



Torres Strait Island
REGIONAL COUNCIL

Engineering Services



DRINKING WATER QUALITY MANAGEMENT PLAN

ANNUAL REPORT
YEAR ENDED 30 JUNE 2023

Torres Strait Island Regional Council Service Provider SP500

This report has been prepared in accordance with the Drinking Water Quality Management Plan Report Guidance Note.

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1 Introduction

This is the Drinking Water Quality Management Plan (DWQMP) Annual Report for Torres Strait Island Regional Council (TSIRC) for the year ended 30 June 2023.

TSIRC is a registered service provider, identification (SPID) number 500, serving 4,083 people across 15 communities on 14 islands in the Torres Strait. Implementation of the approved DWQMP ensures safe drinking water to protect public health. An overview of the water services provided by TSIRC are listed below:

Table 1 Water Services Overview

Description	Metric
Population Served	4,083 people
No. of Raw Water Storage Facilities	12 lagoons
No. of Treated Water Storage Facilities	19 Reservoirs
Length of Delivery Mains	105km

This report summarises compliance with the approved plan over the financial year and includes:

- Activities undertaken during the year in operating the drinking water schemes
- Drinking water quality results for the year
- Summary of events that affected water quality during the year
- DWQMP review findings

This report is submitted to the Queensland Water Supply Regulator (Department of Regional Development, Manufacturing and Water - DRDMW) and is made available to the public through our website or for inspection upon request at any TSIRC office.

2 Summary of Schemes Operated

The table below summarises the drinking water schemes operated by TSIRC.

Table 2 Summary of Drinking Water Schemes Operated

Scheme Name	Population	Connections	Raw Water Source						Pre Treatment Process							Primary Treatment Process			
			Well	Bore	Weir	Desalination	Lagoon (Rainfall)	Dam	Clarifier	Media Filtration	RO Desalination	Coagulation (Alum)	pH adjustment	Ultra-Filtration by TSC	Settling Tank	Ultra Filtration	Media Filtration	Bag Filtration	Chlorine Disinfection
01 - Boigu	199	82				3	1												
02 - Dauan	131	58	4				1	1											
03 - Saibai	340	104					1												
04 - Mabuiaig	253	60			1														
05 - Badu	704	247	3																
06 - Kubin	151	84	4		1			1											
07 - St Pauls	242	118	3		1														
08 - Hammond	253	100	1						1										
09 - lama	275	82				3													
10 - Warraber	287	81				1	1												
11 - Poruma	164	77				2	1												
12 - Masig	283	106				2	1												
13 - Ugar	69	34		2		1	1												
14 - Erub	326	106	1				1												
15 - Mer	406	111				3	1												

3 Implementation of Drinking Water Quality Management Plan

TSIRC's latest version of the DWQMP Version 3.1 was conditionally approved on the 15/08/2022. The DWQMP was reshaped to reflect TSIRC's water management strategy more accurately as it incorporates TSIRC's shift away from paper-based reporting and towards data collection and sharing through SCADA, SWIM and Smartsheets.

Following a regular internal review of the DWQMP in June 2023, an application to amend the DWQMP was submitted. These amendments aimed to refine the 2022 DWQMP for better usability by field operators and to incorporate recommendations from the 2022 DWQMP audit findings and the Water Supply Regulator's August 2022 DWQMP approval conditions.

3.1 Risk Management Improvement Plan

TSIRC's DWQMP Appendix K includes a Risk Management Improvement Plan (RMIP) which captures actions for improving the management of risks identified within the DWQMP. A copy of the RMIP as at 30 June 2023 is included in Appendix A.

3.2 Water Operator Training

TSIRC did not put any of its Water Officers through Cert II or Cert III training between July 2022 - June 2023.

In late 2021, TSIRC conducted a water symposium on Poruma where training was provided to the water operations team in conjunction with the Tropical Public Health Service. This symposium covered topics such as: leak detection, water chemistry, computer skills, water test equipment use and calibration and desalination.

In May 2022, TSIRC in conjunction with representatives from the Tropical Public Health Service and the Water Industry Operators Association of Australia commenced an operator skills mapping process to create an online platform to provide targeted and tailored Cert III training to key staff across the organisation. While progress has been made, this project has been reprioritised to be completed in 2024.

As highlighted in Sections 4 and 5 of this report, insufficient operator training and support have contributed to drinking water incidents in the reporting period. Addressing this will be a focus for 2024.

3.3 Projects to Improve Water Quality

In addition to items in the RMIP, the following capital projects were completed in 2022-23, demonstrating TSIRC's commitment to improving water quality:

Table 3 Water quality improvement projects

Division	Project	Status
02 - Dauan	WTP Upgrade <ul style="list-style-type: none">- Increase media filter size to optimise treatment flow rate- Replace media to optimise filtration capacity- Install bag filters Construct New Rising Main - Redirect Well 1, 2 & 3 to lagoon, have 1 treatment location (WTP)	Completed

04 - Mabuiag	WTP Upgrade <ul style="list-style-type: none"> - Increase media filter size to optimise treatment flow rate - Replace media to optimise filtration capacity - Install bag filters 	Completed
06 - Kubin	WTP Upgrade <ul style="list-style-type: none"> - Increase media filter size to optimise treatment flow rate - Replace media to optimise filtration capacity - Install bag filters 	Completed
07 - St Pauls	WTP Upgrade <ul style="list-style-type: none"> - Increase media filter size to optimise treatment flow rate - Replace media to optimise filtration capacity - Install bag filters 	Completed
05 - Badu	Installation of dedicated reservoir outlet main to ensure appropriate chlorine levels in reservoir and reticulation network.	Funding secured and planning commenced

4 Operational and Verification Monitoring

TSIRC's DWQMP Appendix B - Water Quality Management describes the operational and verification monitoring parameters which are applicable to the various sample points across each water scheme:

- Daily testing: free chlorine, turbidity, conductivity and pH
- Monthly testing: E. coli
- 6 Monthly testing: metals, nutrients, anions and physical properties

An error has been noted in the approved DWQMP in relation to the sample locations where daily pH and conductivity tests are undertaken as part of the operational monitoring program. This will be amended in the next version of the DWQMP.

The results from operational and verification monitoring sampling are presented in Appendix B and C respectively. Compliance with the E. coli 98% annual value is in Appendix D.

4.1 Operational Monitoring

A review of the data in Appendix B has highlighted that instances of results exceeding operational and reporting limits are being overlooked. Furthermore, many daily operational samples were missed. TSIRC is implementing alarms in SWIM to alert the W&WW team about breaches, enabling prompt investigations and reporting to regulators.

Ongoing operator training is needed for understanding limits and proper sampling. Improved review of operational data and enhanced operator support are also identified areas for improvement.

4.2 Verification Monitoring

Review of the verification Monitoring Data highlighted three areas where treated drinking water was outside ADWG values:

- E. coli (refer Section 4.3 below)
- Hardness
- Chloride

All the Total Hardness results (measured as mg CaCO₃ / L) were low, under 60 mg/L, meaning the water in those communities is very soft. Excessively soft water can be corrosive. This frequently occurs when reverse osmosis is being used for water treatment, which is the case in many of the schemes experiencing soft water, namely:

- Mer
- Ugar
- Masig
- Mabuiag
- Erub
- Poruma
- Boigu

Badu and Kubin also had results indicating soft water, however they do not use reverse osmosis. TSIRC will be investigating how to restore hardness to prevent corrosion, and the cause of softness at Badu and Kubin.

There was also one chloride exceedance, which occurred at Mer. The guideline value for chloride is an aesthetic guideline, and the test result was not significantly higher.

Figure 1 shows there were numerous missed verification samples during the reporting period. Logistics problems, like missed flights and delayed freight to the Cairns laboratory, were the main causes. TSIRC is taking steps to address this by reviewing and enhancing sampling logistics procedures, including better rescheduling of missed samples.

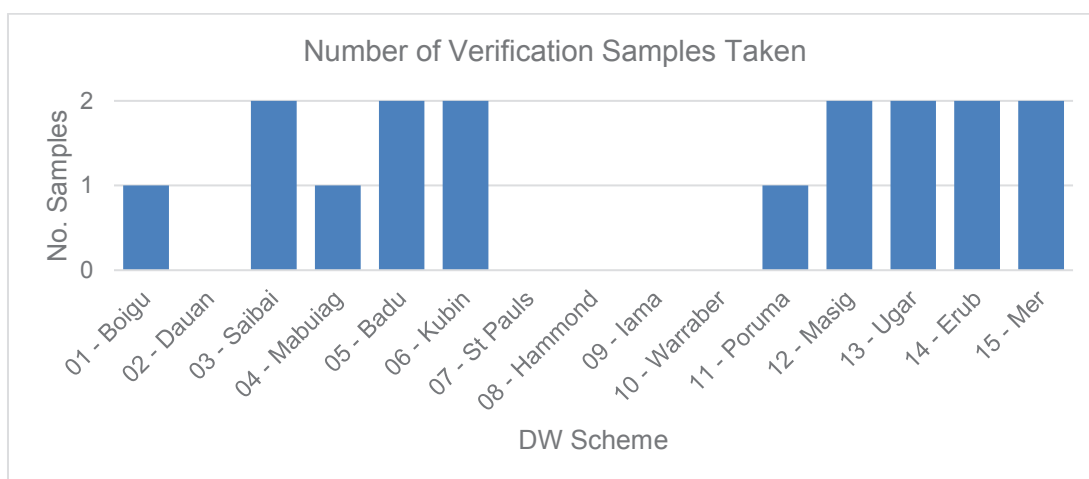


Figure 1 Number of Verification Samples Taken

4.3 E. coli Monitoring

There were three failed E. coli samples from operational and verification monitoring during the reporting period, all occurring at Ugar, on 12/10/22, 14/1/23 and 10/3/23. The first failure was reported to the regulator and a boil water alert was activated on 14/10/22. Refer to DWI-500-22-09881 and I-31 in Appendix E - Incidents and Complaints Register for details. The second and third failures occurred during the active boil water alert so were not reported. The boil water alert was lifted on 17/5/22.

5 Incidents and Complaints

All incidents and complaints are managed in accordance with TSIRC's DWQMP Appendix G – Incidents and Complaints Management Plan. All known incidents and for this reporting period are summarised in Appendix E.

In the 2022-23 year only one formal complaint was received by TSIRC Management. The lack of complaints is likely due to a lack of understanding and training in the area for water officers and other council staff.

Water Officers are prompted to notify management of complaints via email so they can be resolved and noted in the Incidents and Complaints Register.

The drinking water incidents in the reporting period revealed:

- Issues with chlorine dosing system hardware, an ongoing problem being addressed across all communities.
- Aged chlorine affecting effectiveness; water operators received guidance on proper handling, storage, and rotation.
- Need for improvement in operator training and support.

5.1 Alleged Illness

Alleged illness complaints are received from customers who believe their water supply is the cause of an illness. In these cases, recent laboratory samples are reviewed to supply information to the customer to reassure the water supply is meeting the Australian Drinking Water guidelines for health-related parameters.

5.2 Colour Complaints

Discoloured water can predominantly be attributed to emergency works being conducted on the water mains in the area. A change in flow direction can cause sediment to be disturbed in the pipe and push this into legs of water meters at resident's properties. While Water and Wastewater team endeavours to plan works where possible and deliver letters to residents explaining works, duration of time without water and potential effects such as dirty/cloudy water after the water is returned to service, emergencies still occur that require urgent attention and cannot be planned.

Water and Wastewater staff advise residents to run external taps to flush any dirty water trapped in their connection and if the water is still discoloured, Water and Wastewater staff return to the area and flush the delivery mains again.

5.3 Taste and Odour Complaints

The taste and odour complaints received are often related to chlorine in the network. Individual customers have very different tolerance levels and while as low as possible, this can be detected by customers with very sensitive taste and smell.

Chlorine can also react with organics in the pipe network, be affected by periods of low flow and temperature in the pipe network.

Water and Wastewater staff investigate all chlorine complaints and if recent results are not available for that area from daily testing, officers will attend the location and take a chlorine reading using a handheld chlorine meter.

6 DWQMP Audit Findings

An external audit of TSIRC's DWQMP was completed in September 2022 and the findings are included in Appendix F.

7 DWQMP Internal Review

An internal review of the DWQMP was completed in June 2023. An application to amend the DWQMP as a result of the review findings was lodged with the regulator in August 2023. A summary of the proposed amendments is included in Appendix G.

Appendix A - RMIP

ID	Description	TSIRC Priority	Added Date	Status	Expected Completion Date	Availability of funding/resources/estimated cost	Comments	Responsible person
WS-01	Automated water parameter logging and/or business day testing of water parameters by water officer	Low	Sep-21	Commenced	5+ years	Unknown	Some WTP sites have turbidity analysers	Operations Manager - Water
WS-02	Install ultra filtration or UV for water scheme	Medium	Sep-21	Commenced	5+ years	Est. \$1M per UF plant (note: no building works)	UF plants at Erub and Badu	Operations Manager - Water
WS-03	Provide hardstand or automated fire suppression system	Low	Sep-21	Not started	5+ years	Unknown	-	Operations Manager - Water
WS-04	Install escalated alarming system	High	Sep-21	Commenced	Dec-23	Funding available	Linked with WS-11	SCADA Technician and Data Analyst
WS-05	Install automated backwash system	High	Sep-21	Commenced	5+ years	Est. \$500k per WTP (note: no building works)	Automated backwash systems at Dauan, St Pauls, Kubin, Mabuiaig and Hammond	Operations Manager - Water
WS-06	Provide E.coli testing station on island	Medium	Sep-21	Commenced	5+ years	Est. \$100k per testing station (note: no building works)	E.Coli labs on Hammond, Badu, lama, Dauan and Mabuiaig. E. Coli lab under construction at Ugar.	Operations Manager - Water

ID	Description	TSIRC Priority	Added Date	Status	Expected Completion Date	Availability of funding/ resources/ estimated cost	Comments	Responsible person
WS-08	Ensure all pipework is buried or SS316	Low	Sep-21	Not started	5+ years	Unknown	-	Operations Manager - Water
WS-09	Provide permanent desalination unit on island	Medium	Sep-21	Not started	5+ years	Est. \$1M per desalination unit	-	Operations Manager - Water
WS-10	Ensure spare booster pump set is available on island for emergency installation	Medium	Sep-21	Not started	5+ years	Unknown	Relates to Dauan	Operations Manager - Water
WS-11	GeoSCADA (Individual logins regulated by active directory)	High	Sep-21	Commenced	Dec-23	Funding available	Linked with WS-04	SCADA Technician and Data Analyst
WS-12	Cyber security upgrade to radio telemetry networks (DNP3)	High	Sep-21	Not started	5+ years	Est. \$2.5M	-	SCADA Technician and Data Analyst
WS-13	Upgrade supply and return line to Badu reservoir (remove push / pull water system)	Very High	Sep-21	Commenced	Dec-23	Funding available	-	Operations Manager - Water
WS-14	Upgrade Erub reservoir to increase useable lifespan	Very High	Sep-21	Commenced	5+ years	Est. \$1M	Temporary reservoir arrangement in place at Erub	Operations Manager - Water
WS-15	Develop procedurised stocklist and ordering methodology	Medium	Sep-21	Commenced	Jun-24	Internal cost	-	Senior Water and Wastewater Engineer
WS-16	Develop procedurised preventative maintenance plan	Medium	Sep-21	Commenced	Jun-24	Internal cost	-	Senior Water and Wastewater Engineer

ID	Description	TSIRC Priority	Added Date	Status	Expected Completion Date	Availability of funding/ resources/ estimated cost	Comments	Responsible person
WS-17	Ensure water supply scheme reservoirs are adequately sized	Low	Sep-21	Not started	5+ years	Unknown	-	Operations Manager - Water
WS-18	Develop ownership agreement with TSC for 08 - Hammond Water Supply Scheme and establish communication protocol for TSC	Medium	Sep-21	Commenced	Dec-23	Internal cost	-	Senior Water and Wastewater Engineer
WS-19	Install suitable chemical storage shed	Very High	Jul-23	Not started	5+ years	Unknown	Numerous sites do not have adequate undercover chlorine storage available	Operations Manager - Water
WS-20	Raise Boigu seawall	Low	Jul-23	Not started	5+ years	Unknown	-	Operations Manager - Water
WS-21	Raise Warraber seawall	Low	Jul-23	Not started	5+ years	Unknown	-	Operations Manager - Water
WS-22	Extend the water reticulation network at Kubin to include airport and motel	Low	Jul-23	Not started	5+ years	Unknown	-	Operations Manager - Water
WS-23	Create list of vulnerable customers	Medium	Jul-23	Not started	Jun-24	Internal cost	-	Senior Water and Wastewater Engineer
WS-24	Complete collection of sample point GPS locations. Merge GIS and TSIRC Mapping so maps of each island include infrastructure (buildings and mains) and accurate sample point locations.	Medium	Jul-23	Not started	Jun-24	Internal cost	-	Senior Water and Wastewater Engineer

ID	Description	TSIRC Priority	Added Date	Status	Expected Completion Date	Availability of funding/ resources/ estimated cost	Comments	Responsible person
WS-25	Update schematics in A.3	Medium	Jul-23	Not started	Jun-24	Internal cost	Historical working versions have been lost so these need to be recreated and updated. Water Officers still find these a useful resource for reference.	Senior Water and Wastewater Engineer
WS-26	Develop procedurised maintenance plan	Medium	Dec-23	Commenced	Jun-24	Internal cost	-	Senior Water and Wastewater Engineer

Appendix B- Water Quality – Operational Monitoring

Operational Monitoring Summary

Scheme	Parameter	No. Samples Required	No. Samples Collected	No. Non-compliant	Operational Criteria	Minimum	Average	Maximum	Comments
01 - Boigu	Conductivity	1560	199	0	Critical Limits: <1500µS/cm	243	430.70	795.6	
	E coli	72	50	0	<1	<1	<1	<1	
	Free Chlorine	1560	1257	5	Critical Limits: <0.2mg/L and >5mg/L	0.1	0.64	1.99	Low chlorine results due to operator sampling error (0.39% samples taken)
	pH	1560	199	139	6.5-8.5	5.9	6.88	9.95	Refer Notes on Operational Monitoring below
	Turbidity	1560	1256	0	Critical Limit: <5 NTU	0	0.14	3.47	
02 - Dauan	Conductivity	1560	222	0	Critical Limits: <1500µS/cm	0	129.99	183.2	
	E coli	72	0	0	<1	<1	<1	<1	
	Free Chlorine	1560	1373	67	Critical Limits: <0.2mg/L and >5mg/L	0.02	1.06	4.98	Refer Notes on Operational Monitoring below
	pH	1560	222	184	6.5-8.5	5.31	6.14	7.38	Refer Notes on Operational Monitoring below
	Turbidity	1560	1402	28	Critical Limit: <5 NTU	0	1.69	89.82	Refer Notes on Operational Monitoring below
03 - Saibai	Conductivity	1560	102	0	Critical Limits: <1500µS/cm	2.344	159.18	278.1	
	E coli	72	27	0	<1	<1	<1	<1	
	Free Chlorine	1560	803	22	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.85	5	Refer Notes on Operational Monitoring below
	pH	1560	104	6	6.5-8.5	6.34	6.93	7.68	Refer Notes on Operational Monitoring below
	Turbidity	1560	655	2	Critical Limit: <5 NTU	0.01	0.72	5.72	One-off readings (occurred in 1 of 6 sample points on the day); not reported to WSR.
04 - Mabuiaig	Conductivity	1560	216	0	Critical Limits: <1500µS/cm	0	79.94	104.4	
	E coli	72	30	0	<1	<1	<1	<1	
	Free Chlorine	1560	1284	40	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.90	4.02	Refer Notes on Operational Monitoring below
	pH	1560	216	129	6.5-8.5	6.4	6.46	6.76	Refer Notes on Operational Monitoring below
	Turbidity	1560	1272	0	Critical Limit: <5 NTU	0	0.74	4.58	
05 - Badu	Conductivity	1560	223	0	Critical Limits: <1500µS/cm	0	146.24	465	
	E coli	72	78	0	<1	<1	<1	<1	

Scheme	Parameter	No. Samples Required	No. Samples Collected	No. Non-compliant	Operational Criteria	Minimum	Average	Maximum	Comments
06 - Kubin	Free Chlorine	1560	1536	927	Critical Limits: <0.2mg/L and >5mg/L	0.01	0.31	1.59	Refer Notes on Operational Monitoring below
	pH	1560	226	1	6.5-8.5	6.73	7.47	9.07	One-off high reading at reservoir; not reported.
	Turbidity	1560	1488	0	Critical Limit: <5 NTU	0	0.61	2.3	
	Conductivity	1560	3	0	Critical Limits: <1500µS/cm	0	0.57	9	
	E coli	72	35	0	<1	<1	<1	<1	
07 - St Pauls	Free Chlorine	1560	1124	58	Critical Limits: <0.2mg/L and >5mg/L	0.02	1.06	5	Kubin reported low chlorine levels in September 2022. Refer DWI-500-22-09779. A boil water alert was active from 27/9/22 to 30/5/23. The non-compliances noted here were in that period.
	pH	1560	67	2	6.5-8.5	6.3	6.51	6.82	Two one-off low readings at reservoir; not reported.
	Turbidity	1560	1122	187	Critical Limit: <5 NTU	0	2.69	114	Refer Notes on Operational Monitoring below
	Conductivity	1560	80	0	Critical Limits: <1500µS/cm	23.1	70.76	276	
	E coli	72	5	0	<1	<1	<1	<1	
08 - Hammond	Free Chlorine	1560	680	5	Critical Limits: <0.2mg/L and >5mg/L	0.01	1.08	2.85	Refer Notes on Operational Monitoring below
	pH	1560	82	0	6.5-8.5	6.5	6.71	7.09	
	Turbidity	1560	529	9	Critical Limit: <5 NTU	0	0.41	11.3	Refer Notes on Operational Monitoring below
	E coli	72	10	0	<1	<1	<1	<1	
	Free Chlorine	1560	1110	20	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.94	3.45	Refer Notes on Operational Monitoring below
09 - Iama	Turbidity	1560	1103	11	Critical Limit: <5 NTU	0	1.58	107	Refer Notes on Operational Monitoring below
	Conductivity	1560	274	0	Critical Limits: <1500µS/cm	54	791.96	1381	
	E coli	72	40	0	<1	<1	<1	<1	
	Free Chlorine	1560	1741	23	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.92	2.1	Refer Notes on Operational Monitoring below
	pH	1560	272	19	6.5-8.5	5.07	7.43	8.31	Refer Notes on Operational Monitoring below
10 - Warraber	Turbidity	1560	1613	0	Critical Limit: <5 NTU	0.01	0.55	2.24	
	Conductivity	1560	178	0	Critical Limits: <1500µS/cm	0.34	460.70	928.3	
	E coli	72	19	0	<1	<1	<1	<1	

Scheme	Parameter	No. Samples Required	No. Samples Collected	No. Non-compliant	Operational Criteria	Minimum	Average	Maximum	Comments
11 - Poruma	Free Chlorine	1560	1071	2	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.99	2.91	Refer DWI-500-23-10285. Low readings on 25/5/23 and 6/6/23 while BWA active
	pH	1560	177	42	6.5-8.5	5.4	6.73	7.77	Refer Notes on Operational Monitoring below
	Turbidity	1560	1064	4	Critical Limit: <5 NTU	0	1.19	832.9	0.4% samples outside critical limits, with two of four being extreme values indicating incorrect sampling.
	Conductivity	1560	30	0	Critical Limits: <1500µS/cm	310	404.07	489	
	E coli	72	11	0	<1	<1	<1	<1	
	Free Chlorine	1560	192	0	Critical Limits: <0.2mg/L and >5mg/L	0.43	0.86	1.33	
12 - Masig	pH	1560	10	5	6.5-8.5	5.45	6.47	7.5	Five one-off low readings at reservoir; not reported.
	Turbidity	1560	108	0	Critical Limit: <5 NTU	0	0.07	0.86	
	Conductivity	1560	235	0	Critical Limits: <1500µS/cm	0.46	221.79	874	
	E coli	72	25	0	<1	<1	<1	<1	
	Free Chlorine	1560	1420	2	Critical Limits: <0.2mg/L and >5mg/L	0.01	0.80	4.15	Two one-off high readings at 1 of 6 sample points on same day; not reported.
	pH	1560	234	8	6.5-8.5	5.68	6.54	7.21	Eight one-off low readings at reservoir; not reported.
13 - Ugar	Turbidity	1560	1367	0	Critical Limit: <5 NTU	0	0.30	4.34	
	Conductivity	1560	210	0	Critical Limits: <1500µS/cm	4.32	330.90	463.4	
	E coli	72	40	3	<1	<1	<1	<1	Three E.coli non-compliances on: 12/10/23, 14/1/23 and 10/3/23. The first was reported and a Boil Water Alert was active from 14/10/22 to 17/05/23. Refer DWI-500-22-09881.
	Free Chlorine	1560	1275	119	Critical Limits: <0.2mg/L and >5mg/L	0.01	0.69	2.44	Refer Notes on Operational Monitoring below
	pH	1560	212	106	6.5-8.5	5	6.44	7.88	Refer Notes on Operational Monitoring below
	Turbidity	1560	1275	3	Critical Limit: <5 NTU	0.01	0.61	109	Three One-off high/low readings at 1 of 6 sample points on same day; not reported.
14 - Erub	Conductivity	1560	240	0	Critical Limits: <1500µS/cm	0	163.84	305	
	E coli	72	30	0	<1	<1	<1	<1	

