

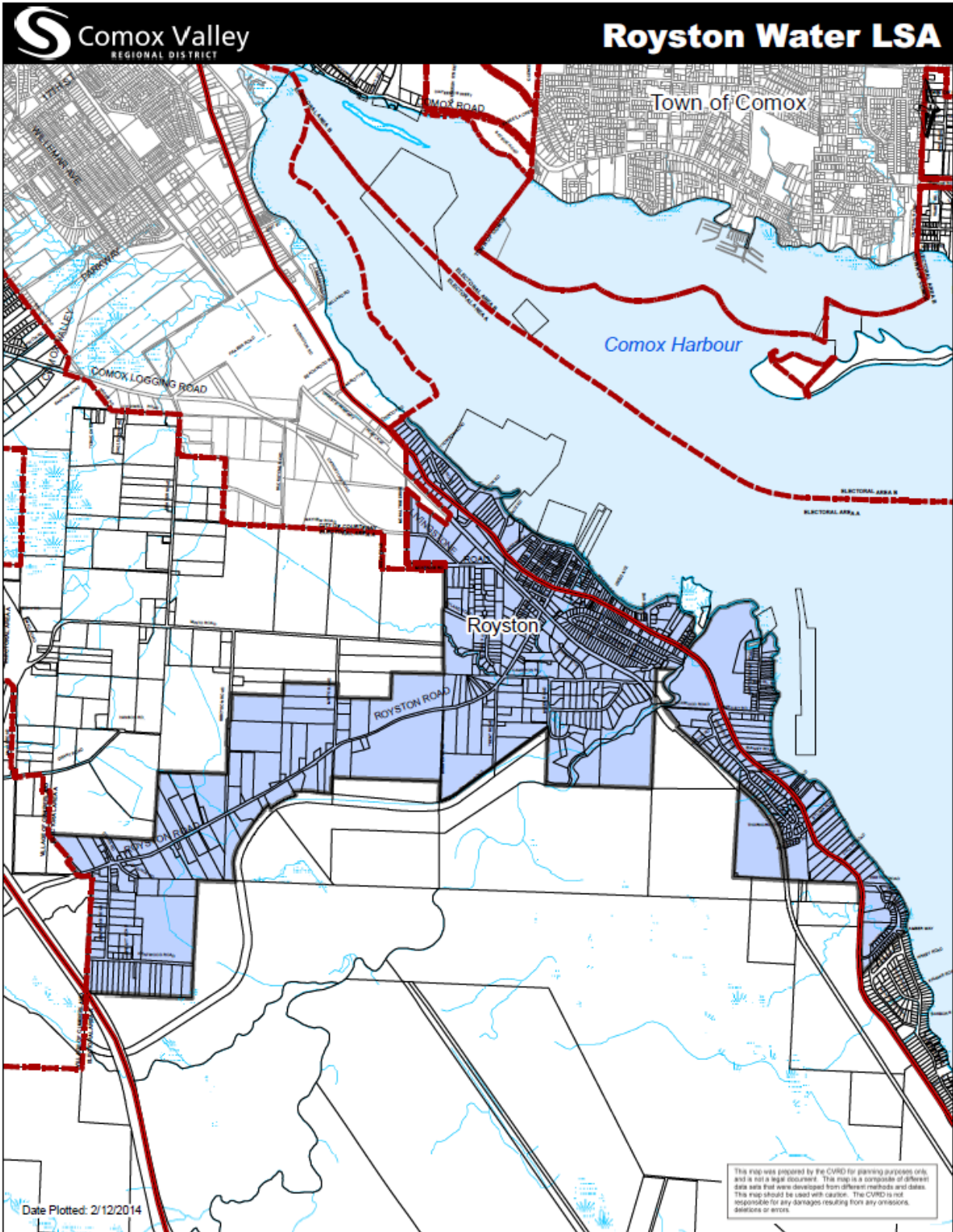


Water Quality Report Royston Water System

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Map of Service Area



Introduction

The Comox Valley Regional District (CVRD) strives to provide high quality drinking water to the Royston Water Local Service Area, through responsible operation, monitoring and management of the water system. The CVRD is regulated by Island Health as part of the Ministry of Health for its activities as a potable water supplier. Under the *Drinking Water Protection Act* (DWP Act), the CVRD is required to report annually on water quality for the Royston Drinking Water System. This report covers the period from January 1 to December 31, 2022 and includes information on water quality, consumption, maintenance and capital projects.

