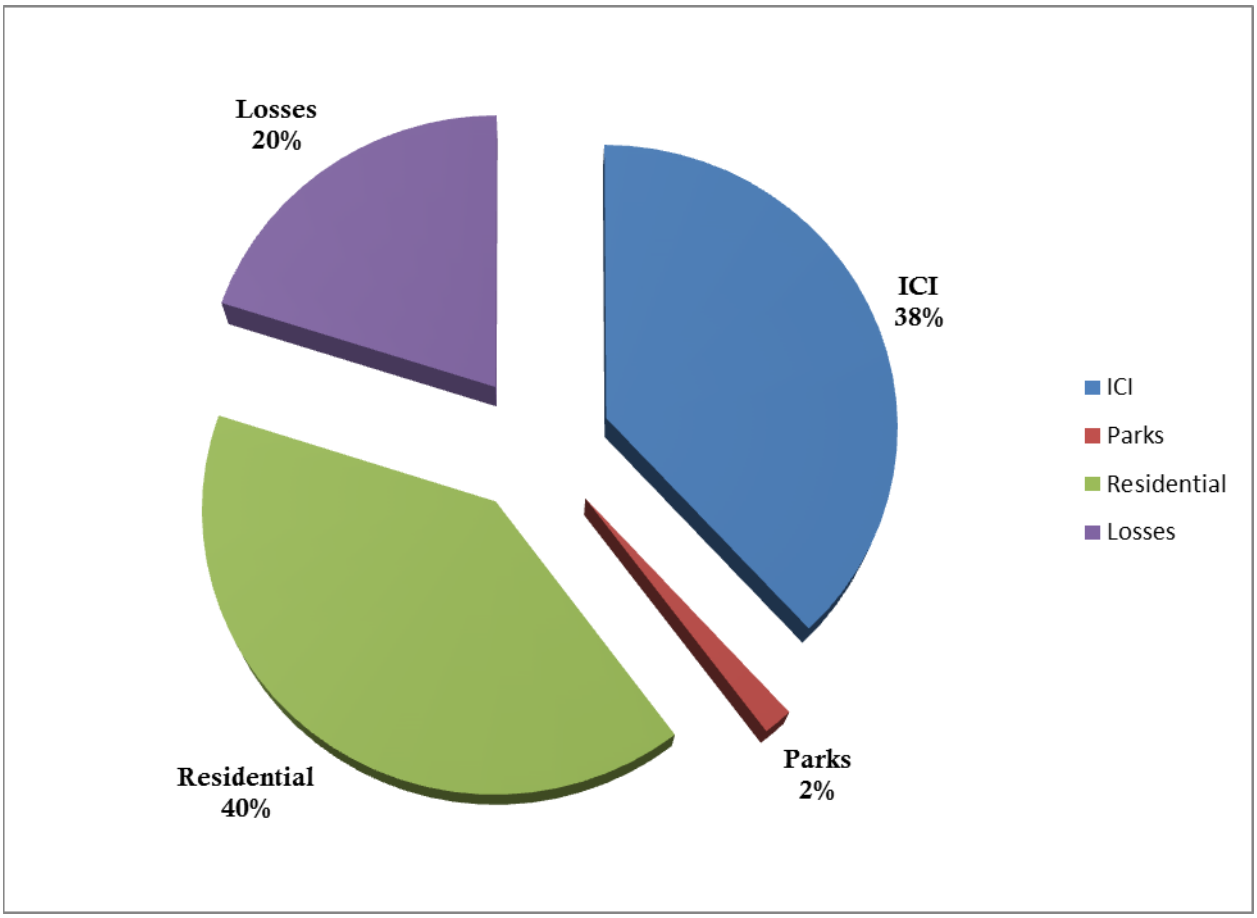
In 2020, Peak Day demand increased by 1.0%, while overall consumption decreased by 1.1% from 2019. The 2020 Peak Day figure is typically assumed to be reflective of residential and municipal irrigating as extensive irrigating on a given day would be a main contributor to Peak Day consumption. Weather conditions leading up and occurring on the Peak Day are thought to be a main factor influencing this demand figure as well. Ongoing leak detection and repair, as well as conservation awareness are believed to be contributing factors in the overall decreases noted.