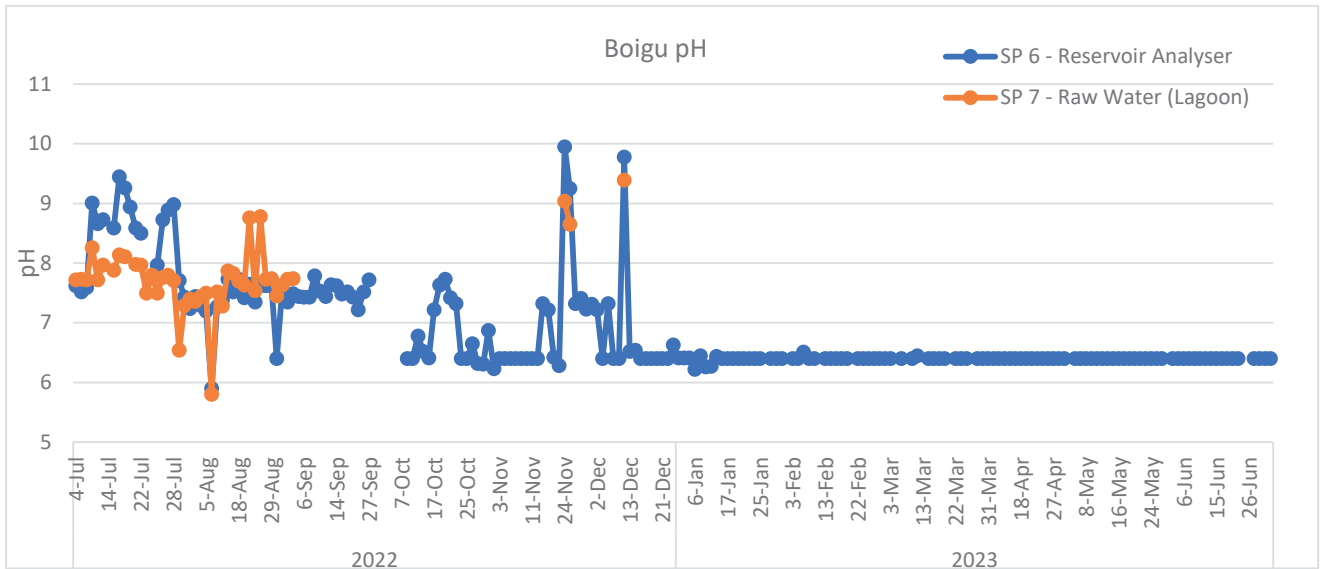
Scheme	Parameter	No. Samples Required	No. Samples Collected	No. Non-compliant	Operational Criteria	Minimum	Average	Maximum	Comments
15 - Mer	Free Chlorine	1560	1274	1	Critical Limits: <0.2mg/L and >5mg/L	0.18	1.21	3.07	One-off high reading at 1 of 6 sample points on same day; not reported.
	pH	1560	240	1	6.5-8.5	6.8	7.47	8.4	One-off high reading at reservoir; not reported.
	Turbidity	1560	1261	2	Critical Limit: <5 NTU	0	0.51	5.41	Two one-off high readings; not reported.
	Conductivity	1560	176	0	Critical Limits: <1500µS/cm	7.91	621.53	935.2	
	E coli	72	35	0	<1	<1	<1	<1	
	Free Chlorine	1560	1073	5	Critical Limits: <0.2mg/L and >5mg/L	0.1	0.92	5	Refer Notes on Operational Monitoring below
	pH	1560	164	10	6.5-8.5	5.57	6.71	10.82	Ten one-off high/low readings at reservoir; not reported.
	Turbidity	1560	1057	1	Critical Limit: <5 NTU	0	0.36	5.12	One-off high reading at 1 of 6 sample points on same day; not reported.

Notes on Operational Monitoring

01 - Boigu

pH

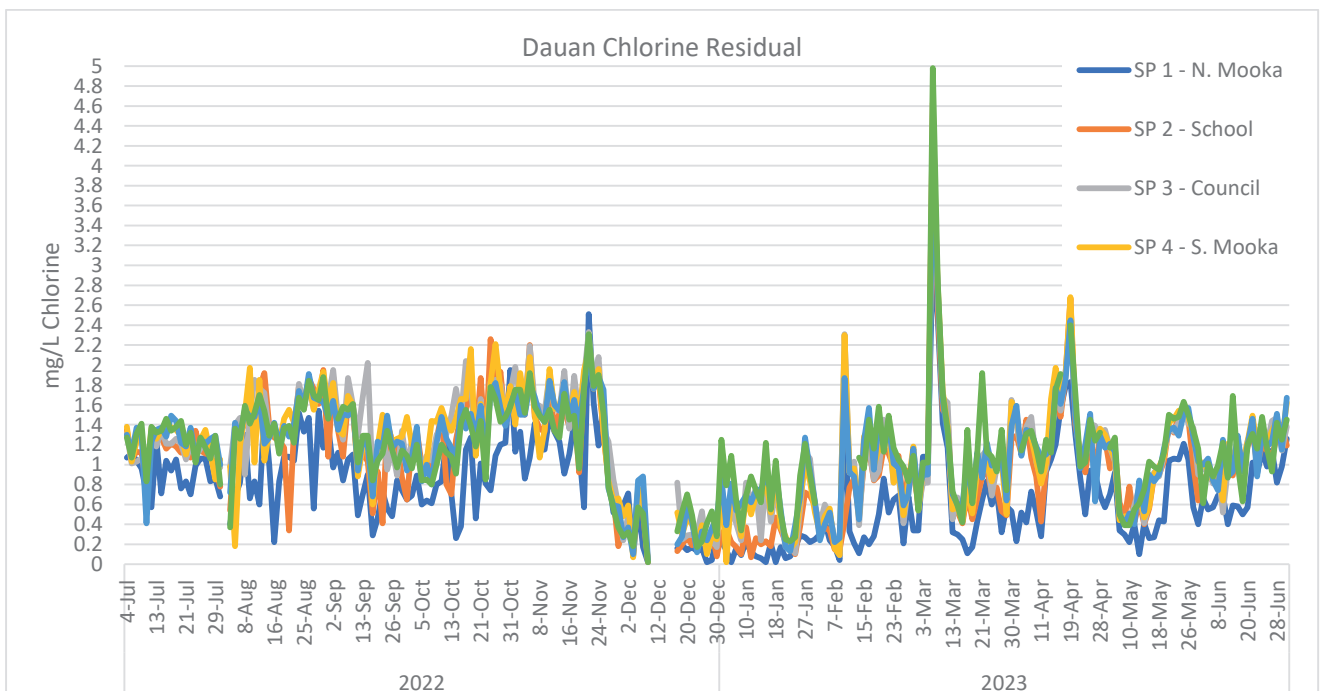
All pH readings taken since January 2023 at the reservoir were outside operating range of meter, i.e. reading showed “<6.5”. In the first half of the reporting period there were also some high values, which may also be due to meter or sampling issues. Training with operators to ensure valid readings recorded to be undertaken, as well as investigation of the meter.



02 - Dauan

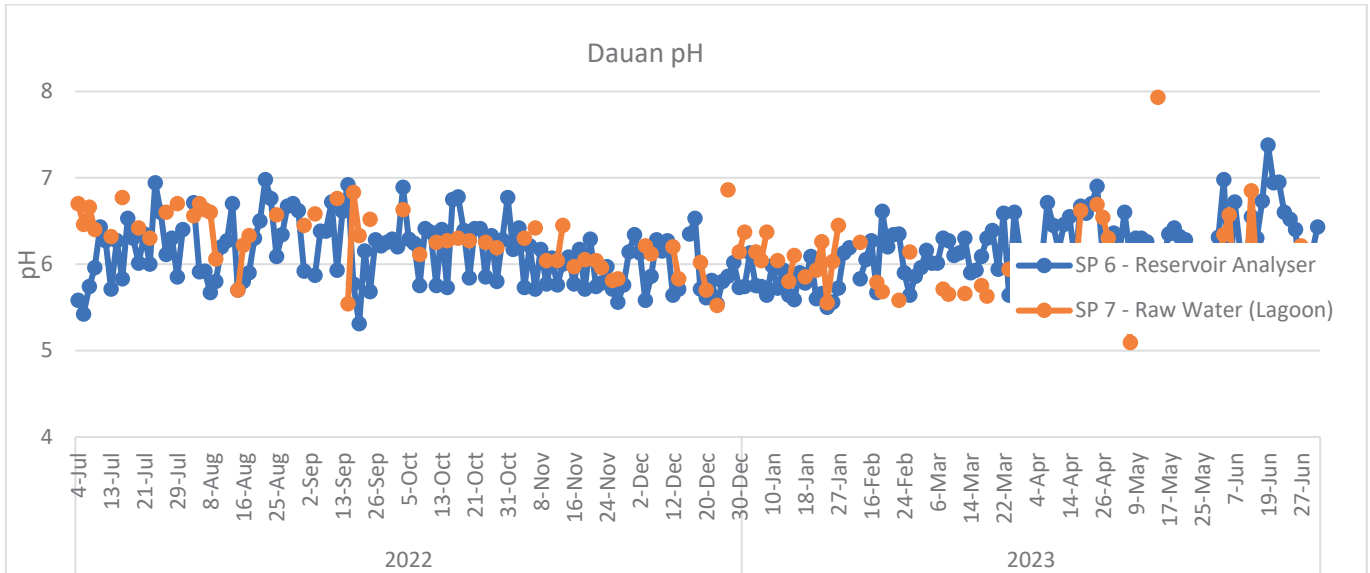
Free Chlorine

There were 67 sample results less than the critical limit of 0.2 mg/L. A majority of these appear to be one-off readings (occurred in 1 of 6 sample points on the day), indicating the tap was not flushed sufficiently before the sample was taken. However, there were instances of low readings at more than one sample point. There was a period from December 2022 to February 2023 where the residuals were low, due to a poor batch of chlorine. Training has been provided to operators to identify batch dates of chlorine to avoid further low chlorine incidents.



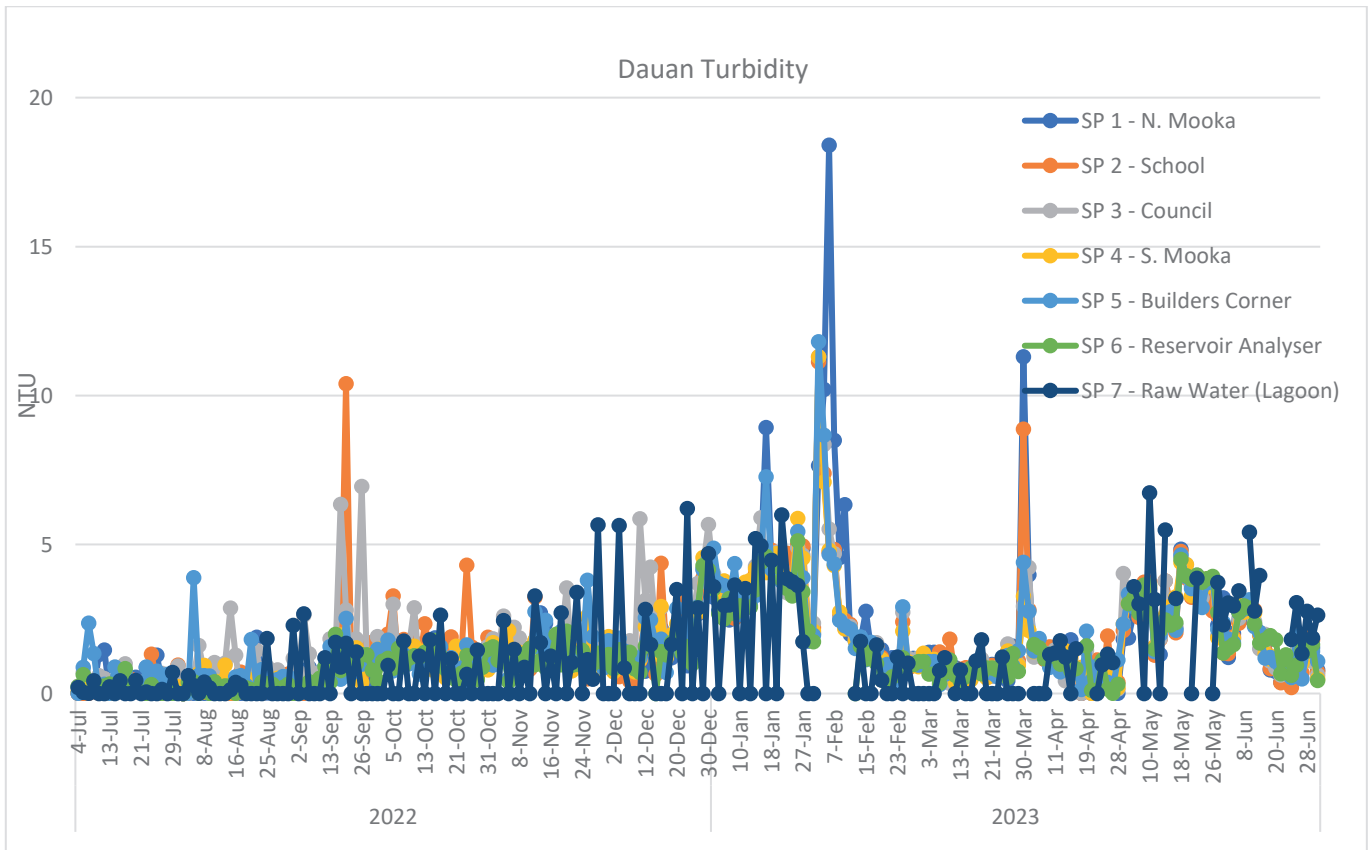
pH

82% of the pH readings at the Dauan Reservoir are lower than the operational limit, and ADWG aesthetic guideline value of 6.5. There were no readings <4, which has potential adverse health affects. Further investigation will be carried out into the low readings, and corrective actions undertaken if required.



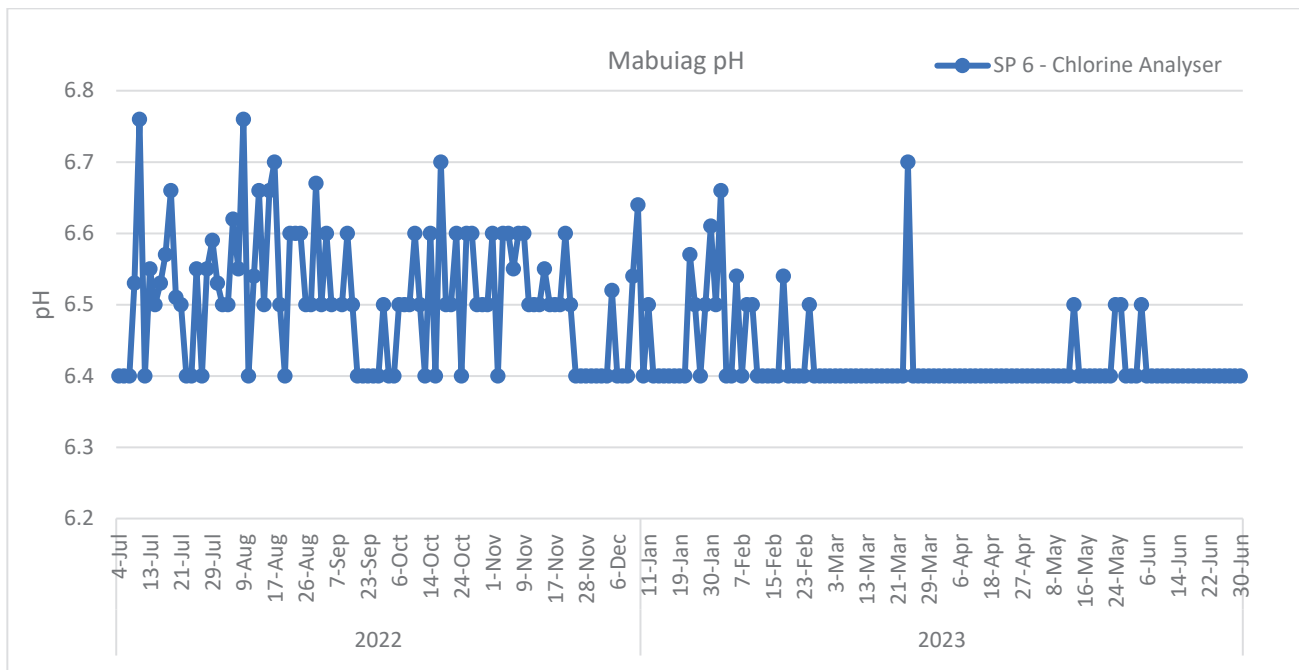
Turbidity

1.85% of samples tested were outside the critical limit of 5 NTU. Turbidity spikes are commonplace during the wet season. Some outlier values are likely due to operator error during sampling, including scratched or dirty glass vials. It has been identified that operators need further training in turbidity testing and reporting, including corrective actions when readings are outside the critical limits. These instances of non-compliance at Dauan were not reported to the regulator either due to oversight or lack of reporting to management. TSIRC is in the process of implementing alarms in SWIM to allow the W&WW team to be alerted when operational limits are breached so investigations can be carried out.



pH

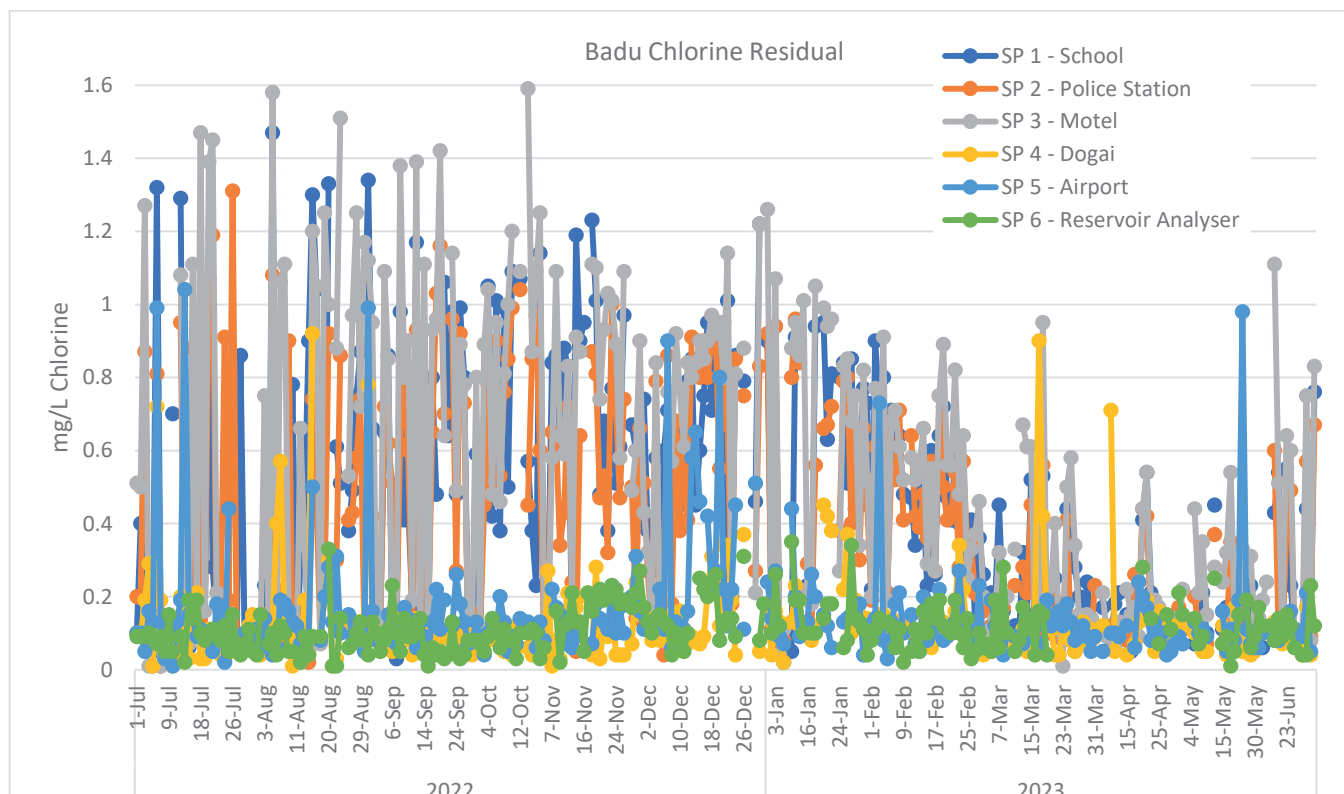
60% pH samples taken were outside operational limits. There is no trend data for the pH readings at Mabuia Reservoir, however all are lower than the operational limit, and ADWG aesthetic guideline value of 6.5. The readings were below the limit of the field sampling device. Further investigation will be carried out into the low readings and necessary corrective actions resulting from this investigation.



05 - Badu

Free Chlorine

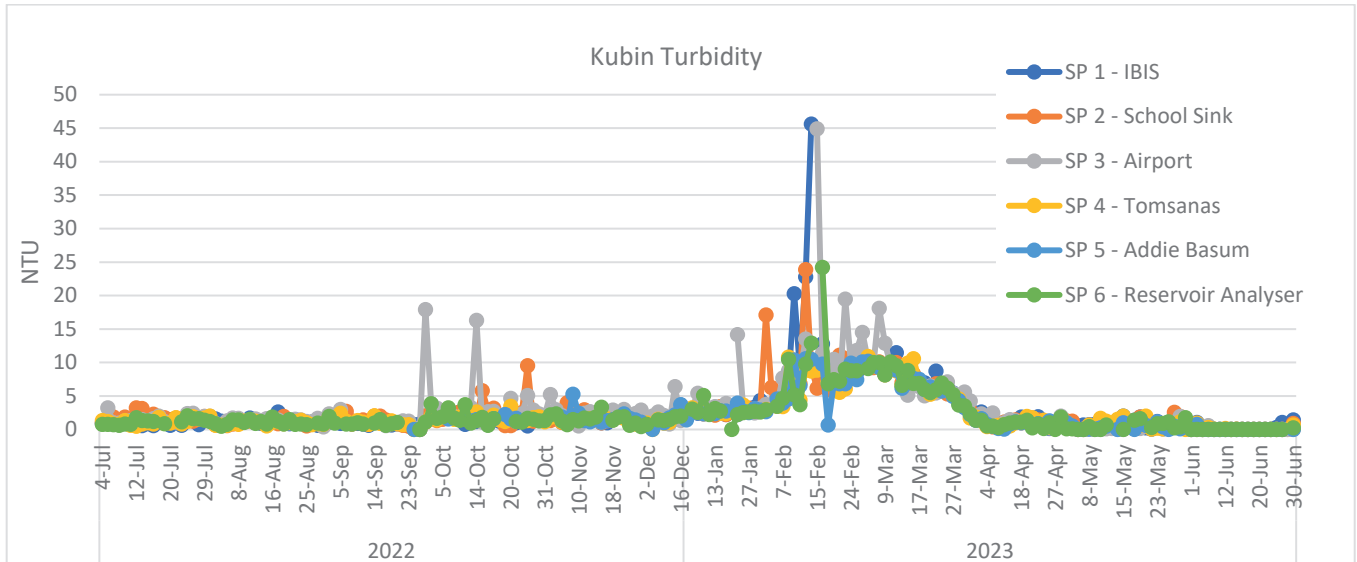
Refer DWI-500-22-09492. There has been an active BWA at Badu since 1/3/2022, which is still ongoing until capital works can be undertaken. These works are in the planning phase and an outcome has not yet been devised.