The Royston Water Service provides domestic water to approximately 2,100 residents located in the CVRD Baynes Sound – Denman/Hornby Islands (Electoral Area A). The service is owned and operated by the CVRD and is funded through a combination of frontage tax and user rates.

Treated water is supplied for the service area via a transmission main from the Village of Cumberland. Once water enters the Royston Water System it is given a secondary dose of chlorine prior to distribution. The system consists of two reservoirs and five pressure reducing valve chambers.



Figure No.1: Water Quality Analyzers

Operations

Goals

To provide high quality drinking water to all customers through efficient and effective disinfection and distribution operations.

Water Quality Summary

Parameter ¹	2021	2022	Target
Water Disinfection			
Chlorine Residual (mg/L)- Royston Reservoir	1.12	1.0	<2.0
Trihalomethanes (mg/L)	0.098	0.072	<0.1
Residual Disinfection			
Chlorine Residual - Distribution System (mg/L)	0.72	0.70	>0.20
Total Coliforms (Positive Samples)	0	0	0
E.Coli (Positive Samples)	0	0	0
Canadian Drinking Water Quality Guidelines			
Distribution Turbidity (average NTU)	0.56	0.51	<1.0
Distribution Water Temperature (Celsius)	11.8	12.3	<15
Distribution Water pH	7.6	7.4	7.0-8.5

¹More information for each parameter is available later on in the report.

The Ministry of Health regulates municipal drinking water quality through the DWP Act and the *Drinking Water Protection Regulation* (the Regulation). The DWP Act and Regulation are administered by regional health authorities, and for the CVRD, the administering authority is Island Health. Both the DWP Act and Regulation set out certain requirements for drinking water operators and suppliers to ensure the provision of safe drinking water to their customers.

In the Royston Water System, treated water is received via a transmission main from the Village of Cumberland and is given a secondary dose of chlorine prior to distribution. After the water is re-chlorinated it proceeds into the distribution system, either directly to the Kentwood Road area or via a series of reservoirs and pressure reducing valves. The CVRD takes weekly water quality samples at five fixed locations within the distribution system to ensure that water is meeting provincial objectives. Testing for distribution by-products is taken from the Royston Reservoir and a water chemistry report is completed quarterly. A summary and description of water quality results are described below.

Disinfection

All water supply systems governed by Island Health that are using surface water are required to adhere to provincial 4-3-2-1-0 surface water treatment objectives to ensure that the water treatment process is effectively killing disease causing viruses, bacteria and parasites. The 4-3-2-1-0 objectives are as follows:

- 4-log (99.99 per cent) removal/inactivation of viruses;
- 3-log (99.9 per cent) removal/inactivation of giardia cysts and cryptosporidium oocysts;
- 2 treatment processes, usually filtration and disinfection;
- 1 NTU turbidity (maximum) in finished water;
- No detectable E.Coli, fecal coliforms and total coliforms in treated water.

Currently the source water for the Royston system is already treated by the Village of Cumberland and is compliant with provincial regulations. However for water quality assurance purposes, prior to the water entering the Royston system, water is given a secondary dose of chlorine.

By dosing the water with chlorine, a free chlorine residual is established throughout the distribution network to help prevent bacteriological regrowth. The free chlorine residual is an indicator of the effectiveness of disinfection within the distribution system. The CVRD strives to maintain a free chlorine residual above 0.2mg/L at the end of the system. The CVRD regularly monitors the chlorine residual throughout the distribution network at five fixed locations. The average results are shown in Figure No.3 below.



Figure No.2: Chlorine Injection at the Royston Chlorination Station.