In 2020, Industrial, Commercial, Institutional (ICI) demand accounted for about 38.0% of the total water pumped (in 2019 ICI demand was recorded as 41.3% of the total water pumped; overall, the 2020 ICI demand component of total water pumped decreased 3.3% as compared to 2019).

Municipal parks demand accounted for about 1.6% of the total water pumped (in 2019 municipal irrigation demand was also recorded as 1.6% of the total water pumped).

The remaining portion of the total volume pumped, represented as 60.4%, 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 contractor usage from hydrants for example). Therefore, approximately 40.4% of the total water pumped is residential demand (in 2019 residential demand was reported as being approximately 37.1% of the total water pumped; overall, 2020 residential demand is assumed to have increased by approximately 3.3%).

[2] Based on the 2020 Total Pumped volume, 20% represents about 116,172 Igpd or about 81 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 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 2020 a total of 239 samples were analyzed for total coliforms and E.coli. with six samples testing positive with a total coliform count greater than one (1). The TC>1 samples were related to sample sets taken from the NE Yellow Reservoir in five instances and the NE Green Reservoir in one case. 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 2019 averaged twenty (20) 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, reservoir draining, cleaning and Remotely Operated Vehicle (ROV) inspections on an approximate 5-year cycle; and, annual hydrant inspections, maintenance and flushing, valve exercising, and dead end main flushing.

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.

Well 6 Status:

Since last reporting on this initiative, chronic turbidity has ensued despite undertaking a pumping-to-waste program in 2020 intended to reduce turbidity to NTU < 1.

While turbidity has decreased below 1 NTU during continuous well operation, stopping and starting still yields initial turbidity results above the Canadian Drinking Water Quality Guidelines.

With Council concurrence work has ceased at Well 6 in favour of investigating the practicality of using the 13th Street Well as a domestic water source.

5.0 System Improvements

Kicking Horse River Watermain Crossing:

Detailed design and project cost estimate based on final design were completed in 2019 and a grant application was submitted to the Province in 2020.

If the funding application is successful the intent is to proceed with construction in 2022.

Potable Bulk Water Filling Station:

In partnership with the Ministry of Transportation and Infrastructure a package potable bulk water filling station was constructed in 2020. The station will serve the needs of potable bulk water haulers and regional residents affected by the Trans-Canada Highway Phase 4 Project.

Metering/Cross Connection Control:

In 2020 work continued with the replacement of non-radio frequency (RF) compatible water meters. Meters were either installed in new development (5), retrofitted with new RF register heads (1), or completely replaced (8) in industrial/commercial/institutional (ICI) facilities. 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.

Improvements to Worker Safety for Working Heights Above 7.6m (25 feet):

In 2020 a contract was let for the fabrication, installation and testing of safety equipment on reservoirs. Fabrication was completed late in 2020 and installation and testing is scheduled for the first week of June this year.

Source Protection Plan:

Work continued with Golder and Associates on source protection in 2020.

Golder 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. The Municipal Water Supply Contingency Plan Report is appended for information.

Leak Detection Work:

Over the course of 2020 construction season, one large irrigation leak was repaired at the KKMP soccer fields. System leak repairs collectively contribute towards overall measured demand reduction.

6.0 Operator Education and Training

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

EOCP Current Certification:

Employee	*Certification #*	*Level*
Lorne Pickering - Public Works Foreman	3879	WD-III, CCC Tester
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 2020 the Town of Golden advanced its CCC program and installed or replaced existing backflow devices on an additional four (4) 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. 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

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.

9.0 Events/Emergency Response

Over the course of 2020 no main breaks occurred. A significant irrigation leak was repaired at the KKMP soccer fields.

10.0 Plans for 2021

- Continue to conduct 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;
- Replace outdated Water Conservation Plan;
- Undertake Pressure Reducing Station reconfiguration planning;
- Investigate 13th Street Well as a potential replacement source for Well 6;
- Minor system upgrades and service repairs on an as-required basis;
- Switch to Neptune 360 meter reader software;
- 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 two of a 5-year program of updating the current telemetry radio system and SCADA hardware and software systems;
- Complete worker safety enhancements for accessing reservoir roof-tops.