06 - Kubin

Turbidity

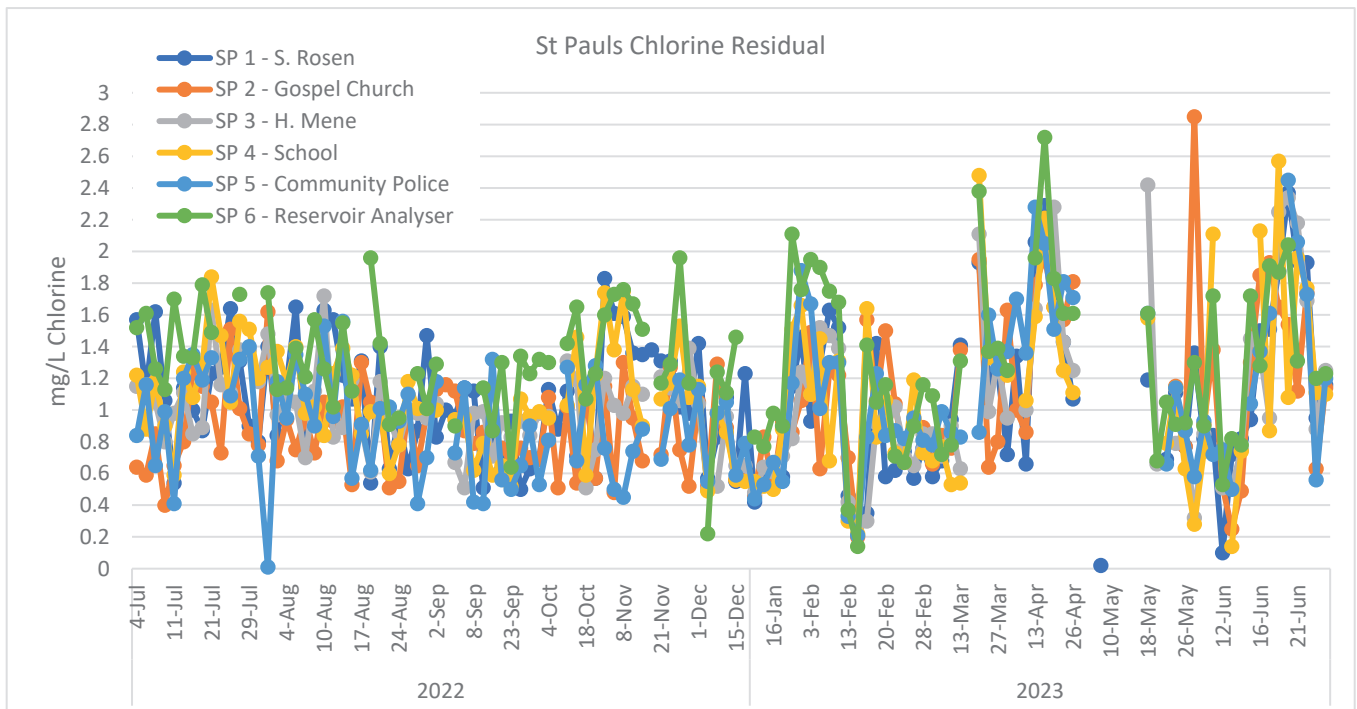
High turbidity readings were experienced Jan – Mar 2023 due to high rainfall, which has an impact of the water quality supplied by the wells. Future improvements to the monitoring of these sites would include a turbidity meter at the well sites and automation of the well pumps to shut down during a high turbidity event. This feature has already been implemented at the Weir site.



07 - St Pauls

Free Chlorine

There were several isolated low readings of free chlorine at St Pauls. These were due to poor sampling methods and not reported. TSIRC is in the process of implementing alarms in SWIM to allow the W&WW team to be alerted when operational or critical limits are breached so investigations can be carried out and breaches reported promptly to the regulators.



Turbidity

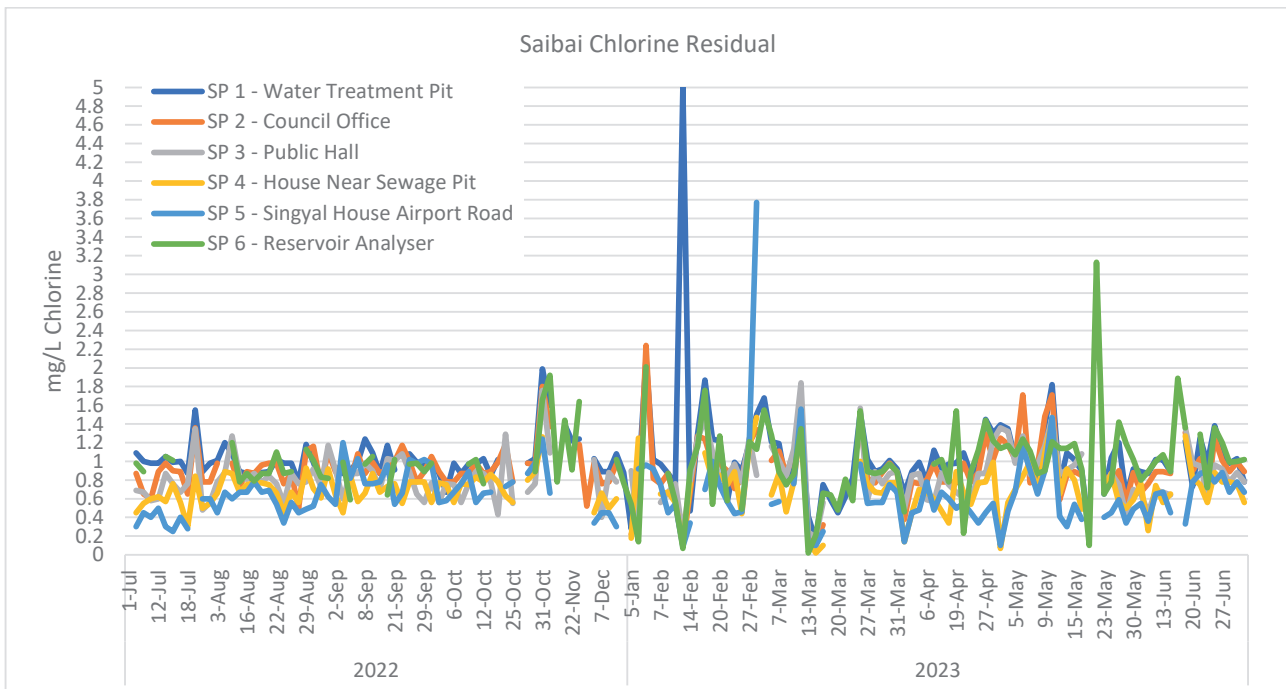
High turbidity readings were experienced Jan – Mar 2023. High rainfall during this period has an impact on the water quality supplied by the wells. Future improvements to the monitoring of these sites would include a turbidity meter at the well sites and automation of the well pumps to shutdown during a high turbidity event. This feature has already been implemented at the Weir site.

03 - Saibai

Free Chlorine

On 13/2/23, 13/3/23 and 14/3/23 there were several sample points with low chlorine readings. On 3/4/23 and 3/5/23 there were two sample points with low readings. These instances of non-compliance at Saibai were not reported to the regulator at the time, either due to oversight or lack of reporting to management. TSIRC is in the process of implementing alarms in SWIM to allow the W&WW team to be alerted when operational limits are breached so investigations can be carried out.

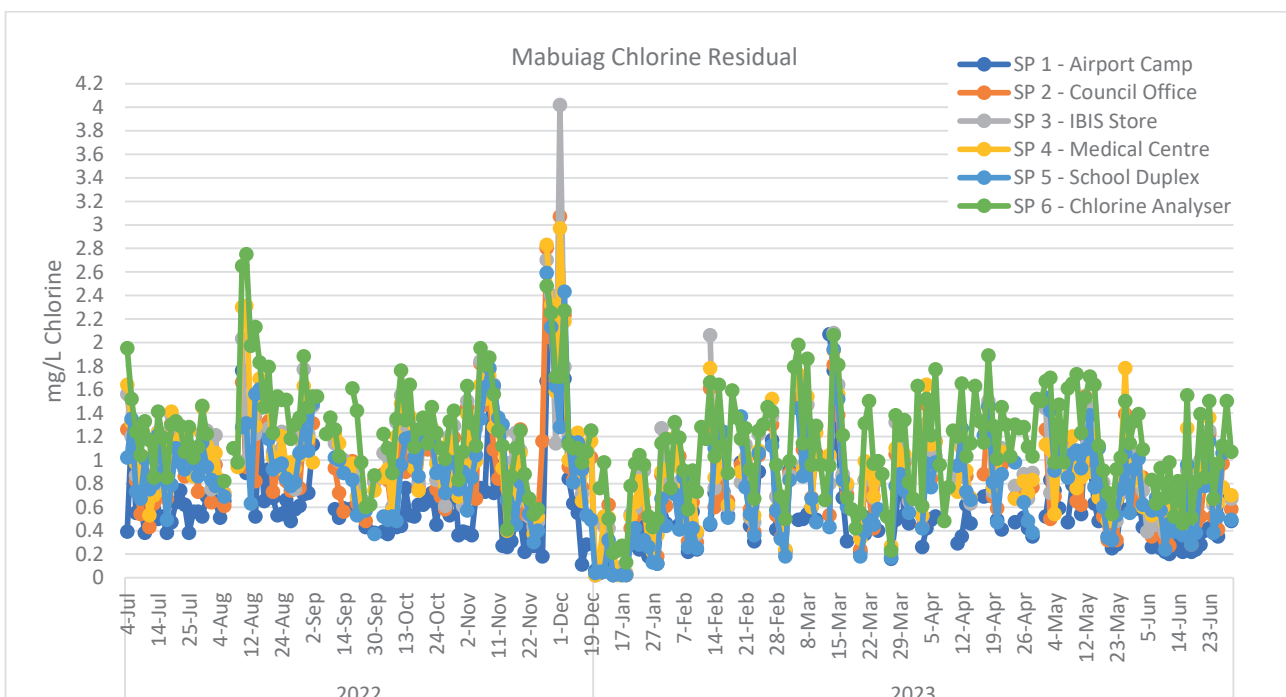
There were 5 other instances where there appears to be a one-off low reading (occurred in 1 of 6 sample points on the day), indicating the tap was not flushed sufficiently before the sample was taken.

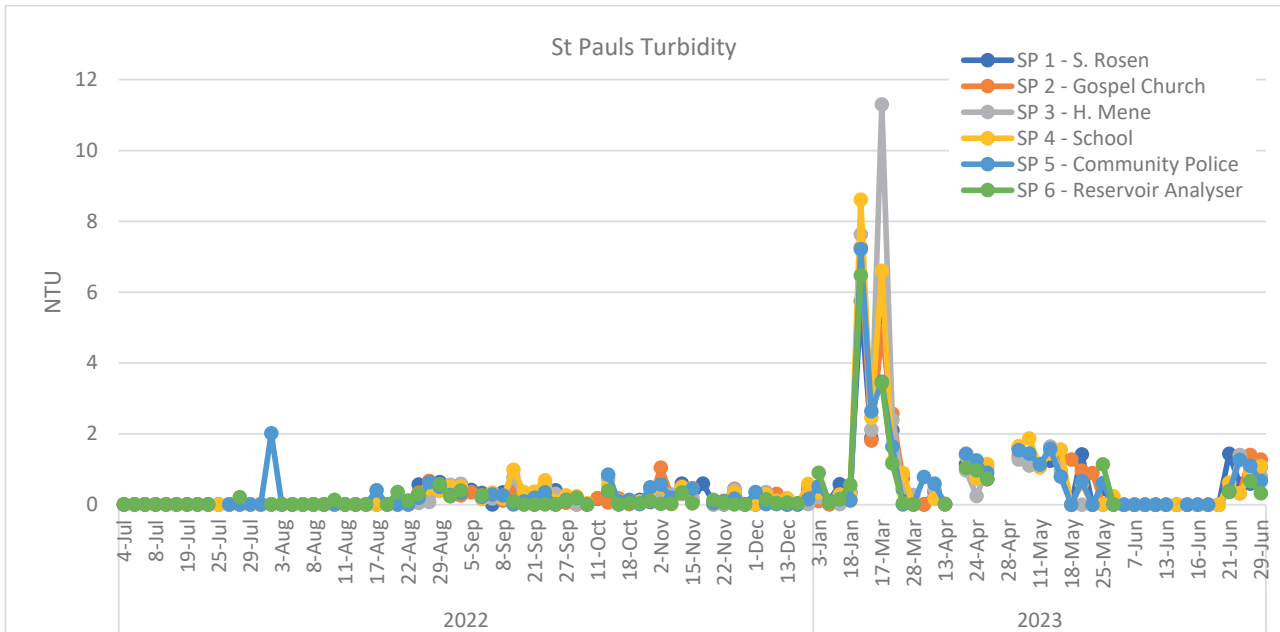


04 - Mabuiag

Free Chlorine

There were low chlorine readings throughout the network in late December 2022 and January 2023, due to a bad batch of chlorine and delivery times to remote communities during this period was difficult. A Boil Water Alert was active 5/1/23 – 28/4/23; refer DWI-500-23-10107.

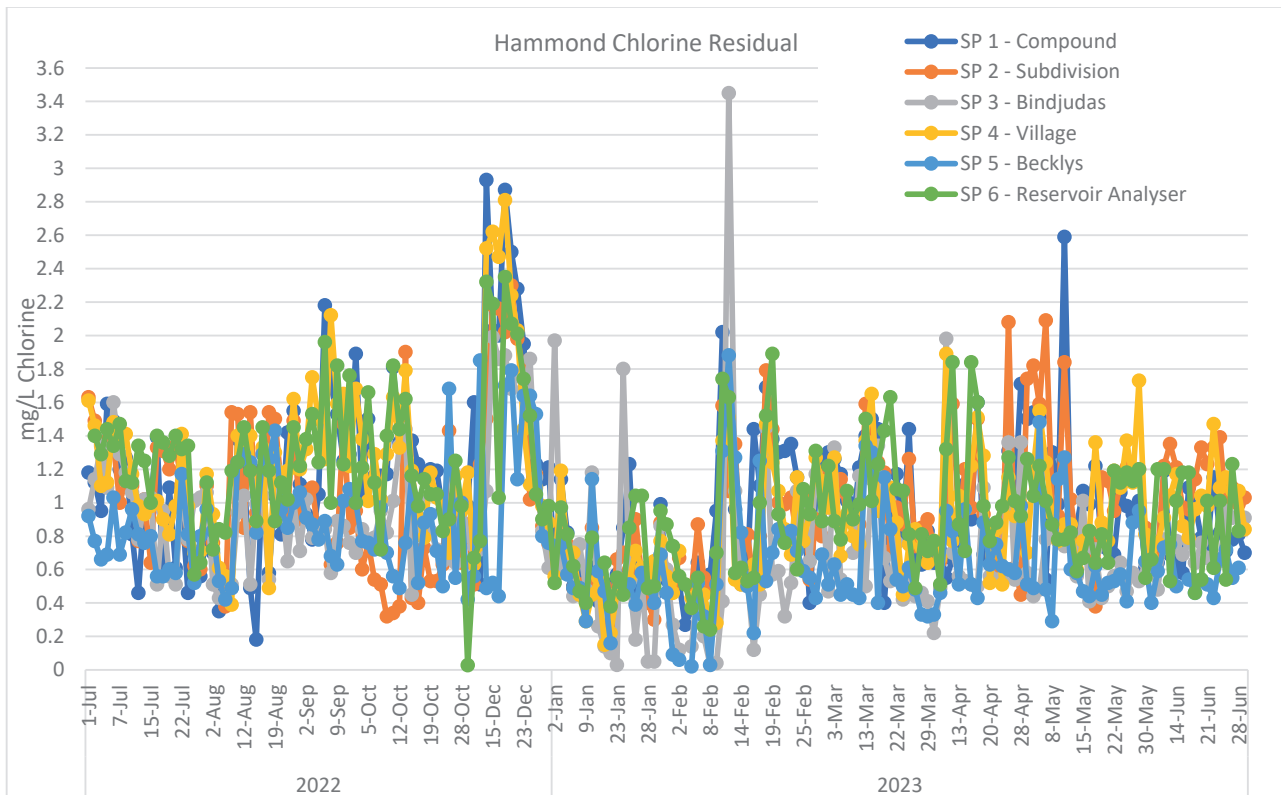




08 – Hammond

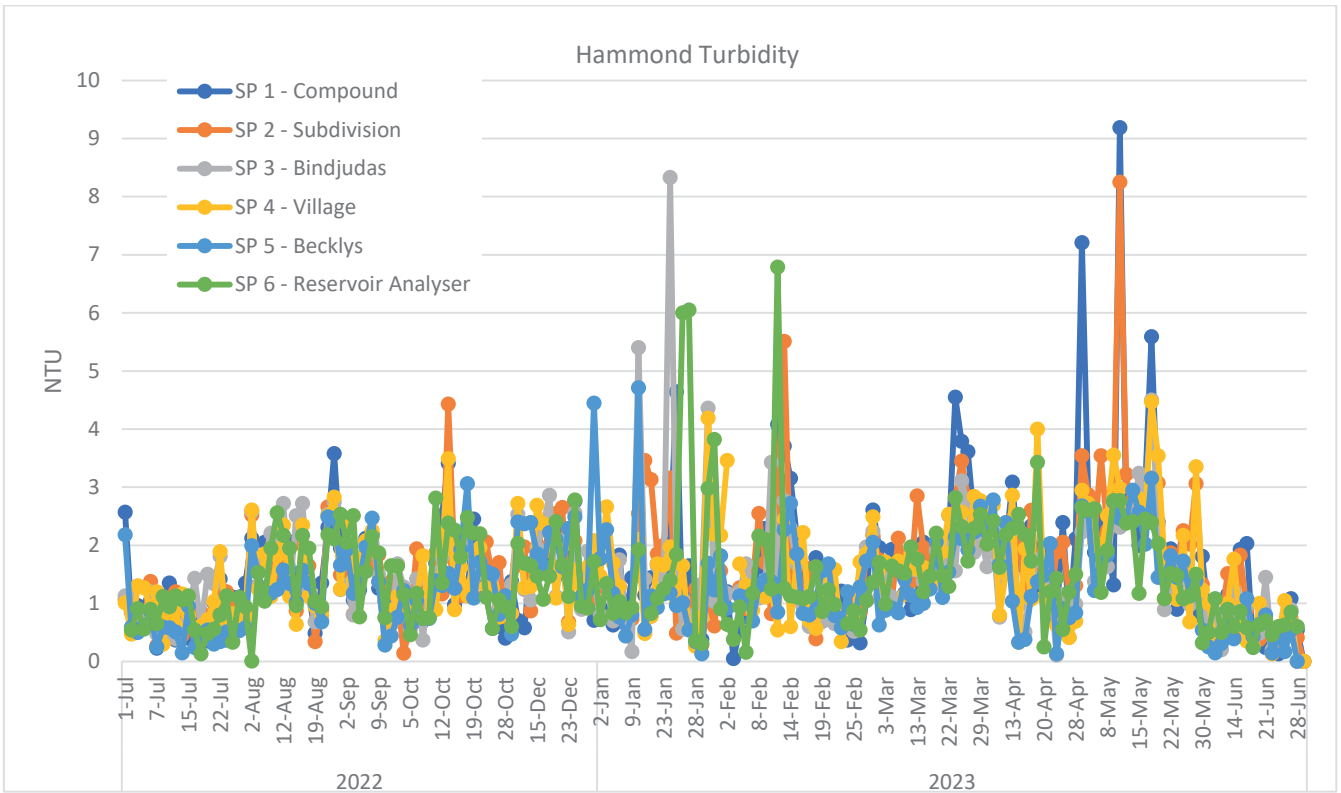
Free Chlorine

There were several low readings in January and February 2023. These were not reported either due to oversight or lack of reporting to management. TSIRC is in the process of implementing alarms in SWIM to allow the W&WW team to be alerted when operational or critical limits are breached so investigations can be carried out and breaches reported promptly to the regulators.



Turbidity

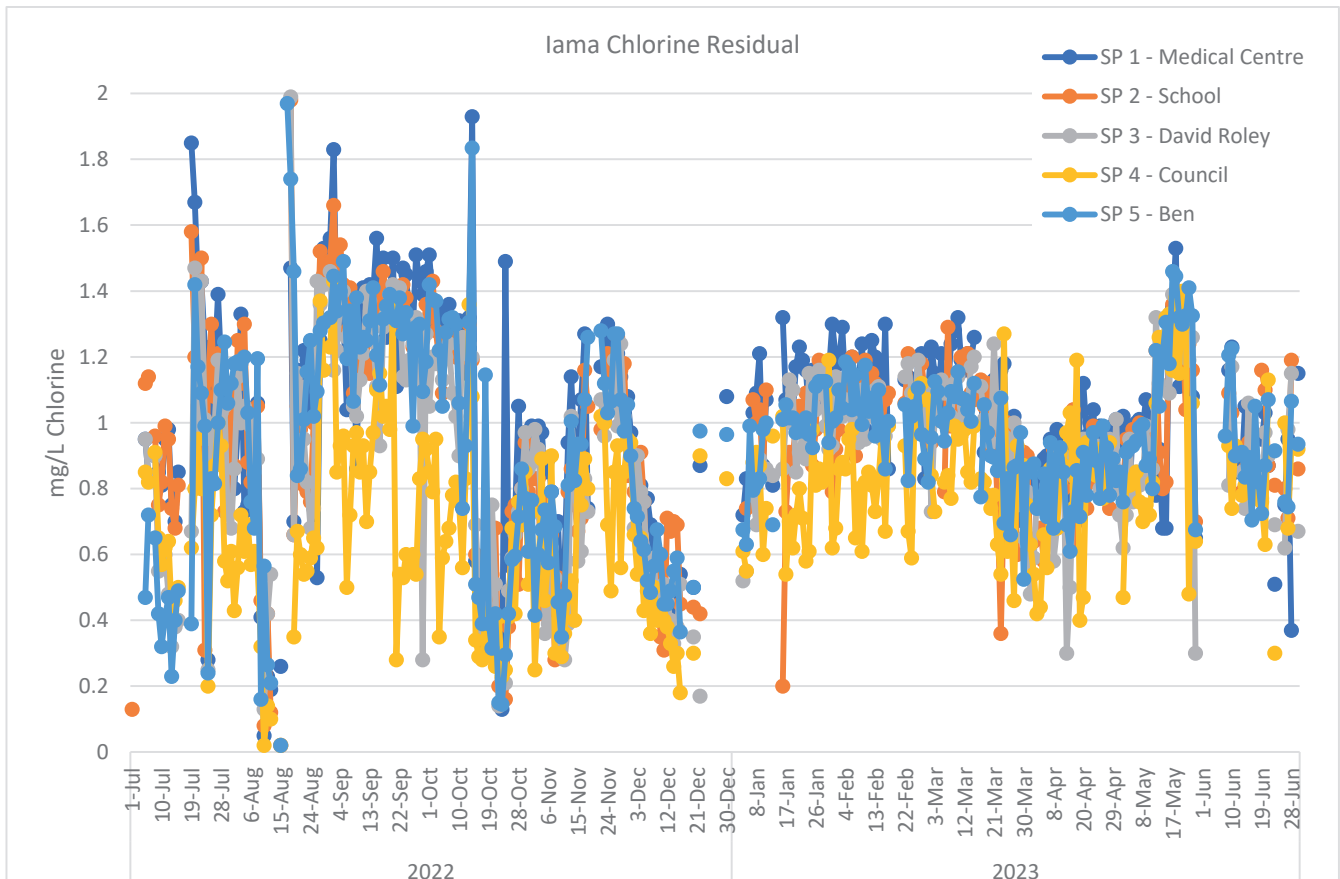
0.01% of samples tested were outside the critical limit of 5 NTU. There appears to be no trend in these sample points and are likely due to operator error during sampling, including scratched glass vials. It has been identified that operators need a refresher in turbidity testing and reporting, including what to do when readings are outside the critical limits. These instances of non-compliance at Hammond were not reported either due to oversight or lack of reporting to management. TSIRC is in the process of implementing alarms in SWIM to allow the W&WW team to be alerted when operational or critical limits are breached so investigations can be carried out and breaches reported promptly to the regulators.