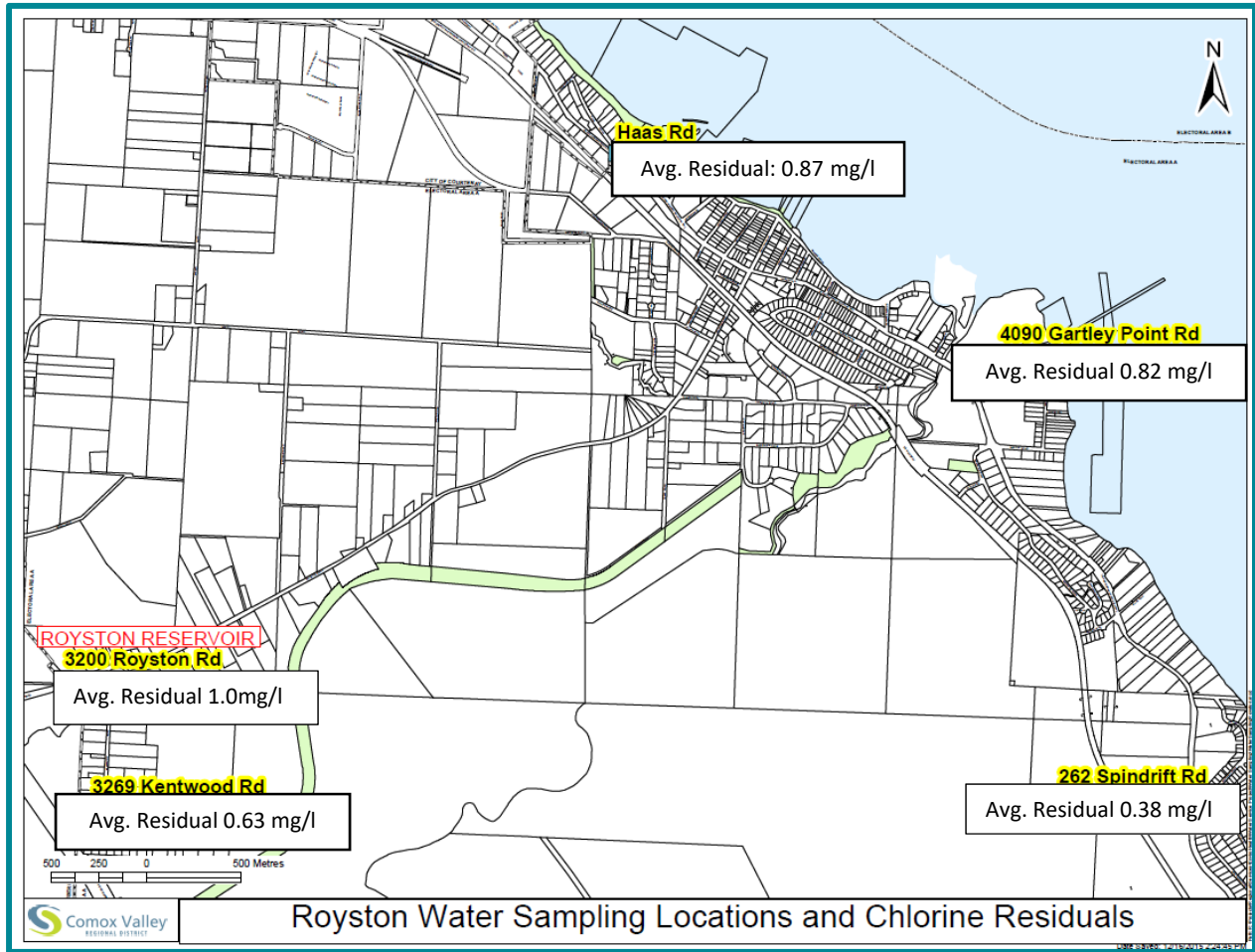


Figure No.3: Average Chlorine Residual at the Royston Sampling Locations

A by-product of chlorination can be Trihalomethanes (THM). There are four types of THM’s that contribute to the total THM’s. Chloroform is the most common THM and is formed when natural organic matter reacts with chlorine and/or bromine in disinfected water. The guidelines require that the total THM’s for drinking water must be less than 0.1mg/L, THM’s were sampled bi-annually. Table No.1 below shows the average THM’s at the Herondale Reservoir.