11.0 Sample Analysis Results

DATE	WELLS					RESERVOIRS		
	#2	#3	#4	#5	#6	NE (yellow)	NE (green)	BEARS PAW
Jan 6	<1	<1	<1	<1	offline	<1	<1	<1
Jan 20	Offline	<1	<1	<1			<1	<1
Jan 27	Offline	<1	<1	<1			<1	<1
Feb 3	Offline	<1	<1	<1		<1		<1
Feb 10	Offline	<1	<1	<1			<1	<1
Feb 24	Offline	<1	<1	<1		<1		<1
Mar 2	Offline	<1	<1	<1			<1	<1
Mar 9	Offline	<1	<1	<1		<1		<1
Mar 16	<1	<1	<1	<1			<1	<1
Mar 23	<1	<1	<1	<1		<1		<1
Apr 6	<1	<1	<1	<1		<1	<1	<1

Apr 20	<1	<1	<1	<1		<1		<1
May 11	<1	<1	<1	<1			<1	<1
May 25	<1	<1	<1	<1		<1		<1
Jun 8	<1	<1	<1	<1		<1		<1
Jun 15	<1	<1	<1	<1			<1	<1
Jun 29	<1	<1	<1	<1			<1	<1
Jul 6	<1	<1	<1	<1		<1		<1
Jul 13	<1	<1	<1	<1			<1	<1
Jul 20	<1	<1	<1	<1		<1		<1
Jul 27	<1	<1	<1	<1			<1	<1
Aug 10	<1	<1	<1	<1		<1		<1
Aug 17	<1	<1	<1	<1			<1	<1
Sep 1	<1	<1	<1	<1		T-27 E<1		<1
Sep 14	<1	<1	<1	<1			<1	<1
Sep 21						<1 (2 samples)		
Sep 28	<1	<1	<1	<1		<1		<1
Oct 1	<1	<1	<1	<1			<1	<1
Oct 1	<1	<1	<1	<1		T-3 E<1		<1
Oct 5						T-3 E<1		
Oct 12						T-1 E<1		
Oct 19	<1	<1	<1	<1			T-1 E<1	<1
Oct 21	<1	<1	<1	<1			<1	<1
Oct 26	<1	<1	<1	<1			<1	<1
Nov 2						<1 (2 Samples)		
Nov 9	<1	<1	<1	<1		<1		<1
Nov 16	<1	<1	<1	<1			<1	<1
Nov 23	<1	<1	<1	<1		<1		<1
Nov 30	<1	<1	<1	<1			<1	<1
Dec 7	<1	<1	<1	<1		<1		<1
Dec 14	<1	<1	<1	<1			<1	<1
Dec 21	<1	<1	<1	<1		<1		<1

12.0 Turbidity Analysis (NTU)

DATE	WELL#2	WELL#3	WELL#4	WELL#5	WELL#6
Jan 6	0.09	0.06	0.07	0.07	offline
Jan13	0.07	0.06	0.11	0.07	
Jan 20	off	0.09	0.09	0.06	
Jan 27	off	0.09	0.08	0.06	
Feb 3	off	0.07	0.10	0.07	
Feb 10	off	0.05	0.06	0.06	
Feb 24	off	0.06	0.05	0.06	
Mar 2	off	0.06	0.07	0.06	
Mar 9	off	0.07	0.08	0.06	
Mar 16	0.06	0.08	0.06	0.07	
Mar 23	0.08	0.08	0.08	0.09	
Mar 30	0.07	0.10	0.07	0.08	

Apr 6	0.06	0.07	0.08	0.07	
Apr 20	0.06	0.07	off	0.06	
May 4	0.06	0.06	0.06	0.06	
May 11	0.07	0.08	0.07	0.06	
May 25	0.07	0.07	0.07	0.07	
Jun 8	0.07	0.06	0.06	0.06	
Jun 15	0.06	0.06	0.06	0.07	
Jun 22	0.06	0.06	0.07	0.06	
Jul 20	0.06	0.06	0.06	0.06	
Jul 27	0.05	0.06	0.05	0.05	
Aug 10	0.05	0.06	0.05	0.05	
Aug 17	0.06	0.06	0.05	0.06	
Aug 24	0.07	0.06	0.06	0.07	
Aug 31	0.07	0.06	0.06	0.07	
Sept 21	0.05	0.06	0.06	0.05	
Oct 5	0.06	0.06	0.07	0.07	
Oct 19	0.05	0.06	0.05	0.05	
Oct 26	0.06	0.05	0.06	0.07	
Nov 2	0.05	0.06	0.05	0.05	
Nov 16	0.05	0.05	0.06	0.05	
Nov 23	0.05	0.06	0.05	0.06	
Nov 30	0.06	0.05	0.06	0.05	
Dec 15	0.06	0.06	0.05	0.07	
Dec 21	0.07	0.07	0.05	0.06	
Average	0.06	0.07	0.07	0.06	
Hi	0.09	0.10	0.11	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 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,
Manager of Operations