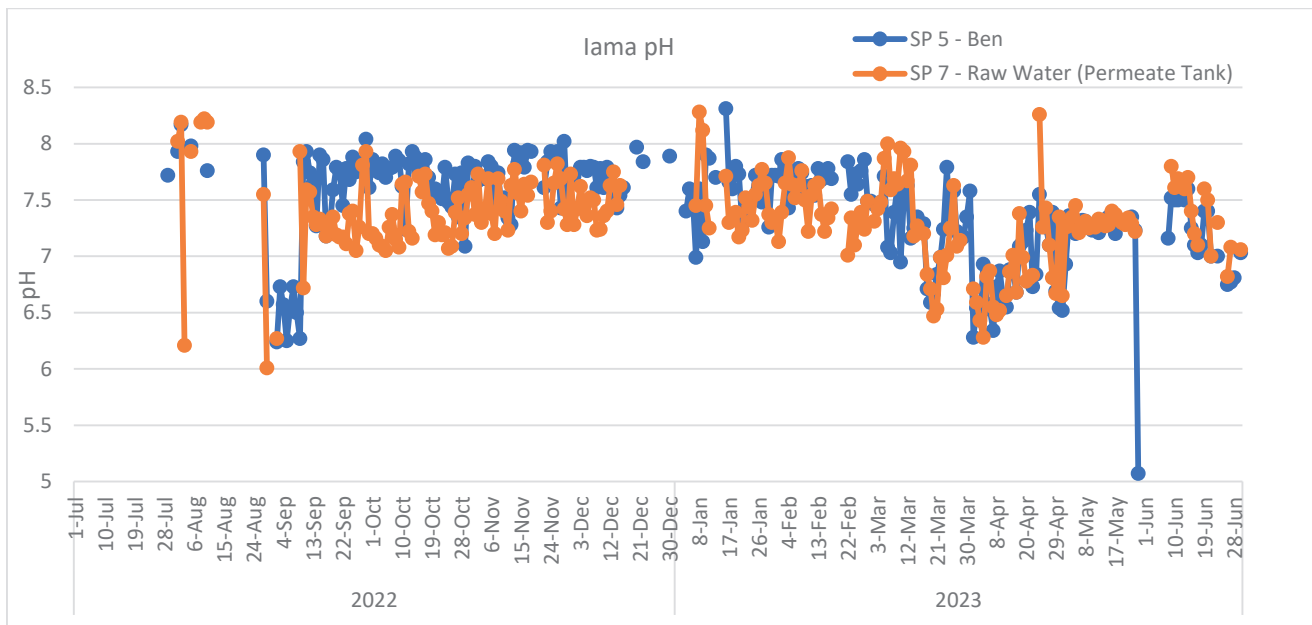
09 - Iama

Free Chlorine

number of low chlorine readings in August 2022, followed by a negative E.coli test, which was reported on 19/8/23.A BWA was active until 12/9/22. There were several low readings in October 2022, which were also not reported either due to oversight or lack of reporting to management. TSIRC is in the process of implementing alarms in SWIM to allow the W&WW team to be alerted when operational or critical limits are breached so investigations can be carried out and breaches reported promptly to the regulators.



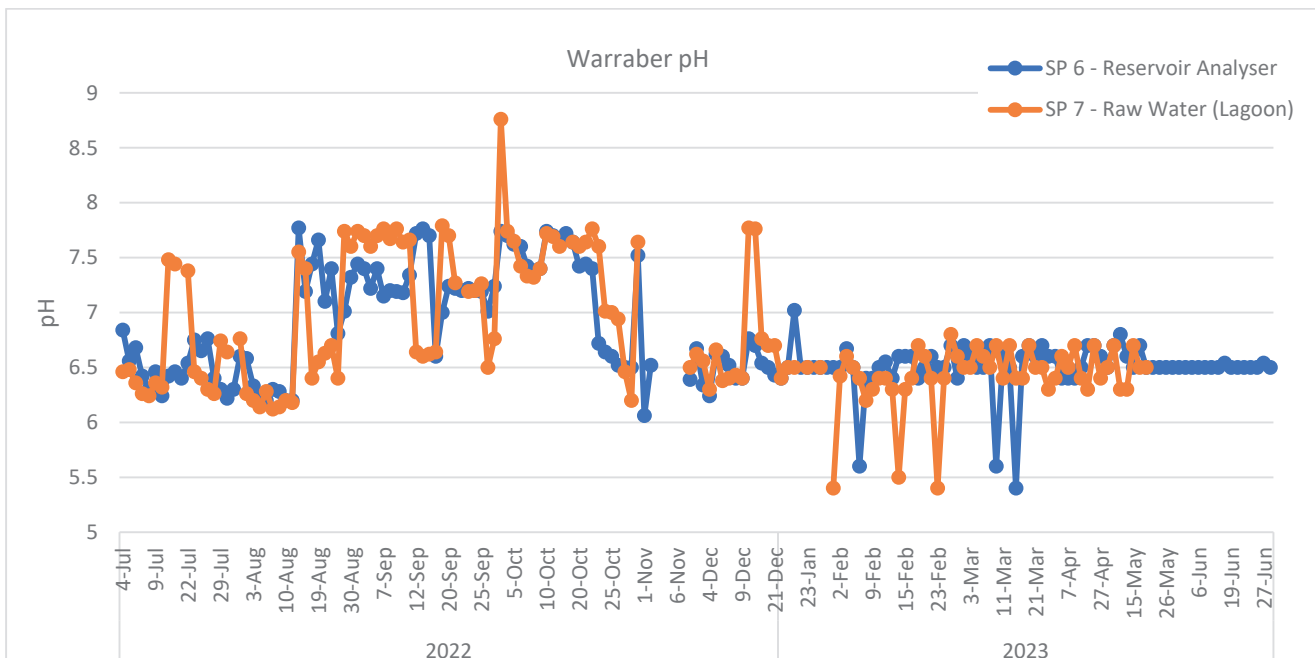
7% of pH samples collected were outside operational limits, however no extreme values (<4 or >11) that may adversely affect health. As expected, they appear to be in line with the raw water readings, except for one outlier low reading which may have been an error. Further investigation required, and corrective actions will be devised from the outcomes if required.



10 - Warraber

pH

24% of pH samples collected were outside operational limits, however no extreme values (<4 or >11) that may adversely affect health. As expected, they appear to be mostly in line with the raw water readings. Further investigation required and corrective actions will be devised from the outcomes if required.

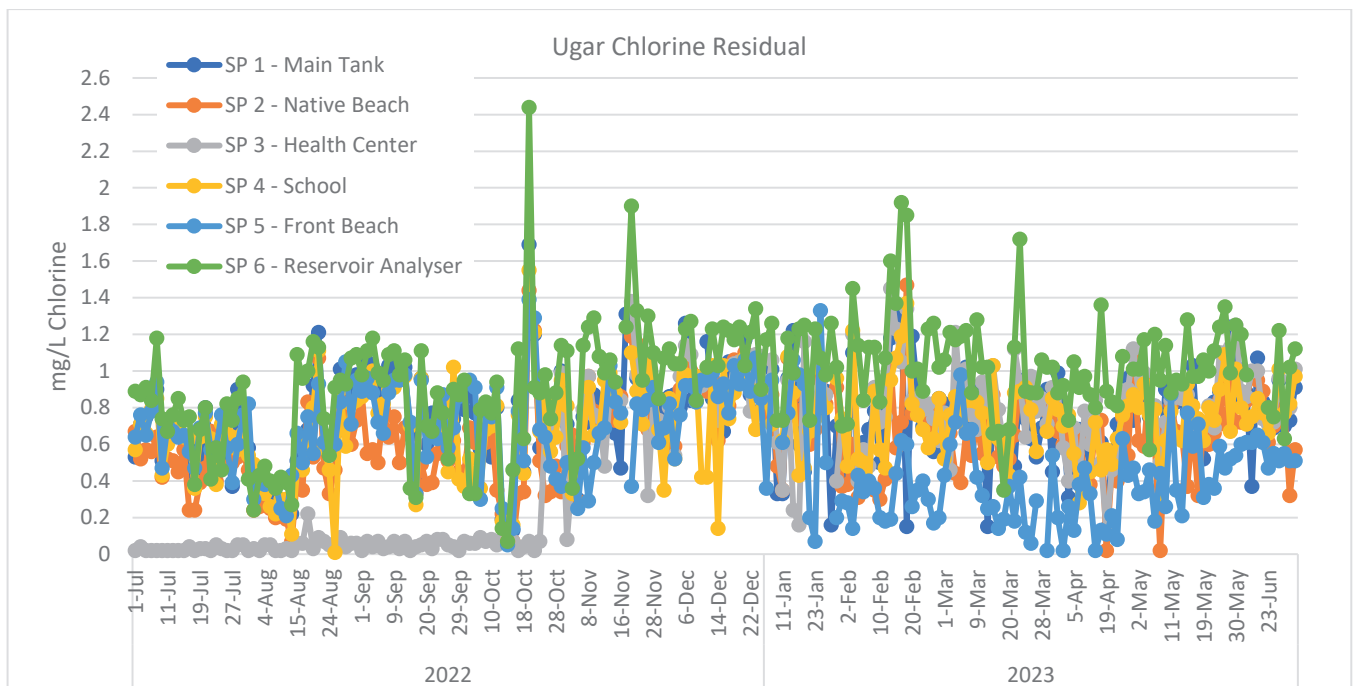


13 - Ugar

Free Chlorine

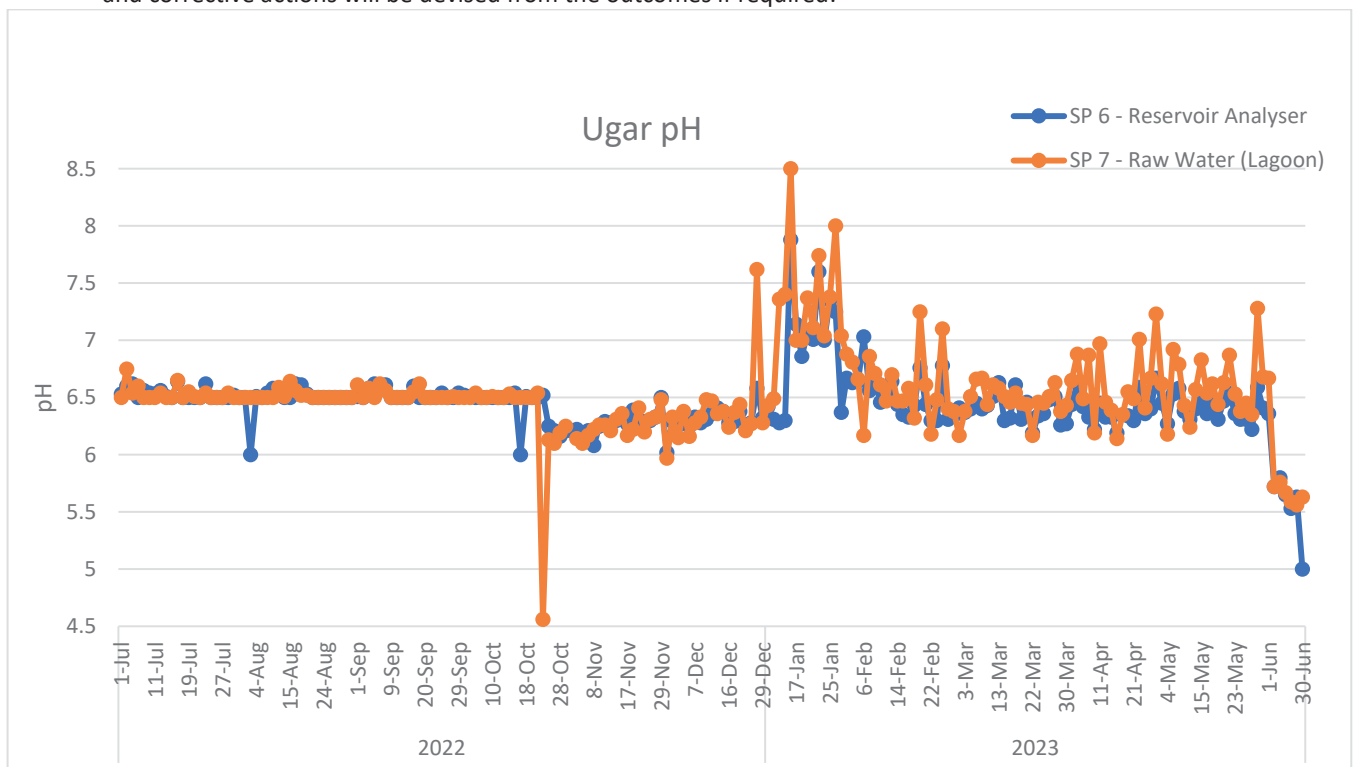
Refer to DWI-500-22-09881 - a Boil Water Alert was active from 14/10/22 to 17/05/23. Low chlorine results were not reported during this period.

There were several low readings that were not reported, particularly from July – October at SPS 3 – Health Centre. TSIRC is in the process of implementing alarms in SWIM to allow the W&WW team to be alerted when operational or critical limits are breached so investigations can be carried out and breaches reported promptly to the regulators.



pH

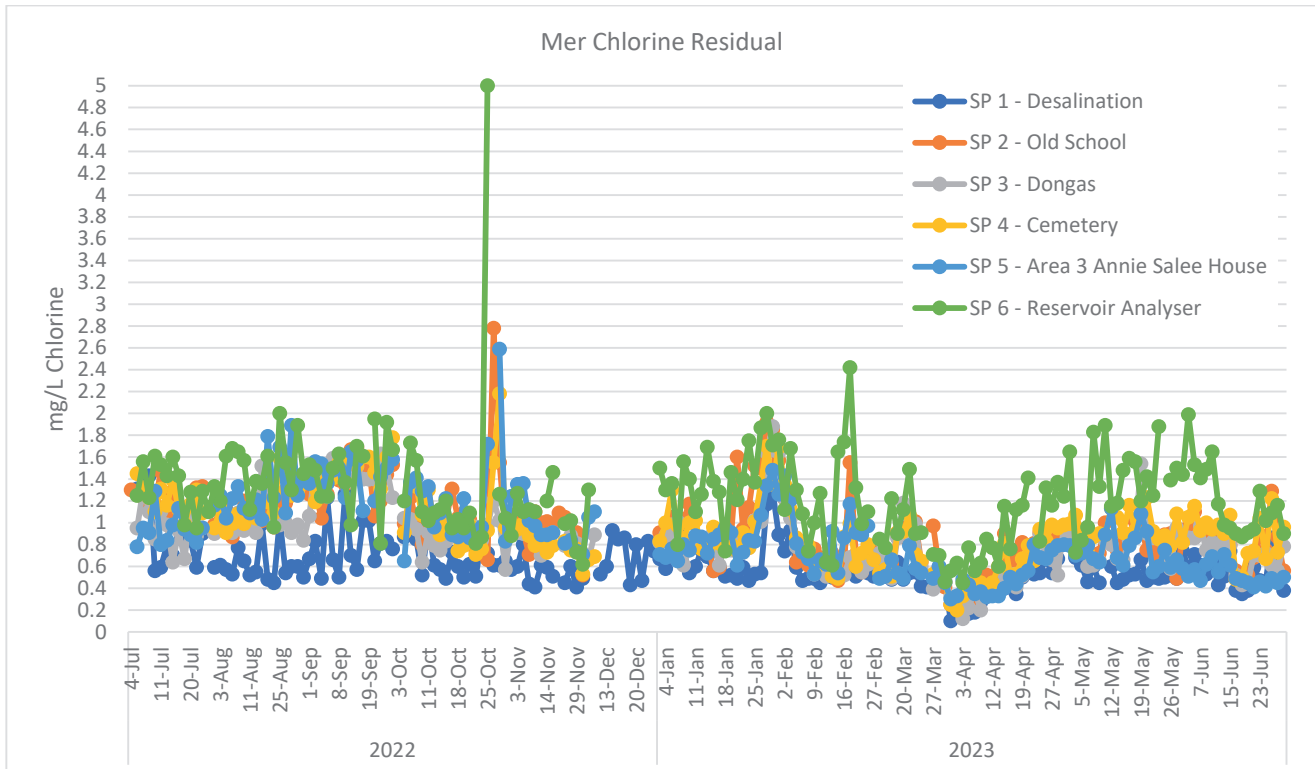
50% of pH samples collected were outside operational limits, however no extreme values (<4 or >11) that may adversely affect health. As expected, they appear to be mostly in line with the raw water readings. Further investigation required, and corrective actions will be devised from the outcomes if required.



15 - Mer

Free Chlorine

There were 5 low chlorine residual readings at Mer, 4 of which were at the same sample point, SP1 – Desalination Plant, on 30/3/23 and 3-5/4/23. There was also one low reading at SP3 – Dongas on 3/4/23. These instances of non-compliance at Mer which were also not reported either due to oversight or lack of reporting to management. TSIRC is in the process of implementing alarms in SWIM to allow the W&WW team to be alerted when operational or critical limits are breached so investigations can be carried out and breaches reported promptly to the regulators.



Operational Data by Sample Point

Scheme	Sample Point	Parameter	No. Samples Required	No. Samples Collected	No. Non-compliant	Operational Criteria	Minimum	Average	Maximum
01 - Boigu	SP 1 - Church	E coli	12	10	0	<1	<1	<1	<1
		Free Chlorine	260	214	0	Critical Limits: <0.2mg/L and >5mg/L	0.20	0.65	1.25
		Turbidity	260	213	0	Critical Limit: <5 NTU	0.01	0.17	1.75
	SP 2 - School	E coli	12	10	0	<1	<1	<1	<1
		Free Chlorine	260	210	0	Critical Limits: <0.2mg/L and >5mg/L	0.20	0.69	1.45
		Turbidity	260	210	0	Critical Limit: <5 NTU	0.00	0.24	3.47
	SP 3 - Airport	E coli	12	10	0	<1	<1	<1	<1
		Free Chlorine	260	211	0	Critical Limits: <0.2mg/L and >5mg/L	0.20	0.55	1.09
		Turbidity	260	210	0	Critical Limit: <5 NTU	0.00	0.07	0.76
	SP 4 - STP	E coli	12	10	0	<1	<1	<1	<1
		Free Chlorine	260	212	4	Critical Limits: <0.2mg/L and >5mg/L	0.10	0.50	1.21
		Turbidity	260	212	0	Critical Limit: <5 NTU	0.01	0.11	1.33
	SP 5 - Health Centre	E coli	12	10	0	<1	<1	<1	<1
		Free Chlorine	260	211	0	Critical Limits: <0.2mg/L and >5mg/L	0.25	0.78	1.23
Turbidity		260	211	0	Critical Limit: <5 NTU	0.01	0.12	1.09	
SP 6 - Reservoir Analyser	Conductivity	260	199	0	Critical Limits: <1500µS/cm	243.00	430.70	795.60	
	Free Chlorine	260	199	1	Critical Limits: <0.2mg/L and >5mg/L	0.14	0.66	1.99	
	pH	260	199	139	6.5-8.5	5.90	6.88	9.95	
	Turbidity	260	200	0	Critical Limit: <5 NTU	0.01	0.15	1.24	

Scheme	Sample Point	Parameter	No. Samples Required	No. Samples Collected	No. Non-compliant	Operational Criteria	Minimum	Average	Maximum	
	SP 7 - Raw Water (Lagoon)	Conductivity	260	43	0	Critical Limits: <1500µS/cm	236.00	413.24	784.80	
		pH	260	43	7	6.5-8.5	5.80	7.78	9.39	
		Turbidity	260	44	0	Critical Limit: <5 NTU	0.01	0.02	0.24	
02 - Dauan	SP 1 - N. Mooka	E coli	12	0	0	<1	0.00	--	0.00	
		Free Chlorine	260	231	30	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.73	3.10	
		Turbidity	260	236	7	Critical Limit: <5 NTU	0.00	1.65	18.40	
	SP 2 - School	E coli	12	0	0	<1	0.00	--	0.00	
		Free Chlorine	260	231	14	Critical Limits: <0.2mg/L and >5mg/L	0.02	1.03	4.63	
		Turbidity	260	236	4	Critical Limit: <5 NTU	0.00	1.67	11.13	
	SP 3 - Council	E coli	12	0	0	<1	0.00	--	0.00	
		Free Chlorine	260	231	7	Critical Limits: <0.2mg/L and >5mg/L	0.02	1.15	4.11	
		Turbidity	260	236	8	Critical Limit: <5 NTU	0.00	1.85	11.30	
	SP 4 - S. Mooka	E coli	12	0	0	<1	0.00	--	0.00	
		Free Chlorine	260	231	8	Critical Limits: <0.2mg/L and >5mg/L	0.02	1.15	4.18	
		Turbidity	260	236	3	Critical Limit: <5 NTU	0.00	1.58	11.30	
	SP 5 - Builders Corner	E coli	12	0	0	<1	0.00	--	0.00	
		Free Chlorine	260	231	5	Critical Limits: <0.2mg/L and >5mg/L	0.04	1.14	4.12	
		Turbidity	260	236	4	Critical Limit: <5 NTU	0.00	1.65	11.80	
	SP 6 - Reservoir Analyser	Conductivity	260	222	0	Critical Limits: <1500µS/cm	0.00	129.99	183.20	
		Free Chlorine	260	218	3	Critical Limits: <0.2mg/L and >5mg/L	0.02	1.16	4.98	
		pH	260	222	184	6.5-8.5	5.31	6.14	7.38	
		Turbidity	260	222	2	Critical Limit: <5 NTU	0.00	1.73	89.82	
	SP 7 - Raw Water (Lagoon)	Conductivity	260	109	0	Critical Limits: <1500µS/cm	0.00	50.64	176.20	
		pH	260	109	87	6.5-8.5	5.09	6.15	7.93	
		Turbidity	260	108	0	Critical Limit: <5 NTU	0.00	1.09	6.73	
	03 - Saibai	SP 1 - Water Treatment Pit	E coli	12	4	0	<1	<1	<1	<1
			Free Chlorine	260	143	1	Critical Limits: <0.2mg/L and >5mg/L	0.15	1.03	5.00
			Turbidity	260	116	0	Critical Limit: <5 NTU	0.01	0.76	3.02
		SP 2 - Council Office	E coli	12	5	0	<1	<1	<1	<1
			Free Chlorine	260	138	3	Critical Limits: <0.2mg/L and >5mg/L	0.10	0.91	2.24
Turbidity			260	115	0	Critical Limit: <5 NTU	0.01	0.68	4.51	
SP 3 - Public Hall		E coli	12	6	0	<1	<1	<1	<1	
		Free Chlorine	260	136	1	Critical Limits: <0.2mg/L and >5mg/L	0.19	0.84	1.84	
		Turbidity	260	111	0	Critical Limit: <5 NTU	0.01	0.64	3.18	
SP 4 - House Near Sewage Pit		E coli	12	6	0	<1	<1	<1	<1	
		Free Chlorine	260	134	7	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.70	1.47	
		Turbidity	260	108	1	Critical Limit: <5 NTU	0.01	0.68	5.21	

Scheme	Sample Point	Parameter	No. Samples Required	No. Samples Collected	No. Non-compliant	Operational Criteria	Minimum	Average	Maximum	
	SP 5 - Singyal House Airport Road	E coli	12	6	0	<1	<1	<1	<1	
		Free Chlorine	260	133	6	Critical Limits: <0.2mg/L and >5mg/L	0.09	0.65	3.77	
		Turbidity	260	109	0	Critical Limit: <5 NTU	0.01	0.80	4.69	
	SP 6 - Reservoir Analyser	Conductivity	260	102	0	Critical Limits: <1500µS/cm	2.34	159.18	278.10	
		Free Chlorine	260	119	4	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.99	3.13	
		pH	260	104	6	6.5-8.5	6.34	6.93	7.68	
		Turbidity	260	96	1	Critical Limit: <5 NTU	0.01	0.78	5.72	
	SP 7 - Raw Water (Pre Filter)	Conductivity	260	101	0	Critical Limits: <1500µS/cm	0.97	143.5	282.0	
		pH	260	103	6	6.5-8.5	6.33	6.94	7.83	
		Turbidity	260	89	0	Critical Limit: <5 NTU	0.01	2.07	98.50	
	04 - Mabuiaq	SP 1 - Airport Camp	E coli	12	6	0	<1	<1	<1	<1
			Free Chlorine	260	207	10	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.58	2.30
Turbidity			260	210	0	Critical Limit: <5 NTU	0.02	0.97	4.25	
SP 2 - Council Office		E coli	12	6	0	<1	<1	<1	<1	
		Free Chlorine	260	209	7	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.85	3.07	
		Turbidity	260	211	0	Critical Limit: <5 NTU	0.02	0.66	2.63	
SP 3 - IBIS Store		E coli	12	6	0	<1	<1	<1	<1	
		Free Chlorine	260	210	6	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.97	4.02	
		Turbidity	260	213	0	Critical Limit: <5 NTU	0.04	0.72	3.00	
SP 4 - Medical Centre		E coli	12	6	0	<1	<1	<1	<1	
		Free Chlorine	260	210	5	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.95	2.97	
		Turbidity	260	211	0	Critical Limit: <5 NTU	0.02	0.70	3.05	
SP 5 - School Duplex		E coli	12	6	0	<1	<1	<1	<1	
		Free Chlorine	260	208	11	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.82	2.59	
		Turbidity	260	210	0	Critical Limit: <5 NTU	0.01	0.69	4.58	
SP 6 - Chlorine Analyser		Conductivity	260	216	0	Critical Limits: <1500µS/cm	0.00	79.94	104.4	
		Free Chlorine	260	240	1	Critical Limits: <0.2mg/L and >5mg/L	0.13	1.19	2.75	
		pH	260	216	129	6.5-8.5	6.40	6.46	6.76	
		Turbidity	260	217	0	Critical Limit: <5 NTU	0.00	0.69	3.94	
SP 7 - Raw Water (Pre Filter)		Conductivity	260	201	0	Critical Limits: <1500µS/cm	0.61	60.94	95.00	
		pH	260	201	189	6.5-8.5	6.40	6.41	6.50	
		Turbidity	260	202	0	Critical Limit: <5 NTU	0.02	1.35	90.40	
SP 8 - Raw Water (Well 1)		Conductivity	260	53	0	Critical Limits: <1500µS/cm	0.00	92.02	152.0	
		pH	260	53	43	6.5-8.5	6.40	6.42	6.57	
	Turbidity	260	54	0	Critical Limit: <5 NTU	0.00	3.73	17.70		
05 - Badu	SP 1 - School	E coli	12	16	0	<1	<1	<1	<1	
		Free Chlorine	260	264	93	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.46	1.47	

