DRINKING WATER QUALITY MANAGEMENT PLAN

Service Provider No 475

GBA CONSULTING ENGINEERS

Document Control

Date	Description	Author
July 2017	Previous Version	George Bourne & Associates
29/01/2020	Review	William Green
05/03/2020	Report released to Client	Garth Kath
16/07/2020	Amended and released to Regulator	Garth Kath
01/06/2022	Amended based on Regulator feedback	Isabeau Gavel
07/06/2022	Approved for Release	Rick Rolfe
11/10/2023	Amended in response to Regular Review	Isabeau Gavel
24/10/2023	Review	Ajay Agway
16/07/2024	Amended in response to Regulator Review	Isabeau Gavel

GBA Project/Doc ID no. **190163 / 469407**

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If you have any questions regarding this document or if you have a suggestion for improvements, please contact GBA Consulting Engineers.

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1.0 INTRODUCTION

1.1 Drinking Water Quality Management Plan Overview

This document describes how Blackall-Tambo Regional Council provides safe and reliable drinking water services to the communities of Blackall and Tambo, in conjunction with the *Water Supply (Safety and Reliability) Act 2008* (*the Act*) which commenced on the 1st July 2008.

The purpose of *the Act* is to provide for the safety and reliability of water supply throughout Queensland and it includes provisions relating to the management of drinking water quality, aimed at protecting public health. This outcome is achieved primarily through a regulatory framework for drinking water quality which requires Drinking Water Service Providers to:

- Undertake monitoring and reporting on drinking water quality;
- Have an approved Drinking Water Quality Management Plan (DWQMP).

This DWQMP is prepared in-line with the DWQMP Guideline issued by the Department of Regional Development, Manufacturing and Water (RDMW).

The operation of a water service or a drinking water service is also covered under other State and Commonwealth Legislation. The requirements of the *Water Supply (Safety and Reliability) Act 2008* do not negate the requirements of other Legislation unless expressly stated. The Drinking Water Service Provider (DWSP) is responsible for obtaining any necessary approvals under other Acts to ensure the compliant operation of their services. Other State and Commonwealth Legislation relating to the operations of water services may include:

- *Water Legislation Act 2016*
- *Public Health Act 2005*
- *Public Health Regulation 2018*
- *Plumbing and Drainage Act 2018*
- *Planning Act 2016*
- *Environmental Protection Act 1994*
- *Water Act 2000*
- *Trade Practices Act 1974*
- *Work Health and Safety Act 2011*
- *Food Act 2006*

1.2 Registered Service Details

This Drinking Water Quality Management Plan relates to the water supply services owned and operated by:

Blackall-Tambo Regional Council, Service Provider ID 475
P.O. Box 21
6 Coronation Drive
BLACKALL 4472
P: (07) 4621 6600
E: admin@btrc.qld.gov.au

The first point of contact in relation to this plan is:

Mike Lollback, Chief Executive Officer
P: (07) 4657 8855
M: 0488 574 035
E: ceo@btrc.qld.gov.au

The Administration Centre and Main Works Depot for the Region are located in the town of Blackall. There is also Customer Service available at the Information Centre in Tambo.

1.3 Chief Executive Office Endorsement

Blackall-Tambo Regional Council recognises the importance of this DWQMP in the management and provision of safe and reliable drinking water services to the reticulated parts of the Shire. BTRC aims to maintain an integrated approach to ensuring that the requirements of this DWQMP are adhered to by all BTRC staff and any contractors operating on behalf of BTRC. In particular, BTRC endorses all outcomes from the current Risk Assessment and all items outlined in the Risk Management Improvement Programme.

..... Date 26/07/2024

Mike Lollback
CHIEF EXECUTIVE OFFICER

1.4 Blackall-Tambo Regional Council

Blackall Tambo Regional Council is located in Queensland's central-west and covers a total land area of 30,537km^2 with a population of approximately 1920 people (as per the 2021 census from the Australian Bureau of Statistics). The Region acts as a gateway community to outback Queensland with a rich history and a unique environment that attracts significant numbers of tourists, particularly during the cooler months. The Region consists of two towns; Blackall and Tambo. The administrative centre of the Region is located in Blackall, approximately 1000km north-west of Brisbane.

BTRC is a small Drinking Water Service Provider (DWSP) as defined in the Water Supply (Safety and Reliability) Act 2008 and provides potable water reticulation to both Blackall and Tambo which is sourced from the Great Artesian Basin, using deep artesian bores with a potential yield of 1,506 ML / annum in total. There are three relatively recent rural residential developments near Blackall and Tambo which have been mostly taken up by local residents rather than in influx of new residents. These include the Industrial sub-divisions in both centres and a rural sub-division in Blackall. Furthermore, it is recognised that there may be some mining developments that could affect either of the towns; to date, there are no known existing plans for any initiatives of this kind.

Table 1 below outlines the current population and connections for the towns of Blackall and Tambo, Figure 1 depicts the BTRC boundary location in relation to the rest of Queensland.

Table 1: Blackall and Tambo population and connections.

Scheme Name	Communities Serviced	Current		
		Population	Connections	Demand
Blackall	Blackall	1,365	771	0.50 KL/day
Tambo	Tambo	318	224	0.13 KL/day

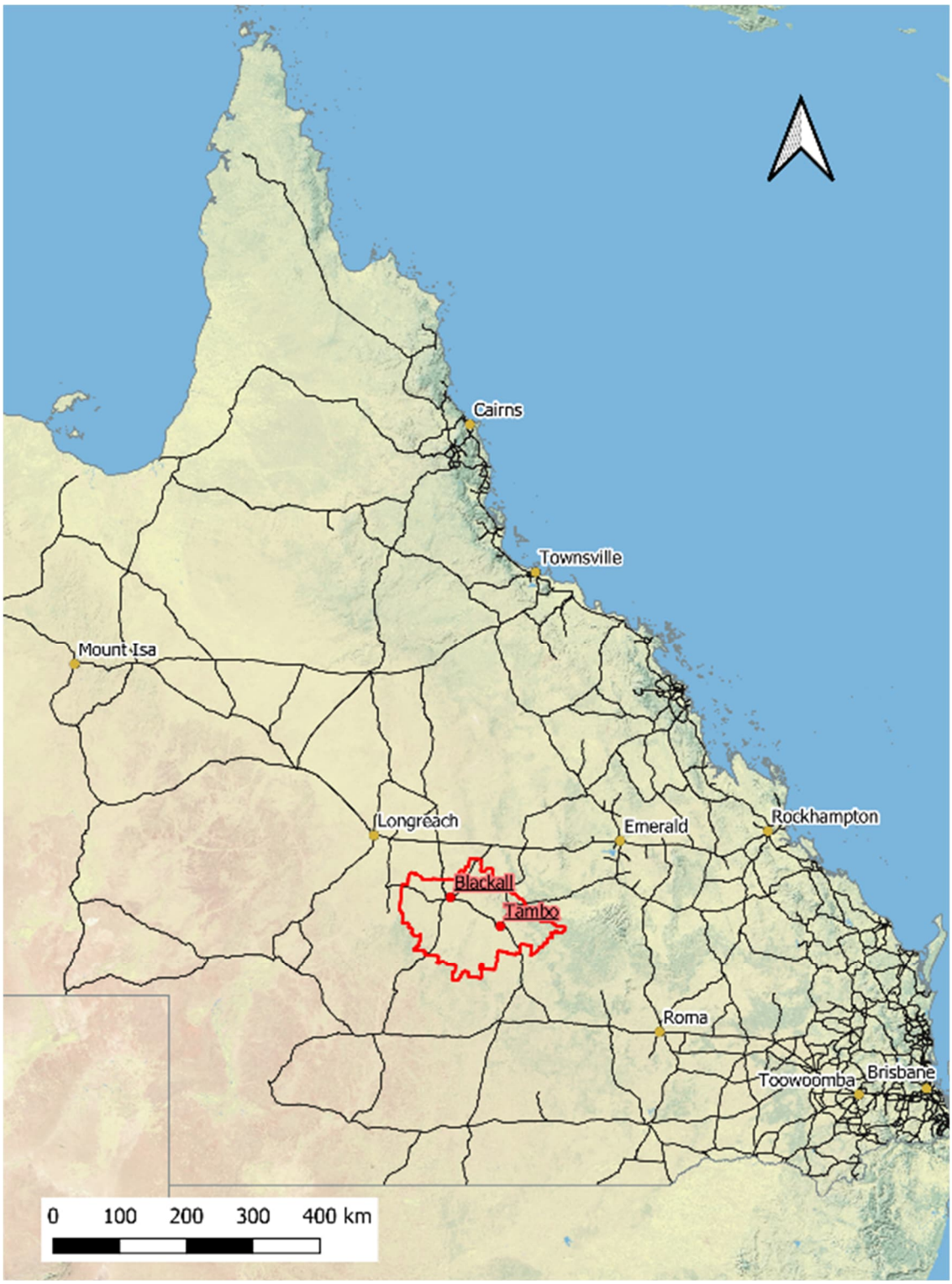

Figure 1: Blackall-Tambo Regional Council area and location relative to Queensland.

1.5 Blackall-Tambo Regional Council Stakeholders

Table 2: Blackall-Tambo Regional Council stakeholders.

Organisation	Contact Name and Details	DWQMP Relevance	How the stakeholder is engaged in the DWQMP
Blackall Tambo Regional Council	Mike Lollback Chief Executive Officer P: (07) 4657 8855 M: 0488 574 035 E: ceo@btrc.qld.gov.au	Council CEO	Council CEO
	Ajay Agwan Director of Works and Services P: (07) 4621 6600 M: 0427 574 298 E: Ajay.Agwan@btrc.qld.gov.au	Overall Supervisor	Participation in review of risks, hazards and hazardous events associated with all water supplies. Review of DWQMP documentation.
	Peter Fry Foreman P: (07) 4621 6600 M: 0488 574 107 E: ForemanPF@btrc.qld.gov.au	Oversees Council workforce	Participation in review of risks, hazards and hazardous events associated with all water supplies. Input to existing preventive barriers, operational initiatives and monitoring programs.
	Jake Plumber P: (07) 4621 6600 M: 0477 705 970 E: Plumber@btrc.qld.gov.au	Plumber	Water Operator and Maintenance of Infrastructure.
GBA Consulting Engineers	Isabeau Gavel P: (07) 4651 5177 M: 0418 411 920 E: igavel@gbaengineers.com.au	Consultancy Services	Preparation of the DWQMP.
Water Supply Regulator	P: 1300 596 709 (24-hour hotline) E:DrinkingWater.Reporting@rdmw.qld.gov.au	Water Supply Regulator	Approval of DWQMP documentation.
Queensland Health Public Health Unit	82-86 Bolsover Street, Rockhampton QLD 4700 PO Box 946, Rockhampton QLD 4700 P: (07) 4920 6989	Public Health Unit	Public Health.

Organisation	Contact Name and Details	DWQMP Relevance	How the stakeholder is engaged in the DWQMP
Toowoomba Regional Water	Shuttlewood Court Mt Kynoch, Toowoomba QLD 4350 P: (07) 4688 6270 E: labservices@toowoombaRC.qld.gov.au	Water Analysis Authority	Chemical Analysis/ Reporting Water Quality.
QLD Government Chief Information Office	P: (07) 3215 3951 E: qgisvrt@qld.gov.au	Cyber Security Hotline	Cyber Security Assistance.
Blackall Sensitive Users			
Blackall Hospital	Shamrock St, Blackall QLD 4472 P: (07) 4650 7700	Sensitive User	Sensitive User.
Blackall State School	39- 45 Shamrock St, Blackall QLD 4472 P: (07) 4657 7333	Sensitive User	Sensitive User.
Blackall Catholic School	109 Thistle St, Blackall QLD 4472 P: (07) 4657 4248	Sensitive User	Sensitive User.
Lady Gowrie Blackall Daycare	39 Shamrock St, Blackall QLD 4472 P: (07) 4657 4832	Sensitive User	Sensitive User.
St Joseph's Catholic Kindergarten	St Andrew St, Blackall QLD 4472 P: (07) 4994 9370	Sensitive User	Sensitive User.
Barcoo Living Aged Care	2A Coronation Drive, Blackall QLD 4472 P: (07) 4657 6777	Sensitive User	Sensitive User.
Tambo Sensitive Users			
Tambo Health Centre	Garden St, Tambo QLD 4478 P: (07) 4621 7100	Sensitive User	Sensitive User.
Tambo State School	16 Mitchell St, Tambo QLD 4478 P: (07) 4621 7333	Sensitive User	Sensitive User.
Tambo Daycare Facility	16 Star Street, Tambo QLD 4478 P: (07) 46546160	Sensitive User	Sensitive User.
Tambo Multipurpose Centre	4-8 Garden Street, Tambo QLD 4478 P: (07) 4621 7100	Sensitive User	Sensitive User.

2.0 CATCHMENT CHARACTERISTICS

2.1 Catchment

The Blackall-Tambo Local Government Area (LGA) is situated in the upper catchment areas of four drainage basins, including, the Fitzroy, the Warrego, the Bulloo, and the Cooper Creek Basins (Figure 2). Being situated in the upper reaches of the catchments, the drinking water schemes do not receive inflows from neighbouring regions. The most significant waterway in the region is the Barcoo River, which constitutes the majority of the area in the LGA, with the headwaters of the Bulloo, Warrego and Fitzroy associated with the land to the south-west, south and south-east of the region.

2.2 Landscape

The Blackall-Tambo region is comprised of a range of landscape types. The north and eastern extent of the region is associated with slight to steep undulating land formed in part from the watershed of the Great Dividing Range. The Geology in this landscape is mostly associated with Cainozoic and Proterozoic sediments which range in texture from coarse consolidated materials of low fertility to fine grained material with moderate fertility. Mulga lands are present in the south and west of the region associated with the Warrego and Gowan Ranges respectfully. Mulga lands are typically associated with low elevation ranges and plains of sandy infertile soils typically dominated by mulga (*Acacia aneura*). The majority of the region is covered by low-lying Mitchel Grass Downs, these landscapes are associated with flat to gently undulating plains and deep cracking clays of open grasslands with acacia woodlands.

The generally flat terrain and moderately fertile clay soils makes the region particularly suited to broad scale grazing, with the agricultural industry providing the greatest level of employment in the region, accounting for approximately 30% of the region's workforce. The region's dependence on agriculture is depicted in the land use map in Figure 3 below, which identifies agriculture as the predominant land-use activity.

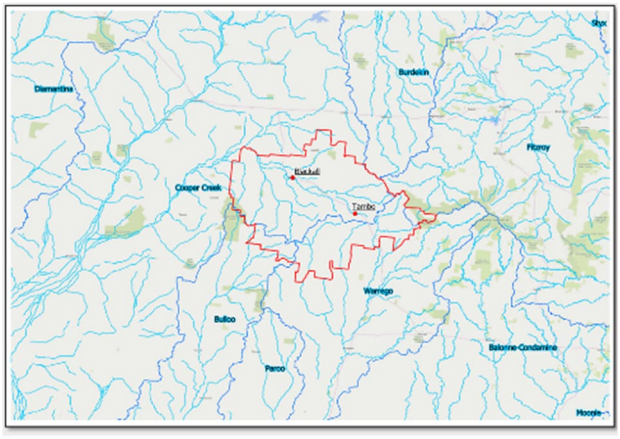

Figure 2: QLD Drainage Basins within the Blackall-Tambo LGA.

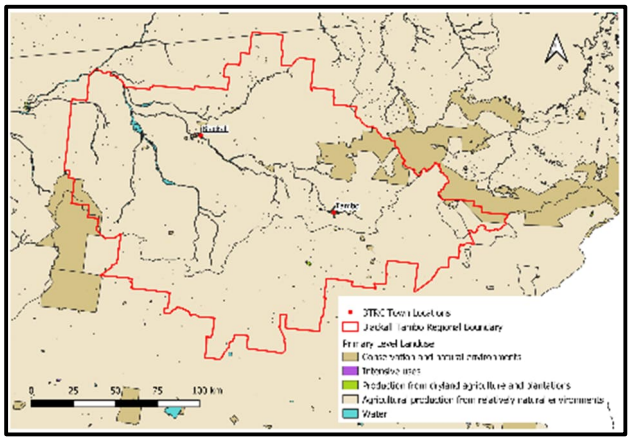

Figure 3: Blackall-Tambo LGA Land Use Map.

2.3 Climate

The average annual rainfall for Blackall and Tambo is 526mm and 530mm respectfully with the majority of the rain falling between late November and late March. The mean annual maximum temperature is 30.2 for Blackall (Figure 4) and 29.1°C for Tambo (Figure 5).

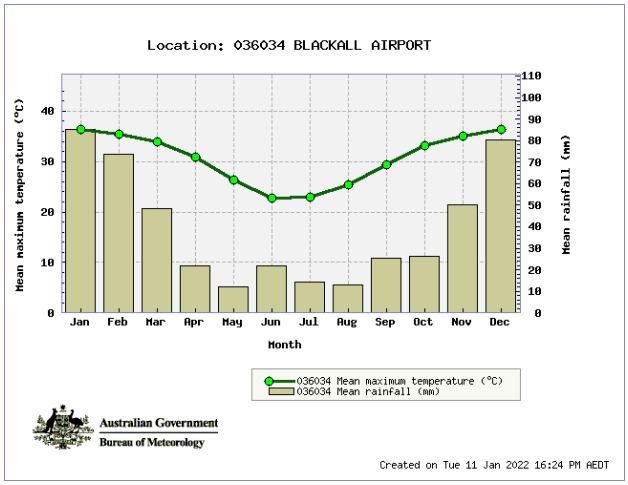

Figure 4: Climate Graph, Blackall Airport.

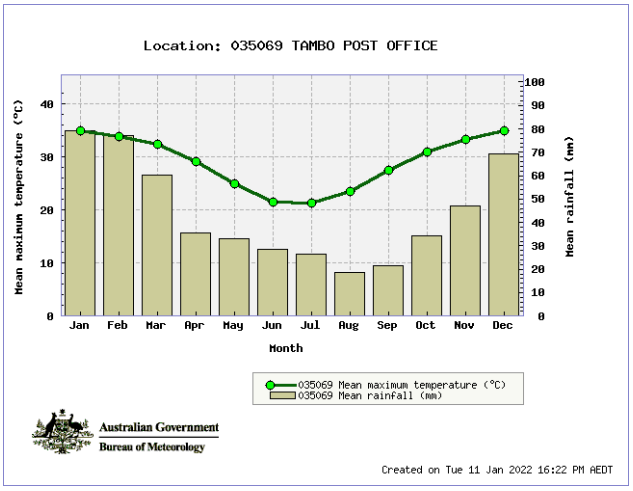

Figure 5: Climate graph, Tambo Post Office.

2.4 Great Artesian Basin

The Blackall and Tambo drinking water schemes source their water from The Great Artesian Basin (GAB), which covers approximately one-fifth of the Australian continent and contains 8.7 x 10^6 GL of groundwater in the Jurassic sandstone aquifers. It is the largest groundwater and artesian basin in the world. The basin is located under mostly arid and semi-arid landscapes to the west of the Great Dividing Range. The major sources of recharge for the GAB are through rainfall and stream flow infiltrating into the exposed sandstone on the edges of the basin.

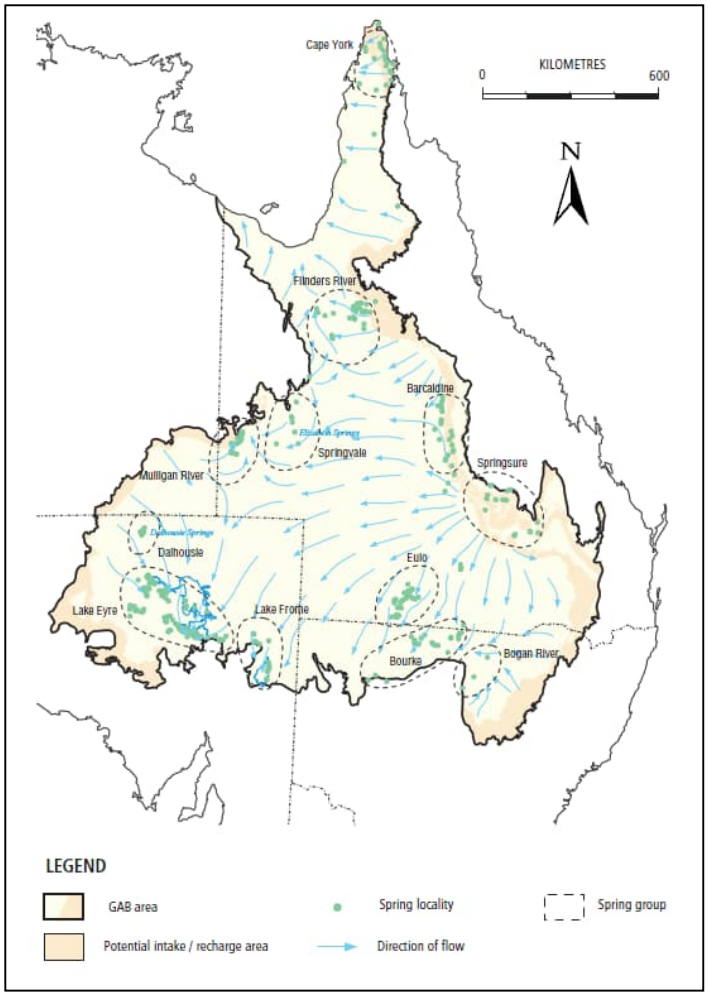

Figure 6: Great Artesian Basin Recharge, Discharge, and Flow Diagram.