Attachment

Drinking Water Package - ALS Environmental

Well #2										
Year	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**RDL**	**Units**	**GCDWQ**
Misc. Inorganics										
Fluoride (F)	0.09	0.08	0.09	0.09	0.09	0.070	0.068	0.02	mg/L	1.5
ANIONS										
Nitrite (N)	<0.005	<0.005	<0.005	<0.005	<0.010	<0.0010	<0.0010	0.001	mg/L	1
Calculated Parameters										
Total Hardness (CaCO3)	130	148	147	142		138	158	0.50	mg/L	
Nitrate (N)	0.2	0.27	0.25	0.24	0.21	0.22	0.209	0.005	mg/L	10
Misc. Inorganics										
Alkalinity (Total as CaCO3)	127	121	130	141	130	142	134	1.0	mg/L	
Alkalinity (PP as CaCO3)	<0.5	<0.5	<0.5	<1.0	<1.0	<2.0	<2.0	2.0	mg/L	
Bicarbonate (HCO3)	155	148	159	172	160	142	134	1.0	mg/L	
Carbonate (CO3)	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	0.5	mg/L	
Hydroxide (OH)	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	0.5	mg/L	
Anions										
Dissolved Sulphate (SO4)	16	16	19.8	19.7	20	18.5	18.2	0.3	mg/L	500
Dissolved Chloride (Cl)	6	11	9.8	8.4	11	10.4	8.08	0.5	mg/L	250
MISCELLANEOUS										
True Colour	<5	<5	<5	<5	<2	<5	<5.0	5.0	TCU	15
Nutrients										
Nitrate plus Nitrite (N)	0.2	0.27	0.25	0.24	0.21	0.216	0.209	0.005	mg/L	
Physical Properties										
Conductivity	286	312	308	314	310	303	295	2.0	uS/cm	
pH	8.21	8.3	8	8.2	8.2	8.15	8.11	0.1	pH Units	7.0-10.5
Physical Properties										
Total Dissolved Solids	198	192	186	156	200	174	189	20	mg/L	500
Turbidity	<0.1	<0.1	0.1	0.3	<0.1	<0.1	<0.10	0.1	NTU	1
Total Metals by Atomic Spectroscopy										
Total Aluminum (Al)	<0.004	<0.003	<0.003	0.012	0.012	0.0041	0.0039	0.003	mg/L	0.1
Total Antimony (Sb)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0001	<0.00010	0.0001	mg/L	0.006
Total Arsenic (As)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.00010	0.0001	mg/L	0.01
Total Barium (Ba)	0.047	0.053	0.054	0.054		0.0552	0.0553	0.0001	mg/L	1
Total Boron (B)	<0.05	<0.05	<0.05	<0.05		<0.010	<0.010	0.01	mg/L	5
Total Cadmium (Cd)	<0.00001	<0.00001	<0.00001	<0.00001	0.00003	<0.000005	<0.0000050	0.000005	mg/L	0.005
Total Chromium (Cr)	<0.001	<0.001	<0.001	<0.001	<0.001	0.00019	38.0	0.0001	mg/L	0.05
Total Cobalt (Co)	<0.0005	<0.0005	<0.0005	<0.0002	<0.0003	<0.00010	0.00018	0.00010	mg/L	
Total Copper (Cu)	0.001	0.001	0.0007	0.0011	0.0009	0.00112	<0.00010	0.00050	mg/L	1
Total Iron (Fe)	<0.005	<0.005	<0.005	<0.005		<0.010	0.00108	0.010	mg/L	0.3
Total Lead (Pb)	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.000056	<0.00005	0.000050	mg/L	0.01
Total Manganese (Mn)	<0.001	<0.001	<0.001	<0.001		<0.00010	<0.00010	0.00010	mg/L	0.05