Scheme	Sample Point	Parameter	No. Samples Required	No. Samples Collected	No. Non-compliant	Operational Criteria	Minimum	Average	Maximum
	SP 2 - Police Station	Turbidity	260	254	0	Critical Limit: <5 NTU	0.00	0.52	1.93
		E coli	12	16	0	<1	<1	<1	<1
		Free Chlorine	260	261	104	Critical Limits: <0.2mg/L and >5mg/L	0.01	0.41	1.31
		Turbidity	260	254	0	Critical Limit: <5 NTU	0.01	0.60	1.92
	SP 3 - Motel	E coli	12	16	0	<1	<1	<1	<1
		Free Chlorine	260	266	85	Critical Limits: <0.2mg/L and >5mg/L	0.01	0.55	1.59
		Turbidity	260	258	0	Critical Limit: <5 NTU	0.00	0.62	1.98
	SP 4 - Dogai	E coli	12	14	0	<1	<1	<1	<1
		Free Chlorine	260	254	222	Critical Limits: <0.2mg/L and >5mg/L	0.01	0.13	0.92
		Turbidity	260	246	0	Critical Limit: <5 NTU	0.01	0.64	1.96
	SP 5 - Airport	E coli	12	16	0	<1	<1	<1	<1
		Free Chlorine	260	257	213	Critical Limits: <0.2mg/L and >5mg/L	0.01	0.15	1.04
		Turbidity	260	248	0	Critical Limit: <5 NTU	0.00	0.58	1.97
	SP 6 - Reservoir Analyser	Conductivity	260	223	0	Critical Limits: <1500µS/cm	0.00	146.24	465.0
		Free Chlorine	260	234	210	Critical Limits: <0.2mg/L and >5mg/L	0.01	0.11	0.35
		pH	260	226	1	6.5-8.5	6.73	7.47	9.07
		Turbidity	260	228	0	Critical Limit: <5 NTU	0.01	0.70	2.30
	SP 8 - Raw Water (Raw Water Tank)	Conductivity	260	222	0	Critical Limits: <1500µS/cm	7.15	92.18	328.00
		pH	260	224	14	6.5-8.5	5.98	7.10	10.80
		Turbidity	260	226	0	Critical Limit: <5 NTU	0.01	3.54	32.30
	06 - Kubin	SP 1 - IBIS	E coli	12	7	0	<1	<1	<1
Free Chlorine			260	201	8	Critical Limits: <0.2mg/L and >5mg/L	0.08	1.03	2.76
Turbidity			260	202	30	Critical Limit: <5 NTU	0.01	3.22	114.00
SP 2 - School Sink		E coli	12	7	0	<1	<1	<1	<1
		Free Chlorine	260	206	10	Critical Limits: <0.2mg/L and >5mg/L	0.05	1.01	2.87
		Turbidity	260	205	35	Critical Limit: <5 NTU	0.00	2.58	23.90
SP 3 - Airport		E coli	12	7	0	<1	<1	<1	<1
		Free Chlorine	260	196	13	Critical Limits: <0.2mg/L and >5mg/L	0.02	1.44	5.00
		Turbidity	260	196	38	Critical Limit: <5 NTU	0.00	3.14	44.90
SP 4 - Tomsanas		E coli	12	7	0	<1	<1	<1	<1
		Free Chlorine	260	203	9	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.99	2.55
		Turbidity	260	202	29	Critical Limit: <5 NTU	0.00	2.23	10.90
SP 5 - Addie Basum		E coli	12	7	0	<1	<1	<1	<1
		Free Chlorine	260	132	14	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.65	1.99
		Turbidity	260	131	27	Critical Limit: <5 NTU	0.00	2.63	10.60
SP 6 - Reservoir Analyser		Conductivity	260	3	0	Critical Limits: <1500µS/cm	0.00	0.57	9.00

Scheme	Sample Point	Parameter	No. Samples Required	No. Samples Collected	No. Non-compliant	Operational Criteria	Minimum	Average	Maximum
		Free Chlorine	260	186	4	Critical Limits: <0.2mg/L and >5mg/L	0.02	1.14	2.74
		pH	260	67	2	6.5-8.5	6.30	6.51	6.82
		Turbidity	260	186	28	Critical Limit: <5 NTU	0.00	2.30	24.20
	SP 7 - Raw Water (Pre Filter)	Conductivity	260	0	0	Critical Limits: <1500µS/cm	0.00	0.00	0.00
		pH	260	8	1	6.5-8.5	6.10	6.45	6.50
		Turbidity	260	59	0	Critical Limit: <5 NTU	0.00	0.90	6.22
07 - St Pauls	SP 1 - S. Rosen	E coli	12	1	0	<1	<1	<1	<1
		Free Chlorine	260	120	2	Critical Limits: <0.2mg/L and >5mg/L	0.02	1.07	2.37
		Turbidity	260	94	2	Critical Limit: <5 NTU	0.00	0.39	5.74
	SP 2 - Gospel Church	E coli	12	1	0	<1	<1	<1	<1
		Free Chlorine	260	116	0	Critical Limits: <0.2mg/L and >5mg/L	0.20	0.99	2.85
		Turbidity	260	95	1	Critical Limit: <5 NTU	0.00	0.41	7.26
	SP 3 - H. Mene	E coli	12	1	0	<1	<1	<1	<1
		Free Chlorine	260	114	0	Critical Limits: <0.2mg/L and >5mg/L	0.28	1.05	2.42
		Turbidity	260	89	2	Critical Limit: <5 NTU	0.00	0.45	11.30
	SP 4 - School	E coli	12	1	0	<1	<1	<1	<1
		Free Chlorine	260	113	1	Critical Limits: <0.2mg/L and >5mg/L	0.14	1.09	2.57
		Turbidity	260	90	2	Critical Limit: <5 NTU	0.00	0.46	8.61
	SP 5 - Community Police	E coli	12	1	0	<1	<1	<1	<1
		Free Chlorine	260	113	1	Critical Limits: <0.2mg/L and >5mg/L	0.01	1.01	2.45
		Turbidity	260	90	1	Critical Limit: <5 NTU	0.00	0.42	7.21
	SP 6 - Reservoir Analyser	Conductivity	260	80	0	Critical Limits: <1500µS/cm	23.1	70.76	276.0
		Free Chlorine	260	104	1	Critical Limits: <0.2mg/L and >5mg/L	0.14	1.31	2.72
		pH	260	82	0	6.5-8.5	6.50	6.71	7.09
		Turbidity	260	71	1	Critical Limit: <5 NTU	0.01	0.32	6.47
	SP 7 - Raw Water (Lagoon)	Conductivity	260	55	0	Critical Limits: <1500µS/cm	0.00	48.83	83.30
		pH	260	57	2	6.5-8.5	6.50	6.60	7.02
Turbidity		260	52	0	Critical Limit: <5 NTU	0.00	1.58	60.00	
08 - Hammond	SP 1 - Compound	E coli	12	2	0	<1	<1	<1	<1
		Free Chlorine	260	187	1	Critical Limits: <0.2mg/L and >5mg/L	0.18	1.03	2.93
		Turbidity	260	186	3	Critical Limit: <5 NTU	0.00	1.58	9.19
	SP 2 - Subdivision	E coli	12	2	0	<1	<1	<1	<1
		Free Chlorine	260	185	0	Critical Limits: <0.2mg/L and >5mg/L	0.28	0.99	2.30
		Turbidity	260	184	2	Critical Limit: <5 NTU	0.00	1.58	8.25
	SP 3 - Bindjudas	E coli	12	2	0	<1	<1	<1	<1
		Free Chlorine	260	185	11	Critical Limits: <0.2mg/L and >5mg/L	0.03	0.79	3.45
		Turbidity	260	183	3	Critical Limit: <5 NTU	0.00	2.04	107.0

Scheme	Sample Point	Parameter	No. Samples Required	No. Samples Collected	No. Non-compliant	Operational Criteria	Minimum	Average	Maximum
	SP 4 - Village	E coli	12	2	0	<1	<1	<1	<1
		Free Chlorine	260	186	1	Critical Limits: <0.2mg/L and >5mg/L	0.15	1.03	2.81
		Turbidity	260	184	0	Critical Limit: <5 NTU	0.00	1.49	4.47
	SP 5 - Becklys	E coli	12	2	0	<1	<1	<1	<1
		Free Chlorine	260	184	6	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.73	1.88
		Turbidity	260	183	0	Critical Limit: <5 NTU	0.00	1.31	4.71
	SP 6 - Reservoir Analyser	Free Chlorine	260	183	1	Critical Limits: <0.2mg/L and >5mg/L	0.03	1.04	2.35
		Turbidity	260	183	3	Critical Limit: <5 NTU	0.01	1.48	6.79
	SP 7 - Raw Water (Pre Filter)	Conductivity	260	173	0	Critical Limits: <1500µS/cm	0.00	81.19	169.5
		Free Chlorine	260	186	0	Critical Limits: <0.2mg/L and >5mg/L	0.02	1.12	2.86
		pH	260	185	8	6.5-8.5	6.40	7.41	8.84
		Turbidity	260	184	0	Critical Limit: <5 NTU	0.00	1.39	7.38
	09 - Iama	SP 1 - Medical Centre	E coli	12	8	0	<1	<1	<1
Free Chlorine			260	297	3	Critical Limits: <0.2mg/L and >5mg/L	0.05	1.01	1.93
Turbidity			260	276	0	Critical Limit: <5 NTU	0.01	0.46	1.14
SP 2 - School		E coli	12	8	0	<1	<1	<1	<1
		Free Chlorine	260	289	5	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.95	1.98
		Turbidity	260	268	0	Critical Limit: <5 NTU	0.01	0.53	1.39
SP 3 - David Roley		E coli	12	8	0	<1	<1	<1	<1
		Free Chlorine	260	294	4	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.91	1.99
		Turbidity	260	273	0	Critical Limit: <5 NTU	0.13	0.60	1.97
SP 4 - Council		E coli	12	8	0	<1	<1	<1	<1
		Free Chlorine	260	291	5	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.74	1.43
		Turbidity	260	270	0	Critical Limit: <5 NTU	0.01	0.56	2.06
SP 5 - Ben		Conductivity	260	274	0	Critical Limits: <1500µS/cm	54.0	791.9	1381
		E coli	12	8	0	<1	<1	<1	<1
		Free Chlorine	260	570	6	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.94	2.10
		pH	260	272	19	6.5-8.5	5.07	7.43	8.31
		Turbidity	260	526	0	Critical Limit: <5 NTU	0.01	0.56	2.24
SP 7 - Raw Water (Permeate Tank)		Conductivity	260	266	0	Critical Limits: <1500µS/cm	0.00	755.1	1238
		pH	260	264	33	6.5-8.5	6.01	7.34	8.28
		Turbidity	260	251	0	Critical Limit: <5 NTU	0.00	0.51	1.90
10 - Warraber		SP 1 - Reservoir	E coli	12	4	0	<1	<1	<1
	Free Chlorine		260	180	0	Critical Limits: <0.2mg/L and >5mg/L	0.39	1.06	1.88
	Turbidity		260	179	0	Critical Limit: <5 NTU	0.01	0.32	1.85
	SP 2 - Jensen P	E coli	12	4	0	<1	<1	<1	<1
		Free Chlorine	260	179	0	Critical Limits: <0.2mg/L and >5mg/L	0.29	1.01	1.79

Scheme	Sample Point	Parameter	No. Samples Required	No. Samples Collected	No. Non-compliant	Operational Criteria	Minimum	Average	Maximum	
	SP 3 - William P	Turbidity	260	178	0	Critical Limit: <5 NTU	0.01	0.39	4.55	
		E coli	12	4	0	<1	<1	<1	<1	
		Free Chlorine	260	178	0	Critical Limits: <0.2mg/L and >5mg/L	0.39	0.98	1.79	
		Turbidity	260	177	0	Critical Limit: <5 NTU	0.02	0.37	2.70	
	SP 4 - School	E coli	12	4	0	<1	<1	<1	<1	
		Free Chlorine	260	179	0	Critical Limits: <0.2mg/L and >5mg/L	0.29	0.97	2.91	
		Turbidity	260	178	0	Critical Limit: <5 NTU	0.06	0.40	3.60	
	SP 5 - Wharf	E coli	12	3	0	<1	<1	<1	<1	
		Free Chlorine	260	177	2	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.87	2.76	
		Turbidity	260	175	1	Critical Limit: <5 NTU	0.00	0.39	6.32	
	SP 6 - Reservoir Analyser	Conductivity	260	178	0	Critical Limits: <1500µS/cm	0.34	460.7	928.3	
		Free Chlorine	260	178	0	Critical Limits: <0.2mg/L and >5mg/L	0.35	1.07	1.97	
		pH	260	177	42	6.5-8.5	5.40	6.73	7.77	
		Turbidity	260	177	3	Critical Limit: <5 NTU	0.03	5.31	832.90	
	SP 7 - Raw Water (Lagoon)	Conductivity	260	154	0	Critical Limits: <1500µS/cm	1.64	510.9	886.2	
		pH	260	153	63	6.5-8.5	5.40	6.78	8.76	
		Turbidity	260	154	0	Critical Limit: <5 NTU	0.01	0.37	0.95	
	11 - Poruma	SP 1 - Donga	E coli	12	2	0	<1	<1	<1	<1
			Free Chlorine	260	25	0	Critical Limits: <0.2mg/L and >5mg/L	0.54	0.84	1.02
			Turbidity	260	18	0	Critical Limit: <5 NTU	0.00	0.07	0.22
		SP 2 - Health Centre	E coli	12	3	0	<1	<1	<1	<1
Free Chlorine			260	24	0	Critical Limits: <0.2mg/L and >5mg/L	0.65	0.89	1.05	
Turbidity			260	14	0	Critical Limit: <5 NTU	0.00	0.05	0.16	
SP 3 - Dick Billys House		E coli	12	2	0	<1	<1	<1	<1	
		Free Chlorine	260	24	0	Critical Limits: <0.2mg/L and >5mg/L	0.67	0.91	1.07	
		Turbidity	260	18	0	Critical Limit: <5 NTU	0.00	0.07	0.21	
SP 4 - School		E coli	12	2	0	<1	<1	<1	<1	
		Free Chlorine	260	23	0	Critical Limits: <0.2mg/L and >5mg/L	0.69	0.84	1.00	
		Turbidity	260	18	0	Critical Limit: <5 NTU	0.01	0.12	0.86	
SP 5 - Tourist Cabin		E coli	12	2	0	<1	<1	<1	<1	
		Free Chlorine	260	24	0	Critical Limits: <0.2mg/L and >5mg/L	0.43	0.77	0.97	
		Turbidity	260	19	0	Critical Limit: <5 NTU	0.01	0.08	0.21	
SP 6 - Reservoir Analyser		Conductivity	260	30	0	Critical Limits: <1500µS/cm	310.	404.0	489.0	
		Free Chlorine	260	72	0	Critical Limits: <0.2mg/L and >5mg/L	0.63	0.88	1.33	
		pH	260	10	5	6.5-8.5	5.45	6.47	7.50	
		Turbidity	260	21	0	Critical Limit: <5 NTU	0.00	0.06	0.44	
12 - Masig		SP 1 - School	E coli	12	5	0	<1	<1	<1	<1

Scheme	Sample Point	Parameter	No. Samples Required	No. Samples Collected	No. Non-compliant	Operational Criteria	Minimum	Average	Maximum	
		Free Chlorine	260	237	0	Critical Limits: <0.2mg/L and >5mg/L	0.25	0.79	3.95	
		Turbidity	260	227	0	Critical Limit: <5 NTU	0.00	0.25	3.45	
	SP 2 - Council Office	E coli	12	5	0	<1	<1	<1	<1	
		Free Chlorine	260	237	0	Critical Limits: <0.2mg/L and >5mg/L	0.26	0.81	4.10	
		Turbidity	260	228	0	Critical Limit: <5 NTU	0.00	0.31	4.34	
	SP 3 - Freezer	E coli	12	5	0	<1	<1	<1	<1	
		Free Chlorine	260	237	0	Critical Limits: <0.2mg/L and >5mg/L	0.22	0.82	4.15	
		Turbidity	260	228	0	Critical Limit: <5 NTU	0.00	0.33	2.50	
	SP 4 - Jack	E coli	12	5	0	<1	<1	<1	<1	
		Free Chlorine	260	237	1	Critical Limits: <0.2mg/L and >5mg/L	0.01	0.73	3.85	
		Turbidity	260	228	0	Critical Limit: <5 NTU	0.00	0.28	1.79	
	SP 5 - Beatrice	E coli	12	5	0	<1	<1	<1	<1	
		Free Chlorine	260	237	0	Critical Limits: <0.2mg/L and >5mg/L	0.24	0.78	3.85	
		Turbidity	260	228	0	Critical Limit: <5 NTU	0.00	0.34	3.32	
	SP 6 - Reservoir Analyser	Conductivity	260	235	0	Critical Limits: <1500µS/cm	0.46	221.7	874.0	
		Free Chlorine	260	235	1	Critical Limits: <0.2mg/L and >5mg/L	0.18	0.87	3.86	
		pH	260	234	8	6.5-8.5	5.68	6.54	7.21	
	SP 7 - Raw Water (Lagoon)	Turbidity	260	228	0	Critical Limit: <5 NTU	0.00	0.30	1.35	
		Conductivity	260	233	0	Critical Limits: <1500µS/cm	0.00	206.5	363.0	
		pH	260	233	12	6.5-8.5	5.55	6.51	7.50	
	13 - Ugar	SP 1 - Main Tank	E coli	12	8	2	<1	5.00	10.00	15.00
			Free Chlorine	260	215	7	Critical Limits: <0.2mg/L and >5mg/L	0.13	0.74	1.69
			pH	260	2	2	6.5-8.5	6.20	6.25	6.30
			Turbidity	260	217	0	Critical Limit: <5 NTU	0.01	0.69	4.75
SP 2 - Native Beach		E coli	12	8	1	<1	6.40	6.40	6.40	
		Free Chlorine	260	213	6	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.64	1.47	
		Turbidity	260	213	2	Critical Limit: <5 NTU	0.01	1.02	109.0	
SP 3 - Health Center		E coli	12	8	0	<1	<1	<1	<1	
		Free Chlorine	260	213	78	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.53	1.45	
		Turbidity	260	213	1	Critical Limit: <5 NTU	0.01	0.41	5.15	
SP 4 - School		E coli	12	8	0	<1	<1	<1	<1	
		Free Chlorine	260	212	6	Critical Limits: <0.2mg/L and >5mg/L	0.01	0.71	1.55	
		Turbidity	260	211	0	Critical Limit: <5 NTU	0.01	0.50	4.25	
SP 5 - Front Beach		E coli	12	8	0	<1	<1	<1	<1	
		Free Chlorine	260	212	20	Critical Limits: <0.2mg/L and >5mg/L	0.02	0.57	1.39	
	Turbidity	260	211	0	Critical Limit: <5 NTU	0.05	0.63	3.24		

Scheme	Sample Point	Parameter	No. Samples Required	No. Samples Collected	No. Non-compliant	Operational Criteria	Minimum	Average	Maximum
	SP 6 - Reservoir Analyser	Conductivity	260	210	0	Critical Limits: <1500µS/cm	4.32	330.9	463.4
		Free Chlorine	260	210	2	Critical Limits: <0.2mg/L and >5mg/L	0.07	0.95	2.44
		pH	260	210	104	6.5-8.5	5.00	6.44	7.88
		Turbidity	260	210	0	Critical Limit: <5 NTU	0.01	0.40	2.11
	SP 7 - Raw Water (Lagoon)	Conductivity	260	210	0	Critical Limits: <1500µS/cm	2.76	310.3	752.4
		pH	260	210	81	6.5-8.5	4.56	6.52	8.50
Turbidity		260	212	0	Critical Limit: <5 NTU	0.01	0.74	17.30	
14 - Erub	SP 1 - Bond House	E coli	12	6	0	<1	<1	<1	<1
		Free Chlorine	260	211	0	Critical Limits: <0.2mg/L and >5mg/L	0.41	1.25	2.77
		Turbidity	260	210	0	Critical Limit: <5 NTU	0.00	0.46	3.44
	SP 2 - Council Office	E coli	12	6	0	<1	<1	<1	<1
		Free Chlorine	260	204	0	Critical Limits: <0.2mg/L and >5mg/L	0.27	1.10	2.34
		Turbidity	260	203	0	Critical Limit: <5 NTU	0.00	0.64	2.77
	SP 3 - School	E coli	12	6	0	<1	<1	<1	<1
		Free Chlorine	260	201	0	Critical Limits: <0.2mg/L and >5mg/L	0.23	1.10	2.74
		Turbidity	260	199	1	Critical Limit: <5 NTU	0.00	0.53	5.41
	SP 4 - Medical Center	E coli	12	6	0	<1	<1	<1	<1
		Free Chlorine	260	206	0	Critical Limits: <0.2mg/L and >5mg/L	0.20	1.21	2.55
		Turbidity	260	204	1	Critical Limit: <5 NTU	0.00	0.49	5.41
	SP 5 - Pitt House	E coli	12	6	0	<1	<1	<1	<1
		Free Chlorine	260	211	0	Critical Limits: <0.2mg/L and >5mg/L	0.34	1.21	2.91
		Turbidity	260	208	0	Critical Limit: <5 NTU	0.00	0.48	2.82
	SP 6 - Reservoir Analyser	Conductivity	260	240	0	Critical Limits: <1500µS/cm	0.00	163.8	305.0
		Free Chlorine	260	241	1	Critical Limits: <0.2mg/L and >5mg/L	0.18	1.38	3.07
		pH	260	240	1	6.5-8.5	6.80	7.47	8.40
		Turbidity	260	237	0	Critical Limit: <5 NTU	0.00	0.47	1.57
	SP 8 - Raw Water (Pre UF)	Conductivity	260	242	0	Critical Limits: <1500µS/cm	0.00	142.1	189.0
		pH	260	242	0	6.5-8.5	6.90	7.31	8.40
Turbidity		260	240	0	Critical Limit: <5 NTU	0.00	43.85	159.00	
15 - Mer	SP 1 - Desalination	E coli	12	7	0	<1	<1	<1	<1
		Free Chlorine	260	188	4	Critical Limits: <0.2mg/L and >5mg/L	0.10	0.62	1.43
		Turbidity	260	183	0	Critical Limit: <5 NTU	0.00	0.34	2.40
	SP 2 - Old School	E coli	12	7	0	<1	<1	<1	<1
		Free Chlorine	260	176	0	Critical Limits: <0.2mg/L and >5mg/L	0.25	0.97	2.78
		Turbidity	260	170	0	Critical Limit: <5 NTU	0.01	0.34	1.86
SP 3 - Dongas	E coli	12	7	0	<1	<1	<1	<1	