Table No.1: Average Total THM Concentration at the Herondale Reservoir

Trihalomethanes	Herondale Reservoir
Chloroform	0.068
Bromodichloromethane	0.006
Dibromochloromethane	0.027
Bromoform	0.002
Average Total THMs (mg/L)	0.072

Bacteria

E.Coli and total coliform bacteria are microorganisms that if present in water samples indicate possible contamination with sewage or animal wastes. Chlorination helps to inactivate harmful pathogens within the water supply network. Table No.2 below shows that within the Royston Water Distribution System for 2022, there were zero positive results found for E.Coli and total coliforms.

Table No.2: Bacteriological Standards and Sampling Results

Results	E.Coli		Total Coliform Bacteria	
	Exceedances	# of Samples	Exceedances	# of Samples
January	0	4	0	4
February	0	4	0	4
March	0	5	0	5
April	0	6	0	6
May	0	5	0	5
June	0	5	0	5
July	0	5	0	5
August	0	5	0	5
September	0	6	0	6
October	0	4	0	4
November	0	5	0	5
December	0	5	0	5
Totals	0 exceedances per 59 samples		0 exceedances per 59 samples	

Canadian Drinking Water Guidelines

Health Canada develops the *Canadian Drinking Water Guidelines*. These are guidelines for limits on microbial, chemical, physical and radiological substances in drinking water. In the guidelines, health-based limits are identified for each substance as maximum allowable concentrations. The guidelines also assign aesthetic objectives to substances that do not cause risk to human health, but will influence consumer acceptance of the water based on factors such as taste, odour and colour.

Table No.3 shows the Herondale Reservoir drinking water averages concentration for multiple parameters compared to the guideline concentrations. In 2022, the system was below all maximum allowable concentrations and aesthetic objectives as illustrated in Table No.3.

More information on the parameters listed below, including common sources and health considerations, can be found on the [Health Canada website](#).

Table No.3: Average Chemical and Physical Parameters at Herondale Reservoir Compared to Guideline Concentrations

Parameter	Herondale Reservoir (mg/L)	Guideline Concentration (mg/L)
Aluminum	0.0147	≤0.1
Arsenic	<0.0001	≤0.01
Barium	0.001	≤1.0
Boron	<0.05	≤5.0
Chloride	5.5	250
Chromium	<0.001	≤0.05
Copper	0.0052	1
Iron	0.099	≤0.30
Lead	0.0059	≤0.01
Manganese	0.006	≤0.05
Nitrite (as N)	0.028	1
Selenium	<0.0001	≤0.05
Sodium	4.71	≤200
Sulphate	1.3	<500
Zinc	0.007	≤5

Turbidity

The *Canadian Drinking Water Guidelines* also recommend the turbidity to be below one NTU.

Turbidity is the measure of relative clarity of a liquid. Clarity is important when producing drinking water for human consumption and in many manufacturing uses. The average turbidity within the system was 0.51 NTU.

Temperature

Temperature is described as an aesthetic objective (a parameter that may impair the taste, smell or colour of water) and physical characteristic of water. Gradual variations in water temperature occur throughout the seasons, however significant changes in water temperature can upset chlorination and chemical water treatment processes. The guidelines recommend water temperature to be less than 15 degrees celsius. The average temperature for the distribution water was 12.3 degrees celsius.

pH

The pH of water is a measure of water acidity. pH has minimal impact for water consumers and varies greatly depending on the water source. However, pH is very important for many operational water quality parameters. The *Canadian Drinking Water Guidelines* recommend the pH ranging between 7-10.5, in 2022, the the average pH within the distribution system was 7.4 pH.

Planning**Goals**

To ensure effective long-term planning and management programs are in place to meet the needs of all users groups while minimizing operation and infrastructure costs.

Consumption

The average daily water consumption for the system was 911 m³/day. A comparison of demands from the past ten years reveals a decrease in the average daily demand while the maximum daily demand has remained almost unchanged. Over the past ten years the highest daily demand has occurred within June, July or August, illustrating that water consumption increases in the summer months. Figure No.4 shows the total yearly consumption for Royston from 2018 to 2022.