3.0 BLACKALL DRINKING WATER SCHEME

The Blackall Drinking Water Scheme sources water from three Artesian bores; Bore 2 (Council Depot), Bore 3 (Showgrounds) and Bore 4 (Leek St), bore locations are provided in Figure 7 below and Appendix B. All bores draw water from the Great Artesian Basin which flows directly into the distribution system under positive pressure. The water supplied into the distribution system is untreated as the bore water is of a quality that complies with the ADWG. All bore meters are manual. Rural connections for Blackall receive drinking water at their point of connection with privately owned infrastructure to their properties.

3.1 Infrastructure

Table 3: Blackall Drinking Water Scheme Infrastructure Details.

Component		Details		
Source Bores	Name	Bore 2 - Council Depot	Bore 3 – Showgrounds	Bore 4 - Leek St
	Details	Artesian RN: 318 Depth: 789m Drill Date: 1901 Aquifer: Adori Sandstone Details: Sealed	Artesian RN: 14588 Depth: 843m Drill Date: 1962 Aquifer: Hutton Sandstone Details: Sealed	Artesian RN: 69912 Depth: 850m Drill Date: 1994 Aquifer: Hutton Sandstone Details: Sealed
	% of Supply	33%	33%	33%
	Reliability	100%	100%	100%
	Catchment Categorisation	Class I Vulnerability, fully protected groundwater.		
	Contamination Sources	None.		
	Water Quality Issues	High pH and elevated temperature (~60°C).		
Source Infrastructure	Description	All bores draw from the Great Artesian Basin constructed from steel casing.		
Treatment		Fully sealed Artesian system, does not undergo disinfection.		
Disinfection		Not provided.		
Distribution and Reticulation System	**Pipe Material**	**PVC/Poly**		
	Age range	50 years' maximum		
	Approx. % of total length	45%		
	Pipe Material	**Blue Brute**		
	Age range	30+ years		
	Approx. % of total length	50%		

Component		Details
	Areas where potential long detention periods could be expected?	Blackall Industrial Estate.
	Areas where low water pressure (e.g. < 12 m) could be expected during peak or other demand periods?	Not applicable.
Reservoirs		None.

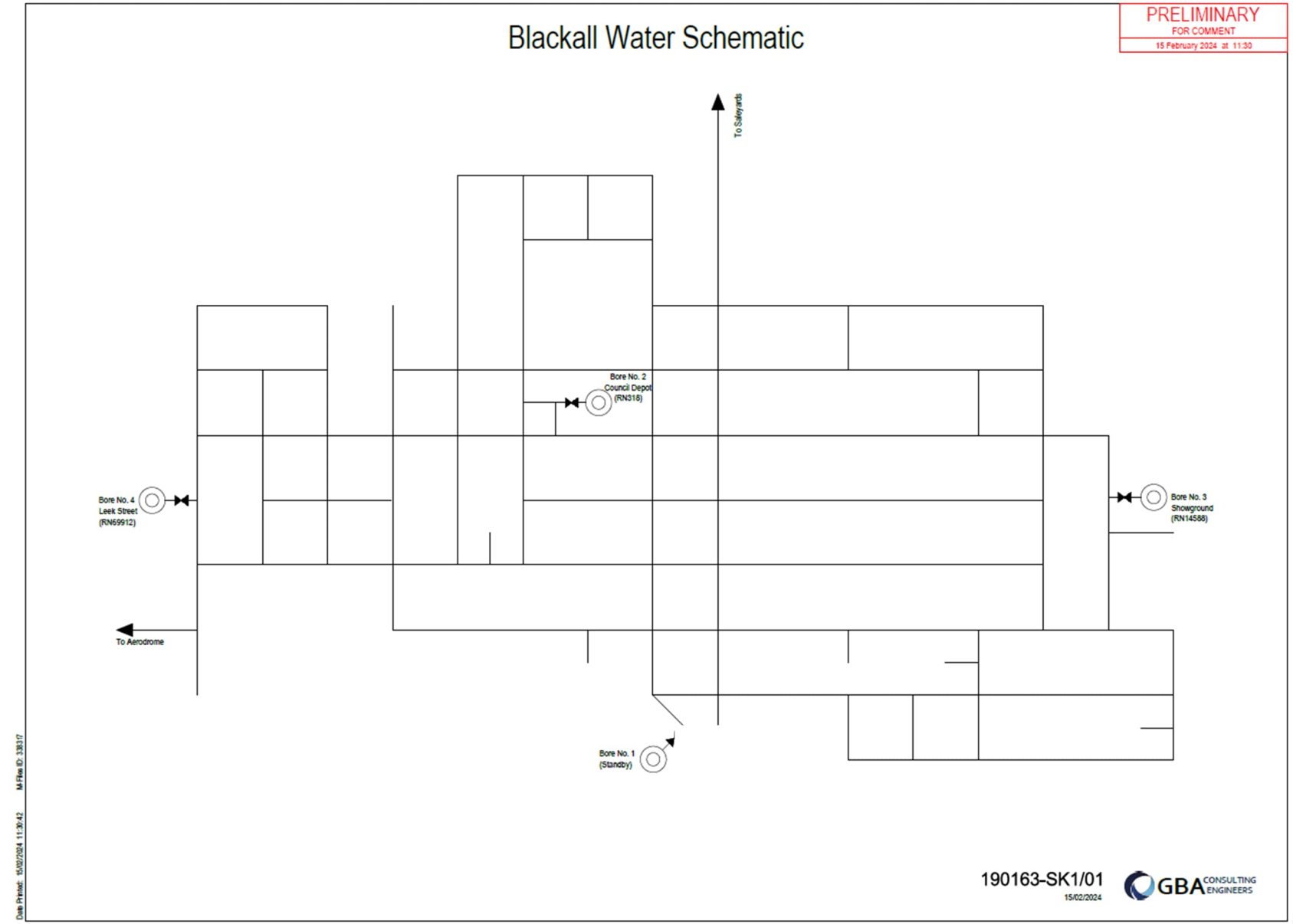

Figure 7: Blackall, drinking water supply schematics.

3.2 Blackall Drinking Water Treatment

The Blackall Bore water is of a quality that does not require chemical treatment as the raw water quality generally complies with the Australian Drinking Water Guideline health and aesthetic values. In order to reduce the complexity of the scheme so that it is more manageable for the water operators, continuous chlorine disinfection is not provided, nor is it a viable option for Council to pursue due to the cost required for the implementation and ongoing maintenance of a disinfection system. Being deep Artesian ground water, the water is sterile at its source and due to the positive pressure throughout the distribution system, there is no opportunity for contamination to occur under normal operating conditions. If a section of the reticulation is depressurised for repairs, then flushing of the affected section with a chlorine solution is undertaken to disinfect the system.

4.0 TAMBO DRINKING WATER SCHEME

The Tambo Drinking Water Scheme consists of four bores; 3x Artesian bores (Bore 3, the Williams St Bore, Bore 4, the Council Depot Bore and Bore 5 the Truck Fill Bore) and 1x sub-Artesian bore (Golf Club Bore; bore locations are provided in Figure 8 below and Appendix B). Of these four bores, the Williams St and Council Depot Bores are the primary bores used to supply drinking water to the town. Bore 5 (Truck Fill) is primarily used as a watering point for Council trucks and to supply the sports oval complex with drinking water however, it is connected to the rest of the Tambo distribution system and can supply drinking water to the entire town as required. The Golf Club Bore is a standalone bore located approximately 4.4km north of Tambo and supplies the Golf Club with drinking water. It is not currently possible for this bore to be connected with the rest of the Tambo distribution system. All bores draw water from the Great Artesian Basin. Bores 3, 4 and 5 are deep artesian bores which flow under pressure, directly into the Tambo distribution system. The Golf Club Bore is a sub-artesian bore which requires a pump (Grundfos 500 pump) to supply water to the Golf Club. Similarly to Blackall, all bore meters are manual and rural connections for Tambo receive drinking water at their point of connection with privately owned infrastructure to their properties.

4.1 Infrastructure

Table 4: Tambo Drinking Water Scheme Infrastructure Details.

Component		Details			
Source Bores	Name	Bore 3 – Williams St	Bore 4 – Council Depot	Bore 5 – Truck Fill	Golf Club Bore
	Details	**Artesian RN:** 116583 **Depth:** 662m **Drill Date:** 2019 **Aquifer:** Precipice Sandstone **Details:** Sealed	**Artesian RN:** 50896 **Depth:** 753m **Drill Date:** 2000 **Aquifer:** Hutton Sandstone **Details:** Sealed	**Artesian RN:** 116498 **Depth:** 612m Drill Date: 2014 **Aquifer:** Hutton Sandstone **Details:** Sealed	**Artesian RN:** 116259 **Depth:** 207m **Drill Date:** 2007 **Aquifer:** Adori Sandstone **Details:** Sealed
	% of Supply	45%	45%	10%	100%
	Reliability	100%	100%	100%	100%
	Catchment Categorisation	Class I Vulnerability, fully protected groundwater.			
	Contamination Sources	None.			
	Water Quality Issues	High pH, elevated temperature (~50°C) and elevated Iron.			
Source Infrastructure	Description	All bores draw from the Great Artesian Basin constructed from steel casing.			

Component		Details
Treatment		Fully sealed Artesian system, does not undergo disinfection.
Disinfection		Not provided.
Distribution and Reticulation System	**Pipe Material**	**UPVC/Poly**
	Age range	Renewed in 2000- 2001.
	Approx. % of total length	100%
	Areas where potential long detention periods could be expected?	Tambo Industrial Estate & at the end of the main lines.
	Areas where low water pressure (e.g. < 12 m) could be expected during peak or other demand periods?	Not applicable.
Reservoirs		None.

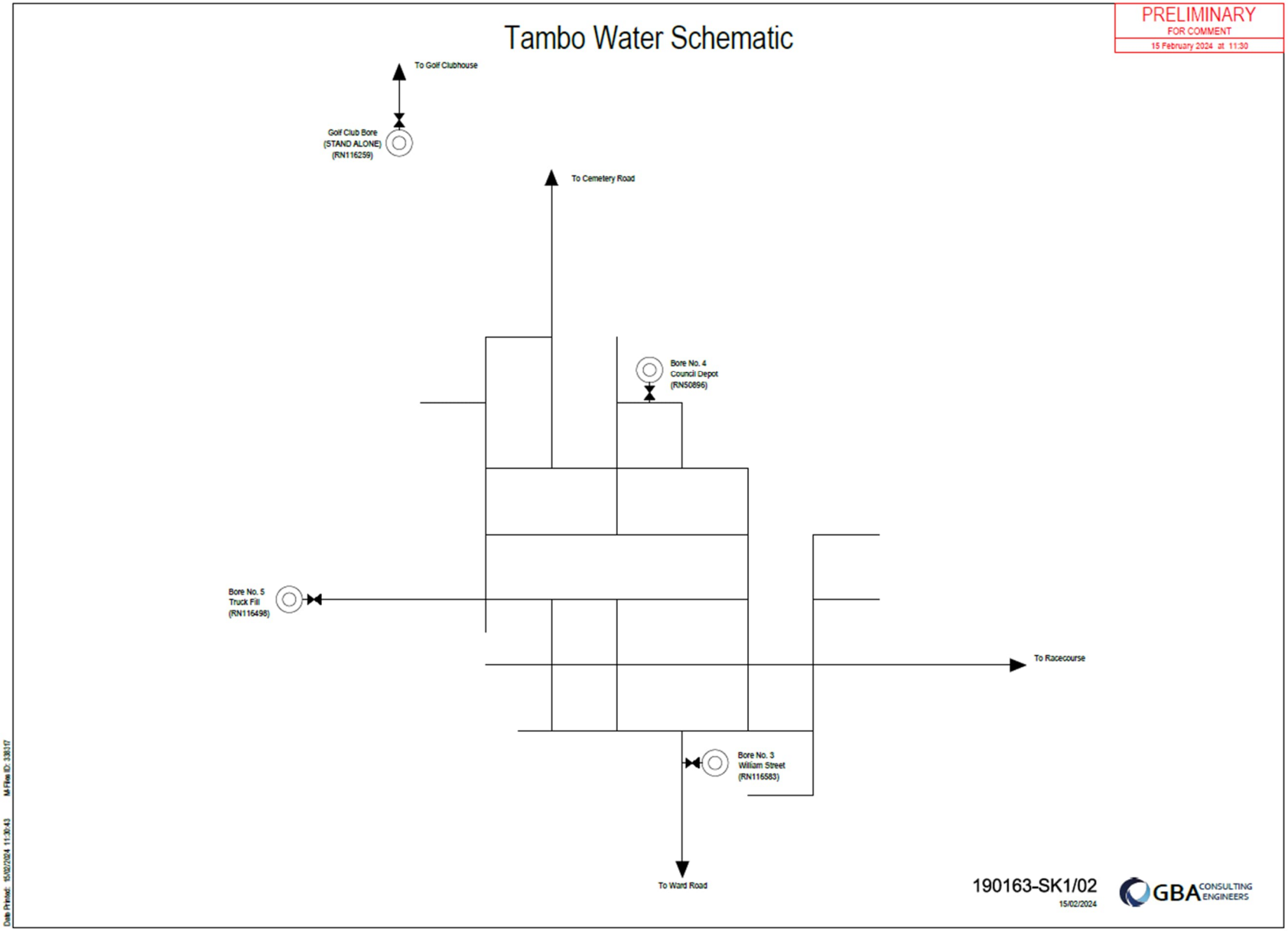

Figure 8: Tambo Drinking Water Scheme Supply Schematics.

4.2 Tambo Drinking Water Treatment

The Tambo Bore water is of a quality that does not require chemical treatment as the raw water quality generally complies with the Australian Drinking Water Guideline health and aesthetic values. In order to reduce the complexity of the scheme so that it is more manageable for the water operators, continuous chlorine disinfection is not provided, nor is it a viable option for Council to pursue due to the cost required for the implementation and ongoing maintenance of a disinfection system. Being deep Artesian ground water, the water is sterile at its source and due to the positive pressure throughout the distribution system, there is no opportunity for contamination to occur under normal operating conditions. If a section of the reticulation is depressurised for repairs, then flushing of the affected section with a chlorine solution is undertaken to disinfect the system.

5.0 BLACKALL AND TAMBO DRINKING WATER QUALITY

Blackall-Tambo Regional Council maintains copies of water quality data from 2017 onwards, all of which is trended in a master spreadsheet that is regularly updated by GBA Consulting Engineers. Colilert testing undertaken by Council is initially entered into a spreadsheet on the Council server in Blackall and sent to GBA to be added to the master spreadsheet. The decision to engage GBA was done in response to the 2022 DWQMP RMIP item BT2 (update and maintain a central drinking water quality data management system) and assists in preventing the loss of water quality data, particularly during staff turnover. All water quality lab reports are still reviewed by Council and saved in Council's filing system.

Nonetheless, some data gaps still exist. No verification monitoring was undertaken during the 2021-22 Financial Year for either scheme, as a result of a miscommunication between staff during a period of high staff turnover. This incident was highlighted to the Regulator at the time and has since been resolved. Similarly, another incident occurred during the 2022-23 Financial Year where operational monitoring for Tambo was missed. This incident was the cause of a miscommunication between staff members. It was also highlighted to the Regulator at the time and has since been resolved.

The data provided in Sections 5.1 and 5.2 below is all available data for the Blackall and Tambo schemes, with graphical representations provided in Appendix C. Where data gaps still appear to be apparent, it is attributed to staff shortages. Since the beginning of the 2022 Financial Year (following the verification monitoring incident), all verification monitoring has been undertaken as per the DWQMP.

5.1 Blackall Drinking Water Quality 2012- 2023 Summary

Table 5: Blackall Distribution System Drinking Water Summary (2012- 2023).

Blackall Distribution System											
Analyte	Units	Monitoring	Summary of Results						Guideline Values			
			Samples Tested	Maximum Value	Mean Value	Minimum Values	Std Dev	95th %	Health	Exceedances	Aesthetic	Exceedances
E. coli	MPN/100ml	Operational/ Verification	1144	0	0	0	0	0	1	0		
Total Coliforms	MPN/100mL	Operational/ Verification	1144	0	0	0	0	0				
Heterotrophic Plate Count	CFU/mL	Verification	9	520	72.78	10	158.46	330				
Conductivity	µS/cm	Verification	42	450	390.29	240	31.6	428.75				
True Colour	mg/L	Verification	18	6	1.53	0.5	1.69	5.15			15	0
Total Hardness	mg/L	Verification	42	21	14.73	7	4.97	20				
pH	pH Units	Verification	42	9	8.45	8	0.22	8.7			≥6.5 & ≤8.5	12
Total Dissolved Solids	mg/L	Verification	42	282	251.7	150	19.26	272.85			660	0
Total Dissolved Ions	mg/L	Verification	39	467	309.05	190	34.8	338.1				
Turbidity	NTU	Verification	21	8	0.67	0	1.65	1			5	1
Chloride	mg/L	Verification	42	43.4	31.7	17	5.57	40.94			250	0
Nitrate	mg/L	Verification	36	0.5	0.075	0.005	0.079	0.1	50	0		
Nitrite	mg/L	Verification	12	0.1	0.076	0.005	0.041	0.1	3	0		
Calcium	mg/L	Verification	42	7.53	5.6	3	1.78	7.47				

Blackall Distribution System												
Analyte	Units	Monitoring	Summary of Results						Guideline Values			
			Samples Tested	Maximum Value	Mean Value	Minimum Values	Std Dev	95th %	Health	Exceedances	Aesthetic	Exceedances
Magnesium	mg/L	Verification	42	2.3	0.194	0.013	0.339	0.24				
Potassium	mg/L	Verification	42	6	3.74	0.024	1.35	5.095				
Silica	mg/L	Verification	42	41	31.93	25	2.79	34			80	0
Sodium	mg/L	Verification	42	92.2	83.15	26	9.69	91.23			180	0
Sulphate	mg/L	Verification	41	9	6.59	4	1.08	8			250	0
Phosphate	mg/L	Verification	33	0.04	0.027	0.02	0.006	0.04				
Total Iron	mg/L	Verification	44	0.37	0.018	0	0.054	0.028			0.3	1
Total Manganese	mg/L	Verification	44	0.044	0.017	0.002	0.0135	0.038	0.5	0	0.1	0
Aesthetic Guideline Exceedance												
Health Guideline Exceedance												

Table 6: Blackall Source Water Drinking Water Summary (2022- 2023).