Total Mercury (Hg)	<0.00001	<0.00001	<0.00001	<0.00001	<0.0020	<0.0000050	<0.0000050	0.0000050	mg/L	0.001
Total Molybdenum (Mo)	<0.001	<0.001	<0.001	<0.001	0.00076	0.000575	0.000614	0.000050	mg/L	
Total Nickel (Ni)	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.00050	<0.00050	0.00050	mg/L	
Total Selenium (Se)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.000050	<0.000050	0.000050	mg/L	0.05
Total Silver (Ag)	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001	<0.000010	<0.000010	0.000010	mg/L	
Total Uranium (U)	0.0005	0.0005	0.0005	0.0005	0.00054	0.000481	0.000540	0.000010	mg/L	0.02
Total Vanadium (V)	<0.005	<0.005	<0.005	<0.005	<0.001	<0.00050	<0.00050	0.00050	mg/L	
Total Zinc (Zn)	<0.005	<0.005	<0.005	<0.005	<0.003	<0.0030	<0.0030	0.0030	mg/L	5
Total Calcium (Ca)	31.5	35.7	35.4	34.9		32.7	38.0	0.050	mg/L	
Total Magnesium (Mg)	12.5	14.3	14.2	13.4		13.7	15.2	0.0050	mg/L	
Total Potassium (K)	0.46	0.56	0.54	0.55		0.562	0.535	0.050	mg/L	
Total Sodium (Na)	3.72	7.3	6.4	5.9		6.74	6.46	0.050	mg/L	200
Total Sulphur (S)	7	6.3	6.3	6.7		6.01	6.56	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	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**RDL**	**Units**	**GCDWQ**
Misc. Inorganics										
Fluoride (F)	0.09	0.08	0.09	0.09	0.10	0.071	0.069	0.02	mg/L	1.5
ANIONS										
Nitrite (N)	<0.005	<0.005	<0.005	<0.005	<0.010	<0.0010	<0.0010	0.001	mg/L	1
Calculated Parameters										
Total Hardness (CaCO3)	158	167	165	165		163	184	0.50	mg/L	
Nitrate (N)	0.53	0.54	0.54	0.55	0.61	0.589	0.636	0.005	mg/L	10
Misc. Inorganics										
Alkalinity (Total as CaCO3)	148	139	149	152	150	159	151	1.0	mg/L	
Alkalinity (PP as CaCO3)	<0.5	1.24	<0.5	<1.0	<1.0	<2.0	<2.0	2.0	mg/L	
Bicarbonate (HCO3)	181	167	182	185	180	159	151	1.0	mg/L	
Carbonate (CO3)	<0.5	1.49	<0.5	<1.0	<1.0	<1.0	<1.0	0.5	mg/L	
Hydroxide (OH)	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	0.5	mg/L	
Anions										
Dissolved Sulphate (SO4)	15.4	16.7	19.1	18.1	20.0	18.4	18.9	0.3	mg/L	500
Dissolved Chloride (Cl)	19	12	12	13	19	15.3	15.4	0.5	mg/L	250
MISCELLANEOUS										
True Colour	<5	<5	<5	9.2	<2	<5	<5.0	5.0	TCU	15
Nutrients										
Nitrate plus Nitrite (N)	0.53	0.54	0.54	0.55	0.61	0.589	0.636	0.005	mg/L	
Physical Properties										
Conductivity	377	349	346	349	360	303	347	2.0	uS/cm	
pH	8.2	8.3	8.1	8.3	8.1	8.20	8.18	0.1	pH Units	7.0-10.5
Physical Properties										
Total Dissolved Solids	196	216	182	182	220	189	181	20	mg/L	500
Turbidity	0.1	0.1	<0.1	0.26	<0.1	<0.1	<0.10	0.1	NTU	1
Total Metals by Atomic Spectroscopy										
Total Aluminum (Al)	<0.003	<0.003	<0.003	0.011	0.004	0.0049	0.0030	0.003	mg/L	0.1