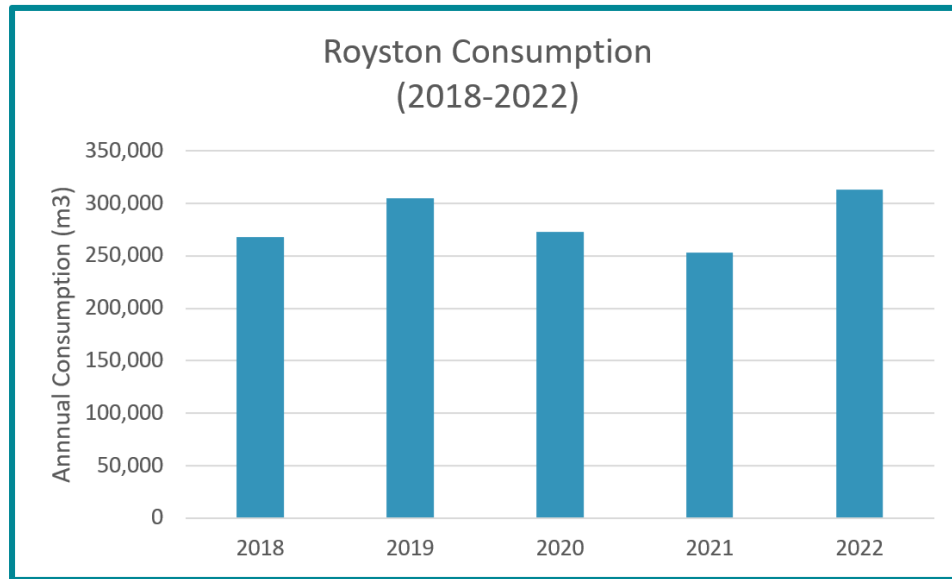


Figure No.4: Royston Yearly Consumption

Maintenance

The Royston Water System is owned and operated by the CVRD. Water services staff consists of eleven operators and a technician with varying ranges of certification. Each operator is registered with the Environmental Operator's Certification Program within BC and is required to remain in good standing by taking yearly continuing education courses.

The CVRD carries out regular and routine maintenance of the entire Royston Water System, to ensure continued operation and supply of safe and clean water to all users. The chlorination facility, distribution lines and reservoirs are regularly inspected and maintained.

263 Work Orders within the system were investigated by the CVRDs Waterworks operations staff. Figure No.5 identifies the breakdown of various types of work orders reviewed by staff.