Blackall Source Water												
Analyte	Units		Summary of Results						Guideline Values			
		Monitoring	Samples Tested	Maximum Value	Mean Value	Minimum Values	Std Dev	95th %	Health	Exceedances	Aesthetic	Exceedances
E. coli	MPN/100ml	Verification	3	0	0	0	0	0	1	0		
Total Coliforms	MPN/100mL	Verification	3	0	0	0	0	0				
Heterotrophic Plate Count	CFU/mL	Verification	3	15	11.67	10	2.36	14.5				
Conductivity	µS/cm	Verification	3	406	391.33	379	11.146	404.3				
True Colour	HU	Verification	3	3	1.67	1	0.943	2.8			15	0
Total Hardness	mg/L	Verification	3	19	14.33	8	4.64	18.7				
pH	pH Units	Verification	3	8.5	8.43	8.3	0.094	8.5			≥6.5 & ≤8.5	0
Total Dissolved Solids	mg/L	Verification	3	267	258.33	254	6.128	265.7			660	0
Total Dissolved Ions	mg/L	Verification	3	326	315.33	309	7.587	324.5				
Turbidity	NTU	Verification	3	0.43	0.32	0.18	0.104	0.422			5	0
Chloride	mg/L	Verification	3	38.7	33.83	30	3.626	38.11			250	0
Nitrate	mg/L	Verification	3	0.1	0.1	0.1	0	0.1	50	0		
Nitrite	mg/L	Verification	3	0.1	0.1	0.1	0	0.1	3	0		
Calcium	mg/L	Verification	3	7.05	5.46	3.08	1.714	6.97				
Magnesium	mg/L	Verification	3	0.234	0.149	0.032	0.0856	0.229				
Potassium	mg/L	Verification	3	5.1	3.933	2.2	1.25	5.04				
Silica	mg/L	Verification	3	33	32.33	31	0.943	33			80	0

Blackall Source Water												
Analyte	Units		Summary of Results						Guideline Values			
		Monitoring	Samples Tested	Maximum Value	Mean Value	Minimum Values	Std Dev	95th %	Health	Exceedances	Aesthetic	Exceedances
Sodium	mg/L	Verification	3	90.9	88.267	93.5	3.377	90.85			180	0
Sulphate	mg/L	Verification	3	7	6.33	6	0.471	6.9			250	0
Phosphate	mg/L	Verification	3	0.02	0.02	0.02	0	0.02				
Total Iron	mg/L	Verification	3	0.018	0.012	0.008	0.004	0.0171			0.3	0
Total Manganese	mg/L	Verification	3	0.036	0.0177	0.003	0.014	0.0338	0.5	0	0.1	0
Arsenic	mg/L	Verification	3	0.0012	0.0011	0.001	0.000009	0.0012	0.01	0		
Cadmium	mg/L	Verification	3	0.0001	0.0001	0.0001	0	0.0001	0.002	0		
Chromium	mg/L	Verification	3	0.0005	0.0005	0.0005	0	0.0005	0.05	0		
Copper	mg/L	Verification	3	0.001	0.001	0.001	0	0.001	2	0	1	0
Nickel	mg/L	Verification	3	0.0005	0.0005	0.0005	0	0.0005	0.02	0		
Lead	mg/L	Verification	3	0.0001	0.0001	0.0001	0	0.0001	0.01	0		
Zinc	mg/L	Verification	3	0.005	0.005	0.005	0	0.005			3	0
Mercury	mg/L	Verification	3	0.0001	0.0001	0.0001	0	0.0001			0.001	0
Uranium	mg/L	Verification	3	0.0001	0.0001	0.0001	0	0.0001	0.017	0		
Gross Alpha	Bq/L	Verification	3	0.1	0.1	0.1	0	0.1			0.5	0
Gross Beta	Bq/L	Verification	3	0.1	0.1	0.1	0	0.1			0.5	0
Aesthetic Guideline Exceedance												
Health Guideline Exceedance												

5.1.1 Blackall Drinking Water Quality ADWG Exceedances

Blackall's drinking water quality analysis has not identified any exceedances of the ADWG health guidelines.

Nonetheless, water quality monitoring results have identified exceedances of the ADWG aesthetic values for pH, exceeding the upper limit of 8.5, with 12 exceedances from 44 test results. No ADWG health target has been set for pH as elevated levels are generally only associated with taste issues and pipe scaling and not with significant health impacts. Elevated pH levels are common in Blackall's drinking water and are associated with the dissolution of minerals in the underlying geology. It should be noted that the pH average for Blackall is 8.45, which is within the ADWG aesthetic guideline.

An outlying Turbidity value of 8NTU has been identified within Blackall's drinking water, recorded in 2012. This result seems to be an isolated event with no other Turbidity exceedances recorded within the scheme, with an average Turbidity of 0.67 NTU, well under the ADWG aesthetic guideline value of 5 NTU.

Finally, an outlying Total Iron value of 0.37 mg/L was recorded for Blackall back in 2018. Similarly, to the Turbidity outlier, no other exceedances have been reported since. Blackall's Total Iron concentration averages 0.018mg/L, well under the ADWG aesthetic value of 0.3 mg/L.

5.1.2 Blackall Drinking Water Quality Complaints

To date, there is no record of any formal water quality complaints within the Blackall drinking water scheme.

5.2 Tambo Drinking Water Quality Summary 2012- 2023.

Table 7: Tambo Distribution System Drinking Water Summary (2012- 2023).

Tambo Distribution System											
Analyte	Units	Monitoring	Summary of Results						Guideline Values			
			Samples Tested	Maximum Value	Mean Value	Minimum Values	Std Dev	95th %	Health	Exceedances	Aesthetic	Exceedances
E. coli	MPN/100ml	Operational/ Verification	125	0	0	0	0	0	1			
Total Coliforms	MPN/100mL	Operational/ Verification	125	0	0	0	0	0				
Heterotrophic Plate Count	CFU/mL	Verification	9	160	36.67	5	50.99	134				
Conductivity	µS/cm	Verification	29	260	221.59	193	14.435	238.6				
True Colour	mg/L	Verification	11	7	2.82	1	2.12	6			15	0
Total Hardness	mg/L	Verification	29	46	32.28	25	5.5	44.6				
pH	pH Units	Verification	26	7.4	7.008	6.5	0.224	7.3			≥6.5 & ≤8.5	0
Total Dissolved Solids	mg/L	Verification	29	160	142.86	127	7.59	156			660	0
Total Dissolved Ions	mg/L	Verification	28	191	168.18	151	8.8	179.65				
Turbidity	NTU	Verification	14	59	7.15	0.5	14.505	26.5			5	2
Chloride	mg/L	Verification	29	23	18.79	14.6	2.05	22.02			250	0
Nitrate	mg/L	Verification	27	0.1	0.08	0.005	0.028	0.1	50	0		
Nitrite	mg/L	Verification	10	0.1	0.09	0.001	0.03	0.1	3	0		
Calcium	mg/L	Verification	29	7.65	5.77	4.6	0.811	7.27				

Tambo Distribution System												
Analyte	Units	Monitoring	Summary of Results						Guideline Values			
			Samples Tested	Maximum Value	Mean Value	Minimum Values	Std Dev	95th %	Health	Exceedances	Aesthetic	Exceedances
Magnesium	mg/L	Verification	29	6.51	4.34	3.22	0.85	6.41				
Potassium	mg/L	Verification	29	10.8	9.331	7.3	0.97	10.6				
Silica	mg/L	Verification	28	23	21.25	18	0.99	22			80	0
Sodium	mg/L	Verification	29	37.4	31.134	21.8	3.73	35.16			180	0
Sulphate	mg/L	Verification	29	7	5.66	2	1.21	7			250	0
Phosphate	mg/L	Verification	26	0.04	0.025	0.01	0.0093	0.04				
Total Iron	mg/L	Verification	30	8.9	1.76	0.01	1.86	5.331			0.3	28
Total Manganese	mg/L	Verification	31	0.088	0.05	0.034	0.013	0.079	0.5	0	0.1	0
Aesthetic Guideline Exceedance												
Health Guideline Exceedance												

Table 8: Tambo Source Water Drinking Water Summary (2022- 2023).

Tambo Source Water											
Analyte	Units	Monitoring	Summary of Results						Guideline Values			
			Samples Tested	Maximum Value	Mean Value	Minimum Values	Std Dev	95th %	Health	Exceedances	Aesthetic	Exceedances
E. coli	MPN/100ml	Verification	3	0	0	0	0	0	1	0		
Total Coliforms	MPN/100mL	Verification	3	0	0	0	0	0				
Heterotrophic Plate Count	CFU/mL	Verification	3	10	10	10	0	10				
Conductivity	µS/cm	Verification	3	222	210.67	201	8.654	220.7				
True Colour	HU	Verification	3	1	1	1	0	1			15	0
Total Hardness	mg/L	Verification	3	43	34	25	7.348	42.1				
pH	pH Units	Verification	3	7.2	7	6.9	0.141	7.17			≥6.5 & ≤8.5	0
Total Dissolved Solids	mg/L	Verification	3	147	140	132	6.164	146.4			660	0
Total Dissolved Ions	mg/L	Verification	3	174	165.33	159	6.34	172.9				
Turbidity	NTU	Verification	3	63	23	1.6	28.307	57014			5	1
Chloride	mg/L	Verification	3	18.8	17.27	14.7	1.83	18.75			250	0
Nitrate	mg/L	Verification	3	0.1	0.1	0.1	0	0.1	50	0		
Nitrite	mg/L	Verification	3	0.1	0.1	0.1	0	0.1	3	0		
Calcium	mg/L	Verification	3	7.06	5.78	4.43	1.075	6.94				
Magnesium	mg/L	Verification	3	6.24	4.73	6.37	1.213	6.083				
Potassium	mg/L	Verification	3	10.8	9.667	7.9	1.266	10.75				
Silica	mg/L	Verification	3	22	22	22	0	22			80	0

Tambo Source Water												
Analyte	Units	Monitoring	Summary of Results						Guideline Values			
			Samples Tested	Maximum Value	Mean Value	Minimum Values	Std Dev	95th %	Health	Exceedances	Aesthetic	Exceedances
Sodium	mg/L	Verification	3	36.2	30.167	22.5	5.711	35.76			180	0
Sulphate	mg/L	Verification	3	6	4.67	2	1.886	6			250	0
Phosphate	mg/L	Verification	3	0.05	0.033	0.02	0.0125	0.048				
Total Iron	mg/L	Verification	3	4.89	2.337	0.881	1.811	4.525			0.3	3
Total Manganese	mg/L	Verification	3	0.075	0.0523	0.036	0.0165	0.0721	0.5	0	0.1	0
Arsenic	mg/L	Verification	3	0.0005	0.0005	0.0005	0	0.0005	0.01	0		
Cadmium	mg/L	Verification	3	0.0001	0.0001	0.0001	0	0.0001	0.002	0		
Chromium	mg/L	Verification	3	0.0005	0.0005	0.0005	0	0.0005	0.05	0		
Copper	mg/L	Verification	3	0.0018	0.0013	0.001	0.0004	0.0017	2	0	1	0
Nickel	mg/L	Verification	3	0.0005	0.0005	0.0005	0	0.0005	0.02	0		
Lead	mg/L	Verification	3	0.00016	0.00012	0.0001	0.000003	0.00015	0.01	0		
Zinc	mg/L	Verification	3	0.01	0.0067	0.005	0.0024	0.0095			3	0
Mercury	mg/L	Verification	3	0.0001	0.0001	0.0001	0	0.0001			0.001	0
Uranium	mg/L	Verification	3	0.0001	0.0001	0.0001	0	0.0001	0.017	0		
Gross Alpha	Bq/L	Verification	3	0.24±0.05	0.19±0.05	0.12±0.05	0.05	0.24			0.5	0
Gross Beta	Bq/L	Verification	3	0.4± 0.1	0.3± 0.1	0.2± 0.1	0.08	0.39			0.5	0
Aesthetic Guideline Exceedance												
Health Guideline Exceedance												

5.2.1 Tambo Drinking Water Quality ADWG Value Exceedances

Tambo's drinking water quality analysis has not identified any exceedances of the ADWG health guidelines.

In Tambo, exceedances of the ADWG guideline values have been recorded for Total Iron and Turbidity. Total Iron exceedance are common in Tambo's drinking water due to the dissolution of iron from the underlying geology into the groundwater. 28 out of 30 tests have reported Total Iron exceedances above the ADWG aesthetic threshold of 0.3 mg/L. The average Total Iron content for Tambo's water is 1.76 mg/L. No ADWG health value has been set for Iron as exceedances are mostly associated with taste issues, however, elevated Iron concentrations can impact upon other parameters such as Turbidity. Tambo also has reported Turbidity exceedances in the drinking water with 2 recorded exceedances from 14 tests. The average recorded Turbidity for Tambo is 7.15 NTU which is above the aesthetic guideline value of 5 NTU, however, it should be noted that this high average is a result of one outlier result of 59 NTU recorded at the Tambo Truck Fill. The Tambo Truck Fill is located on the edge of town at the end of the distribution system, this water point is likely not used frequently, resulting in a build-up of turbid particles and subsequent inaccurate water monitoring results. When this result is removed from the calculations, Tambo's average Turbidity sits at 3.1 NTU, under the ADWG aesthetic guideline. High Turbidity can be associated with increased potential for the presence of water pathogens, where impurities provide habitat for the water pathogens to proliferate. However, *E.coli* has not been detected in Tambo's drinking water, suggesting that Turbidity is not an issue for the scheme.

5.2.2 Tambo Drinking Water Quality Complaints

To date, there is no record of any formal water quality complaints within the Tambo drinking water scheme.

6.0 HAZARD IDENTIFICATION AND RISK ASSESSMENT

The hazard identification and risk assessment for BTRC's DWQMP was undertaken using the risk methodology detailed in the Departmental Guideline. The Blackall and Tambo Risk Assessment outlined in Table 14 below details the mitigated and unmitigated hazard assessments for each scheme which includes:

- Identified hazards or hazardous events;
- Hazard or hazardous event sources;
- An assessment of the unmitigated maximum risk level, determined by considering the consequence and likelihood of each hazard or hazardous event occurring in the absence of any controls;
- Existing preventative measures implemented to counteract each hazard or hazardous event to reduce the maximum unmitigated risk level;
- A re-assessed residual risk level which details the final risk level of a hazard or hazardous event that is applicable when the appropriate mitigation measures have been implemented. The residual risk is determined using the same methodology as the initial maximum risk assessment; however, changes to the assessed likelihood should result in an overall lower risk level.

As the Blackall and Tambo Drinking Water Schemes are very similar and generally operated by the same people, a combined risk assessment was conducted simultaneously for the two schemes. The final Risk Assessment notes where differences between the schemes have been identified. The Risk Assessment was reviewed in September 2023 and Amended as necessary. Moving forward, Council intends to Review the Risk Assessment every 2 years, to coincide with the DWQMP Regular Reviews. All amendments will be referred to the Director of Works for input, review and acceptance of the new Risk Assessment with Risk Assessment workshops held as required.

Finally, where there was insufficient data or information to complete a reliable risk assessment, this was highlighted as an uncertainty to be discussed further in the Risk Management Improvement Program (Section 7).

6.1 Risk Assessment Methodology

In assessing the risk score of each hazard or hazardous event, the first step is to determine the consequence. Consequence categories used are outlined in Table 9 below.

Table 9: Consequence Descriptors.

Consequence	Descriptors
Insignificant	Negligible injury or health effects, isolated complaints related to aesthetic parameters. Little to no disruption to the normal operation of the scheme.
Minor	Negligible injury or health effects, widespread complaints related to aesthetic parameters.
Moderate	Potential acute health impact or potential chronic health impact.
Major	Acute health impact, no declared outbreak expected.
Catastrophic	Declared outbreak expected with an acute health impact. One or more fatalities or large number of hospitalisations.

Once the consequences were identified, the likelihood of each consequence occurring was determined using the Likelihood categories outlined in Table 10 below.

Table 10: Likelihood Descriptors.

Likelihood	Descriptors
Almost Certain	Hazard is considered to be present on a daily to weekly basis.
Likely	Occurs more often than once per month and up to once per week.
Possible	Occurs more often than once per year and up to once a month.
Unlikely	Unlikely but may occur once every 1- 5 years.
Rare	Hazard is expected to arise in exceptional circumstances; <1 occurrence every 5 years.

The risk scores were then assessed using the likelihood and consequence matrix provided in Table 11 below. The risk score was calculated by the intercept of likelihood and consequence.

Table 11: Risk Matrix used for the Blackall and Tambo Risk Assessments.

Likelihood	Consequence				
	Insignificant	**Minor**	**Moderate**	**Major**	**Catastrophic**
Almost Certain	Medium- 6	High- 10	High- 15	Extreme- 20	Extreme- 25
Likely	Medium- 5	Medium- 8	High- 12	High- 16	Extreme- 20
Possible	Low- 3	Medium- 6	Medium- 9	High- 12	High- 15
Unlikely	Low- 2	Low- 4	Medium- 6	Medium- 8	High- 10
Rare	Low- 1	Low- 2	Low- 3	Medium- 5	Medium- 6

Finally, uncertainty was assessed using the definitions outlined in Table 12 below. Assessing uncertainty provides an indication of the need to undertake further work or gather more data to ensure that the risk assessment is accurate and reliable.

Table 12: Uncertainty Definitions used for the Hazard and Hazardous Events Assessment.

Level of Uncertainty	Definition
Certain	There is 5 years of continuous monitoring data, which has been trended and assessed, with at least daily monitoring; or the processes involved are thoroughly understood.
Confident	There is 5 years of continuous monitoring data, which has been collated and assessed, with at least weekly monitoring or monitoring for the duration of seasonal events; or there is a good understanding of the processes involved.
Reliable	There is at least a year of continuous monitoring data available, which has been assessed; or there is reasonable understanding of the processes involved.
Estimate	There is limited monitoring data available; or there is limited understanding of the processes involved.
Uncertain	There is limited or no monitoring data available; or the processes are not well understood, and the processes are based on best estimates.

The Risk Assessment methodology is first used to obtain an unmitigated risk level for each hazard or hazardous event. It is then repeated to obtain the final mitigated risk level for each hazard or hazardous event.

The acceptable risk level in relation to public health depends very much on the Likelihood and Consequence descriptors used for the assessment. For the criteria used by BTRC, all risk levels identified as Medium or less are considered acceptable risks for both schemes. All high or "unacceptable" risk identified from the Risk Assessment are then used to inform the Risk Management Improvement Programme outlined in Section 7 below.

Note that in some cases, actions have been taken to reduce low level risks, while other medium or high-level risks have been left unmitigated. These decisions are based on two factors:

- the magnitude of the risk, and
- the cost and difficulty of actions required to reduce the risk.

6.2 Blackall & Tambo Risk Assessment

The team from BTRC that participated in the most recent 2023 Risk Assessment workshop is outlined in Table 13 below.

Table 13: BTRC Risk Assessment Workshop 2023 Team.

Name	Organisation	Position	Rationale
Ajay Agwan	Blackall-Tambo Regional Council	Director of Works and Services	Council works supervisor.
Peter Fry	Blackall-Tambo Regional Council	Foreman	Oversees Council workforce.
Aaron Protheroe	Blackall-Tambo Regional Council	Plumber	Council plumber and water operator.
Isabeau Gavel	GBA Consulting Engineers	Senior Environmental Officer	Responsible for the preparation of the DWQMP.

The final Risk Assessment for BTRC (reviewed in September 2023) is provided in Table 14 below.

Table 14: Blackall and Tambo Risk Assessment.

Hazard/Hazardous Event	Hazard Source	Location	Likelihood	Consequence	Unmitigated Risk Level	Preventative Measures	Mitigated			Uncertainty	Documented Procedures	Comments	RMIP Item
							Likelihood	Consequence	Risk Level				
Source Water													
Pathogenic ingress	Contamination of the Artesian aquifer or pathogenic ingress through the borehead	Blackall/Tambo	Rare	Catastrophic	Medium – 6	All bores are deep flowing and always under positive pressure at the surface. Source water is pasteurised due to the heat. Working day visual inspections of bores including checks for pressure and borehead integrity.	Rare	Catastrophic	Medium – 6	Confident	CCP3	Last CCTV inspections occurred in 2019. New Tambo Bore drilled in 2019.	**BT1:** Monitoring of monthly Turbidity results to assess associated risks.
Pathogenic ingress	Contamination of source water through incorrect hygiene practices during maintenance, repair or commissioning of source water infrastructure.	Blackall/Tambo	Rare	Catastrophic	Medium – 6	Maintenance always undertaken by Council plumber familiar with system requirements. Staff and contractors to check for vermin prior to pump, pipe and fittings assembly. Staff trained to exercise correct hygiene practices.	Rare	Catastrophic	Medium – 6	Confident	CCP3 Repair, Maintenance and Commissioning of Water Mains Procedure.	None.	Not applicable.
Chemical impurities	Exceedance of ADWG health and aesthetic values in the source water.	Blackall/Tambo	Unlikely	Moderate	Medium – 6	Operational and verification monitoring of source and distribution water.	Unlikely	Moderate	Medium – 6	Confident	None.	Monitoring data from 2017/24 has identified no regular exceedances, unmitigated risk reduced based on data.	Not applicable.
Iron	Exceedance of ADWG aesthetic value for Total Iron in source water.	Tambo	Unlikely	Insignificant	Low – 2	Operational and verification monitoring of source and distribution water to monitor exceedances.	Unlikely	Insignificant	Low – 2	Confident	CCP2	No water treatment in place. Iron levels are discussed in Section 5.2.1. Unmitigated risk reduced based on data.	Not applicable.