Total Antimony (Sb)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0001	<0.00010	0.0001	mg/L	0.006
Total Arsenic (As)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.00010	0.0001	mg/L	0.01
Total Barium (Ba)	0.125	0.121	0.118	0.117		0.1290	0.127	0.0001	mg/L	1
Total Boron (B)	<0.05	<0.05	<0.05	<0.05		<0.010	<0.010	0.01	mg/L	5
Total Cadmium (Cd)	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.0000050	0.000005	mg/L	0.005
Total Chromium (Cr)	<0.001	<0.001	<0.001	<0.001	<0.0010	0.00057	0.00055	0.0001	mg/L	0.05
Total Cobalt (Co)	<0.0005	<0.0005	<0.0005	<0.0002	<0.0003	<0.00010	<0.00010	0.00010	mg/L	
Total Copper (Cu)	0.0006	0.001	0.0006	0.0009	0.0009	0.00132	0.00061	0.00050	mg/L	1
Total Iron (Fe)	<0.005	<0.005	<0.005	<0.005		<0.010	<0.010	0.010	mg/L	0.3
Total Lead (Pb)	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.000065	<0.000050	0.000050	mg/L	0.01
Total Manganese (Mn)	<0.001	<0.001	<0.001	<0.001		<0.00010	<0.00010	0.00010	mg/L	0.05
Total Mercury (Hg)	<0.00001	<0.00001	<0.00001	<0.00001	<0.0020	<0.0000050	<0.0000050	0.0000050	mg/L	0.001
Total Molybdenum (Mo)	<0.001	<0.001	<0.001	<0.001	0.001	0.000573	0.000590	0.000050	mg/L	
Total Nickel (Ni)	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.00050	<0.00050	0.00050	mg/L	
Total Selenium (Se)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.000050	<0.000050	0.000050	mg/L	0.05
Total Silver (Ag)	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001	<0.000010	3.16	0.000010	mg/L	
Total Uranium (U)	0.0007	0.0007	0.0007	0.0007	0.00070	0.000656	0.000693	0.000010	mg/L	0.02
Total Vanadium (V)	<0.005	<0.005	<0.005	<0.005	0.0014	<0.00050	<0.00050	0.00050	mg/L	
Total Zinc (Zn)	<0.005	<0.005	<0.005	<0.005	<0.003	<0.0030	<0.0030	0.0030	mg/L	5
Total Calcium (Ca)	30.4	33.2	31.5	31.3		30.8	34.8	0.050	mg/L	
Total Magnesium (Mg)	19.9	20.4	20.9	21.2		20.8	23.6	0.0050	mg/L	
Total Potassium (K)	0.75	0.79	0.73	0.73		0.817	0.852	0.050	mg/L	
Total Sodium (Na)	12.1	7.6	7.2	7.0		9.85	11.0	0.050	mg/L	200
Total Sulphur (S)	7	6.5	6.1	6.4		6.17	6.79	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	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**RDL**	**Units**	**GCDWQ**
Misc. Inorganics		OFFLINE								
Fluoride (F)	0.06		0.06	0.06		0.036	0.041	0.02	mg/L	1.5
ANIONS										
Nitrite (N)	<0.005		<0.005	<0.005	<0.03	<0.0010	<0.0010	0.001	mg/L	1
Calculated Parameters										
Total Hardness (CaCO3)	344		383	396		420	424	0.50	mg/L	
Nitrate (N)	1.42		1.44	1.64	7.8	1.76	1.75	0.005	mg/L	10
Misc. Inorganics										
Alkalinity (Total as CaCO3)	323		338	356	370	362	351	1.0	mg/L	