Scheme	Sample Point	Parameter	No. Samples Required	No. Samples Collected	No. Non-compliant	Operational Criteria	Minimum	Average	Maximum
		Free Chlorine	260	178	1	Critical Limits: <0.2mg/L and >5mg/L	0.12	0.86	1.88
		Turbidity	260	174	0	Critical Limit: <5 NTU	0.01	0.42	4.10
	SP 4 - Cemetery	E coli	12	7	0	<1	<1	<1	<1
		Free Chlorine	260	180	0	Critical Limits: <0.2mg/L and >5mg/L	0.20	0.96	2.18
		Turbidity	260	176	1	Critical Limit: <5 NTU	0.01	0.45	5.12
	SP 5 - Area 3 Annie Salee House	E coli	12	7	0	<1	<1	<1	<1
		Free Chlorine	260	177	0	Critical Limits: <0.2mg/L and >5mg/L	0.30	0.89	2.59
		Turbidity	260	174	0	Critical Limit: <5 NTU	0.01	0.35	2.38
	SP 6 - Reservoir Analyser	Conductivity	260	176	0	Critical Limits: <1500µS/cm	7.91	621.5	935.2
		Free Chlorine	260	174	0	Critical Limits: <0.2mg/L and >5mg/L	0.45	1.26	5.00
		pH	260	164	10	6.5-8.5	5.57	6.71	10.82
		Turbidity	260	180	0	Critical Limit: <5 NTU	0.01	0.24	2.73

Appendix C- Water Quality – Verification Monitoring

Scheme	Sample Location	Parameter	No. Samples Required	No. Samples Collected	No. Non-compliant Samples	Australian Drinking Water Guidelines Value	Minimum	Average	Maximum
01 - Boigu	SP 1 - Church	E coli	2	1	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		10	10	10
	SP 2 - School	E coli	2	1	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		10	10	10
	SP 3 - Airport	E coli	2	1	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		20	20	20
	SP 4 - STP	E coli	2	1	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		10	10	10
	SP 5 - Health Centre	E coli	2	1	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		10	10	10
	SP 6 - Reservoir Analyser	Calcium	2	1	0		1.1	1.1	1.1
		Chloride	2	1	0	<250mg/L (a)	170	170	170
		Colour	2	1	0	15 HU (a)	<1	<1	<1
		Conductivity	2	1	0		580	580	580
		E coli	2	0	0	<1	-	-	-
		Fluoride	2	1	0	<1.5 mg/L	0.02	0.02	0.02
		Heterotrophic Plate Count	2	1	0		480	480	480
		ICPOES Iron	2	1	0	<0.3 mg/L (a)	0.05	0.05	0.05
		ICPOES Manganese	2	1	0	<0.5 mg/L	0.002	0.002	0.002
		ICPOES Silicon	2	1	0	<80 mg/L (a)	0.2	0.2	0.2
		Magnesium	2	1	0		1.9	1.9	1.9
Potassium		2	1	0		4.3	4.3	4.3	
Sodium		2	1	0	<180 mg/L (a)	91	91	91	
Sulphate		2	1	0	<250 mg/L (a)	3.6	3.6	3.6	
Total Alkalinity	2	1	0		1.6	1.6	1.6		
Total Hardness	2	1	1	60-200mg CaCO3/L (a)	11	11	11		
SP 7 - Raw Water (Lagoon)	Colour	2	1	0	15 HU (a)	1	1	1	
	Conductivity	2	1	0		540	540	540	
	E coli	2	1	1	<1	26	26	26	
03 - Saibai	SP 2 - Council Office	E coli	2	1	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	2	0		20	20	20
	SP 3 - Public Hall	E coli	2	2	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		40	40	40
	SP 4 - House Near Sewage Pit	E coli	2	2	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		10	10	10
	SP 5 - Singyal House Airport Road	E coli	2	2	0	<1	<1	<1	<1
Heterotrophic Plate Count		2	1	0		10	10	10	
SP 6 - Reservoir Analyser	E coli	2	2	0	<1	<1	<1	<1	
	Heterotrophic Plate Count	2	1	0		50	50	50	
04 - Mabuia	SP 1 - Airport Camp	E coli	2	1	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		10	10	10
	SP 2 - Council Office	E coli	2	1	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		10	10	10
	SP 3 - IBIS Store	E coli	2	1	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		10	10	10
	SP 4 - Medical Centre	E coli	2	1	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		10	10	10
	SP 5 - School Duplex	E coli	2	1	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		10	10	10
	SP 6 - Chlorine Analyser	Calcium	2	1	0		2.2	2.2	2.2
		Chloride	2	1	0	<250mg/L (a)	28	28	28
		Colour	2	1	0	15 HU (a)	1.6	1.6	1.6
		Conductivity	2	1	0		120	120	120
E coli		2	1	0	<1	<1	<1	<1	

Scheme	Sample Location	Parameter	No. Samples Required	No. Samples Collected	No. Non-compliant Samples	Australian Drinking Water Guidelines Value	Minimum	Average	Maximum
		Fluoride	2	1	0	<1.5 mg/L	0.02	0.02	0.02
		Heterotrophic Plate Count	2	1	0		10	10	10
		ICPOES Iron	2	1	0	<0.3 mg/L (a)	0.05	0.05	0.05
		ICPOES Manganese	2	1	0	<0.5 mg/L	0.002	0.002	0.002
		ICPOES Silicon	2	1	0	<80 mg/L (a)	8	8	8
		Magnesium	2	1	0		1.4	1.4	1.4
		Potassium	2	1	0		1.6	1.6	1.6
		Sodium	2	1	0	<180 mg/L (a)	18	18	18
		Sulphate	2	1	0	<250 mg/L (a)	2.5	2.5	2.5
		Total Alkalinity	2	1	0		8.2	8.2	8.2
		Total Hardness	2	1	1	60-200mg CaCO3/L (a)	11	11	11
	SP 7 - Raw Water (Pre Filter)	Colour	2	1	0	15 HU (a)	5.7	5.7	5.7
		Conductivity	2	1	0		99	99	99
		E coli	2	1	0	<1	7	7	7
	SP 8 - Raw Water (Well 1)	Colour	2	1	0	15 HU (a)	55	55	55
Conductivity		2	1	0		270	270	270	
E coli		2	1	0	<1	10	10	10	
05 - Badu	SP 1 - School	E coli	2	2	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	2	0		10	10	10
	SP 10 - Well 2	Colour	2	2	0	15 HU (a)	25	27.5	30
		Conductivity	2	2	0		30	33	36
		E coli	2	2	0	<1	<1	<1	<1
	SP 11 - Well 3	Colour	2	2	0	15 HU (a)	51	56	61
		Conductivity	2	2	0		34	40.5	47
		E coli	2	2	0	<1	<1	<1	<1
	SP 2 - Police Station	E coli	2	2	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	2	0		10	10	10
	SP 3 - Motel	E coli	2	2	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	2	0		10	10	10
	SP 5 - Airport	E coli	2	2	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	2	0		10	10	10
	SP 6 - Reservoir Analyser	Calcium	2	2	0		0.2	0.2	0.2
		Chloride	2	2	0	<250mg/L (a)	9.8	11.9	14
		Colour	2	2	0	15 HU (a)	1.2	1.45	1.7
		Conductivity	2	2	0		110	115	120
		E coli	2	2	0	<1	<1	<1	<1
		Fluoride	2	2	0	<1.5 mg/L	0.02	0.02	0.02
		Heterotrophic Plate Count	2	2	0		10	10	10
		ICPOES Iron	2	2	0	<0.3 mg/L (a)	0.05	0.05	0.05
		ICPOES Manganese	2	2	0	<0.5 mg/L	0.003	0.0035	0.004
		ICPOES Silicon	2	2	0	<80 mg/L (a)	1.4	1.8	2.2
		Magnesium	2	2	0		0.51	0.535	0.56
		Potassium	2	2	0		0.15	0.15	0.15
		Sodium	2	2	0	<180 mg/L (a)	23	24	25
		Sulphate	2	2	0	<250 mg/L (a)	1.5	3.8	6.1
Total Alkalinity		2	2	0		34	36	38	
Total Hardness	2	2	2	60-200mg CaCO3/L (a)	2.6	2.7	2.8		
SP 9 - Well 1	Colour	2	2	0	15 HU (a)	54	55	56	
	Conductivity	2	2	0		130	165	200	
	E coli	2	2	0	<1	<1	<1	<1	
06 - Kubin	SP 1 - IBIS	E coli	2	2	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		10	10	10
	SP 2 - School Sink	E coli	2	2	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		10	10	10
	SP 3 - Airport	E coli	2	2	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		10	10	10
	SP 4 - Tomsanas	E coli	2	2	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		10	10	10

Scheme	Sample Location	Parameter	No. Samples Required	No. Samples Collected	No. Non-compliant Samples	Australian Drinking Water Guidelines Value	Minimum	Average	Maximum
	SP 5 - Addie Basum	E coli	2	2	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		10	10	10
	SP 6 - Reservoir Analyser	Calcium	2	1	0		1.4	1.4	1.4
		Chloride	2	1	0	<250mg/L (a)	57	57	57
		Colour	2	1	0	15 HU (a)	3	3	3
		Conductivity	2	1	0		230	230	230
		E coli	2	2	0	<1	<1	<1	<1
		Fluoride	2	1	0	<1.5 mg/L	0.09	0.09	0.09
		Heterotrophic Plate Count	2	1	0		10	10	10
		ICPOES Iron	2	1	0	<0.3 mg/L (a)	0.189	0.189	0.189
		ICPOES Manganese	2	1	0	<0.5 mg/L	0.003	0.003	0.003
		ICPOES Silicon	2	1	0	<80 mg/L (a)	17	17	17
		Magnesium	2	1	0		1.4	1.4	1.4
		Potassium	2	1	0		1.3	1.3	1.3
		Sodium	2	1	0	<180 mg/L (a)	39	39	39
		Sulphate	2	1	0	<250 mg/L (a)	2.2	2.2	2.2
	Total Alkalinity	2	1	0		25	25	25	
	Total Hardness	2	1	1	60-200mg CaCO3/L (a)	9.3	9.3	9.3	
	SP 7 - Raw Water (Pre Filter)	Colour	2	1	0	15 HU (a)	6.2	6.2	6.2
		Conductivity	2	1	0		100	100	100
E coli		2	1	0	<1	<1	<1	<1	
09 - lama	SP 2 - School	E coli	2	1	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		80	80	80
	SP 3 - David Roley	E coli	2	2	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		10	10	10
	SP 5 - Ben	E coli	2	2	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		30	30	30
	SP 1 - Medical Centre	E coli	2	1	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		110	110	110
	SP 4 - Council	E coli	2	1	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		300	300	300
	SP 7 - Raw Water (Permeate Tank)	Calcium	2	1	0		0.68	0.68	0.68
		Chloride	2	1	1	<250mg/L (a)	270	270	270
		Colour	2	1	0	15 HU (a)	1	1	1
		Conductivity	2	1	0		920	920	920
		E coli	2	1	0	<1	<1	<1	<1
		Fluoride	2	1	0	<1.5 mg/L	0.02	0.02	0.02
		Heterotrophic Plate Count	2	1	0		20	20	20
		ICPOES Iron	2	1	0	<0.3 mg/L (a)	0.05	0.05	0.05
		ICPOES Manganese	2	1	0	<0.5 mg/L	0.002	0.002	0.002
		ICPOES Silicon	2	1	0	<80 mg/L (a)	0.2	0.2	0.2
Magnesium		2	1	0		2	2	2	
Potassium		2	1	0		6.7	6.7	6.7	
Sodium		2	1	0	<180 mg/L (a)	160	160	160	
Sulphate		2	1	0	<250 mg/L (a)	3.9	3.9	3.9	
Total Alkalinity	2	1	0		2.5	2.5	2.5		
Total Hardness	2	1	1	60-200mg CaCO3/L (a)	9.9	9.9	9.9		
11 - Poruma	Raw Water (Lagoon)	Colour	2	1	0	15 HU (a)	1	1	1
		Conductivity	2	1	0		470	470	470
		E coli	2	1	0	<1	<1	<1	<1
	SP 2 - Health Centre	E coli	2	1	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	1	0		10	10	10
	SP 6 - Reservoir Analyser	Calcium	2	1	0		0.88	0.88	0.88
		Chloride	2	1	0	<250mg/L (a)	140	140	140
		Colour	2	1	0	15 HU (a)	1	1	1
		Conductivity	2	1	0		470	470	470
		E coli	2	1	0	<1	<1	<1	<1
Fluoride	2	1	0	<1.5 mg/L	0.02	0.02	0.02		
Heterotrophic Plate Count	2	1	0		10	10	10		

Scheme	Sample Location	Parameter	No. Samples Required	No. Samples Collected	No. Non-compliant Samples	Australian Drinking Water Guidelines Value	Minimum	Average	Maximum
		ICPOES Iron	2	1	0	<0.3 mg/L (a)	0.05	0.05	0.05
		ICPOES Manganese	2	1	0	<0.5 mg/L	0.003	0.003	0.003
		ICPOES Silicon	2	1	0	<80 mg/L (a)	0.2	0.2	0.2
		Magnesium	2	1	0		0.26	0.26	0.26
		Potassium	2	1	0		3.3	3.3	3.3
		Sodium	2	1	0	<180 mg/L (a)	91	91	91
		Sulphate	2	1	0	<250 mg/L (a)	1	1	1
		Total Hardness	2	1	1	60-200mg CaCO3/L (a)	3.3	3.3	3.3
12 - Masig	SP 1 - School	E coli	2	2	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	2	0		10	55	100
	SP 2 - Council Office	E coli	2	2	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	2	0		10	10	10
	SP 3 - Freezer	E coli	2	2	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	2	0		10	10	10
	SP 4 - Jack	E coli	2	2	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	2	0		10	15	20
	SP 5 - Beatrice	E coli	2	2	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	2	0		10	10	10
	SP 6 - Reservoir Analyser	Calcium	2	2	0		1.7	2	2.3
		Chloride	2	2	0	<250mg/L (a)	100	110	120
		Colour	2	2	0	15 HU (a)	1	2.1	3.2
		Conductivity	2	2	0		370	410	450
		E coli	2	2	0	<1	<1	<1	<1
		Fluoride	2	2	0	<1.5 mg/L	0.02	0.02	0.02
		Heterotrophic Plate Count	2	2	0		10	10	10
		ICPOES Iron	2	2	0	<0.3 mg/L (a)	0.05	0.172	0.294
		ICPOES Manganese	2	2	0	<0.5 mg/L	0.002	0.0085	0.015
		ICPOES Silicon	2	2	0	<80 mg/L (a)	0.2	0.2	0.2
		Magnesium	2	2	0		0.44	0.555	0.67
		Potassium	2	2	0		1.5	1.9	2.3
		Sodium	2	2	0	<180 mg/L (a)	44	52.5	61
	Sulphate	2	2	0	<250 mg/L (a)	1.9	2.1	2.3	
	Total Alkalinity	2	2	0		7.7	14.35	21	
	Total Hardness	2	2	2	60-200mg CaCO3/L (a)	7	7.3	7.6	
	SP 7 - Raw Water (Lagoon)	Colour	2	2	0	15 HU (a)	1.1	1.75	2.4
Conductivity		2	2	0		120	310	500	
E coli		2	2	1	<1	4	10	16	
13 - Ugar	SP 1 - Main Tank	Calcium	2	2	0		3	6.35	9.7
		Chloride	2	2	0	<250mg/L (a)	60	74	88
		Colour	2	2	0	15 HU (a)	2.9	3	3.1
		Conductivity	2	2	0		270	300	330
		E coli	2	2	2	<1	5	10	15
		Fluoride	2	2	0	<1.5 mg/L	0.02	0.02	0.02
		Heterotrophic Plate Count	2	2	0		60	225	390
		ICPOES Iron	2	2	0	<0.3 mg/L (a)	0.05	0.05	0.05
		ICPOES Manganese	2	2	0	<0.5 mg/L	0.021	0.0225	0.024
		ICPOES Silicon	2	2	0	<80 mg/L (a)	1.2	8.6	16
		Magnesium	2	2	0		1	3.4	5.8
		Potassium	2	2	0		1.7	1.9	2.1
		Sodium	2	2	0	<180 mg/L (a)	30	43	56
		Sulphate	2	2	0	<250 mg/L (a)	1.8	3.75	5.7
	Total Alkalinity	2	2	0		7.6	14.8	22	
	Total Hardness	2	2	2	60-200mg CaCO3/L (a)	12	30	48	
	SP 2 - Native Beach	E coli	2	2	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	2	0		10	15	20
	SP 3 - Health Center	E coli	2	2	0	<1	<1	<1	<1
		Heterotrophic Plate Count	2	2	0		10	2355	4700
SP 4 - School	E coli	2	2	0	<1	<1	<1	<1	

Scheme	Sample Location	Parameter	No. Samples Required	No. Samples Collected	No. Non-compliant Samples	Australian Drinking Water Guidelines Value	Minimum	Average	Maximum	
	SP 5 - Front Beach	Heterotrophic Plate Count	2	2	0		10	25	40	
		E coli	2	2	0	<1	<1	<1	<1	
		Heterotrophic Plate Count	2	2	0		10	20	30	
	SP 6 - Reservoir Analyser	E coli	2	2	0	<1	<1	<1	<1	
		Heterotrophic Plate Count	2	2	0		10	10	10	
	SP 7 - Raw Water (Lagoon)	Colour	2	2	0	15 HU (a)	3.4	4.4	5.4	
		Conductivity	2	2	0		240	275	310	
		E coli	2	2	0	<1	23	291.50	560	
	14 - Erub 15 - Mer	SP 1 - Bond House	E coli	2	3	0	<1	<1	<1	<1
			Heterotrophic Plate Count	2	1	0		10	10	10
SP 2 - Council Office		E coli	2	3	0	<1	<1	<1	<1	
		Heterotrophic Plate Count	2	1	0		370	370	370	
SP 3 - School		E coli	2	3	0	<1	<1	<1	<1	
		Heterotrophic Plate Count	2	1	0		10	10	10	
SP 4 - Medical Center		E coli	2	3	0	<1	<1	<1	<1	
		Heterotrophic Plate Count	2	1	0		10	10	10	
SP 5 - Pitt House		E coli	2	3	0	<1	<1	<1	<1	
		Heterotrophic Plate Count	2	1	0		10	10	10	
SP 6 - Reservoir Analyser		Calcium	2	1	0		4.7	4.7	4.7	
		Chloride	2	1	0	<250mg/L (a)	23	23	23	
		Colour	2	1	0	15 HU (a)	3.1	3.1	3.1	
		Conductivity	2	1	0		160	160	160	
		E coli	2	2	0	<1	<1	<1	<1	
		Fluoride	2	1	0	<1.5 mg/L	0.05	0.05	0.05	
		Heterotrophic Plate Count	2	1	0		10	10	10	
		ICPOES Iron	2	1	0	<0.3 mg/L (a)	0.05	0.05	0.05	
		ICPOES Manganese	2	1	0	<0.5 mg/L	0.002	0.002	0.002	
		ICPOES Silicon	2	1	0	<80 mg/L (a)	24	24	24	
		Magnesium	2	1	0		3.5	3.5	3.5	
		Potassium	2	1	0		2.4	2.4	2.4	
		Sodium	2	1	0	<180 mg/L (a)	21	21	21	
		Sulphate	2	1	0	<250 mg/L (a)	3.6	3.6	3.6	
Total Alkalinity		2	1	0		33	33	33		
Total Hardness		2	1	1	60-200mg CaCO3/L (a)	26	26	26		
Well		Colour	2	1	0	15 HU (a)	23	23	23	
		Conductivity	2	1	0		260	260	260	
		E coli	2	2	0	<1	8	4004	8000	
Raw Water (Lagoon)		Colour	2	2	0	15 HU (a)	1	1.4	1.8	
	Conductivity	2	2	0		620	670	720		
	E coli	2	2	0	<1	1	9.5	18		
15 - Mer	SP 1 - Desalination	E coli	2	2	0	<1	<1	<1	<1	
		Heterotrophic Plate Count	2	2	0		10	15	20	
	SP 2 - Old School	E coli	2	2	0	<1	<1	<1	<1	
		Heterotrophic Plate Count	2	2	0		10	10	10	
	SP 3 - Dongas	E coli	2	2	0	<1	<1	<1	<1	
		Heterotrophic Plate Count	2	2	0		10	60	110	
	SP 4 - Cemetery	E coli	2	2	0	<1	<1	<1	<1	
		Heterotrophic Plate Count	2	2	0		10	45	80	
	SP 5 - Area 3 Annie Salee House	E coli	2	2	0	<1	<1	<1	<1	
		Heterotrophic Plate Count	2	2	0		10	10	10	
	SP 6 - Reservoir Analyser	Calcium	2	2	0		0.31	0.43	0.55	
		Chloride	2	2	1	<250mg/L (a)	250	260	270	
		Colour	2	2	0	15 HU (a)	1	3.1	5.2	
		Conductivity	2	2	0		860	915	970	
		E coli	2	2	0	<1	<1	<1	<1	
		Fluoride	2	2	0	<1.5 mg/L	0.02	0.02	0.02	
Heterotrophic Plate Count		2	2	0		110	5055	10000		
ICPOES Iron	2	2	0	<0.3 mg/L (a)	0.05	0.05	0.05			

Scheme	Sample Location	Parameter	No. Samples Required	No. Samples Collected	No. Non-compliant Samples	Australian Drinking Water Guidelines Value	Minimum	Average	Maximum
		ICPOES Manganese	2	2	0	<0.5 mg/L	0.002	0.002	0.002
		ICPOES Silicon	2	2	0	<80 mg/L (a)	0.2	0.2	0.2
		Magnesium	2	2	0		0.91	1.255	1.6
		Potassium	2	2	0		6.2	6.65	7.1
		Sodium	2	2	0	<180 mg/L (a)	150	160	170
		Sulphate	2	2	0	<250 mg/L (a)	1.8	2.5	3.2
		Total Alkalinity	2	2	0		2.5	2.75	3
		Total Hardness	2	2	2	60-200mg CaCO3/L (a)	4.5	6.25	8

(a) – Aesthetic guideline value

Appendix D - Water Quality – E. coli Compliance

01 - Boigu	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23
No. of samples collected	5	5	0	5	5	5	5	5	5	0	5	5
No. of samples collected in which E. coli is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	40	45	40	45	45	50	50	50	50	50	50	50
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

02 - Dauan	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23
No. of samples collected	0	0	0	0	0	0	0	0	0	0	0	5
No. of samples collected in which E. coli is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	3	3	0	0	0	0	0	0	0	0	0	5
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100.0%	100.0%										100.0%
Compliance with 98% annual value	YES	YES										YES

03 - Saibai	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23
No. of samples collected	3	0	0	5	4	0	0	5	0	0	5	5
No. of samples collected in which E. coli is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	39	34	29	34	33	33	28	28	28	27	27	27
No. of failures for previous 12 month period	5	5	5	5	5	5	5	0	0	0	0	0
% of samples that comply	87.2%	85.3%	82.8%	85.3%	84.8%	84.8%	82.1%	100.0%	100.0%	100.0%	100.0%	100.0%
Compliance with 98% annual value	NO	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES

04 - Mabuag	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23
No. of samples collected	5	5	5	0	0	0	0	0	10	0	5	0
No. of samples collected in which E. coli is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	40	40	40	40	35	30	25	25	30	30	30	30
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

05 - Badu	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23
No. of samples collected	5	9	5	10	5	5	5	9	10	5	5	5
No. of samples collected in which E. coli is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	45	49	49	59	59	59	59	68	73	73	73	78
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

06 - Kubin	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23
No. of samples collected	5	5	5	5	5	5	0	0	0	0	5	0
No. of samples collected in which E. coli is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	50	50	50	55	55	55	50	50	45	40	40	35
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

07 - St Pauls	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23
No. of samples collected	0	0	5	0	0	0	0	0	0	0	0	0
No. of samples collected in which E. coli is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	30	25	30	30	25	25	25	20	15	10	10	5
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

08 - Hammond	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23
No. of samples collected	0	0	0	0	0	0	5	0	0	5	0	0
No. of samples collected in which E. coli is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	27	22	22	22	17	17	22	17	10	15	10	10
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

09 - Iama	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23
No. of samples collected	0	5	5	5	0	0	5	5	0	5	5	5
No. of samples collected in which E. coli is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	30	35	35	40	40	40	40	40	35	40	40	40
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

10 - Warraber	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23
No. of samples collected	5	0	0	5	4	0	0	0	0	5	0	0
No. of samples collected in which E. coli is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	31	26	26	31	35	35	35	35	31	31	27	19
No. of failures for previous 12 month period	1	1	1	1	1	1	1	1	1	1	1	0
% of samples that comply	96.8%	96.2%	96.2%	96.8%	97.1%	97.1%	97.1%	97.1%	96.8%	96.8%	96.3%	100.0%
Compliance with 98% annual value	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES

11 - Poruma	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23
No. of samples collected	0	1	0	5	0	5	0	0	0	0	0	0
No. of samples collected in which E. coli is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	35	31	26	31	31	36	36	31	26	21	16	11
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

12 - Masig	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23
No. of samples collected	0	5	0	0	0	0	0	5	5	0	5	5
No. of samples collected in which E. coli is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	45	50	45	45	40	40	30	30	30	25	25	25
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

13 - Ugar	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23
No. of samples collected	0	0	0	15	5	0	5	5	5	5	0	0
No. of samples collected in which E. coli is detected (i.e. a failure)	0	0	0	1	0	0	1	0	1	0	0	0
No. of samples collected in previous 12 month period	0	0	0	15	20	20	25	30	35	40	40	40
No. of failures for previous 12 month period	0	0	0	1	1	1	2	2	3	3	3	3
% of samples that comply				93.3%	95.0%	95.0%	92.0%	93.3%	91.4%	92.5%	92.5%	92.5%
Compliance with 98% annual value				NO	NO	NO	NO	NO	NO	NO	NO	NO

14 - Erub	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23
No. of samples collected	5	5	0	0	5	5	0	0	5	5	0	0
No. of samples collected in which E. coli is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	45	45	40	38	39	44	44	39	44	44	40	30
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

15 - Mer	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23
No. of samples collected	0	10	0	0	5	0	0	5	5	0	5	5
No. of samples collected in which E. coli is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	51	56	51	46	50	45	40	40	40	35	35	35
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Appendix E - Incidents and Complaints Register

Incident ID	Incident Number	Island	Incident/ Complaint	Date of Incident	Description of Incident	BWA Start Date	BWA End Date	Incident Resolved Date	Resolution Actions (Note 1)
I-22	DWI-500-22-09483	03 - Saibai	Incident	22/02/2022	Positive E.coli test result	23/02/2022	29/08/2022	29/08/2022	Resourcing issues at water treatment plant were rectified.
I-25	DWI-500-22-09641	10 - Warraber	Incident	14/06/2022	Positive E.coli test results	14/06/2022	18/10/2022	18/10/2022	Repairs carried out to disinfection system and modification to SCADA system.
I-26	DWI-500-22-09699	15 - Mer	Incident	28/07/22	Low chlorine levels due to crack in chlorine dosing system pipework	28/07/22	21/09/22	21/09/22	Repairs carried out to disinfection system.
I-30	N/A	14 - Erub	Complaint	09/08/22	Water supply to house is inconsistent	N/A	N/A	11/10/22	Issues with water supply are being remedied.
I-27	DWI-500-22-09739	09 - Iama	Incident	19/08/22	Positive E.coli test result	19/08/22	12/09/22	12/09/22	Repairs carried out to disinfection system.
I-29	DWI-500-22-09779	06 - Kubin	Incident	27/09/22	Low chlorine levels in water network	27/09/22	30/05/23	30/05/23	Repairs carried out to disinfection system.
I-31	DWI-500-22-09881	13 - Ugar	Incident	14/10/22	Positive E.coli test result	14/10/22	17/05/23	17/05/23	Replaced chlorine being used in disinfection system.
I-32	DWI-500-23-10107	04 - Mabuiag	Incident	05/01/23	Low chlorine levels in water network	05/01/23	28/04/23	28/04/23	Repairs carried out to disinfection system.
I-34	DWI-500-23-10285	10 - Warraber	Incident	24/05/23	Low chlorine levels in water network	24/05/23	05/08/23	05/08/23	Replaced chlorine being used in disinfection system.