Hazard/Hazardous Event	Hazard Source	Location	Likelihood	Consequence	Unmitigated Risk Level	Preventative Measures	Mitigated			Uncertainty	Documented Procedures	Comments	RMIP Item
							Likelihood	Consequence	Risk Level				
Elevated Fluoride in groundwater	Fluoride	Blackall/Tambo	Unlikely	Major	Medium – 8	Verification monitoring (source and distribution).	Unlikely	Major	Medium – 8	Reliable	CCP1	Monitoring data from 2017/18 has identified no exceedances, monitoring reinstated in 2024. Unmitigated risk reduced based on data.	Not applicable.
Elevated temperature of groundwater	Temperature	Blackall/Tambo	Almost Certain	Insignificant	Medium – 6	Operational monitoring.	Almost Certain	Insignificant	Medium – 6	Confident	None.	Operational monitoring updated to include temperature monitoring (2024). Source water temperature is approximately 54°C (Tambo) and 60°C (Blackall), risk is considered to be more aesthetic than health. Operational monitoring shows temperature to sit around 30°C in the distribution systems and therefore, not considered a major concern for either scheme.	Not applicable.

Hazard/Hazardous Event	Hazard Source	Location	Likelihood	Consequence	Unmitigated Risk Level	Preventative Measures	Mitigated			Uncertainty	Documented Procedures	Comments	RMIP Item
							Likelihood	Consequence	Risk Level				
Loss of water supply	Flooding	Blackall/Tambo	Rare	Moderate	Low- 3	All Bores are located above the flood level.	Rare	Moderate	Low- 3	Confident	None.	Previous assessment has been conducted on the potential impact of floods and private bores on water quality.	Not applicable.
Loss of water supply	Bore failure	Blackall/Tambo	Rare	Moderate	Low – 3	In Blackall, drinking water is supplied by 3 bores. In Tambo water is supplied by 4 bores.	Rare	Moderate	Low- 2	Reliable	None.	The potential for long-term bore failure of all 7 bores at once is low.	Not applicable.
Loss of water supply	Power failure	Tambo (Golf Club Bore)	Possible	Minor	Medium – 6	The Golf Club Bore only supplies water to the Tambo Golf Club. If it were to go offline due to a power failure, water would still be available in Tambo.	Possible	Minor	Medium – 6	Confident	None.	Golf Club users would be advised to bring their own water from Tambo.	Not applicable.
Damage to infrastructure - malicious or accidental	Damage to Bores	Blackall/Tambo	Unlikely	Moderate	Low – 3	Bores are located in a fenced compound with locked gates. Working day visual inspections of bores, including ensuring compound fence is intact and gate locked.	Rare	Moderate	Low – 2	Confident	None.	To date, damage to water infrastructure has not been an issue for Council.	Not applicable.
Radiological activity	Elevated levels of Gross Alpha , Gross Beta and Uranium naturally occurring in the source water.	Blackall/Tambo	Unlikely	Major	Medium – 8	Annual Uranium and radiological activity verification monitoring.	Unlikely	Major	Medium – 8	Estimate	CCP2	Source water monitoring implemented in 2023. No ADWG exceedances recorded to date. Monitoring to occur annually to gather additional data.	Not applicable.

Hazard/Hazardous Event	Hazard Source	Location	Likelihood	Consequence	Unmitigated Risk Level	Preventative Measures	Mitigated			Uncertainty	Documented Procedures	Comments	RMIP Item
							Likelihood	Consequence	Risk Level				
Heavy metals	Elevated levels of heavy metals naturally occurring in the source water.	Blackall/Tambo	Unlikely	Major	Medium – 8	Heavy metal verification monitoring (source and distribution).	Unlikely	Major	Medium – 8	Estimate	CCP1	Source water monitoring implemented in 2023. No ADWG exceedances recorded to date. Monitoring to occur annually to gather additional data.	**2022 DWQMP ID BT4:** item complete, heavy metal monitoring of the new Tambo Bore added to the verification monitoring programme.
Repair, Maintenance and Commissioning of Mains													
Pathogenic Ingress	Contamination from pathogenic ingress occurring during repair, maintenance or commissioning of water mains.	Blackall/Tambo	Possible	Catastrophic	High – 15	Maintenance undertaken by Council plumber familiar with requirements. Staff trained to exercise correct hygiene practices. Asset renewal programme.	Rare	Catastrophic	Medium – 6	Confident	CCP2/CCP3 Repair, Maintenance and Commissioning of Water Mains Procedure.	None.	**2022 DWQMP ID BT1:** item complete water mains drawings updated (2022) to assist in prioritisation of asset renewal programme. **BT2:** Asset renewal programme prioritising older mains to be upgraded, with the aim of reducing overall mains breaks.
Turbidity			Possible	Moderate	Medium – 9		Rare	Moderate	Low – 3				**BT1:** Monitoring of monthly Turbidity results to assess associated risks.

Hazard/Hazardous Event	Hazard Source	Location	Likelihood	Consequence	Unmitigated Risk Level	Preventative Measures	Mitigated			Uncertainty	Documented Procedures	Comments	RMIP Item
							Likelihood	Consequence	Risk Level				
Pathogenic ingress	Contamination from pathogenic ingress caused by backflow occurring during repair, maintenance or commissioning of water mains.	Blackall/Tambo	Possible	Catastrophic	High – 15	Maintenance always undertaken by Council plumber familiar with requirements. Staff trained to exercise correct hygiene practices.	Rare	Catastrophic	Medium – 6	Confident	CCP3 Repair, Maintenance and Commissioning of Water Mains Procedure.	None.	**2022 DWQMP ID BT1:** item complete water mains drawings updated (2022) to assist in prioritisation of asset renewal programme. **BT2:** Asset renewal programme prioritising older mains to be upgraded, with the aim of reducing overall mains breaks.
Hydrocarbons	Contamination from major spill near water mains during repair, maintenance or commissioning activities.	Blackall/Tambo	Unlikely	Moderate	Medium – 6	Staff adequately trained so that they can respond well to these types of situations.	Rare	Moderate	Low – 3	Estimate	Repair, Maintenance and Commissioning of Water Mains Procedure.	None.	Not applicable.
Distribution System													
Pathogenic ingress	Contamination from drinking water that has a long detention time in the main.	Blackall/Tambo	Unlikely	Catastrophic	High – 10	Flushing water mains that have a long detention time based on bacteriological results. Compact distribution systems for both schemes.	Rare	Catastrophic	Medium – 6	Reliable	CCP3 Repair, Maintenance and Commissioning of Water Mains Procedure.	Long main to mains to racecourses and Blackall airport to be flushed prior to any major events,	Not applicable.

Hazard/Hazardous Event	Hazard Source	Location	Likelihood	Consequence	Unmitigated Risk Level	Preventative Measures	Mitigated			Uncertainty	Documented Procedures	Comments	RMIP Item
							Likelihood	Consequence	Risk Level				
Pathogenic ingress	Contamination from a lack of or failure of backflow prevention devices in the distribution system.	Blackall	Possible	Catastrophic	High – 15	Bores flow under positive pressure which is monitored on working days. Backflow devices fitted at the town common.	Rare	Catastrophic	Medium – 6	Reliable	CCP3	Devices placed on bores reduce water pressure, causing multiple complaints throughout the town, thus Council decided to remove. Negative pressure events are considered unlikely. No backflow devices fitted at the industrial sub-division as this is more of a storage yard than an industry with real concerns via. backflow. No backflow devices fitted at the sale yards, bore water is fed into tank via. a poly pipe with over the top fill and a screened air vent directly above it so that a vacuum could not be formed- difficult to see how backflow could occur.	Not applicable.
		Tambo				Backflow devices fitted at the sale yards and water troughs.						No backflow prevention at the Tambo health centre, however, not considered to	

Hazard/Hazardous Event	Hazard Source	Location	Likelihood	Consequence	Unmitigated Risk Level	Preventative Measures	Mitigated			Uncertainty	Documented Procedures	Comments	RMIP Item
							Likelihood	Consequence	Risk Level				
												be a concern for the scheme.	
Pathogenic ingress	Contamination of potable water through illegal access to mains water supply.	Blackall/Tambo	Unlikely	Catastrophic	High – 10	Both schemes are small, illegal activities would be noticed by Council.	Rare	Catastrophic	Medium – 6	Estimate	CCP3	Risk level is as low as reasonably practical.	Not applicable.
Pathogenic ingress	Opportunistic pathogens	Blackall/Tambo	Rare	Catastrophic	Medium – 6	Verification monitoring. Mains repair procedures in place to prevent contamination from mains breaks. Closed distribution systems, contamination can only occur via. mains breaks.	Rare	Catastrophic	Medium – 6	Reliable	CCP3 Repair, Maintenance and Commissioning of Water Mains Procedure.	Investigation into opportunistic pathogens completed in 2023. Refer to Section 6.3.2 below for summary. Unmitigated risk reduced based on data.	**2022 DWQMP ID BT6:** item complete, investigation completed, summarised in Section 6.3.2 below.
Pathogenic ingress	Non-potable water tanks at the MPC, ablution blocks and irrigation schemes.	Blackall	Unlikely	Catastrophic	High – 10	Signage on these tanks informing public that the water is non-potable. Float systems in place.	Rare	Catastrophic	Medium – 6	Confident	CCP3	None.	Not applicable.
	Non-potable water tanks in the system for irrigation	Tambo											
Mains breaks	Pressure increase in distribution system	Blackall/Tambo	Possible	Minor	Medium – 6	Bleed Mains – pressure relief point in Blackall located next to the historical bore.	Possible	Minor	Medium – 6	Reliable	None.	High pressure, generally associated with periods of high rainfall due to lower water usage within the town.	Not applicable.

Hazard/Hazardous Event	Hazard Source	Location	Likelihood	Consequence	Unmitigated Risk Level	Preventative Measures	Mitigated			Uncertainty	Documented Procedures	Comments	RMIP Item
							Likelihood	Consequence	Risk Level				
Loss of water supply	Pressure decrease in distribution system	Blackall/Tambo	Possible	Minor	Medium – 6	Water restrictions implemented.	Possible	Minor	Medium – 6	Reliable	None.	Backflow prevention devices fitted on bores result in pressure issues within the distribution system.	Not applicable.
Whole of System													
Lack of skilled/trained staff.	Inability for staff to respond to drinking water events or changes in drinking water quality due to lack of formal training/skills.	Blackall/Tambo	Unlikely	Catastrophic	High – 10	Council employs a licensed plumber who is familiar with the Blackall/Tambo schemes. Private plumber available if required. Documented operation and maintenance procedures which plumber and water operators are familiar with.	Rare	Catastrophic	Medium – 6	Confident.	All procedures listed in Table 17 below.	2023 failure to undertake water monitoring was more the result of a communication issue, not a lack of skilled/trained staff. Workshops have been undertaken with water operators following this incident to ensure everyone is aware of their responsibilities.	**BT3 (item complete):** Update to Operation and Maintenance Procedures.
Poor data management	Undetected drinking water event or incident.	Blackall/Tambo	Unlikely	Major	Medium – 8	Regular operational and verification monitoring. Information management systems.	Unlikely	Major	Medium – 8	Estimate	None.		**2022 DWQMP ID BT2:** all drinking water data was collated into a master spreadsheet in 2022. All lab reports are saved in Council records system.

Hazard/Hazardous Event	Hazard Source	Location	Likelihood	Consequence	Unmitigated Risk Level	Preventative Measures	Mitigated			Uncertainty	Documented Procedures	Comments	RMIP Item
							Likelihood	Consequence	Risk Level				
Cyber Security breach.	Breach of Council's internal system causing access to restricted information.	Blackall/Tambo	Unlikely	Major	Medium – 8	Council data is stored on an Info Expert system with high grade security protection, user authentication, restricted admin privileges and back-up systems in place.	Rare	Major	Medium – 5	Estimate	None.	BTRC does not rely on computerised technologies within their water supply schemes. If a breach were to occur, they would only obtain remote access to records and not infrastructure. All BTRC document systems are heavily secure and in the cloud for storage purposes.	Not applicable.
Prolonged mains repair time	Outdated water network drawings.	Blackall/Tambo	Possible	Minor	Medium – 6	Council plumber familiar with the system. Update distribution system drawings. Regular updates now occurring in response to distribution system upgrades/changes.	Rare	Minor	Low – 2	Confident	Repair, Maintenance and Commissioning of Water Mains Procedure.	"As constructed" drawings in place with updates occurring as required. Schematics last updated in 2020.	Not applicable.

6.3 Opportunistic Pathogens Risk Assessment Summary

During the 2022-23 FY, Council conducted three rounds of verification monitoring for opportunistic pathogens within the Blackall and Tambo distribution systems, to assess the risk of opportunistic pathogens within the two schemes (in response to the 2022 Amendment RMIP item BT6). This testing was in response to one of the RMIP items outlined in Council's approved 2022 DWQMP. The results of this testing are summarised in Table 15 below.

Table 15: Blackall and Tambo Opportunistic Pathogen Testing (2022-23 Financial Year).

Parameters	Units	Sampling Frequency	Samples Tested	Blackall			Tambo		
				Max Value	Mean Value	Min Value	Max Value	Mean Value	Min Value
Pseudomonas aeruginosa	MPN/100mL	Triannual	9	<1	<1	<1	<1	<1	<1
Enterococci	CFU/100mL	Triannual	9	<1	<1	<1	<1	<1	<1
Legionella	CFU/100mL	Triannual	9	<10	<10	<10	<10	<10	<10
Aesthetic Guideline Exceedance									
Health Guideline Exceedance									

Verification monitoring for opportunistic pathogen did not identify any opportunistic pathogens within either scheme (note that the lab reporting limits for *Pseudomonas* and Enterococci is 1 and the reporting limit for Legionella is 10).

During the 2022-23 Financial Year, there were six mains breaks recorded for Blackall and no mains breaks recorded for Tambo. In general, mains breaks only seem to occur in Blackall during high rain events, causing pressure to build up within the distribution system.

Due to the combination of verification monitoring which has not identified opportunistic pathogens to be an issue within either scheme's distribution system and the lack of mains breaks that occur within the schemes, the risk of opportunistic pathogens within either of the schemes has been assessed as low.

7.0 RISK MANAGEMENT IMPROVEMENT PROGRAMME

BTRC's Risk Management Improvement Programme for both the Blackall and Tambo schemes is provided in Table 16 below. The RMIP was reviewed and amended in October 2023 via. consultation with the BTRC Director of Works and Services. Moving forward, Council intends to review all completion target dates at 6-monthly intervals to ensure that the processes are in place for items to be completed within their forecast timeframes. The target dates for all RMIP items were determined via. consultation with Council staff responsible for the respective items.

Table 16: Blackall and Tambo Risk Management Improvement Programme.

Code	Hazard/Hazardous Event	Scheme	Improvement Item	Priority	Target Date/s	Comments	Responsibility
BT1	Pathogenic ingress.	Blackall/ Tambo	**2022 DWQMP ID: BT3** Implement weekly/monthly operational monitoring for Turbidity to accurately trend values and assess associated risks.	High	Dec 2024	Target date set to enable Council approximately 1 year of viable data that can be used to assess trends.	Director of Works and Services.
BT2	Mains breaks and/or ageing infrastructure.	Blackall/ Tambo	**2022 DWQMP ID: BT1 (completed)** **2022 DWQMP ID: BT5** Asset renewal programme for ageing mains; assessment to prioritise replacement and replacement of mains that have reached the end of their design life.	High	Dec 2024	Ageing mains on Garden St in Blackall have been replaced. There are still some AC mains in both distribution systems, however, these are in good condition; Council are waiting on funding before they can eventually be upgraded.	Director of Works and Services.
BT4	Pathogenic ingress.	Blackall/Tambo	Upgrade the water testing lab located at the Blackall depot	High	June 2025	Council intends to enclose the current laboratory, add air conditioning and remove dust and clutter.	Director of Works and Services.

8.0 OPERATION AND MAINTENANCE PROCEDURES

Council have developed a series of Operation and Maintenance Procedures and Critical Control Points (CCPs) for the operation of the Blackall and Tambo schemes. Table 17 below outlines the current status of all Operation and Maintenance Procedures, note that due to the small scale of the scheme and lack of complexity, minimal procedures are required. Moving forward, Council will undertake reviews of all CCPs and O&M Procedures on the following triggers:

- Following significant changes in processes;
- At the time of the scheduled DWQMP Review.

Table 17: Blackall and Tambo Operation and Maintenance Procedures.

Scheme Component / Sub-component	Preventive Measure Managed	Documented Procedure	Version Date	Status
Whole of System	Blackall/Tambo Drinking Water Schemes	Blackall/Tambo Drinking Water Scheme Operating Plans	April 2024	To be reviewed April 2025
Sourcing Infrastructure & Distribution System	Pathogenic Ingress	Repair, Maintenance and Commissioning of Water Mains	April 2024	To be reviewed April 2025
	Boreheads	Borehead Inspection Procedure	April 2024	To be reviewed April 2025
Water Sampling	Verification and Operational Monitoring	Water Sampling Procedure	April 2024	To be reviewed April 2025

8.1 Critical Control Points

The following Critical Control Points have been implemented within the Blackall and Tambo schemes:

- **CCP 1:** ADWG Health Exceedance (Source or Distribution)
- **CCP 2:** ADWG Aesthetic Exceedance (Source or Distribution)
- **CCP 3:** *E.coli* Detection (Source or Distribution)

CCP1: ADWG Health Exceedance (Source or Distribution)			
What is measured?	**Where /how is it measured?**	**What is the Control Point?**	**What are the Hazards?**
Drinking Water Quality	In-house operational monitoring and external verification monitoring	ADWG Health Parameters	Pathogenic ingress Public Health Risk
Target Value: Drinking water monitoring identifies tested parameters to sit within ADWG health values.			
Alert Level: Potential exceedance of an ADWG health value **Responsibility: Water Operator**		**Critical Limit: Confirmed exceedance of an ADWG health value OR *E.coli* detection** **Responsibility: Water Operator**	
1. Immediately re-take grab sample to verify result. 2. Inform the Director of Works and Services. 3. Notify the Drinking Water Supply Regulator. 4. If follow-up grab sample does not identify any exceedances then re-commence the scheme's operation as normal, via. consultation with the Regulator. 5. If follow-up sample confirms exceedance then escalate to Critical Limit response. **Note that *E.coli* detections do not need to be verified and are to be escalated to the Critical Limit response immediately.** **Reporting:** Alert Director of Works and Services and Drinking Water Supply Regulator.		1. Inform Director of Works and Services and Drinking Water Supply Regulator of confirmed result. 2. Refer to CCP 3 for procedure to follow for *E.coli* detections. 3. Isolate effected area if possible. 4. Review the need for a Boil Water Alert or an alternative water supply. 5. Conduct investigation into exceedance. 6. Re-sample. 7. Continue scheme operation as normal if testing shows exceeded parameter has been corrected via. consultation with the Regulator. 8. Complete incident reporting forms. **Note that Boil Water Alerts can only be lifted via. consultation with QLD Health and the Water Regulator.**	

CCP2: ADWG Aesthetic Exceedance (Source or Distribution)			
What is measured?	**Where /how is it measured?**	**What is the Control Point?**	**What are the Hazards?**
Drinking Water Quality	In-house operational monitoring and external verification monitoring	ADWG Aesthetic Parameters	Pathogenic ingress Public Health Risk
Target Value: Drinking water monitoring identifies tested parameters to sit within ADWG aesthetic values.			
Alert Level: Potential exceedance of an ADWG aesthetic value **Responsibility: Water Operator**		**Critical Limit: Confirmed exceedance of an ADWG aesthetic value that cannot be managed under the DWQMP (e.g. elevated radiological activity)** **Responsibility: Water Operator**	
1. Immediately re-take grab sample to verify result. 2. Inform Director of Works and Services. 3. If follow-up grab sample does not identify any exceedances, then re-commence the scheme's operation as normal. 4. If follow-up sample confirms exceedance and it cannot be safely managed under the DWQMP, then escalate to Critical Limit response. **Note that some aesthetic parameters (pH and Total Iron) are naturally elevated in Blackall and Tambo's drinking water and therefore, minor exceedances are not required to be investigated.** **Reporting:** Alert Director of Works and Services.		1. Inform Director of Works and Services of confirmed results. 2. Refer to CCP 3 for procedures to follow for Turbidity and Total Coliform exceedances. 3. Notify the Drinking Water Supply Regulator. 4. Isolate effected area if possible. 5. Review the need for a Boil Water Alert or an alternative water supply. 6. Conduct investigation into exceedance. 7. Re-sample. 8. Continue scheme operation as normal if testing shows exceeded parameter has been corrected via. consultation with the Regulator. 9. Complete incident reporting forms. **Note that Boil Water Alerts can only be lifted via. consultation with QLD Health and the Water Regulator.** **Reporting:** Alert Director of Works and Services and Drinking Water Supply Regulator.	
CCP3: *E.coli* Detections (Source or Distribution)			
What is measured?	**Where /how is it measured?**	**What is the Control Point?**	**What are the Hazards?**
E.coli Total Coliforms Turbidity	In-house operational monitoring and external verification monitoring	*E.coli* detections	Pathogenic ingress Public Health Risk

Target Value: No *E.coli* detections in source water or distribution system	
Alert Level: Turbidity >5 NTU & Elevated Total Coliforms **Responsibility: Water Operator**	**Critical Limit: *E.coli* detection** **Responsibility: Water Operator**
1. Notify Director of Works and Services. 2. Where exceedance is reported (e.g. source water or distribution), commence *E.coli* sampling. 3. Flush Mains. 4. Re-sample for Turbidity and Total Coliforms. 5. If exceedances are still being detected, re-commence flushing. 6. If *E.coli* is detected, escalate to Critical Limit response. 7. If *E.coli* is not being detected and Turbidity and Total Coliforms are no longer elevated after mains flushing, then re-commence the normal operation of the scheme. **Reporting:** Alert Director of Works and Services.	1. Inform Director of Works and Services and issue Boil Water Alert. 2. Notify Drinking Water Supply Regulator. 3. Isolate the affected area if possible and commence investigation into exceedance. 4. Re-test for *E.coli* to ensure it was not a sampling error. 5. Flush mains, then re-test for *E.coli* , Total Coliforms and Turbidity. 6. If *E.coli* is still being detected, re-flush the mains. 7. The Boil Water Alert is to remain in place until operational and verification monitoring detects no *E.coli*. 8. Complete incident reporting forms. **Note that Boil Water Alerts can only be lifted via. consultation with QLD Health and the Water Regulator.** **Reporting:** Alert Director of Works and Services and Drinking Water Supply Regulator.