Alkalinity (PP as CaCO3)	<0.5		<0.5	<1.0	<1.0	<2.0	<2.0	2.0	mg/L	
Bicarbonate (HCO3)	395		412	434	450	362	351	1.0	mg/L	
Carbonate (CO3)	<0.5		<0.5	<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	0.5	mg/L	
Anions										
Dissolved Sulphate (SO4)	33.8		41.5	42.8	41	39.2	39.7	0.3	mg/L	500
Dissolved Chloride (Cl)	78		97	110	110	101.0	99.5	0.5	mg/L	250
MISCELLANEOUS										
True Colour	<5		<5	17.3	2.2	<5	<5.0	5.0	TCU	15
Nutrients										
Nitrate plus Nitrite (N)	1.42		1.44	1.64	1.8	1.760	1.75	0.005	mg/L	
Physical Properties										
Conductivity	896		959	1050	1000	968	922	2.0	uS/cm	
pH	8		7.77	8.26	7.9	7.95	8.14	0.1		7.0-10.5
Physical Properties										
Total Dissolved Solids	490		506	580	560	544	557	20	mg/L	500
Turbidity	<0.1		0.15	1.03	<0.1	0.17	0.12	0.1	NTU	1
Total Metals by Atomic Spectroscopy										
Total Aluminum (Al)	<0.003		<0.003	0.010	0.0035	<0.003	<0.0030	0.003	mg/L	0.1
Total Antimony (Sb)	<0.0005		<0.0005	<0.0005	<0.0006	<0.0001	<0.00010	0.0001	mg/L	0.006
Total Arsenic (As)	<0.0001		<0.0001	<0.0001	<0.0002	<0.0001	<0.00010	0.0001	mg/L	0.01
Total Barium (Ba)	0.179		0.21	0.24		0.2290	0.209	0.0001	mg/L	1
Total Boron (B)	<0.05		<0.05	<0.05		0.014	0.012	0.01	mg/L	5
Total Cadmium (Cd)	<0.00001		<0.00001	<0.00001	<0.00002	<0.000005	<0.0000050	0.000005	mg/L	0.005
Total Chromium (Cr)	<0.001		<0.001	<0.001	<0.001	0.00012	0.00012	0.0001	mg/L	0.05
Total Cobalt (Co)	<0.0005		<0.0005	<0.0002	<0.0003	<0.00010	<0.00010	0.00010	mg/L	
Total Copper (Cu)	0.0008		0.0012	0.0016	0.0023	0.00654	0.00250	0.00050	mg/L	1
Total Iron (Fe)	<0.005		<0.005	<0.005		<0.010	<0.010	0.010	mg/L	0.3
Total Lead (Pb)	<0.0002		<0.0002	<0.0002	<0.0002	0.000697	0.000314	0.000050	mg/L	0.01
Total Manganese (Mn)	<0.001		<0.001	<0.001		<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	mg/L	0.001
Total Molybdenum (Mo)	<0.001		<0.001	<0.001	<0.0002	0.000243	0.000173	0.000050	mg/L	
Total Nickel (Ni)	<0.001		<0.001	<0.001	<0.0005	<0.00050	<0.00050	0.00050	mg/L	
Total Selenium (Se)	0.0001		<0.0001	<0.0001	<0.0002	0.000101	<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	mg/L	
Total Uranium (U)	0.0011		0.0012	0.0013	0.0014	0.00128	0.00124	0.000010	mg/L	0.02
Total Vanadium (V)	<0.005		<0.005	<0.005	0.001	<0.00050	<0.00050	0.00050	mg/L	
Total Zinc (Zn)	<0.005		<0.005	<0.005	0.005	0.0217	0.0121	0.0030	mg/L	5
Total Calcium (Ca)	81.4		85.4	89.7		95.1	97.8	0.050	mg/L	
Total Magnesium (Mg)	34.3		41.2	41.7		44.3	43.7	0.0050	mg/L	
Total Potassium (K)	1.48		1.89	1.96		2.02	1.89	0.050	mg/L	
Total Sodium (Na)	38.8		51.1	59.0		62.0	59.8	0.050	mg/L	200
Total Sulphur (S)	13		14.1	15.5		14.6	14.8	0.50	mg/L	