Notes:

1. In all incidents, investigations were carried out; community notified; and Council worked with the Queensland Tropical Health Unit and Water Supply Regulator to resolve the issue; and follow up samples were taken to ensure safe drinking water before lifting the boil water alert.

Appendix F - DWQMP Audit Findings



DWQMP Regular Audit Report

Torres Strait Island Regional Council
November 2022



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Appendices

Detailed Audit Findings

Executive Summary

Background

Karen Pither of Viridis Consultants Pty Ltd (Viridis) conducted the regular audit of the Torres Strait Island Regional Council (TSIRC) approved Drinking Water Quality Management Plan (DWQMP). The audit is a requirement of the *Water Supply (Safety and Reliability) Act 2008* (the Act). The scope of the audit was in accordance with the *Drinking Water Quality Management Plan Review and Audit Guidelines 2019*.

The auditor went onsite on 6 - 7 September 2022 to conduct the audit. The audit sample included inspection of the supply schemes at Iama, Masig and Erub Islands, interviews with relevant staff and observation of documentation and records.

This report includes the findings and conclusions from the regular audit of the DWQMP.

Positives

The auditor was especially pleased to note the following:

- Operators were knowledgeable and provided great value to the audit
- Significant improvements have been made in data collection, review and reporting
- Mobile solutions for data entry have been well adopted by operators
- A defects reporting process has been established and is being rolled out

Compliance Summary

The degree to which the audit criteria was fulfilled is summarised in Table 1, fifteen (15) requirements needed to be audited.

The auditor concluded based on the results of the audit that:

- The accuracy of the data in the annual report could not be verified, however new data collection processes should address this issue
- The implementation of verification monitoring was non-complaint in the audit period, however the issue is already being improved
- The scheme diagrams, risk assessment and critical control points require review to ensure water quality risks are adequately managed.
- the objectives of the audit were fulfilled without any issues.

Table 1 Compliance Summary

Compliance Codes	Number of Findings
Compliant	9
Minor Non-Compliance	2
Major Non-Compliance	3
No requirement	1

TSIRC has made significant improvement to its DWQMP in the audit period and continues to implement new processes to drive continuous improvement. Improvement in data collection and reporting was demonstrated in the audit, with new processes including utilising the SWIM database, smart sheets and mobile data entry tools for operators. Operators demonstrated a good understanding of using the new processes to input operational data. The defect process is another improvement that was noted in the audit. Incident recording was also noted as being well implemented.

A major non-compliance was noted in relation to the implementation of the verification monitoring program over the audit period, with many samples noted as missing. TSIRC provided evidence that it is aware of the gaps and is improving processes. The poor implementation of the program is very likely due to remoteness, reliance on commercial airlines and helicopters, as well as limited time frames for sampling. Despite this audit area being noted as a major non-compliance, the new process already implemented is expected to improve this greatly.

Major non-compliances were noted in relation to adequacy of the DWQMP. The risk methodology was not consistently implemented leading to gaps in the risk assessment and preventive measures. Identification of critical treatment barriers needs to be reviewed and operational monitoring and critical limits established for all treatment barriers, not just disinfection. The Australian Drinking Water Guidelines (chapter 5) and other relevant industry guidelines should be relied upon for guidance in establishing and implementing critical control points.

Recommendations have been provided for the minor non-compliances. Opportunities for improvement have also been identified, where relevant.

Recommendations

- REC-22-001 Ensure record keeping of verification data is robust and complete to allow for annual reports to be collated accurately and enable the accuracy of the data to be audited.
- REC-22-002 Improve processes to ensure compliance with the verification monitoring program (monthly sampling at each location), for example scheduling the sampling for the beginning of the month to allow for another sample to be taken and or develop a process to take follow up sample if the airline has issues delivering the samples. Alternatively consider the need for additional in-house testing for sites with challenges in sending samples.
- REC-22-003 Review the process flow diagrams and scheme descriptions and update where necessary.
- REC-22-004 Review the risk assessment, applying the risk methodology consistently. Clearly identify the relevant hazards for each hazardous event, apply appropriate consequence and likelihood categories, identify preventive measures that reduce the risk and assess the adequacy of these preventive measure (residual risk). Utilise industry standards such as the Good Practice Guide, and the Chapter 5 of the ADWG when assessing the adequacy of the preventive measures. Identify improvement actions where residual risk is unacceptable. It should also be noted that verification monitoring is not a preventive measure.
- REC-22-005 Include the assessment of disinfection by-products and identify preventive measures.
- REC-22-006 Review the RMIP to include the date the item was raised, the date it commenced, projected completion date and the person responsible for progressing the improvement item.
- REC-22-007 Undertake an assessment of each barrier (including filtration) at all schemes to identify CCPs (and quality control points). Set appropriate critical limits that identify the threshold between acceptable and unacceptable performance. Identify corrective actions to prevent potential unsafe water being supplied. Utilise industry guidelines to identify appropriate critical limits.

- REC-22-008 Calculate C.t for each supply system and confirm that the C.t (based on the critical limit, lowest operating volume of the reservoir and maximum flow) is adequate to achieve primary disinfection prior to the first customer.
- REC-22-009 Review the Water Quality Management Plan to reflect the monitoring identified in the risk assessment (six monthly cryptosporidium and giardia testing) or alternatively update the risk assessment to reflect the monitoring that is undertaken.

Opportunities for Improvement

- OFI-22-001 Prior to completion of the annual reports, ensure that tables are populated correctly
- OFI-22-002 Continue to roll out training to operators on accessing SCADA.
- OFI-22-003 Consider including the IDEXX Quality Control Procedure in the *E.coli* sampling process to ensure results are reliable.
- OFI-22-004 Consider implementing a Health Based Targets Approach as detailed in Chapter 5 of the ADWG when assessing the effectiveness of the preventive measures and identifying CCPs and critical limits.

1 INTRODUCTION

Viridis Consultants Pty Ltd (Viridis) was engaged by Torres Strait Island Regional Council (TSIRC), service provider identification number 500, to undertake a regular (external) audit of its Drinking Water Quality Management Plan (DWQMP).

As required by the *Water Supply (Safety and Reliability) Act 2008* (the Act), TSIRC is operating its drinking water service under an approved DWQMP and is required to complete the regular audit of its approved DWQMP by 30 September 2022.

This report includes the findings and conclusions from the regulator audit undertaken in September 2022.

1.1 Objectives

The objectives of the audit are to:

- undertake an audit of the DWQMP to fulfil the requirements of the Act and approval notice
- conduct the audit in line with the *Drinking Water Quality Management Plan Review and Audit Guidelines 2019*.

1.2 Audit Client

TSIRC is the audit client.

1.3 Regulatory Regime

The statutory requirements for DWQMP regular audits are detailed in the Act. The relevant provisions in the Act for providing audit reports are:

- section 99(2)(c) - if the regulator approves the plan, the notice of the decision or information notice for the decision, will state that if the regulator requires audits of the approved plan – the intervals at which the audits must be conducted
- section 99(4) - the interval for regular audits will not be less than two years
- section 108(1) - the provider must arrange for regular audit reports to be prepared about the provider's plans and compliance with the plans
- section 108(2) - regular audit reports must be prepared in accordance with the notice given by the regulator under section 99
- section 108(3) states that the purpose of the regular audit report for this plan is:
 - to verify the accuracy of the monitoring and performance data provided to the regulator under the plan
 - to assess the service provider's compliance with the plan
 - to assess the relevance of the plan in relation to the provider's drinking water service.
- section 108(6) outlines that the regular audit report for this plan must be prepared by a person, other than an employee of the service provider or someone employed in operating the service provider's infrastructure, who is certified under the Drinking Water Quality Management System Auditor Certification Scheme to conduct an audit of the type to which the report relates, or has a qualification the regulator is satisfied is at least equivalent to this qualification
- section 108(6) also states that the regular audit report must be:
 - prepared in accordance with the guidelines made by the regulator about preparing regular audit reports
 - given to the regulator within 30 business days after its completion
 - made available for inspection and purchase.

- section 575 states that the provider must keep a copy of the audit report available for inspection by the public during office hours on business days at the office of the service provider.

2 AUDIT METHOD

2.1 Auditor

The audit was undertaken by Karen Pither. Karen's qualifications to undertake this audit are detailed below:

- Education:
 - Bachelor of Science (Ecology and Conservation Biology)
- Auditor certification held with Exemplar Global:
 - Lead Water Quality Management Systems Auditor:
 - Drinking Water
 - Recycled Water
- Experience
 - >50 audits undertaken, ranging from regulatory, compliance and process improvement audits
 - Audit clients have included small supplies to very large metropolitan supplies (e.g. Urban Utilities, Unitywater, Hunter Water, Wannon Water, Gippsland Water, Burke Shire, Bulloo Shire, Paroo Shire, Gympie Regional Council, Mornington Shire and WaterNSW)
 - DWQMP development, review and implementation for >20 utilities across QLD and NSW

The auditor confirms that:

- sufficient evidence has been sighted on which to base audit conclusions
- the audit findings accurately reflect the professional opinion of the auditor
- the audit findings have not been unduly influenced by the auditee and/or any of its associates.

2.2 Audit Scope

The scope of the audit was to:

- verify the accuracy of monitoring and performance data given to the regulator under the plan
- assess compliance with the plan
- assess compliance with the DWQMP approval conditions
- assess the relevance of the plan in relation to the drinking water service

2.3 Audit Standard

ISO 19011:2018 Guidelines for auditing management systems was used to ensure good auditing practice.

2.4 Audit Criteria

The audit focused on the implementation of the DWQMP and relevance of the plan to manage risks to water quality. The criteria for assessing compliance were:

- the approved DWQMP (2022)
- approval information notice (2022).

2.5 Audit Process

The audit was undertaken in accordance with the methodology outlined in the Audit Standard. The audit steps and responsible parties are outlined in 2.

Table 2 Audit Steps

Step Description	Responsibility
Initiate audit / engage auditor	Council
Information request	Viridis
Supply audit evidence requested	Council
Prepare Audit Plan	Viridis
Audit preparation	Viridis
Opening meeting (onsite)	Viridis/Council
Attend interviews and site inspection (onsite)	Viridis/Council
Closing meeting (onsite and/or remote)	Viridis/Council
Draft audit report preparation	Viridis
Review and provide comments on draft report	Council
Final audit report	Viridis
Signed statutory declarations	Viridis/Council
Submit final audit report and statutory declarations to the regulator	Viridis

2.6 Audit Grades

Table 3 identifies the grades used for this audit.

Table 3 Audit Grades

Compliance Codes	Definition
Compliant	Indicates compliance of audit findings with audit criteria.
Minor Non-Compliance	Does not comply, however, deficiency does not compromise the delivery of products or outcomes and does not compromise the ability to achieve defined objectives.
Major Non-Compliance	Does not comply. Deficiency compromises the delivery of products or outcomes, and the ability to achieve defined objectives.
No requirement	There was no requirement to meet this criterion within the audit period.

A recommendation (Rec) is provided for requirements which do not comply, that is, minor or major non-compliance.

An opportunity for improvement (OFI) is identified for activities which comply but may also be improved. This may be an opportunity for process improvement or comments that may be relevant to the next audit. An OFI may also be provided for a Compliant grade.

2.7 Quality Assurance Process

This audit was carried out in accordance with the Viridis Quality Manual, which is third-party certified to standard *ISO 9001:2015 Quality Management Systems*. Quality assurance activities undertaken during the audit comprised of:

- compliance with the Viridis Quality Manual
- document control and approval processes
- quality review of the report.

2.8 Sampling

Audits by nature are a sampling exercise; as such there is a risk that the audit evidence examined is not representative. The audit sample included onsite inspection of the supply scheme, interviews with relevant staff and observation of documentation and records.

2.9 Audit Schedule

Date: Onsite – 6-7 September 2022, agenda is shown in Table 4.

Table 4 Audit Agenda

Time	Details	Suggested Personnel
Tuesday 6 September		
9:00	Audit Opening Meeting	Manager, Water and Wastewater Relevant interested parties
9:15	Interview <ul style="list-style-type: none"> • Incident management • Reporting incidents to the Regulator • Training and awareness • DWQMP <ul style="list-style-type: none"> ○ Reviews ○ Annual reporting Improvement plans	Incident Managers Water quality Officers Technical officers who prepare annual report Engineers HR or training officer
12:00	Travel to Airport	
1:20	Flight to Horn Island	
Wednesday 7 September		
All day	Site Inspections – Iama Masig Erub <ul style="list-style-type: none"> • Raw water source and catchment • Water treatment plant walk through • Critical Control Points • Operational Monitoring • In-house testing • Calibrations • Treatment water storage • Network monitoring points Close out meeting	Manager, Water and Wastewater Water Operators Water quality Officers Technical officers Engineers

2.10 Auditees

The auditees were as follows:

- Terrence Jeppesen - Manager, Water and Wastewater
- Joshua Dilmetz - Water and Wastewater Engineer
- Mark David: Operations Manager – Water [Yam, Masig and Erub]
- Manual Kepa: Engineering Officer [Yam]
- Dick Billy: Engineering Officer [Masig]
- Saulo Gamia: Engineering Officer [Masig]
- Samuel Mye: Engineering Officer [Erub]
- Lui Marama: Engineering Officer [Erub]
- Ellayne Wiles: QLD Health Environmental Health Officer (WaSH Program) [Erub] - observer
- Nicholas Coronos – Water Supply Regulator – observer

3 STATUS OF RECOMMENDATIONS FROM PREVIOUS AUDIT

The status of the recommendations from the previous regular audit of the DWQMP was discussed with the provider and is noted in Table 5 below.

Table 5 Status of Previous Regular Audit Recommendations

Previous Recommendation	Status / Comments
REC-18-001 – Continue to improve processes for data collection including verification monitoring results, complaints and improvement plan actions.	New data collection processes have been established The audit findings have been addressed
REC-18-002 - Update the DWQMP to identify the actual preventive measures that are relevant to each scheme.	Risk assessment to be reviewed
REC-18-003 - Undertake further training on the requirements for filling out the log sheet to ensure operators are identifying issues, such as a lack of spare parts, and communicating them to the organisation.	New data collection processes have been established The audit findings have been addressed
REC-18-004 – Confirm that preventive measures identified in the plan are being implemented, for example, vermin proofing and locked hatches on treated water storages, cleaning of lagoon covers, first flush of lagoon covers.	Addressed
REC-18-005 - Progress establishment of procedures for implementing preventive measures, to ensure that there is a documented standard for their implementation across all schemes.	Addressed
REC-18-006 - Revise the critical limits to require operators to undertake a corrective action when the quality of water can no longer be guaranteed, for example, when filtered water turbidity is greater than 0.5 NTU in catchments with a protozoa risk, and when disinfection effectiveness is potentially compromised (when turbidity is greater than 1 NTU).	Not yet addressed
REC-18-007 - Update the St Pauls DWQMP, and subsequent supporting documents, such as the risk assessment and monitoring plans to reflect the sources of water for the drinking water schemes.	The risk assessment includes the weir as a source. The process flow diagrams are vague on the sources of water, the weir is not shown on the SCADA or Figure 19 of Appendix A. It is unclear if there is raw water sampling noted in the Water Quality Management Plan. The recommendation is mostly addressed.
REC-18-008 - Review all DWQMPs to confirm that the catchment characteristics are documented accurately and all sources of water are included.	Addressed

4 AUDIT FINDINGS

The audit was carried out as described in Section 2. The completed Audit Checklist is in Appendix A, which provides the detailed findings for the audit. These findings have been summarised in the following subsections.

4.1 Accuracy of Monitoring and Performance Data

Compliance grade by component:

- Verification data generated **Compliant**
- Data Accuracy in the DWQMP (annual) Reports **Minor Non-compliant**
- Data Accuracy in periodic reports **No requirement**

TSIRC provided the required information in the annual reports audited, however due to gaps in the evidence provided for the audit, the accuracy of the data could not be verified. TSIRC has already commenced improvements in data collection and record keeping that will address this

4.2 Compliance with the Plan

Compliance grade by component:

- Implementation of preventive measures **Compliant**
- Implementation of operational and maintenance procedures **Compliant**
- Implementation of process for managing incidents and emergencies **Major Non-compliant**
- Implementation of operational and verification monitoring programs **Compliant**
- Implementation of the risk management improvement program **Compliant**
- Maintaining records **Compliant**

TSIRC generally complied with their DWQMP with the exception of the verification monitoring program. Remoteness, holding times and reliance on commercial and charter airlines contribute to the challenges of implementing the monitoring program .

4.3 Compliance with Approval Conditions

Compliance grade by component:

- Reporting incidents **Compliant**
- Adhering to provisions and conditions **Compliant**

TSIRC complied with this audit area. Some opportunities for improvement have been provided.

4.4 Relevance of the Plan

Compliance grade by component:

- Service description and details of infrastructure **Minor Non-compliant**
- Catchment characteristics and water quality information **Compliant**
- Risk assessment and risk management **Major Non-compliant**
- Operational and verification monitoring **Major Non-compliant**

The risk methodology was not consistently implemented leading to gaps in the risk assessment and preventive measures. Identification of critical treatment barriers needs to be reviewed and operational

monitoring and critical limits established for all treatment barriers, not just disinfection. The Australian Drinking Water Guidelines (chapter 5) and other relevant industry guidelines should be relied upon for guidance in establishing and implementing critical control points.

5 AUDIT CONCLUSIONS

The degree to which the audit criteria was fulfilled is summarised in Table 6, fifteen (15) requirements needed to be audited.

TSIRC has made significant improvement to its DWQMP in the audit period and continues to implement new processes to drive continuous improvement. Improvement in data collection and reporting was demonstrated in the audit, with new processes including utilising the SWIM database, smart sheets and mobile data entry tools for operators. Operators demonstrated a good understanding of using the new processes to input operational data. The defect process is another improvement that was noted in the audit. Incident recording was also noted as being well implemented.

A major non-compliance was noted in relation to the implementation of the verification monitoring program over the audit period, with many samples noted as missing. TSRIC provided evidence that it is aware of the gaps and is improving processes. The poor implementation of the program is very likely due to remoteness, reliance on commercial airlines and helicopters, as well as limited time frames for sampling. Despite this audit area being noted as a major non-compliance, the new process already implemented is expected to improve this greatly.

Major non-compliances were noted in relation to adequacy of the DWQMP. The risk methodology was not consistently implemented leading to gaps in the risk assessment and preventive measures. Identification of critical treatment barriers needs to be reviewed and operational monitoring and critical limits established for all treatment barriers, not just disinfection. The Australian Drinking Water Guidelines (chapter 5) and other relevant industry guidelines should be relied upon for guidance in establishing and implementing critical control points.

The auditor concludes based on the results of the audit that:

- Operators were knowledgeable and provided great value to the audit
- The accuracy of the data in the annual report could not be verified, however new data collection processes should address this issue
- The implementation of verification monitoring was non-compliant in the audit period, however the issue is already being improved
- The scheme diagrams, risk assessment and critical control points require review to ensure water quality risks are adequately managed.
- the objectives of the audit were fulfilled without any issues.

Recommendations and opportunities for improvement have been identified, where relevant.