9.0 OPERATIONAL AND VERIFICATION MONITORING

9.1 Operational Monitoring

In the Blackall and Tambo drinking water supply schemes, Council's operational efforts are directed to ensuring that the drinking water supplied within each scheme meets the aesthetic and health ADWG values. Council undertakes in-house operational monitoring and external verification monitoring as part of their water quality monitoring programme for both schemes. This is an essential part of the operation of the schemes. All water quality data, once received by Council is reviewed for any ADWG exceedances or abnormal characteristics and trended in a master spreadsheet.

Tables 18 and 19 below identify the operational monitoring programme for the Blackall and Tambo supply schemes. Refer to Appendix B for operational monitoring water sampling locations for each town.

Table 18: Blackall Operational Monitoring Programme.

Location	Parameter	Sampling			Target Limit	Action If Target Limit Exceeded	Critical Limit	Action If Critical Limit Exceeded	Positions Responsible
		Frequency	Method	Location					
Raw Water	General maintenance / security	Weekly	Visual inspection	Inspection of source water infrastructure including bore headworks and general integrity of all active bores and reticulation mains connected to the supply in Blackall.	N/A	N/A	N/A	No critical limit applicable. Following assessment of infrastructure, maintenance issues are to be escalated to the Director of Works and Services.	**Overall Responsibility:** Chief Executive Officer **Implementation, review, and action:** Director of Works and Services **Operations:** Water Operator
	Boreheads	Quarterly	Documented inspection	Inspection of boreheads to document any maintenance issues.	N/A	N/A	N/A		
Distribution system	*E. coli*	Weekly	Grab sample	5 samples from any of the following locations: • Tennis Club • Hospital • Washdown • Council Depot • Showgrounds • Skate Park • Albert Park • Airport • Saleyards	<1	Resample and test	>1	Report to DWS. Notify OWSR and complete incident reporting forms. Retest to verify results. Try to isolate source of contamination. Implement corrective actions. Flush lines if necessary, isolate bores and repair infrastructure.	
	Turbidity	Weekly			<5NTU		>5NTU		
	Temperature	Weekly			N/A		N/A		
	Water use	Weekly	Visual inspection	Meters from source water lines connected to the supply in both Blackall and Tambo.	N/A	N/A	N/A	If use is significantly higher than usual, try to identify cause. Report to DWS and rectify issue.	

Note: Actions for target and critical limits are to be in accordance with the Management of Incidents and Emergencies procedures detailed in Table 23 below.

Table 19: Tambo Operational Monitoring Programme.

Location	Parameter	Sampling			Target Limit	Action If Target Limit Exceeded	Critical Limit	Action If Critical Limit Exceeded	Positions Responsible
		Frequency	Method	Location					
Raw Water	General maintenance / security	Weekly	Visual inspection	Inspection of source water infrastructure including bore headworks and general integrity of all active bores and reticulation mains connected to the supply in Blackall.	N/A	N/A	N/A	No critical limit applicable. Following assessment of infrastructure, maintenance issues are to be escalated to the Director of Works and Services.	**Overall Responsibility:** Chief Executive Officer **Implementation, review, and action:** Director of Works and Services **Operations:** Water Operator
	Boreheads	Quarterly	Documented inspection	Inspection of boreheads to document any maintenance issues.	N/A	N/A	N/A		
Distribution system	*E. coli*	Monthly	Grab sample	5 samples from any of the following locations: • Racecourse • State School • Hospital • Council Depot • Police Station • Caravan Park • Aquatic Centre • Golf Club	<1	Resample and test	>1	Report to DWS. Notify OWSR and complete incident reporting forms. Retest to verify results. Try to isolate source of contamination. Implement corrective actions. Flush lines if necessary, isolate bores and repair infrastructure.	
	Turbidity	Monthly			<5NTU		>5NTU		
	Temperature	Monthly			N/A		N/A		
	Water use	Weekly	Visual inspection	Meters from source water lines connected to the supply in both Blackall and Tambo.	N/A	N/A	N/A	If use is significantly higher than usual, try to identify cause. Report to DWS and rectify issue.	

Note: Actions for target and critical limits are to be in accordance with the Management of Incidents and Emergencies procedures detailed in Table 23 below.

9.2 Verification Monitoring

Blackall-Tambo Regional Council undertake four rounds of verification monitoring throughout the year; three rounds within the distribution system and one round for all the source water bores. Samples are sent to Toowoomba Regional Water Laboratory Services (an external NATA accredited laboratory) to verify the chemical quality of the water. Tables 20 and 21 below identifies the verification monitoring programme for both the Blackall and Tambo supply schemes. Refer to Appendix B for verification monitoring water sampling locations for each town.

Table 20: Blackall and Tambo Distribution System Verification Monitoring Programme.

Characteristic	Parameter	ADWG and / or Regulation Value	Frequency	Sampling Locations		Response to Exceedances	Positions Responsible
				Blackall	Tambo		
Microbial quality	*E. coli*	Nil detect	Triannual	3x samples from any of the following locations: • Council Depot • Showgrounds • Hospital	3x samples from any of the following locations: • Council Depot • Aquatic Centre • Hospital	Refer to incident management Plan, Acceptable risk continue to monitor for exceedances or complete incident reporting forms for exceedance of health guidelines	**Overall Responsibility:** Chief Executive Officer **Implementation, review and actions:** Director of Works and Services **Operations:** Water Operator
	Total Coliforms	Nil detect					
	Heterotrophic Plate Count	N/A					
Physical	Conductivity	N/A					
	True Colour	15HU - Aesthetic					
	Total Hardness	N/A					
	pH	pH 6.5 - 8.5 - Aesthetic					
	Total Dissolved Solids	N/A					
	Total Dissolved Ions	N/A					
	Turbidity	5 NTU - Aesthetic					
Inorganics	Fluoride	1.5 mg/L - Health					
	Chloride	250mg/L - Aesthetic					
	Nitrate	50mg/L - Health					
	Nitrite	3mg/L - Health					
	Calcium	N/A					
	Magnesium	N/A					
	Potassium	N/A					
	Silica	80mg/L - Aesthetic					
	Sodium	180mg/L - Aesthetic					

Characteristic	Parameter	ADWG and / or Regulation Value	Frequency	Sampling Locations		Response to Exceedances	Positions Responsible
				Blackall	Tambo		
	Sulphate	250mg/L - Aesthetic					
	Phosphate	N/A					
	Total Iron	0.3mg/L - Aesthetic					
	Total Manganese	0.5mg/L - Health					
	Arsenic	0.01mg/L – Health					
	Cadmium	0.002mg/L – Health					
	Chromium	0.05mg/L – Health					
	Copper	2mg/L – Health					
	Nickel	0.02mg/L – Health					
	Lead	0.01mg/L – Health					
	Zinc	3mg/L – Aesthetic					
	Mercury	0.001mg/L – Health					

Table 21: Blackall and Tambo Source Water Verification Monitoring Programme.

Characteristic	Parameter	ADWG and / or Regulation Value	Frequency	Sampling Locations		Response to Exceedances	Positions Responsible
				Blackall	Tambo		
Microbial quality	*E.coli*	Nil detect	Annual	All active supply boreheads: • Depot Bore • Showgrounds Bore • Leek St Bore	All active supply boreheads: • Depot Bore • Williams St Bore • Truck Fill Bore • Golf Club Bore	Refer to incident management Plan, Acceptable risk continue to monitor for exceedances or complete incident reporting forms for exceedance of health guidelines	**Overall Responsibility:** Chief Executive Officer **Implementation, review and actions:** Director of Works and Services **Operations:** Water Operator
	Total Coliforms	Nil detect					
	Heterotrophic Plate Count	N/A					
Physical	Conductivity	N/A					
	True Colour	15Hu - Aesthetic					
	Total Hardness	N/A					
	pH	pH 6.5 - 8.5 - Aesthetic					
	Total Dissolved Solids	N/A					
	Total Dissolved Ions	N/A					
	Turbidity	5 NTU - Aesthetic					
Inorganics	Fluoride	1.5 mg/L - Health					
	Chloride	250mg/L - Aesthetic					
	Nitrate	50mg/L - Health					
	Nitrite	3mg/L - Health					
	Calcium	N/A					
	Magnesium	N/A					
	Potassium	N/A					
	Silica	80mg/L - Aesthetic					
	Sodium	180mg/L - Aesthetic					
	Sulphate	250mg/L - Aesthetic					

Characteristic	Parameter	ADWG and / or Regulation Value	Frequency	Sampling Locations		Response to Exceedances	Positions Responsible
				Blackall	Tambo		
	Phosphate	N/A					
	Total Iron	0.3mg/L - Aesthetic					
	Total Manganese	0.5mg/L - Health					
	Arsenic	0.01mg/L – Health					
	Cadmium	0.002mg/L – Health					
	Chromium	0.05mg/L – Health					
	Copper	2mg/L – Health					
	Nickel	0.02mg/L – Health					
	Lead	0.01mg/L – Health					
	Zinc	3mg/L – Aesthetic					
	Mercury	0.001mg/L – Health					
Radiation	Gross Alpha	0.5 Bq/L – Aesthetic					
	Gross Beta	0.5 Bq/L – Aesthetic					
	Uranium	0.017mg/L – Health					

10.0 INCIDENTS AND EMERGENCIES

Blackall-Tambo Regional Council operates on a 3-level incident and emergency framework in the management of their drinking water incidents and emergencies, starting at Level 1 (least severe) through to Level 3 (most severe); these are outlined in Table 22 below. It should be noted that during a full-scale emergency response and recovery scenario (e.g. a natural disaster), the Local Disaster Management Group is activated in accordance with BTRC's Local Disaster Management Plan. The Blackall-Tambo Local Disaster Management Plan can be accessed here:

https://www.btrc.qld.gov.au/downloads/file/1088/ldmg-local-disaster-management-plan-5-0-november-2022.

The drinking water incident and emergency action plan for the Blackall and Tambo schemes is provided in Section 10.1 below.

Table 22: BTRC 3-level incident and emergency framework.

Alert Level	Description	Key Management Responses	Positions Responsible
Level 1 Low-Risk Operational Actions	Operational issues that could escalate if not responded to. These types of incidents are managed immediately and effectively by BTRC staff, without any public health impact to the community. For example: • Exceedance of an OCP. • Exceedance of an ADWG Aesthetic value that can be managed under the DWQMP. • Short-term drinking water infrastructure fail.	1. Notify Water Operator and/or Director of Works and Services. 2. Check and act upon operation and maintenance procedures. 3. Take appropriate actions to rectify the situation.	Water Operator, Director of Works and Services
Level 2 Medium-Risk Incidents and Emergencies	All ADWG health exceedances and incidents where normal actions under the DWQMP do not effectively manage the issue and there is a concern that public health may be impacted. For example: • Detection of a parameter with no water quality criteria that may have an adverse impact upon public health. • Detection of an ADWG aesthetic value exceedance that may have an adverse impact upon public health (e.g. radiological activity). • Minor exceedance of an ADWG health value. • Short-term loss of drinking water supply (<24 hours). • Cyber Security Breach	1. Report incident/event to the Water Supply Regulator (OWSR). 2. Inform Director of Works and Services and implement short-term management measures. 3. Undertake incident investigation.	Water Operator, Director of Works and Services, Water Supply Regulator
Level 3 High-Risk Declared Disaster	Widespread ADWG health exceedances and drinking water events. For example: • Widespread outbreak of a waterborne disease. • Major loss of drinking water supply, e.g. >24 hours over wide area.	• Report incident/event to the Water Supply Regulator (OWSR). • Notify Director of Works and Services who will inform the Chief Executive Officer	Chief Executive Officer (CEO), water Operator, Director of Works and Services, Water Supply Regulator

Alert Level	Description	Key Management Responses	Positions Responsible
	• Gross exceedance of an ADWG health guideline value for a chemical parameter (e.g. more than five times the ADWG health guideline limit). • Declared disaster. • Long-term drinking water infrastructure fail.	• CEO makes the call to activate the Local Disaster Management Plan (as required) • Implement short-term management measures. • Undertake incident investigation.	

10.1 BTRC Incident and Emergency Action Plan

Table 23: BTRC drinking water incident and emergency action plan.

Level	Incident Or Emergency	Summary Of Actions to be Undertaken	Positions Responsible for Actions
1	**Exceedance of OCP or exceedance of an ADWG aesthetic value that can be managed under the DWQMP**	1. Water Operator to notify Director of Works and Services. 2. If simple adjustment is required, make adjustment and record details. 3. If a more substantial system change is required (e.g. maintenance to overcome a recurring problem), advise the Director of Works and Services so that budget can be made available for the project. 4. Organise system change or list for capital works as appropriate.	Water Operator & Director of Works and Services
	Short-term drinking water infrastructure fail	1. Water Operator to notify Director of Works and Services. 2. Determine the potentially affected area and isolate. 3. Inform concerned customers of the details of the incident and anticipated progress (if required). 4. Rectify the problem. 5. Investigate options to avoid any reoccurrence. 6. If a more substantial system change is required (e.g. maintenance to overcome a recurring problem), advise the Director of Works and Services so that budget can be made available for the project.	Water Operator & Director of Works and Services
2	**Detection of a parameter with no water quality criteria that may have an adverse impact upon Public Health OR detection of an ADWG aesthetic value exceedance that may have an adverse impact upon public health**	1. Water Operator to notify Director of Works and Services. 2. Check with the testing laboratory to confirm the exceedance OR re-commence operational monitoring to confirm aesthetic exceedance or adverse water quality criteria. 3. Report details of the exceedance to the Water Supply Regulator within 3 hours via. the Drinking Water Hotline (P: 1300 596 709) and the online notification form within 24 hours (E: DrinkingWater.Reporting@rdmw.qld.gov.au). 4. Determine the potentially affected area and advise the affected consumers (via. the usual communication channels) if required. 5. Commence investigation into water quality criteria or aesthetic exceedance. Some aesthetic exceedances or adverse water quality (e.g. Turbidity) may be able to be to be fixed with mains flushing. 6. Once investigation is complete and the issue fixed, re-test the drinking water supply and send samples to the external laboratory (if required) for confirmation that there are no issues.	Water Operator & Director of Works and Services, Water Supply Regulator

Level	Incident Or Emergency	Summary Of Actions to be Undertaken	Positions Responsible for Actions
		7. Investigate options to avoid any reoccurrences. 8. Upon resolution, provide a written report to the OWSR (Part 2 of Incident Reporting Form).	
	Minor exceedance of an ADWG health value	1. Water Operator to notify Director of Works and Services. 2. Where an exceedance has been observed check with the testing laboratory to confirm the exceedance. 3. Report details of exceedance to the Water Supply Regulator within 3 hours via. the Drinking Water Hotline (P: 1300 596 709) and the online notification form within 24 hours (E: DrinkingWater.Reporting@rdmw.qld.gov.au) 4. Determine if water quality can be corrected and the time/resources required. 5. Advise consumers and make temporary water supply arrangements including bottled potable water if warranted. 6. Rectify the problem or inform consumers of ongoing water quality limitation. 7. Once rectified, re-test and send the water samples to an external lab for verification monitoring to confirm the issue has been resolved (if required). 8. Provide a written report to the OWSR (Part 2 of Incident Reporting Form).	Water Operator & Director of Works and Services, Water Supply Regulator
	Short-term loss of drinking water (<24 hours)	1. Water Operator to notify Director of Works and Services. 2. Details of the supply loss or infrastructure fail are to be reported to the Water Supply Regulator within 3 hours via. the Drinking Water Hotline (P: 1300 596 709) and the online notification form within 24 hours (E: DrinkingWater.Reporting@rdmw.qld.gov.au). 3. Determine the potentially affected area and advise the affected consumers (via. the usual communication channels) and implement temporary water restrictions if applicable. 4. Rectify the problem. 5. Investigate options to avoid any reoccurrence. 6. Upon resolution, provide a written report to the OWSR (Part 2 of Incident Reporting Form).	Water Operator & Director of Works and Services, Water Supply Regulator
	Cyber Security Breach	1. Water Operator to notify Director of Works and Services. 2. Determine the potentially affected area (i.e. remote access to Council files). 3. Alert Australian Government Cyber Security Hotline (P: (07) 3215 3951) 4. Rectify the problem.	Water Operator & Director of Works and Services, Water Supply Regulator

Level	Incident Or Emergency	Summary Of Actions to be Undertaken	Positions Responsible for Actions
		5. Investigate options to avoid any recurrence.	
3	**Widespread outbreak of a waterborne disease**	1. Water Operator to notify Director of Works and Services. 2. Director of Works and Services to alert CEO. 3. Details of the outbreak are to be reported to the Water Supply Regulator within 3 hours via. the Drinking Water Hotline (P: 1300 596 709) and the online notification form within 24 hours (E:DrinkingWater.Reporting@rdmw.qld.gov.au). 4. Determine the potentially affected area and isolate if possible. Issue a Boil Water Alert and advise the effected consumers (via. the usual communication channels) or other precautions as required. 5. Flush all affected mains. 6. Provide additional/temporary chlorine dosing if practical. 7. Undertake a comprehensive contamination investigation and take necessary corrective actions. 8. Upon resolution, provide a written report to the OWSR (Part 2 of Incident Reporting Form).	Water Operator & Director of Works and Services, Water Supply Regulator, Chief Executive Officer
	Major loss of drinking water supply (>24 hours) OR long-term drinking water infrastructure fail	1. Water Operator to notify Director of Works and Services. 2. Director of Works and Services to alert CEO. 3. Details of the supply loss or infrastructure fail are to be reported to the Water Supply Regulator within 3 hours via. the Drinking Water Hotline (P: 1300 596 709) and the online notification form within 24 hours (E:DrinkingWater.Reporting@rdmw.qld.gov.au). 4. Determine the potentially affected area and advise the affected consumers (via. the usual communication channels) and implement temporary water restrictions if applicable. 5. Make temporary water supply arrangements if required. 6. Rectify the problem. 7. Investigate options to avoid any reoccurrence. 8. Upon resolution, provide a written report to the OWSR (Part 2 of Incident Reporting Form).	Water Operator & Director of Works and Services, Water Supply Regulator, Chief Executive Officer
	Gross exceedance of an ADWG health value	1. Water Operator to notify director of Works and Services. 2. Director of Works and Services to alert CEO. 3. Check with the testing laboratory to confirm the exceedance (a sudden gross exceedance is only likely to occur as the result of sabotage or an unreported chemical spill). 4. Report details of the exceedance to the Water Supply Regulator within 3 hours via. the Drinking Water Hotline	Water Operator & Director of Works and Services, Water Supply Regulator, Chief Executive Officer

Level	Incident Or Emergency	Summary Of Actions to be Undertaken	Positions Responsible for Actions
		(P: 1300 596 709) and the online notification form within 24 hours (E: DrinkingWater.Reporting@rdmw.qld.gov.au). 5. Determine the potentially affected area and advise the affected consumers (via. the usual communication channels) not to drink the water. 6. Re-test the drinking water supply and send samples to the external laboratory for confirmation that health exceedance was not a testing error. 7. Make temporary supply arrangements, including bottled potable water if required. 8. Commence investigation into exceedance and rectify the problem. 9. Once, rectified, re-test the drinking water supply and send samples to the external laboratory to confirm that the problem has been fixed and the drinking water is safe for consumption. 10. Investigate options to avoid any reoccurrence. 11. Upon resolution, provide a written report to the OWSR (Part 2 of Incident Reporting Form).	
	Declared disaster	1. Water Operator to notify Director of Works and Services. 2. Director of Works and Services to alert CEO. 3. CEO to liaise with Local Disaster Management centre to monitor the potential effect of the disaster upon water supply and sewerage services. 4. If impact to drinking water services, details of the event to be reported to the Water Supply Regulator within 3 hours via. the Drinking Water Hotline (P: 1300 596 709) and the online notification form within 24 hours (E:DrinkingWater.Reporting@rdmw.qld.gov.au). 5. If the water supply has been affected, consider a Boil Water Alert and take relevant actions as per the DWQMP and direction from the Local disaster Management Centre and Water Supply Regulator. 6. If the water supply has been affected, upon resolution, provide a written report to the OWSR (Part 2 of Incident Reporting Form).	Water Operator & Director of Works and Services, Water Supply Regulator, Chief Executive Officer

10.2 Community Notification

During an incident or emergency, if the need arises, BTRC's Director of Community Services and Communications will be the designated person to provide warnings and updates to the community and media. Nonetheless, all BTRC employees should be kept informed of any incident and / or emergency that requires community notification, as they provide informal points of contact for the community. Information is also available on Council's Disaster Dashboard on the BTRC website: https://rapad.qitplus.com/blackall-tambo. Information can also be circulated via the BTRC Council Facebook Page and the 4LG Radio Broadcast Corporation in Longreach (P: (07) 4658 3333).