Maximum Acceptable Concentration
Interem Maximum Allowable Concentration
Operation Guidline
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Well #5										
Year	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**RDL**	**Units**	**GCDWQ**
Misc. Inorganics										
Fluoride (F)	0.10	0.08	0.09	0.09		0.065	0.067	0.02	mg/L	1.5
ANIONS										
Nitrite (N)	<0.005	<0.005	<0.005	<0.005	<0.033	<0.0010	<0.0010	0.001	mg/L	1
Calculated Parameters										
Total Hardness (CaCO3)	169	181	182	174		177	199	0.50	mg/L	
Nitrate (N)	0.45	0.46	0.45	0.52	2.1	0.497	0.520	0.005	mg/L	10
Misc. Inorganics										
Alkalinity (Total as CaCO3)	156	150	162	168	160	174	172	1.0	mg/L	
Alkalinity (PP as CaCO3)	<0.5	0.83	<0.5	<1.0	<1.0	<2.0	<2.0	2.0	mg/L	
Bicarbonate (HCO3)	190	181	198	205	190	174	172	1.0	mg/L	
Carbonate (CO3)	<0.5	1	<0.5	<1.0	<1.0	<1.0	<1.0	0.5	mg/L	
Hydroxide (OH)	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	0.5	mg/L	
Anions										
Dissolved Sulphate (SO4)	19.5	18.8	22.6	21.2	23	20.8	21.3	0.3	mg/L	500
Dissolved Chloride (Cl)	14	14	14	15	16	17.0	18.0	0.5	mg/L	250
MISCELLANEOUS										
True Colour	<5	<5	<5	5		<5	<5.0	5.0	TCU	15
Nutrients										
Nitrate plus Nitrite (N)	0.45	0.46	0.45	0.52	0.47	0.497	0.52	0.005	mg/L	
Physical Properties										
Conductivity	373	379	382	390	390	391	374	2.0	uS/cm	
pH	8.17	8.32	8.06	8.29	8.13	8.23	8.20	0.1		7.0-10.5
Physical Properties										
Total Dissolved Solids	198	228	206	200	190	222	218	20	mg/L	500
Turbidity	<0.1	0.14	<0.1	0.3		<0.1	<0.10	0.1	NTU	1
Total Metals by Atomic Spectroscopy										
Total Aluminum (Al)	<0.003	<0.003	<0.003	0.012	0.005	0.0088	0.0036	0.003	mg/L	0.1
Total Antimony (Sb)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0006	<0.0001	<0.00010	0.0001	mg/L	0.006
Total Arsenic (As)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.00010	0.0001	mg/L	0.01
Total Barium (Ba)	0.069	0.074	0.073	0.076		0.0762	0.0796	0.0001	mg/L	1
Total Boron (B)	<0.05	<0.05	<0.05	<0.05		<0.010	<0.010	0.01	mg/L	5
Total Cadmium (Cd)	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.000005	<0.0000050	0.000005	mg/L	0.005
Total Chromium (Cr)	<0.001	<0.001	<0.001	<0.001	<0.001	0.00033	0.00038	0.0001	mg/L	0.05
Total Cobalt (Co)	<0.0005	<0.0005	<0.0005	<0.0002	<0.0003	<0.00010	<0.00010	0.00010	mg/L	
Total Copper (Cu)	0.0008	0.0006	0.0006	0.0007	0.0007	0.00142	0.00062	0.00050	mg/L	1
Total Iron (Fe)	<0.005	<0.005	<0.005	<0.010		0.011	<0.010	0.010	mg/L	0.3
Total Lead (Pb)	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.000057	<0.000050	0.000050	mg/L	0.01
Total Manganese (Mn)	<0.001	<0.001	<0.001	<0.001		0.00012	<0.00010	0.00010	mg/L	0.05
Total Mercury (Hg)	<0.00001	<0.00001	<0.00001	<0.00001	<0.0020	<0.0000050	<0.0000050	0.0000050	mg/L	0.001
Total Molybdenum (Mo)	<0.001	<0.001	<0.001	<0.001	0.0005	0.000528	0.000502	0.000050	mg/L	
Total Nickel (Ni)	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.00050	<0.00050	0.00050	mg/L	
Total Selenium (Se)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	0.000055	<0.000050	0.000050	mg/L	0.05
Total Silver (Ag)	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001	<0.000010	<0.000010	0.000010	mg/L	
Total Uranium (U)	0.0006	0.0006	0.0006	0.0006	0.00063	0.00058	0.000570	0.000010	mg/L	0.02
Total Vanadium (V)	<0.005	<0.005	<0.005	<0.005	0.002	<0.00050	<0.00050	0.00050	mg/L	
Total Zinc (Zn)	<0.005	<0.005	<0.005	<0.005	<0.003	0.0038	<0.0030	0.0030	mg/L	5
Total Calcium (Ca)	41.1	43.6	42.6	41.0		40.9	45.1	0.050	mg/L	
Total Magnesium (Mg)	16.1	17.4	18.3	17.3		18.3	21.1	0.0050	mg/L	
Total Potassium (K)	0.82	0.92	0.92	0.91		0.98	1.01	0.050	mg/L	
Total Sodium (Na)	8.26	9.46	9.66	9.23		10.6	12.1	0.050	mg/L	200
Total Sulphur (S)	7	7.1	7.6	6.4		7.04	7.03	0.50	mg/L	

Maximum Acceptable Concentration
Interem Maximum Allowable Concentration
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Asthetic Objective

RDL - Reported Detection Limit
mg/L - Milligrams Per Litre
TCU - True Colour Unit
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