Table 6 Audit Compliance

Compliance Codes	Number of Findings
Compliant	9
Minor Non-Compliance	2
Major Non-Compliance	3
No requirement	1

6 GLOSSARY

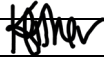
Word	Description
ADWG	Australian Drinking Water Guidelines
CCP	Critical Control Point
DWQMP	Drinking Water Quality Management Plan
mg/L	Milligram per Litre
NA	Not Applicable
NATA	National Association of Testing Authorities
OPI	Opportunity for Improvement
Rec	Recommendation
Regulator	Department of Regional Development, Mines and Water
SCADA	Supervisory Control and Data Acquisition
TSIRC	Torres Strait Island Regional Council

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DETAILED AUDIT FINDINGS

Table 7 Detailed Audit Findings

Auditable item	Checklist	Evidence	Findings and Discussions	Compliance Grade	Recommendation	OFI
Data Accuracy - verification data generated	Verification data included in the DWQMP (annual) Reports as per the DWQMP	00-TSIRC-DWQMP-03 and Appendices DWQMP Annual Report 2020-2021 DWQMP Annual Report 2019-20	TSIRC provided the 2019/2020 and the 2020/2021 Annual Reports. The Annual Reports contained the relevant information required to be reported in the Annual Reports.	Compliant	Not applicable	Not applicable
Data Accuracy - data provided in the DWQMP (annual) report	Accurate Data in DWQMP (annual) Reports	00-TSIRC-DWQMP-03 and Appendices DWQMP Annual Report 2020-2021 DWQMP Annual Report 2019-20 Water & Wastewater Sampling Register In-house records: 08 - Hammond 01.pdf 12 - Masig 01.pdf 14 - Erub 01 V1.pdf 14 - Erub 01.pdf 15 - Mer 01.pdf 01 - Boigu 03.pdf 03 - Saibai 03.pdf 04 - Mabuiag 03.pdf 05 - Badu 03.pdf 06 - Kubin 03.pdf 12 - Masig 03.pdf 15 - Mer 03.pdf	TSIRC provided the 2019/2020 and the 2020/2021 Annual Reports. To assess accuracy of the data provided in the annual report, the auditor compared the <i>E.coli</i> results reported in the evidence provided by TSIRC. TSIRC provided folders for each month from July 2020 – June 2021, which contained the scanned copies of inhouse testing records, populated by the operators undertaking the inhouse lab analysis. Spreadsheets were also provided for 2020 and 2021 that were assumed to represent lab testing undertaken by the Cairns Lab. It was assumed that the folders contained all available records of analysis. When reviewing the contents of the folders that were a number of results in the Annual report for 2020/2021 that did not have a corresponding lab record, for example, a spreadsheet indicating that the Poruma samples were analysed by Cairns Lab, with 4 results in the spreadsheet, but 5 reported in the Annual report. For October 2020, in-house lab reports were provided only for Duan and Erub, and the spreadsheet showed results for Masig and Mer, however the Annual Report showed results for Saibai and Warraber that did not have a corresponding sampling record.	Minor Non-compliant	REC-22-001 Ensure record keeping of verification data is robust and complete to allow for annual reports to be collated accurately and ensure that the accuracy of data auditable.	OFI-22-001 Prior to completion of the annual reports, ensure that tables are populated correctly

Auditable item	Checklist	Evidence	Findings and Discussions	Compliance Grade	Recommendation	OFI
<p>Data Accuracy - data provided to the regulator as part of a periodic reporting condition</p>	<p>Accurate Data in required periodic reports</p>	<p>Spreadsheets: CRC 2021 CRC 2020</p>	<p>For July, August and September 2020, the Water and Wastewater Spreadsheet was provided that indicated only if an island 'passed' or 'failed' however there were no sites or sample numbers indicated.</p> <p>The table for <i>E.coli</i> sampling at Boigu in the Annual Report appears to have been populated incorrectly showing zero samples taken in the past 12 months, but 100% compliance with the annual value.</p> <p>Based on the gaps in the data as detailed above, the accuracy of the data reported in the Annual reports could not be verified.</p> <p>It is noted that gaps could be due to the completeness of the evidence provided for the audit.</p> <p>It is also noted that TSIRC has improved data collected and recording recently and these gaps in the data are likely to have been addressed by these improvements.</p>	<p>No Requirement</p>	<p>No Requirement</p>	<p>No Requirement</p>
<p>Compliance with the Plan – implementation of preventive measures described in the plan</p>	<p>Preventive measures identified Preventive measures implemented</p>	<p>00-TSIRC-DWQMP-03 and Appendices</p>	<p>The DWQMP includes the risk register in Appendix K. The risk register includes identification of preventive measures implemented to reduce the risk of identified hazardous events.</p> <p>Examples of preventive measures discussed and observed in the audit include:</p> <ul style="list-style-type: none"> Daily monitoring of SCADA system – this was observed at Iama Island. On Masig, it was found that operators had not yet commenced logging 	<p>Compliant</p>	<p>Not Applicable</p>	<p>Not Applicable</p>

Auditable item	Checklist	Evidence	Findings and Discussions	Compliance Grade	Recommendation	OFI
<p>Compliance with the Plan – implementation of operational and maintenance procedures</p>	<p>Procedures – currency Procedures - implementation</p>	<p>00-TSIRC-DWQMP-03 and Appendices 260822 - Water and Wastewater Operations Report 220902 - Water and Wastewater Operations Report 190822 - Water and Wastewater Operations Report DNRME Data Email - TSIRC Operator skills mapping - WIOA</p>	<p>into the SCADA system, and required additional support to commence this.</p> <ul style="list-style-type: none"> Physical presence at WTP and STP on weekdays – this was verbally confirmed at the three sites that were visited by operators Raw water wells - Vermin proof lid to well locked gate and weir pump well, this was observed at the Lagoon catchment is fenced – all lagoons visited were fenced (at Masig and Erub) Chlorinated water supply (automated) - observed at each site 	<p>Compliant</p>	<p>Not Applicable</p>	<p>Not Applicable</p>
			<p>The DWQMP identifies a number of plans that are used to document the processes for implementing the DWQMP. Many of these processes are new and in the process of being rolled out, due to the approval of the amended DWQMP.</p> <p>Water Leaks Management Plan – progress and reported in the weekly report which shows open leaks and fixed leaks per scheme. The reports show that leaks are being repaired on a regular basis.</p> <p>Defects and Issues Management Plan – defects and progress are reported in the weekly report. During the audit, operators showed how they make a defect report using the app on their phones.</p> <p>Communications Management Plan – Weekly water quality reports (noted in the Communications Management Plan were shown in the audit and provide as evidence.</p> <p>Training Management Plan outlines the training for those roles in the water team, including mandatory training in water operations for a range of roles. It was discussed in the audit that there has been challenges in sourcing training and council is working</p>	<p>Compliant</p>	<p>Not Applicable</p>	<p>Not Applicable</p>

Auditable item	Checklist	Evidence	Findings and Discussions	Compliance Grade	Recommendation	OFI
Compliance with the Plan – implementation of process for managing incidents and emergencies	Process documented Response actions documented	00-TSIRC-DWQMP-03 and Appendices 260822 - Water and Wastewater Operations Report 220902 - Water and Wastewater Operations Report 190822 - Water and Wastewater Operations Report Incident records: <ul style="list-style-type: none"> • 200519 – Mer • 210225 - St Pauls • 220208 – Hammond • 220223 – Saibai • 220614 - Warraber 	<p>on this. It was noted that at each scheme visited, there were operators with formal qualifications that have been mentoring and providing training on the job for those who have not yet undertaken the formal training.</p> <p>Incidents and Complaints Management Plan is in Appendix G of the DWQMP.</p> <p>The Incident Management Plan includes a flow chart for managing incidents. There is an internal form for reporting incidents and all staff members are responsible for making these reports, however the procedures requires an immediate phone call to a supervisor or equivalent.</p> <p>Incidents are recorded on a register in Smart Sheets which will automatically populate when an incident form is lodged. The Smart Sheet will be populated with the links to the incident records. These processes were shown the audit interviews. The incident register is included in the weekly water quality report.</p> <p>TSIRC provided the records from a number of incidents. Each incident record included the initial notification, and where relevant, the investigation report in Form B. Due to the requirements of the Incident Management Plan, a CCP exceedance (and a range of other incident types) requires a boil water notice. The notices are also recorded in the incident record folders, as well as monitoring results.</p> <p>During the audit, the operators verbally confirmed the incident management process and incident reporting requirements.</p>	Compliant	Not Applicable	Not Applicable
Compliance with the Plan – implementation of	Operational monitoring plan	00-TSIRC-DWQMP-03 and Appendices	Operational Monitoring The Water Quality Management Plan (Appendix B of the DWQMP) outlines the operational monitoring	Major Non-Compliance	REC-22-002 Improve processes to ensure compliance with the	OFI-22-002 Continue to roll out training to

Auditable item	Checklist	Evidence	Findings and Discussions	Compliance Grade	Recommendation	OFI
<p>operational and verification monitoring plan</p>	<p>implementation, including CCPs Verification monitoring plan implementation</p>	<p>Water quality log sheets - Erub, lama and Masig 260822 - Water and Wastewater Operations Report 220902 - Water and Wastewater Operations Report 190822 - Water and Wastewater Operations Report Chain of Custody Form:</p> <ul style="list-style-type: none"> • 19/8/22 • 26/5/22 • 5/8/22 <p>Water Ecoli Test Results Spreadsheet Emails 1 May 2022 and 3 April 2022</p>	<p>for all schemes, as well as the reporting and communication requirements. Daily Chlorine, pH, Turbidity and conductivity is required on a daily basis in the network, raw water, reservoir outlet and other locations. Operators record the results on paper record sheets and enter the results into SWIM. Operators demonstrated how the data entry is undertaken using the app on their mobile phones. When the app was opened, the data had been entered up to the audit day. The app also showed the levels of chemicals (for example caustic and citric at Erub) to inform chemical ordering. The Water Quality Management Plan identifies the approved instruments for operational monitoring and it was discussed that they have been chosen to reduce the calibration requirements, for example, the turbidity instruments don't require calibration. Review of operational monitoring is undertaken weekly and a report on performance is collated and distributed across the water teams. The report includes a summary of how complete the SWIM records are, with the majority of schemes showing above 50% with lama showing 100%. Some schemes are showing no data however the SWIM and data entry is a new process and a work in progress. The report also shows chlorine residual and turbidity results for all schemes. Verification Monitoring The Water Sample Test Matrix in Appendix B includes the verification monitoring program for each scheme. The program requires monthly <i>E.coli</i></p>	<p>Compliance Grade</p>	<p>verification monitoring program (monthly sampling at each location), for example scheduling the sampling for the beginning of the month to all for another sample to be taken and or develop a process to take follow up sample if the airline has issues delivering the samples. Alternatively consider the need for additional in-house testing for sites with challenges in sending samples.</p>	<p>operators on accessing SCADA. OFI-22-003 Consider including the IDEXX Quality Control Procedure in the <i>E.coli</i> sampling process to ensure results are reliable.</p>

Auditable item	Checklist	Evidence	Findings and Discussions	Compliance Grade	Recommendation	OFI
<p>Compliance with the Plan – implementation of risk management improvement program</p>	<p>Improvement program implementation Monitoring progress Continual improvement</p>	<p>00-TSIRC-DWQMP-03 and Appendices</p>	<p>testing at 6 locations. The locations are in the network with one sample point (SP6) at the reservoir outlet at each scheme. <i>E.coli</i> analysis is undertaken in-house, at TSIRCs in-house labs. The lab at lama was observed during the site inspection. The results are recorded on a Chain of Custody Form. These results are populated onto a spreadsheet that records the result and also if a result is missing. The <i>E.coli</i> spreadsheet provided for the audit contained data from 10/1/22 -13/7/22. It noted an <i>E.coli</i> exceedance on Saibai on 22/2/22 and Warraber on 14/6/22, the corresponding incident records were provided for these detections. The spreadsheet noted that a number of the monthly samples were missed across a number of islands through 2022. It was discussed that this is largely due to remoteness of the islands and reliability of commercial planes and helicopters to deliver samples to labs. Emails shown in the audit (1 May 2022 and 3 April 2022) showed the summary of <i>E.coli</i> sampling that was community to the relevant people. It is noted that TSIRC is working on improving verification monitoring implementation by training staff about the importance, and strengthening relationships with charter companies.</p>	<p style="background-color: red; color: white; text-align: center;">Compliant</p>	<p>Not Applicable</p>	<p>Not Applicable</p>
<p>Compliance with the Plan – implementation of risk management improvement program</p>	<p>Improvement program implementation Monitoring progress Continual improvement</p>	<p>00-TSIRC-DWQMP-03 and Appendices</p>	<p>The Risk Management Improvement Plan (RMIP) is in Appendix K, and is linked to the outcomes of the risk assessment. Examples: <ul style="list-style-type: none"> WS11 – GeoSCADA – this is due to be completed in 2022 and is currently underway. </p>	<p style="background-color: green; color: white; text-align: center;">Compliant</p>	<p>Not Applicable</p>	<p>Not Applicable</p>

Auditable item	Checklist	Evidence	Findings and Discussions	Compliance Grade	Recommendation	OFI
Compliance with the Plan – maintaining records as described in the plan	Records management	00-TSIRC-DWQMP-03 and Appendices	<ul style="list-style-type: none"> W502 – install UF or UV for schemes – the new UF plant was observed at Erub <p>In addition to the RMIP the Defects procedure is another way of progressing improvements, which is a new process that is currently being rolled out and improvement – for example, changes are being made to allow operators to track the defects process and to improve allocation of tasks.</p> <p>The Information Management Plan is an appendix to the DWQMP. During the audit a range of record keeping processes were demonstrated such as SWIM for recording monitoring results, Smart Sheets for incidents and hard copy log sheets at the WTP sites.</p>	Compliant	Not Applicable	Not Applicable
Compliance with the Approval Conditions – reporting incidents	Reporting incident in relation to Events Reporting incidents in relation to water quality criteria Adequacy of actions undertaken	00-TSIRC-DWQMP-03 and Appendices 260822 - Water and Wastewater Operations Report 220902 - Water and Wastewater Operations Report 190822 - Water and Wastewater Operations Report Incident records: <ul style="list-style-type: none"> 200519 – Mer 210225 - St Pauls 220208 – Hammond 	<p>TSIRC provided the records from a number of incidents. Each incident record included the initial notification, and where relevant, the investigation report in Form B. Due to the requirements of the Incident Management Plan, a CCP exceedance (and a range of other incident types) requires a boil water notice. The notices are also recorded in the incident record folders, as well as monitoring results.</p> <p>The <i>E. coli</i> spreadsheet provided for the audit contained data from 10/1/22 - 13/7/22. It noted an <i>E. coli</i> exceedance on Saibai on 22/2/22 and Warraber on 14/6/22, the corresponding incident records were provided for these detections.</p>	Compliant	Not Applicable	Not Applicable

Auditable item	Checklist	Evidence	Findings and Discussions	Compliance Grade	Recommendation	OFI
Compliance with the Approval Conditions – adhering to provisions and conditions	Review undertaken	<ul style="list-style-type: none"> 220223 – Saibai 220614 - Warraber 	The DWQMP was amended and revised to reflect TSIRC operations. The amended plan was approved by the Regulator on 15 August 2022, with conditions.	Compliant	Not Applicable	Not Applicable
Relevance of the Plan – service description and infrastructure details	All relevant schemes included Schematic or flow diagram currency	00-TSIRC-DWQMP-03 and Appendices	<p>During the audit, three schemes were inspected, and the following was noted:</p> <ul style="list-style-type: none"> The Erub process flow diagram is not consistent with the current treatment plant, as the pre-soda ash dosing and supernatant return are no longer connected. The Hypochlorite dosing at lama is between the 2ML and 330 kL reservoir and not prior to the 2 ML reservoir. This has repercussions as the contact time will be greatly reduced and will need to be calculated and the minimum dose required to achieve primary disinfection prior the first customer (metres from the reservoir) needs to be confirmed. 	Minor Non-compliance	REC-22-003 Review the process flow diagrams and scheme descriptions and update where necessary.	Not Applicable
Relevance of the Plan – catchment characteristics and water quality information	Changes in catchment and land use Hazards from water quality information	00-TSIRC-DWQMP-03 and Appendices	The previous audit found that the DWQMP (previous version) did not include all raw water sources for St Pauls and the weir supply had not been risk assessed. This has now been included in the risk assessment. For the sites that were visited, the catchments were consistent with the infrastructure details and risk assessment.	Compliant	Not Applicable	Not Applicable

Auditable item	Checklist	Evidence	Findings and Discussions	Compliance Grade	Recommendation	OFI
Relevance of the Plan – risk assessment and risk management	Risk assessment relevant Adequacy	00-TSIRC-DWQMP-03 and Appendices	<p>The risk assessment was reviewed and contains hazardous events for each scheme. When reviewing the risk assessment, it was noted that</p> <p>Hazard 1.03 Pathogen and Microbial Contaminant has been assigned a maximum consequence of ‘Insignificant’ which is described in the risk matrix as potential isolated occurrence of aesthetic parameter above guideline value. If there was a Pathogen and Microbial Contaminant in the drinking water this would meet the criteria of ‘catastrophic’.</p> <p>Hazard 1.05 The hazardous event is ‘Ineffective Treatment’ and the hazard is ‘low chlorine residual’. The hazardous event should be ineffective treatment resulting in low chlorine residual, and the hazards are bacteria and virus. Low chlorine is not a hazard, the failure of disinfection is a hazardous event that will lead to the presence of chlorine sensitive pathogens.</p> <p>Hazard 1.06 The Hazardous event is ‘Ineffective Treatment’ and the hazard is turbidity. High turbidity is a hazard, however high turbidity is an indicator of ineffective treatment leading to the ineffective removal of protozoa. Hazard 1.08 identifies crypto and giardia as hazards and identifies 6 monthly testing as the preventive measures. The preventive measure should be the treatment process, the monitoring does not prevent the hazard. For schemes with a protozoan risk, the treatment barrier should be identified as the preventive measure, and if there is no effective barrier, the residual risk should reflect this. Where there is no barrier (with appropriate monitoring and critical limits) the risk is not reduced.</p>	Major Non-compliance	REC-22-004 Review the risk assessment, applying the risk methodology consistently. Clearly identify the relevant hazards for each hazardous event, apply appropriate consequence and likelihood categories, identify preventive measures that reduce the risk and assess the adequacy of these preventive measure (residual risk). Utilise industry standards such as the Good Practice Guide, and the Chapter 5 of the ADWG when assessing the adequacy of the preventive measures. Identify improvement actions where residual risk is unacceptable. It should also be noted that verification monitoring is not a preventive measure. REC-22-005 Include the assessment of disinfection by-	OFI-22-004 Consider implementing a Health Based Targets Approach as detailed in Chapter 5 of the ADWG when assessing the effectiveness of the preventive measures and identifying CCPs and critical limits.

Auditable item	Checklist	Evidence	Findings and Discussions	Compliance Grade	Recommendation	OFI
Relevance of the Plan – operational and verification monitoring	Operational monitoring relevant Verification monitoring relevant CCP limits relevant for risk management	00-TSIRC-DWQMP-03 and Appendices	<p>Disinfection by-products have not been assessed. It was noted that in some schemes, chlorine ICBs may be left out in the sun, and have spent time in the sun when being delivered to island. The formation of disinfection by-products, and associated preventive measures such as using UV protective ICBs should be assessed.</p> <p>The Risk Management Improvement Plan in the DWQMP includes improvement items and a column for status. It is not possible to see when the item was raised, when it commenced and when it is due, nor is there a responsible person allocated.</p>	Major Non-compliance	<p>products and identify preventive measures. REC-22-006 Review the RMIP to include the date the item was raised, the date it commenced, projected completion date and the person responsible for progressing the improvement item.</p>	Not Applicable
			<p>The operational monitoring of CCPs is documented in Appendix G - Incidents and Complaints Management Plan. Turbidity is identified as a CCP, however it is in the treated water in the network and the critical limit is 5 NTU. Turbidity monitoring after the filtration processes is not identified is not identified.</p> <p>The ADWG (in Table 9.1) provides examples of characteristics commonly used for operational monitoring, by location from catchment to consumer. This includes monitoring turbidity in the raw water, at coagulation/sedimentation, clarification, filtration, disinfection and in the network. There is currently no monitoring of the performance of the treatment barriers other than disinfection detailed in the DWQMP. TSRIC operates a number of filtration processes for managing hazards.</p> <p>It was discussed in the audit the TSIRC issues a boil water notice when any of the current critical limits are exceeded, and this was part of the reasoning for determining the current critical limits. It was also discussed that it would put a lot of pressure on</p>	Major Non-compliance	<p>REC-22-007 Undertake an assessment of each barrier (including filtration) at all schemes to identify CCPs (and quality control points). Set appropriate critical limits that identify the threshold between acceptable and unacceptable performance. Identify corrective actions to prevent potential unsafe water being supplied. Utilise industry guidelines to identify appropriate critical limits. REC-22-008 Calculate C.t for each supply</p>	Not Applicable

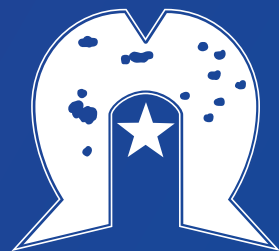
Auditable item	Checklist	Evidence	Findings and Discussions	Compliance Grade	Recommendation	OFI
			<p>communities if they had a boil water notice when turbidity increased (but below 5 NTU).</p> <p>When assessing the adequacy of the critical limits and CCP the following observations are made:</p> <p>CCPs are intended to identify the threshold of acceptable barrier performance and trigger and action to prevent unsafe water being supplied. In the case of operating filters as a barrier to protozoa, shutting down on a turbidity exceedance or failed integrity test (UF) would not require a boil water notice, however it would prevent inadequately treated water from being supplied.</p> <p>The disinfection CCP includes chlorine residual and turbidity. It was discussed that the calculation of C.t has not been undertaken to confirm the adequacy of the critical limits and during the audit it was noted that the lama dosing unit is prior the 33 kL tank and after the larger treated water tank, and the larger treated water tank is unchlorinated and cannot be relied upon for chlorine contact. Additionally, Badu has customers prior the treated water reservoir. It cannot be confirmed if the free chlorine residual critical limit is adequate to achieve primary disinfection prior to the first customer.</p> <p>The turbidity critical limit is 5 NTU. The ADWG recommends that turbidity is no greater than 1 NTU at the point of disinfection. There are C.t. tables available (for example in WaterVal) that provides revised C.t values for higher turbidity. A full review of the C.t, in relation to the distance to first customer, theoretical detection time and turbidity should be undertaken.</p> <p>The Water Quality Monitoring Plan does not include the six monthly Crypto and Giardia testing as indicated in the risk assessment The risk assessment</p>		<p>system and confirm that the C.t (based on the critical limit, lowest operating volume of the reservoir and maximum flow) is adequate to achieve primary disinfection prior to the first customer.</p> <p>REC-22-009 Review the Water Quality Management Plan to reflect the monitoring identified in the risk assessment (six monthly cryptosporidium and giardia testing) or alternatively update the risk assessment to reflect the monitoring that is undertaken. . .</p>	

Auditable item	Checklist	Evidence	Findings and Discussions	Compliance Grade	Recommendation	OFI
			notes this monitoring as a preventive measure however it must be noted that monitoring does not reduce the risk. There should be an adequate barrier to remove or reduce the risk to an acceptable level.			

Appendix G - Summary of DWQMP Amendments Resulting from Internal Review

DWQMP Section	Description of change
3.1 Risk Assessment Team	Updated risk assessment team in Appendix K.1
3.2 Risk Assessment Methodology	Updated risk level table
4.4 Drought Management Plan	Minor wording edits
4.5 Maintenance Management Plan	Minor wording edits
4.6 Defects and Issues Management Plan	Minor wording edits
4.7 Incidents and Complaints Management Plan	Minor wording edits
4.8 Communications Management Plan	Minor wording edits
4.9 Training Management Plan	Minor wording edits
4.10 Information Management Plan	Minor wording edits
4.12 Disinfection By-products	New section
4.13 Microbial risks	New section
Appendix A – Infrastructure Details	
A.1.1-A1.6	Amendments/updates
A.1.1	Updated populations per census and connections
A.1.3	Removed rows for 2 x 70kL mobile RO units as they are now permanently installed (at Ugar and Mer)
A.1.6	Removed rows for unused reservoirs: Dauan Eastern and Kubin old
A.2	Added in all new screen shots of GeoSCADA and TSIRC mapping
A.3	Historical schematics, maps, SCADA screen shots
Appendix B – Water Quality Management Plan	
B.1	Removed redundant sample point at Erub Added long & lat data for Masig and Mer
B.2	Removed Sewer Sample Test Matrix; Added sample SWIM local operations entry
B.3	Removed Sewer Licence Parameters; moved old B.5 to B.3
B.4	Removed logsheet examples; moved old B.6 to B.4
B.5	Moved old B.7 to B.5 (note, this was referred to under the heading Appendix B, however was left off the final PDF)
B.6	Moved B.6 to B.4 Added Water Quality Complaints summary
Appendix C – Leaks Management Plan	Minor wording edits
Appendix D – Demand Management Plan	<ul style="list-style-type: none"> Changed all references to Drought Management Plan to Demand Management Plan for consistency throughout Minor wording edits

Appendix E – Maintenance Management Plan	Minor wording edits
Appendix F – Defects and Issues Management Plan	<ul style="list-style-type: none"> • Minor wording edits • Updated extract from defects register
Appendix G – Incidents and Complaints Management Plan	<ul style="list-style-type: none"> • Minor wording edits • Updated incident & complaints register extract • Amended Incidents and complaints resolution procedure table and flowchart so only refers to colours (not colours and levels) • Amended CCP2 Turbidity table • Added in new Boil Water Alert Procedure
Appendix H – Communications Management Plan	<ul style="list-style-type: none"> • Minor wording edits
H.1	<ul style="list-style-type: none"> • Amended TSC line per Information Notice conditions (f) & (g) • Added back in line for Torres Strait Local Disaster Management Group • Added address details for new in-house labs
H.2	<ul style="list-style-type: none"> • Updated contact details and org structure
H.4, H.3	<ul style="list-style-type: none"> • removed Wastewater officer and Operations Manager Wastewater; added Executive Director Engineering
Appendix I – Training Management Plan	Minor wording edits, added DWQMP training module to table
Appendix J – Information Management Plan	Updated document and procedure register
Appendix K – Hazard Identification and Risk Assessment	<ul style="list-style-type: none"> • Updated K.1 for revision staff • Updated K.4 risk assessment matrix • Updated K.4 risk assessment matrix – removed references to 6-monthly testing for crypto and giardia • Updated K.6 RMIP and added new columns



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