11.0 INFORMATION MANAGEMENT

Blackall-Tambo Regional Council is a relatively small organisation with a records system that is available to all relevant staff. Where required, engineering services are provided by GBA Consulting Engineers who are based in Barcaldine. Additionally, GBA provides technical support for Council's water operations, preparing tender documents and specifications for new works and as-constructed data for completed works. GBA also develops, maintains, and distributes the works procedures to cover construction, maintenance, testing and inspections to control risks to water supply quality.

11.1 Process for Internal and External Reporting

Internal Reports

Reports are provided from field staff and supervisors direct to the coordinators, and if needed directed to the Director of Works and Services. Supervisors generally handle day to day reporting, with coordinators organising reports for operation and maintenance as required.

External Reporting

Reports sent to external parties are prepared by the coordinators and passed by the Director of Works and Services for final checking. All reports sent are saved into Councils document database. However, not all information gets reported to Council formally or directly and both the operators and plumbers are often approached by members of the community. Council employees are required to formally lodge any requests or complaints made by the community to them directly.

11.2 Complaints

BTRC have several ways in which complaints can be made, which includes the following:

- In person at Council's administration centre in Blackall or by calling (07) 4621 8855;
- By filling in the "Report an Issue" form, located on the Council website: https://www.btrc.qld.gov.au/report-an-issue;
- In writing by letter, fax or email, addressed to the Chief Executive Officer
  Postal Address: P.O. Box 21, BLACKALL QLD 4472
  Fax: (07) 4657 8855
  Email: admin@btrc.qld.gov.au or tfd@btrc.gov.au
- Using the Snap/Send/Solve App, available for download from the Apple Store or Google Play.

Council aims to investigate all complaints as quickly and as efficiently as possible. The officer handling each complaint will contact the complainant within a timely manner to provide an update on any rectification methods and their expected timeframes.

All drinking water complaints that are lodged with Council are sent to the Director of Works and Services who actions the complaints. It should be noted that it is not uncommon for informal complaints to made to Council. Due to the small populations within the two towns, most individuals know they can talk directly to the plumber if there is a leak of any other drinking water related issues.

11.2.1 Record Retention

All reports are kept electronically on Council's internal server. Reports that are passed to the Manager and to Council are kept in meeting records and Councils Document Database. All reports sent externally, or received from external parties are kept in Council's Electronic document database. Records are kept for a minimum of 7 years. Table 24 below outlines the specific details in relation to BTRC's information management system.

Table 24: BTRC drinking water information management details.

Information/Document	Format (Hardcopy /Electronic)	Where Stored (at WTP / on Electronic System / Other)	Position Responsible	Comments
Customer Complaint Record Form	Hardcopy and Electronic	Filed at Blackall –Tambo Regional Council (Electronic on Server)	Administrative Officer Director of Works and Services	To record individual customer details and complaints. This form enables customer complaints to be dealt with expediently and enables identification of recurring problems. It also helps facilitate corrective and preventative actions and improvements to operations as part of the continual improvement process within Councils QES Management Systems.
Reactive / Planned Maintenance / Capital Works Record Sheet	Hardcopy and Electronic	Filed at Blackall –Tambo Regional Council (Electronic on Server)	Administrative Officer Director of Works and Services Water / technical / works officers	Records the type of work, its location within the water supply system and labour, plant and materials used to complete the task.
Planned Operational and Maintenance Programme	Hardcopy and Electronic	Filed at Blackall –Tambo Regional Council (Electronic on Server)	Administrative Officer Director of Works and Services Water / technical / works officers	This form details planned maintenance procedures that the Officers (works / technical / water) complete at weekly, monthly, bi-annually, or annually. The form also serves as a report sheet recommending further immediate corrective action.

APPENDIX A

DEPARTMENT OF RESOURCES BORE REPORT CARDS (BLACKALL & TAMBO)

Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
318	Artesian - Controlled Flow	Existing	17/07/1901	Longreach	760 - BLACKALL TAMBO REGIONAL

Details

Description	P30		
Parish	505 - BLACKALL		
Original Name	BLACKALL N.2 P/HOUSE		
Driller Name			
Drill Company			
Const Method	CABLE TOOL		
Bore Line			
D/O File No	140/014/0003	**Polygon**	
R/O File No	28-404101-A	**Equipment**	NE
H/O File No	L05381B	**RN of Bore Replaced**	
Log Received Date		**Data Owner**	
Roles			

Location

Latitude	24-25-17	**Basin**	0033
Longitude	145-27-54	**Sub-area**	
GIS Latitude	-24.42133217	**Lot**	1
GIS Longitude	145.4650804	**Plan**	SP152748
Easting	344382		
Northing	7298263	**Map Scale**	254 - 1: 250 000
Zone	55	**Map Series**	M - Metric Series
Accuracy		**Map No**	SG55-1
GPS Accuracy		**Map Name**	BLACKALL
Checked	Yes	**Prog Section**	

Casing

4 ***records for RN*** **318**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	03/03/1942	1	0.00	626.10	Steel Casing		WT - Wall Thickness	152
A	03/03/1942	2	610.00	787.50	Steel Casing		WT - Wall Thickness	127
A	03/03/1942	3		789.90	Perforated or Slotted Casing		AP - Aperture Size	
A	03/03/1942	4			Grout			

Strata Logs

15 ***records for RN*** **318**

Bore Report

From Year:

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	36.58	YELLOW CLAY
2	36.58	452.93	SHALE
3	452.93	485.55	QUARTZ BLACK SHALE PYRITES
4	485.55	508.41	SAND SHALE CLAY
5	508.41	538.89	SHALE
6	538.89	550.16	SHALE AND CLAY
7	550.16	564.18	CLAY
8	564.18	579.12	SHALE
9	579.12	609.60	PIPE CLAY
10	609.60	633.07	SHALE
11	633.07	655.02	SANDROCK
12	655.02	677.57	SHALE
13	677.57	749.81	SANDROCK AND PIPE CLAY
14	749.81	773.28	SANDROCK
15	773.28	789.43	SHALE

Stratigraphies

9 ***records for RN*** **318**

Source	Rec	Top (m)	Bottom (m)	Strata Description
DNR	1	0.00		WINTON FORMATION
DNR	2			MACKUNDA FORMATION
DNR	3			ALLARU MUDSTONE
DNR	4			TOOLEBUC FORMATION
DNR	5			WALLUMBILLA FORMATION
DNR	6			HOORAY SANDSTONE
DNR	7			WESTBOURNE FORMATION

Bore Report

From Year:

Source	Rec	Top (m)	Bottom (m)	Strata Description
DNR	8			ADORI SANDSTONE
DNR	9		789.40	BIRKHEAD FORMATION

Aquifers

3 *records for RN* **318**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	465.10		SHLE - Shale							FR	HOORAY SANDSTONE
2	524.30		SHLE - Shale							FR	HOORAY SANDSTONE
3	629.40		SHLE - Shale							FR	ADORI SANDSTONE

Pump Tests Part 1

12 *records for RN* **318**

Pipe	Date	Rec	RN of Pumped Bore	Top (m)	Bottom (m)	Dist (m)	Meth	Test Types	Pump Type	Suction Set (m)	Q Prior to Test (l/s)	Dur of Q PR (mins)	Pres on Arriv (m)	Q on Arriv (l/s/)
A	01/01/1901	1	318	629.40		0.00	F/F	FR						69.17
A	10/09/1917	1	318	629.40		0.00	F/F	FR						41.71
A	21/10/1921	1	318	629.40		0.00	F/F	FR						40.04
A	28/12/1927	1	318			0.10	F/F	FR						41.72
A	13/01/1941	1	318				F/F	FR						46.03
A	21/01/1948	1	318				F/F	FR						41.71
A	01/04/1962	1												
A	16/10/1963	1												35.11
A	01/01/1967	1	318					RT						
A	30/04/1987	1	318			0.50	ART	DT						
A	04/10/1989	1	318			0.10	ART	ST FR ST						
A	13/05/2004	1				0.05	ART	ST FR ST DT					32.89	12.50

Bore Report

From Year:

Pump Tests Part 2

12 *records for RN* 318

Pipe	Date	Rec	Test Dur (mins)	SWL(m)	Recov Time (mins)	Resid DD (m)	Max DD or P RED (m)	Q at Max DD (l/s)	Time to Max DD (mins)	Max Q (l/s)	Calc Stat HD (m)	Design Yield (l/s)	Design BP (m)	Suct. Set (m)	Tmsy (m2/Day)	Stor
A	01/01/1901	1		78.33				69.19		69.17						
A	10/09/1917	1		50.90				41.72		41.71						
A	21/10/1921	1	360					40.03	330	40.04					468	0.00000000
A	28/12/1927	1						41.71		41.72						
A	13/01/1941	1		53.64				46.02		46.03						
A	21/01/1948	1						41.71		41.71						
A	01/04/1962	1		50.71				38.37								
A	16/10/1963	1		49.30				35.11		38.37						
A	01/01/1967	1		52.82												
A	30/04/1987	1	342	46.94			24.60	27.79	240			37.20	0.00		340	0.00000000
A	04/10/1989	1	270	44.06			40.20	38.16	120	41.52						
A	13/05/2004	1	375	47.45			43.72	37.73	90	40.71					259	

Bore Conditions

1 *records for RN* 318

	Drain Details			*Headworks*									
Date	Tot Len (km)	Max Run (km)	Cond	Ret Len (km)	Cond	Ctrl	Leak	Flow Irreg	Precip	Est Use (ML/yr)	Num of Cattle	Num of Sheep	Comments
13/05/2004	0.0				Good	F							

Elevations

1 *records for RN* 318

Pipe	Date	Elevation (m)	Precision	Datum	Meas Point	Survey Source

Bore Report

From Year:

Pipe	Date	Elevation (m)	Precision		Datum	Meas	Point	Survey Source
A	03/03/1942	285.10	SVY	Surveyed	STD - State Datum	N	Natural Surface	

Water Analysis Part 1

2 *records for RN* 318

Pipe	Date	Rec	Analyst	Analysis No	Depth (m)	Meth	Src	Cond (uS/cm)	pH	Si (mg/L)	Total Ions (mg/L)	Total Solids (mg/L)	Hard	Alk	Fig. of Merit	SAR	RAH
A	30/04/1987	1	GCL	119732	789.00	PU	GB	375	8.0	30	300.00	240.00	15	145	0.1	8.8	2.60
A	14/05/2004	1	GCL	215786	789.40	PU	GB	411	8.4	32	316.39	257.56	9	151	0.1	12.2	2.82

Water Analysis Part 2

2 *records for RN* 318

Pipe	Date	Rec	Na	K	Ca	Mg	Mn	HCO3	Fe	CO3	Cl	F	NO3	SO4	Zn	Al	B	Cu
A	30/04/1987	1	78.0	4.0	6.0	0.0	0.01	175.0	0.00	0.9	29.0	0.20	0.0	6.7				
A	14/05/2004	1	86.2	3.7	3.6	0.1	0.01	178.3	0.01	2.7	35.4	0.23	0.0	6.1	0.00	0.01	0.05	0.00

Water Levels

0 *records for RN* 318

Wire Line Logs

3 *records for RN* 318

Date	Run	Type		Source	Top (m)	Bottom (m)	Operator	Comments
22/04/2001	1	GR	Gamma Ray	BLACKALL SHIRE	-0.18	647.770		
23/04/2001	1	CALU	Caliper Unspecified	BLACKALL SHIRE	608.88	627.180		
23/04/2001	2	CALU	Caliper Unspecified	BLACKALL SHIRE	-0.07	756.130		

Field Measurements

4 *records for RN* 318

Pipe	Date	Depth (m)	Conduct (uS/cm)	pH	Temp (C)	NO3 (mg/L)	DO2 (mg/L)	Eh (mV)	Alkalinity (mV)	Samp	Method	Samp	Source
A	01/01/1901				58.0					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore
A	30/04/1987				59.0					PU	Pump - Other or	GB	Groundwater - from

Bore Report

From Year:

Pipe	Date	Depth (m)	Conduct (uS/cm)	pH	Temp (C)	NO3 (mg/L)	DO2 (mg/L)	Eh (mV)	Alkalinity (mV)	Samp	Method	Samp	Source
											Flowing Bore		Bore
A	04/10/1989				59.0					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore
A	13/05/2004		400	7.8	59.0					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore

Special Water Analysis

0 ***records for RN*** **318**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
14588	Artesian - Controlled Flow	Existing	24/10/1962	Longreach	760 - BLACKALL TAMBO REGIONAL

Details

Description	R51		
Parish	505 - BLACKALL		
Original Name	BLACKALL NO 3		
Driller Name			
Drill Company			
Const Method	CABLE TOOL		
Bore Line			
D/O File No	140/014/0003	**Polygon**	
R/O File No	28-404101-A	**Equipment**	
H/O File No	L05381B	**RN of Bore Replaced**	
Log Received Date		**Data Owner**	
Roles			

Location

Latitude	24-25-49	**Basin**	0033
Longitude	145-28-49	**Sub-area**	
GIS Latitude	-24.4302387	**Lot**	160
GIS Longitude	145.4802206	**Plan**	TB264
Easting	345928		
Northing	7297293	**Map Scale**	254 - 1: 250 000
Zone	55	**Map Series**	M - Metric Series
Accuracy		**Map No**	SG55-1
GPS Accuracy		**Map Name**	BLACKALL
Checked	Yes	**Prog Section**	

Casing

5 ***records for RN*** **14588**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	24/10/1962	1	0.00	61.40	Steel Casing		WT - Wall Thickness	254
A	24/10/1962	2	60.00	465.60	Steel Casing		WT - Wall Thickness	203
A	24/10/1962	3	457.20	843.00	Steel Casing		WT - Wall Thickness	152
A	24/10/1962	4		843.00	Perforated or Slotted Casing		AP - Aperture Size	
A	24/10/1962	5			Grout			

Bore Report

From Year:

Strata Logs

18 ***records for RN*** **14588**

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	1.52	SOIL
2	1.52	22.86	CLAY AND SAND
3	22.86	64.01	GREY MUDSTONE
4	64.01	85.34	LIMESTONE, MUDSTONE
5	85.34	188.98	GREY MUDSTONE
6	188.98	195.07	BROWN MUDSTONE
7	195.07	204.22	SANDY MUD
8	204.22	423.67	GREY MUDSTONE
9	423.67	432.82	LIMESTONE
10	432.82	451.10	MUDSTONE
11	451.10	457.20	SAND AND SANDSTONE
12	457.20	487.68	GREY SHALE AND MUDSTONE
13	487.68	496.82	SANDSTONE AND SHALE
14	496.82	515.11	CLAY AND SANDSTONE
15	515.11	615.70	MUDSTONE
16	615.70	637.03	SANDSTONE
17	637.03	697.99	MUDSTONE
18	697.99	783.34	SANDSTONE

Stratigraphies

11 ***records for RN*** **14588**

Source	Rec	Top (m)	Bottom (m)	Strata Description
DNR	1	0.00		WINTON FORMATION
DNR	2		64.00	MACKUNDA FORMATION

Bore Report

From Year:

Source	Rec	Top (m)	Bottom (m)	Strata Description
DNR	3	64.00	190.50	ALLARU MUDSTONE
DNR	4	190.50	198.10	TOOLEBUC FORMATION
DNR	5	198.10	317.00	COREENA MEMBER
DNR	6	317.00	451.70	DONCASTER MEMBER
DNR	7	451.70		HOORAY SANDSTONE
DNR	8			WESTBOURNE FORMATION
DNR	9			ADORI SANDSTONE
DNR	10			BIRKHEAD FORMATION
DNR	11		843.10	HUTTON SANDSTONE

Aquifers

5 *records for RN* **14588**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	451.70		SDST - Sandstone							PS	HOORAY SANDSTONE
2	487.10	490.80	SDST - Sandstone							PS	HOORAY SANDSTONE
3	508.40		SDST - Sandstone							PS	HOORAY SANDSTONE
4	615.70		SDST - Sandstone							PS	ADORI SANDSTONE
5	698.00		SDST - Sandstone							PS	HUTTON SANDSTONE

Pump Tests Part 1

3 *records for RN* **14588**

Pipe	Date	Rec	RN of Pumped Bore	Top (m)	Bottom (m)	Dist (m)	Meth	Test Types	Pump Type	Suction Set (m)	Q Prior to Test (l/s)	Dur of Q PR (mins)	Pres on Arriv (m)	Q on Arriv (l/s/)
A	01/02/1962	20	14588	698.00		0.00	F/F	FR						
A	30/04/1987	1	14588			0.50	ART	DT						
A	11/05/2004	1				0.90	ART	ST FR ST DT					32.57	24.97

Bore Report

From Year:

Pump Tests Part 2

3 *records for RN* 14588

Pipe	Date	Rec	Test Dur (mins)	SWL(m)	Recov Time (mins)	Resid DD (m)	Max DD or P RED (m)	Q at Max DD (l/s)	Time to Max DD (mins)	Max Q (l/s)	Calc Stat HD (m)	Design Yield (l/s)	Design BP (m)	Suct. Set (m)	Tmsy (m2/Day)	Stor
A	01/02/1962	20		50.71				54.04		54.02						
A	30/04/1987	1	360	46.53			24.90	44.57	60			51.30	0.00		748	0.00000000
A	11/05/2004	1	375	46.79			41.28	50.21	90	53.91					331	

Bore Conditions

1 *records for RN* 14588

	Drain Details			*Headworks*									
Date	Tot Len (km)	Max Run (km)	Cond	Ret Len (km)	Cond	Ctrl	Leak	Flow Irreg	Precip	Est Use (ML/yr)	Num of Cattle	Num of Sheep	Comments
11/05/2004	0.0				Good	F					0	0	Town Bore

Elevations

1 *records for RN* 14588

Pipe	Date	Elevation (m)	Precision		Datum	Meas	Point	Survey Source
X	24/10/1962	285.10	SVY	Surveyed	STD - State Datum	N	Natural Surface	

Water Analysis Part 1

3 *records for RN* 14588

Pipe	Date	Rec	Analyst	Analysis No	Depth (m)	Meth	Src	Cond (uS/cm)	pH	Si (mg/L)	Total Ions (mg/L)	Total Solids (mg/L)	Hard	Alk	Fig. of Merit	SAR	RAH
A	18/07/1962	1	GCL	000001	843.00		GB	0	7.5		227.28	0.00	20	148	0.1	8.1	2.56
A	29/04/1987	1	GCL	119743	843.00	PU	GB	410	8.0	27	320.00	250.00	18	150	0.1	8.6	2.60
A	12/05/2004	1	GCL	215788	843.10	PU	GB	386	8.3	32	298.98	244.79	14	142	0.1	9.2	2.56