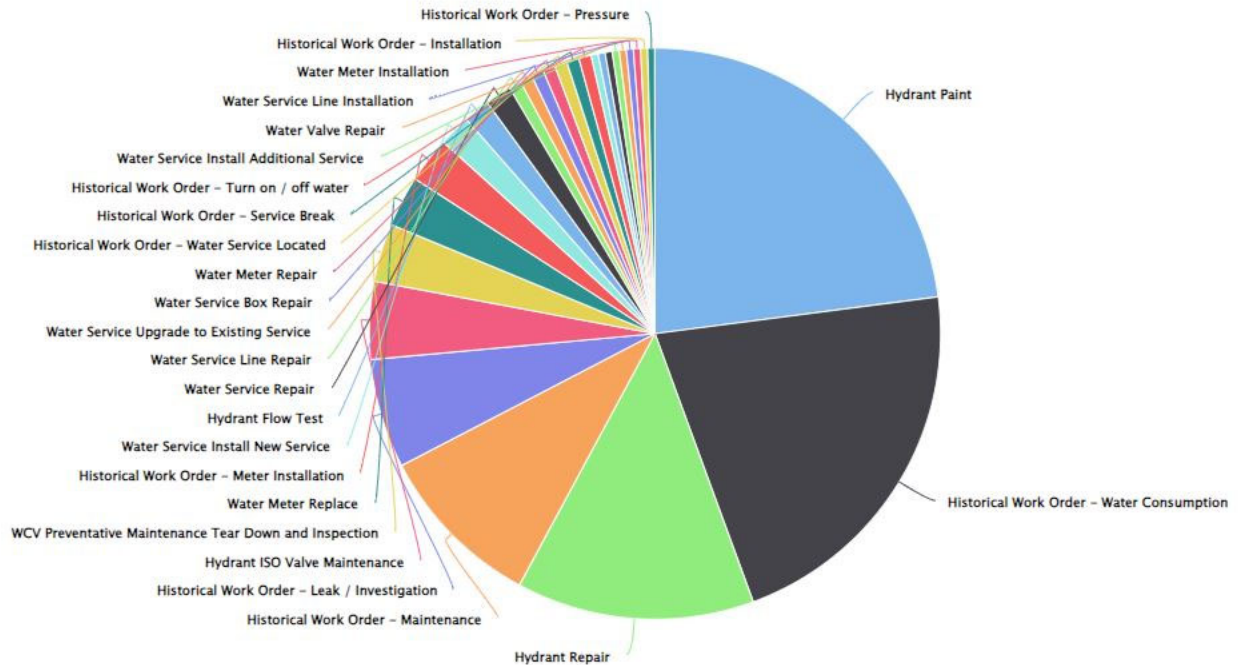


Figure No.5: Work Orders by Category

Financial

In 2022, the CVRD supplied a total of 331,708 m³ of water. Water for the Royston system is supplied in bulk from the Village of Cumberland.

As part of the water supply agreement with the Village of Cumberland, the CVRD continues to review alternate water supply options. Further work, including project scoping and discussions with potential project partners on alternate water sources is ongoing and planned to be continued into 2022.

2022 Accomplishments

- ✓ Complete year two of five in the residential water meter replacement program.
- ✓ Complete design for the Water South Extension Project.
- ✓ Finished PRV screen project (bringing screens to surface)
- ✓ Completed year 2 of 5 of the residential water meter replacement project
- ✓ Replaced the Kentwood transmission Flow Meter

2023 Objectives

- Herondale Reservoir repair (interior floor and overflow pipe hangers)
- Complete year 3 of 5 of the residential water meter replacement project
- Minto Rd watermain replacement (fire protection project)
- Advancing the Royston alternate water source study (Comox Valley water servicing south project)

ROYSTON DISTRIBUTION SYSTEM

Date	Chlorine Residual (mg/L)					E.Coli						Total Coliforms					
	Reservoir Outlet	3269 Kentwood Road	262 Spindrift Road	3771 Haas Road	4090 Gartley Road	4090 Gartley Point Road	262 Spindrift Road	3269 Kentwood Road	Herondale Reservoir 400 Herondale Road	Royston Reservoir 3200 Royston Road	Haas Road	4090 Gartley Point Road	262 Spindrift Road	3269 Kentwood Road	Herondale Reservoir 400 Herondale Road	Royston Reservoir 3200 Royston Road	Haas Road
2022-01-04				0.95						< 1							< 1
2022-01-10	1.2	0.84					< 1		< 1				< 1		< 1		
2022-01-17							< 1					< 1					
2022-01-24					0.91	< 1					< 1						
2022-02-07				1.01						< 1							< 1
2022-02-14			0.52				< 1					< 1					
2022-02-22			0.64														
2022-02-28					0.94												
2022-03-07				0.8						< 1							< 1
2022-03-14								< 1					< 1				
2022-03-21			0.84				< 1					< 1					
2022-03-28					0.84	< 1					< 1						
2022-04-04				0.96						< 1							< 1
2022-04-11	1.19	0.66						< 1	< 1				< 1		< 1		
2022-04-19			0.34				< 1					< 1					
2022-04-25					0.91	< 1					< 1						
2022-04-26								< 1						< 1			
2022-05-02				1.02						< 1							< 1
2022-05-09	1.23	0.61						< 1	< 1				< 1		< 1		
2022-05-16			0.38				< 1					< 1					
2022-05-24					0.92	< 1					< 1						
2022-06-06				1.08						< 1							< 1
2022-06-07								< 1						< 1			
2022-06-13	0.56	0.57						< 1	< 1				< 1		< 1		
2022-06-20			0.28				< 1					< 1					
2022-06-27						< 1					< 1						