Water Analysis Part 2

3 *records for RN* 14588

Bore Report

From Year:

Pipe	Date	Rec	Na	K	Ca	Mg	Mn	HCO3	Fe	CO3	Cl	F	NO3	SO4	Zn	Al	B	Cu
A	18/07/1962	1	82.9		5.7	1.4		0.0	8.58	88.7	40.0			0.0				
A	29/04/1987	1	84.0	4.4	7.0	0.1	0.00	180.0	0.06	1.0	30.0	0.20	0.0	8.3				
A	12/05/2004	1	78.4	4.9	5.2	0.2	0.02	168.6	0.01	2.0	32.5	0.17	0.0	7.0	0.00	0.01	0.03	0.00

Water Levels

1 ***records for RN*** **14588**

Pipe	Date	Time	Measure (m)	Meas	Point	Remark	Meas	Type	Coll Auth	Coll	Method	Project	Quality
X	24/10/1962		47.10	N	Natural Surface		NR	Not Recorded	NR	NR	Not Recorded	130	Data is of unknown quality

Wire Line Logs

0 ***records for RN*** **14588**

Field Measurements

2 ***records for RN*** **14588**

Pipe	Date	Depth (m)	Conduct (uS/cm)	pH	Temp (C)	NO3 (mg/L)	DO2 (mg/L)	Eh (mV)	Alkalinity (mV)	Samp	Method	Samp	Source
A	30/04/1987				59.0					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore
A	11/05/2004		385	7.7	58.0					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore

Special Water Analysis

0 ***records for RN*** **14588**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
69912	Artesian - Controlled Flow	Existing	16/11/1994	Longreach	760 - BLACKALL TAMBO REGIONAL

Details

Description	R58 CNR THISTLE & LEEK STS.		
Parish	505 - BLACKALL		
Original Name	TOWN NO. 4 BORE		
Driller Name	T HOWSE		
Drill Company	ARTESIAN DRILLING		
Const Method	FAILING 2500		
Bore Line			
D/O File No	140/014/0003	**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date		**Data Owner**	
Roles			

Location

Latitude	24-25-08	**Basin**	0033
Longitude	145-27-12	**Sub-area**	
GIS Latitude	-24.4188379	**Lot**	1
GIS Longitude	145.4532057	**Plan**	CP817739
Easting	343175		
Northing	7298526	**Map Scale**	
Zone	55	**Map Series**	
Accuracy		**Map No**	SG55-1
GPS Accuracy		**Map Name**	BLACKALL
Checked	Yes	**Prog Section**	

Casing

9 ***records for RN*** **69912**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	29/08/1994	1	0.00	100.50	Steel Casing	6.400	WT - Wall Thickness	200
A	29/08/1994	2	0.00	100.50	Grout			260
A	29/08/1994	3	0.00	760.00	Steel Casing	6.400	WT - Wall Thickness	168
A	29/08/1994	4	0.00	428.00	Grout			200
A	29/08/1994	5	740.00	846.00	Steel Casing	4.760	WT - Wall Thickness	127

Bore Report

From Year:

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	29/08/1994	6	480.00	550.00	Perforated or Slotted Casing	300.000	AP - Aperture Size	
A	29/08/1994	7	645.00	741.00	Perforated or Slotted Casing	300.000	AP - Aperture Size	
A	29/08/1994	8	766.00	846.00	Perforated or Slotted Casing	300.000	AP - Aperture Size	
A	10/11/1994	9	0.00	600.00	Grout			168

Strata Logs

23 ***records for RN*** **69912**

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	1.00	SOIL, BLACK
2	1.00	4.00	CLAY, YELLOW
3	4.00	11.00	CLAY, WHITE
4	11.00	17.00	SAND, RIVER
5	17.00	19.00	ROCK & GRAVEL
6	19.00	49.00	CLAY, GREY
7	49.00	119.00	SHALE, GREY
8	119.00	266.00	SHALE, GREY WITH HARD BANDS
9	266.00	487.00	SHALE, GREY AND QUARTZ
10	487.00	497.00	SANDSTONE*
11	497.00	535.00	CLAY, WHITE SANDY, QUARTZ & S/STONE
12	535.00	554.00	SANDSTONE*
13	554.00	654.00	SILTSTONE, SANDY
14	654.00	657.00	SILTSTONE, HARD & LAYERS OF SAND
15	657.00	674.00	SANDSTONE AND QUARTZ*
16	674.00	700.00	MUDSTONE, HARD WITH SAND BANDS
17	700.00	710.00	MUDSTONE, QUARTZ & S/STONE LAYERS

Bore Report

From Year:

Rec	Top (m)	Bottom (m)	Strata Description
18	710.00	748.00	SANDSTONE & QUARTZ
19	748.00	754.00	MUDSTONE, HARD, SAND & QUARTZ*
20	754.00	787.00	MUDSTONE, BROWN WITH QUARTZ BANDS
21	787.00	805.00	SANDSTONE, FINE WATER*
22	805.00	840.00	SANDSTONE, WATER
23	840.00	846.00	SANDSTONE, WATER & HARD BANDS

Stratigraphies

0 *records for RN* **69912**

Aquifers

10 *records for RN* **69912**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	487.00	497.00	SDST - Sandstone						Y	PS	
2	497.00	535.00	SANC - Sandy Clay						Y	UC	
3	535.00	554.00	SDST - Sandstone						Y	PS	
4	657.00	674.00	META - Metamorphics						Y	PS	
5	674.00	700.00	MDST - Mudstone SAND - Sand						Y	UC	
6	700.00	710.00	META - Metamorphics						Y	PS	
7	710.00	748.00	META - Metamorphics			Y	FLW,YLD 487-748	9.78	Y	PS	
8	748.00	754.00	META - Metamorphics SAND - Sand						N	SC	
9	787.00	805.00	SDST - Sandstone						Y	PS	
10	805.00	840.00	SDST - Sandstone	17/11/1994	45.08	Y	(TOTALS)	48.30	Y	PS	

Pump Tests Part 1

3 *records for RN* **69912**

Bore Report

From Year:

Pipe	Date	Rec	RN of Pumped Bore	Top (m)	Bottom (m)	Dist (m)	Meth	Test Types	Pump Type	Suction Set (m)	Q Prior to Test (l/s)	Dur of Q PR (mins)	Pres on Arriv (m)	Q on Arriv (l/s/)
A	21/11/1994	1	69912				ART	DT						0.00
A	22/11/1994	1	69912			1.08	ART	ST FR DT ST					41.07	1.02
A	13/05/2004	1				0.66	ART	ST FR ST DT					48.17	0.00

Pump Tests Part 2

3 *records for RN* **69912**

Pipe	Date	Rec	Test Dur (mins)	SWL(m)	Recov Time (mins)	Resid DD (m)	Max DD or P RED (m)	Q at Max DD (l/s)	Time to Max DD (mins)	Max Q (l/s)	Calc Stat HD (m)	Design Yield (l/s)	Design BP (m)	Suct. Set (m)	Tmsy (m2/Day)	Stor
A	21/11/1994	1		41.04			37.04	38.70	120			37.50	0.00			
A	22/11/1994	1	340	40.86			37.04	38.70	90	41.81		37.50			439	
A	13/05/2004	1	894	48.22			43.67	42.94	90	48.07					174	

Bore Conditions

2 *records for RN* **69912**

	Drain Details			*Headworks*									
Date	Tot Len (km)	Max Run (km)	Cond	Ret Len (km)	Cond	Ctrl	Leak	Flow Irreg	Precip	Est Use (ML/yr)	Num of Cattle	Num of Sheep	Comments
22/11/1994	0.0				Good	F							
13/05/2004	0.0				Good	F							

Elevations

0 *records for RN* **69912**

Water Analysis Part 1

1 *records for RN* **69912**

Pipe	Date	Rec	Analyst	Analysis No	Depth (m)	Meth	Src	Cond (uS/cm)	pH	Si (mg/L)	Total Ions (mg/L)	Total Solids (mg/L)	Hard	Alk	Fig. of Merit	SAR	RAH

Bore Report

From Year:

Pipe	Date	Rec	Analyst	Analysis No	Depth (m)	Meth	Src	Cond (uS/cm)	pH	Si (mg/L)	Total Ions (mg/L)	Total Solids (mg/L)	Hard	Alk	Fig. of Merit	SAR	RAH
A	13/05/2004	1	GCL	215787	846.00	PU	GB	366	8.6	32	290.57	234.75	4	148	0.0	17.3	2.87

Water Analysis Part 2

1 *records for RN* **69912**

Pipe	Date	Rec	Na	K	Ca	Mg	Mn	HCO3	Fe	CO3	Cl	F	NO3	SO4	Zn	Al	B	Cu
A	13/05/2004	1	80.0	1.9	1.6	0.0	0.01	173.4	0.01	3.5	24.3	0.25	0.0	5.6	0.00	0.01	0.03	0.00

Water Levels

0 *records for RN* **69912**

Wire Line Logs

0 *records for RN* **69912**

Field Measurements

4 *records for RN* **69912**

Pipe	Date	Depth (m)	Conduct (uS/cm)	pH	Temp (C)	NO3 (mg/L)	DO2 (mg/L)	Eh (mV)	Alkalinity (mV)	Samp	Method	Samp	Source
A	16/11/1994	840.00			62.0					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore
A	21/11/1994				60.0					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore
A	22/11/1994		428	8.5	60.0					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore
A	13/05/2004		359	8.0	60.0					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore

Special Water Analysis

0 *records for RN* **69912**

Bore Report

From Year:

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Report Date: 27/09/2023 13:51

Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
116583	Artesian - Controlled Flow	Existing	08/10/2019	Charleville	760 - BLACKALL TAMBO REGIONAL

Details

Description	DRILL LOG 2016025		
Parish	6000 - NO LONGER USED		
Original Name			
Driller Name	HOFFMANN, SCOTT		
Drill Company	DALY BROS		
Const Method	ROTARY MUD		
Bore Line			
D/O File No	CHA/515/001 (0323)3	**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date		**Data Owner**	
Roles	Town Water Supply		

Location

Latitude	24-53-14	**Basin**	0033
Longitude	146-15-31	**Sub-area**	
GIS Latitude	-24.8872222222	**Lot**	51
GIS Longitude	146.2586111111	**Plan**	TB229
Easting	425117		
Northing	7247335	**Map Scale**	
Zone	55	**Map Series**	
Accuracy		**Map No**	
GPS Accuracy		**Map Name**	
Checked	Yes	**Prog Section**	

Casing

10 ***records for RN*** **116583**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	08/10/2019	1	0.00	11.50	Steel Casing	6.400	WT - Wall Thickness	406
A	08/10/2019	2	0.00	108.10	Steel Casing	6.400	WT - Wall Thickness	324
A	08/10/2019	3	0.00	631.25	Stainless Steel	7.700	WT - Wall Thickness	219
A	08/10/2019	4	617.00	751.35	Stainless Steel	7.700	WT - Wall Thickness	168
A	08/10/2019	5	0.00	108.00	Centraliser			

Bore Report

From Year:

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	08/10/2019	6	0.00	631.25	Centraliser			
A	08/10/2019	7	617.00	751.35	Centraliser			
A	08/10/2019	8	653.35	725.35	Perforated or Slotted Casing	15.000	AP - Aperture Size	168
X	08/10/2019	9	0.00	108.00	Grout			363
X	08/10/2019	10	0.00	631.25	Grout			266

Strata Logs

15 ***records for RN*** **116583**

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	1.50	RED BROWN TOP SOIL
2	1.50	7.00	YELLOW TAN CLAYS
3	7.00	30.00	GREY CLAYS
4	30.00	90.00	GREY SHALES
5	90.00	110.00	LIGHT & GREY SANDY CLAY
6	110.00	122.00	LIGHT GREY WHITE CLAYEY SAND
7	122.00	146.00	GREY SANDSTONE
8	146.00	248.00	GREY SHALES
9	248.00	314.00	MEDIUM GRAINED SANDSTONE
10	314.00	422.00	GREY SHALES
11	422.00	632.00	FINE GRAINED SANDSTONE
12	632.00	643.00	DARK GREY SHALES
13	643.00	691.00	MEDIUM GRAINED SANDSTONES
14	691.00	703.00	DARK GREY SHALE
15	703.00	751.35	MEDIUM GRAINED SANDSTONES

Stratigraphies

0 ***records for RN*** **116583**

Bore Report

From Year:

Aquifers

1 *records for RN* **116583**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	643.00	700.00	SDST - Sandstone SHLE - Shale			Y	POTABLE 447USCM	57.00	Y	PS	PRECIPICE SANDSTONE

Pump Tests Part 1

0 *records for RN* **116583**

Pump Tests Part 2

0 *records for RN* **116583**

Bore Conditions

0 *records for RN* **116583**

Elevations

1 *records for RN* **116583**

Pipe	Date	Elevation (m)	Precision		Datum	Meas	Point	Survey Source
X	21/01/2022	401.00	EST	Estimate Using Contours	AHD - Aust. Height Datum	N	Natural Surface	

Water Analysis Part 1

0 *records for RN* **116583**

Water Analysis Part 2

0 *records for RN* **116583**

Water Levels

0 *records for RN* **116583**

Wire Line Logs

0 *records for RN* **116583**

Field Measurements

0 *records for RN* **116583**

Special Water Analysis

0 *records for RN* **116583**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
50896	Artesian - Controlled Flow	Existing	15/03/2000	Charleville	760 - BLACKALL TAMBO REGIONAL

Details

Description			
Parish	6000 - NO LONGER USED		
Original Name	TAMBO TOWN BORE NO 4		
Driller Name	TONY HOWSE		
Drill Company	ARTESIAN DRILLING CONTRACTORS		
Const Method	MUD ROTARY		
Bore Line			
D/O File No	V17 323	**Polygon**	
R/O File No		**Equipment**	HW
H/O File No		**RN of Bore Replaced**	50025
Log Received Date		**Data Owner**	
Roles	Water Supply		

Location

Latitude	24-52-54	**Basin**	0033
Longitude	146-15-16	**Sub-area**	
GIS Latitude	-24.88153939	**Lot**	904
GIS Longitude	146.25450534	**Plan**	T1501
Easting	424699		
Northing	7247963	**Map Scale**	104 - 1: 100 000
Zone	55	**Map Series**	N - New Series
Accuracy	SKET	**Map No**	8148
GPS Accuracy		**Map Name**	TAMBO
Checked	Yes	**Prog Section**	

Casing

11 ***records for RN*** **50896**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	12/08/1999	1	0.00	48.00	Steel Casing	4.760	WT - Wall Thickness	365
A	12/08/1999	2	0.00	48.00	Grout			444
A	12/08/1999	3	0.00	58.00	Steel Casing	6.400	WT - Wall Thickness	324
A	12/08/1999	4	0.00	58.00	Grout			365
A	12/08/1999	5	0.00	412.00	Steel Casing	6.400	WT - Wall Thickness	273

Bore Report

From Year:

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	12/08/1999	6	0.00	412.00	Grout			315
A	01/03/2000	7	0.00	396.00	Acrylonitrile Butadiene Styrene	6.400	WT - Wall Thickness	219
A	01/03/2000	8	396.00	644.00	Acrylonitrile Butadiene Styrene	6.400	WT - Wall Thickness	168
A	01/03/2000	9	0.00	662.00	Grout			260
A	01/03/2000	10	410.00	566.00	Perforated or Slotted Casing	10.000	AP - Aperture Size	168
A	01/03/2000	11	626.00	662.00	Perforated or Slotted Casing	10.000	AP - Aperture Size	168

Strata Logs

30 ***records for RN*** **50896**

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	1.00	BLACK SOIL
2	1.00	4.00	GREY CLAY
3	4.00	14.00	SHALE
4	14.00	16.00	ROCK
5	16.00	30.00	SHALE AND ROCK
6	30.00	33.00	HARD SANDSTONE
7	33.00	42.00	SANDY SHALE
8	42.00	44.00	ROCK
9	44.00	55.00	WHITE SANDY CLAY
10	55.00	63.00	ROCK AND SHALE
11	63.00	66.00	FINE SAND ****
12	66.00	88.00	WHITE SANDY CLAY ****
13	88.00	93.00	SANDSTONE AND QUARTZ ****
14	93.00	194.00	WHITE SANDY CLAY ****
15	194.00	212.00	HARD GREY SHALE

Bore Report

From Year:

Rec	Top (m)	Bottom (m)	Strata Description
16	212.00	254.00	WHITE SANDY CLAY ****
17	254.00	274.00	SANDSTONE ****
18	274.00	298.00	BROWN MUDSTONE
19	298.00	299.00	COAL
20	299.00	330.00	BROWN MUDSTONE
21	330.00	418.00	WHITE SANDY CLAY & SHALE BANDS
22	418.00	422.00	SANDY CLAY ****FLOW
23	422.00	525.00	DIRTY SANDSTONE ****
24	525.00	552.00	SANDY CLAY & QUARTZ ****
25	552.00	618.00	BROWN AND GREY MUDSTONE
26	618.00	639.00	FINE SANDSTONE
27	639.00	656.00	COURSE SANDSTONE ****
28	656.00	658.00	FINE SANDSTONE & QUARTZ ****
29	658.00	660.00	FINE SANDY RED & WHITE CLAY
30	660.00	662.00	GREEN HARD SHALE

Stratigraphies

0 *records for RN* **50896**

Aquifers

4 *records for RN* **50896**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	63.00	120.00	CSAN - Clayey Sand				VERY BAD		N	PS	BIRKHEAD FORMATION
2	120.00	274.00	CSAN - Clayey Sand				UNKNOWN		N	PS	BIRKHEAD FORMATION
3	418.00	552.00	SDST - Sandstone				POTABLE	34.00	Y	SC	HUTTON SANDSTONE
4	639.00	658.00	SANC - Sandy Clay SDST - Sandstone				POTABLE		Y	SC	HUTTON SANDSTONE

Bore Report

From Year:

Pump Tests Part 1

2 *records for RN* 50896

Pipe	Date	Rec	RN of Pumped Bore	Top (m)	Bottom (m)	Dist (m)	Meth	Test Types	Pump Type	Suction Set (m)	Q Prior to Test (l/s)	Dur of Q PR (mins)	Pres on Arriv (m)	Q on Arriv (l/s/)
A	22/03/2000	1	50896			1.08	ART	FR ST						
A	04/04/2000	1	50896			1.40	ART	FR ST DT					22.86	

Pump Tests Part 2

2 *records for RN* 50896

Pipe	Date	Rec	Test Dur (mins)	SWL(m)	Recov Time (mins)	Resid DD (m)	Max DD or P RED (m)	Q at Max DD (l/s)	Time to Max DD (mins)	Max Q (l/s)	Calc Stat HD (m)	Design Yield (l/s)	Design BP (m)	Suct. Set (m)	Tmsy (m2/Day)	Stor
A	22/03/2000	1	165	22.78				29.66		32.71	24.09				230	
A	04/04/2000	1	340	22.55			18.00	29.70	90	32.29	23.67				230	

Bore Conditions

2 *records for RN* 50896

	Drain Details			*Headworks*									
Date	Tot Len (km)	Max Run (km)	Cond	Ret Len (km)	Cond	Ctrl	Leak	Flow Irreg	Precip	Est Use (ML/yr)	Num of Cattle	Num of Sheep	Comments
22/03/2000					Good	F							New bore for town supply not hooked up to system yet
04/04/2000					Good	F							Bore is for town supply and is not hooked up yet.

Elevations

0 *records for RN* 50896

Water Analysis Part 1

1 *records for RN* 50896

Pipe	Date	Rec	Analyst	Analysis No	Depth (m)	Meth	Src	Cond (uS/cm)	pH	Si (mg/L)	Total Ions (mg/L)	Total Solids (mg/L)	Hard	Alk	Fig. of Merit	SAR	RAH

Bore Report

From Year:

Pipe	Date	Rec	Analyst	Analysis No	Depth (m)	Meth	Src	Cond (uS/cm)	pH	Si (mg/L)	Total Ions (mg/L)	Total Solids (mg/L)	Hard	Alk	Fig. of Merit	SAR	RAH
A	22/03/2000	1	GCL	204166		PU	GB	259	7.5	20	184.26	155.02	29	79	0.4	3.0	1.00

Water Analysis Part 2

1 *records for RN* **50896**

Pipe	Date	Rec	Na	K	Ca	Mg	Mn	HCO3	Fe	CO3	Cl	F	NO3	SO4	Zn	Al	B	Cu
A	22/03/2000	1	37.5	8.7	6.1	3.4	0.04	96.3	0.04	0.2	25.1	0.13	0.0	6.9	0.07	0.00	0.00	0.00

Water Levels

0 *records for RN* **50896**

Wire Line Logs

0 *records for RN* **50896**

Field Measurements

2 *records for RN* **50896**

Pipe	Date	Depth (m)	Conduct (uS/cm)	pH	Temp (C)	NO3 (mg/L)	DO2 (mg/L)	Eh (mV)	Alkalinity (mV)	Samp	Method	Samp	Source
A	22/03/2000		260	9.0	44.0					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore
A	04/04/2000		260	9.0	44.7					PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore

Special Water Analysis

0 *records for RN* **50896**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
116498	Artesian - Controlled Flow	Existing	18/06/2014	Charleville	760 - BLACKALL TAMBO REGIONAL

Details

Description	DRILL LOG 15274		
Parish	6000 - NO LONGER USED		
Original Name			
Driller Name	NORRIE, KEVIN		
Drill Company			
Const Method			
Bore Line			
D/O File No	CHV 1146	**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date	03/05/2019	**Data Owner**	
Roles	Water Supply		

Location

Latitude	24-53-12	**Basin**	0033
Longitude	146-14-30	**Sub-area**	
GIS Latitude	-24.88666667	**Lot**	3
GIS Longitude	146.24166667	**Plan**	SP157686
Easting	423405		
Northing	7247388	**Map Scale**	
Zone	55	**Map Series**	
Accuracy		**Map No**	
GPS Accuracy		**Map Name**	
Checked	Yes	**Prog Section**	

Casing

7 ***records for RN*** **116498**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	20/06/2014	1	0.00	40.00	Polyvinyl Chloride	13.000	WT - Wall Thickness	225
A	20/06/2014	2	0.00	390.00	Steel Casing			125
A	20/06/2014	3	356.00	612.00	Steel Casing			150
A	20/06/2014	4	415.00	546.00	Perforated or Slotted Casing	3.000	AP - Aperture Size	150
A	20/06/2014	5	550.00	606.00	Perforated or Slotted Casing	3.000	AP - Aperture Size	150

Bore Report

From Year:

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
X	20/06/2014	1	0.00	40.00	Grout			300
X	20/06/2014	2	0.00	390.00	Grout			215

Strata Logs

20 *records for RN* **116498**

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	6.00	TOPSOIL
2	6.00	90.00	GREY SHALE
3	90.00	122.00	SOFT LIGHT GREY SHALESTONE
4	122.00	181.00	DARK GREY SHALE
5	181.00	201.00	FINE WHITE SANDSTONE
6	201.00	219.00	GREY COARSE SANDSTONE
7	219.00	249.00	WHITE COARSE SANDSTONE / COAL
8	249.00	258.00	DARK SHALEY SANDSTONE
9	258.00	266.00	SHALE
10	266.00	272.00	FINE GREY SANDSTONE
11	272.00	278.00	DARK SHALE
12	278.00	284.00	DARK COARSE SANDSTONE
13	284.00	290.00	SHALEY SANDSTONE
14	290.00	401.00	SHALE
15	401.00	448.00	SOFT FINE SANDSTONE
16	448.00	466.00	COARSE SANDSTONE
17	466.00	546.00	SOFT FINE SANDSTONE
18	546.00	564.00	DARK SANDSTONE
19	564.00	602.00	DARK HARD COARSE SANDSTONE

Bore Report

From Year:

Rec	Top (m)	Bottom (m)	Strata Description
20	602.00	612.00	SHALEY HARD

Stratigraphies

0 *records for RN* **116498**

Aquifers

1 *records for RN* **116498**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	564.00	606.00	SDST - Sandstone	20/06/2014	-60.00	N	POTABLE	31.00	Y	SC	HUTTON SANDSTONE

Pump Tests Part 1

0 *records for RN* **116498**

Pump Tests Part 2

0 *records for RN* **116498**

Bore Conditions

0 *records for RN* **116498**

Elevations

0 *records for RN* **116498**

Water Analysis Part 1

0 *records for RN* **116498**

Water Analysis Part 2

0 *records for RN* **116498**

Water Levels

0 *records for RN* **116498**

Wire Line Logs

0 *records for RN* **116498**

Field Measurements

0 *records for RN* **116498**

Special Water Analysis

0 *records for RN* **116498**

Bore Report

From Year:

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Report Date: 24/10/2023 14:08

Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
116259	Sub-Artesian Facility	Existing	25/10/2007	Charleville	760 - BLACKALL TAMBO REGIONAL

Details

Description			
Parish	4415 - TAMBO		
Original Name	GOLF CLUB ROAD		
Driller Name	LLOYD JOHNSON		
Drill Company	JOHNSON DRILLING		
Const Method	ROTARY AIR/MUD		
Bore Line			
D/O File No	V17 0323	**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date	12/11/2007	**Data Owner**	
Roles	Water Supply		

Location

Latitude	24-50-38	**Basin**	0033
Longitude	146-15-57	**Sub-area**	
GIS Latitude	-24.844819	**Lot**	1
GIS Longitude	146.2655658	**Plan**	SP197820
Easting	425831		
Northing	7252140	**Map Scale**	104 - 1: 100 000
Zone	55	**Map Series**	N - New Series
Accuracy	GPS	**Map No**	8148
GPS Accuracy	300	**Map Name**	TAMBO
Checked	Yes	**Prog Section**	

Casing

5 ***records for RN*** **116259**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	21/10/2007	1	0.00	42.00	Steel Casing	4.800	WT - Wall Thickness	219
A	21/10/2007	2	0.00	42.00	Grout			265
A	24/10/2007	3	0.00	206.30	Steel Casing	4.800	WT - Wall Thickness	168
A	24/10/2007	4	173.00	206.00	Perforated or Slotted Casing	12.000	AP - Aperture Size	168
A	24/10/2007	5	0.00	150.00	Grout			204

Bore Report

From Year:

Strata Logs

13 *records for RN* **116259**

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	0.80	TOP SOIL
2	0.80	2.80	GRAVEL & CLAY
3	2.80	9.00	SDST & CLAY BANDS
4	9.00	33.00	YELLOW SDST
5	33.00	39.00	SAND & SDST
6	39.00	65.00	GREY SHALE - GREY SDST
7	65.00	124.00	GREY SHALE
8	124.00	130.00	GREY SDST
9	130.00	142.00	FINE WHITE GREY SDST **** NO TEST
10	142.00	153.00	GREY SHALE
11	153.00	174.00	SDST - GREY SHALE ****
12	174.00	207.00	CLEANER SDST **** 14LTS/SEC
13	207.00	210.60	GREY SHALE

Stratigraphies

0 *records for RN* **116259**

Aquifers

1 *records for RN* **116259**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	153.00	207.00	SDST - Sandstone	25/10/2007	-30.20	N	POTABLE	14.00	Y	PS	ADORI SANDSTONE

Pump Tests Part 1

1 *records for RN* **116259**

Pipe	Date	Rec	RN of Pumped Bore	Top (m)	Bottom (m)	Dist (m)	Meth	Test Types	Pump Type	Suction Set (m)	Q Prior to Test (l/s)	Dur of Q PR (mins)	Pres on Arriv (m)	Q on Arriv (l/s/)
A	25/10/2007	1	116259	153.00	206.00		PUM		AIR	90.00				

Bore Report

From Year:

Pump Tests Part 2

1 *records for RN* **116259**

Pipe	Date	Rec	Test Dur (mins)	SWL(m)	Recov Time (mins)	Resid DD (m)	Max DD or P RED (m)	Q at Max DD (l/s)	Time to Max DD (mins)	Max Q (l/s)	Calc Stat HD (m)	Design Yield (l/s)	Design BP (m)	Suct. Set (m)	Tmsy (m2/Day)	Stor
A	25/10/2007	1	120	-30.20										90.00		

Bore Conditions

0 *records for RN* **116259**

Elevations

0 *records for RN* **116259**

Water Analysis Part 1

0 *records for RN* **116259**

Water Analysis Part 2

0 *records for RN* **116259**

Water Levels

0 *records for RN* **116259**

Wire Line Logs

0 *records for RN* **116259**

Field Measurements

0 *records for RN* **116259**

Special Water Analysis

0 *records for RN* **116259**

Bore Report

From Year:

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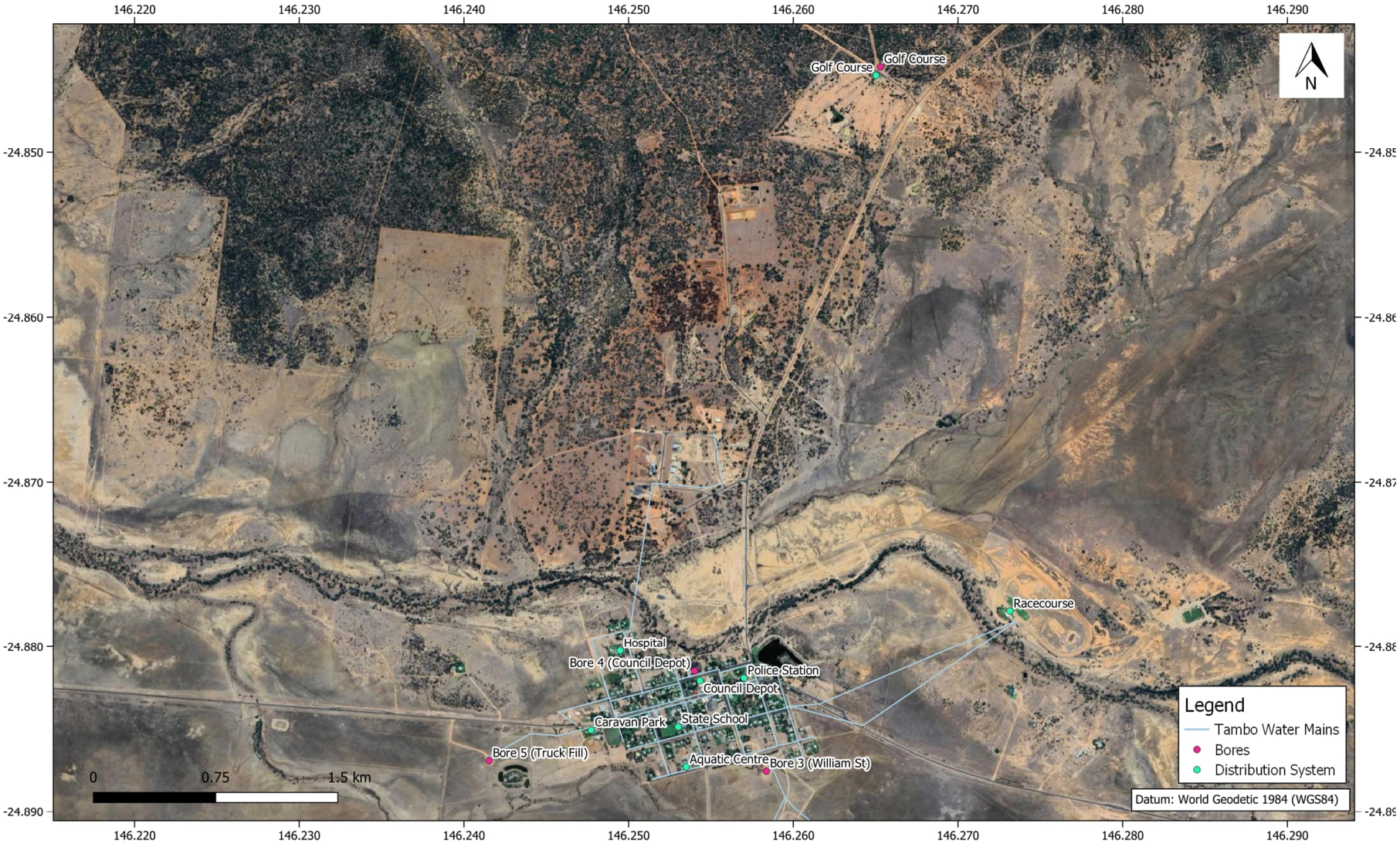
APPENDIX B

BLACKALL & TAMBO OPERATIONAL/VERIFICATION MONITORING LOCATIONS

Map: 1

Blackall-Tambo Regional Council DWQMP Operational and Verification Monitoring Locations - Blackall

GBA CONSULTING ENGINEERS



Map: 2

Blackall-Tambo Regional Council DWQMP
Operational and Verification
Monitoring Locations - Tambo

GBA CONSULTING ENGINEERS

APPENDIX C

BLACKALL WATER QUALITY TRENDS

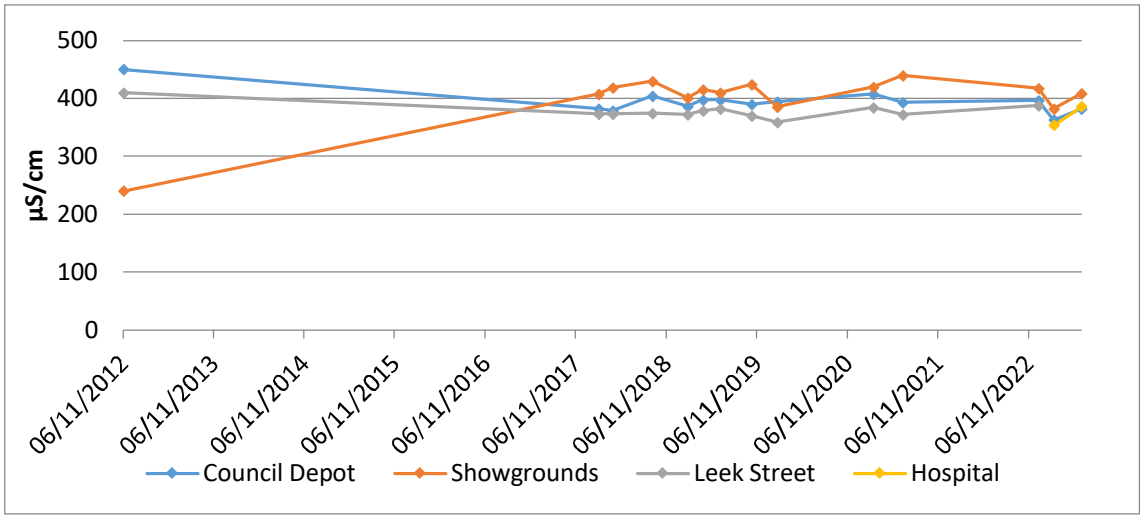


Figure 9: Blackall verification monitoring trends for Conductivity (2012- 2023).

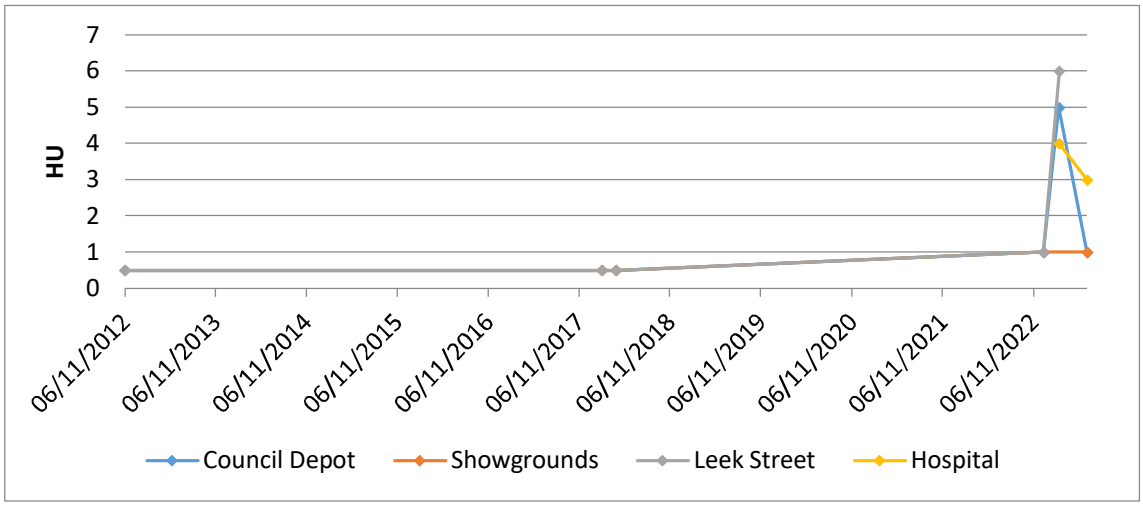


Figure 10: Blackall verification monitoring trends for True Colour (2012- 2023).

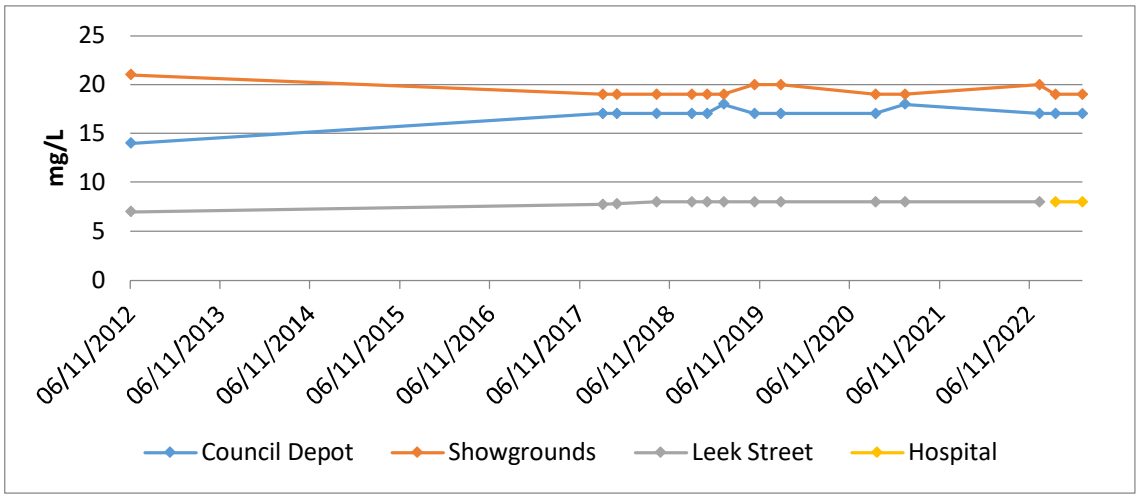


Figure 11: Blackall verification monitoring trends for Total Hardness (2012- 2023).

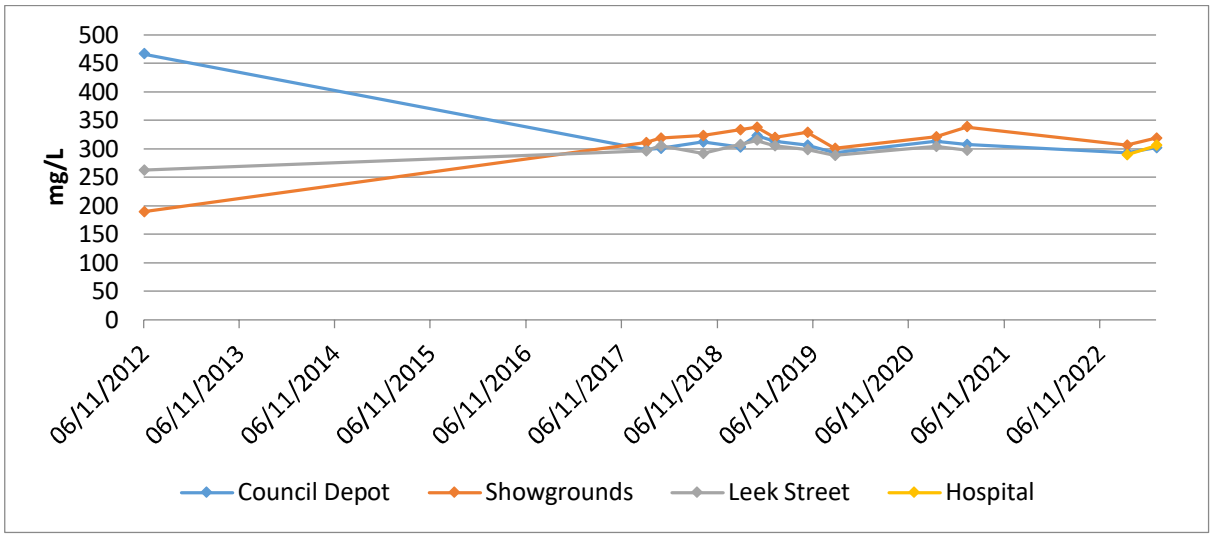


Figure 12: Blackall verification monitoring trends for Total Dissolved Ions (2012- 2023).

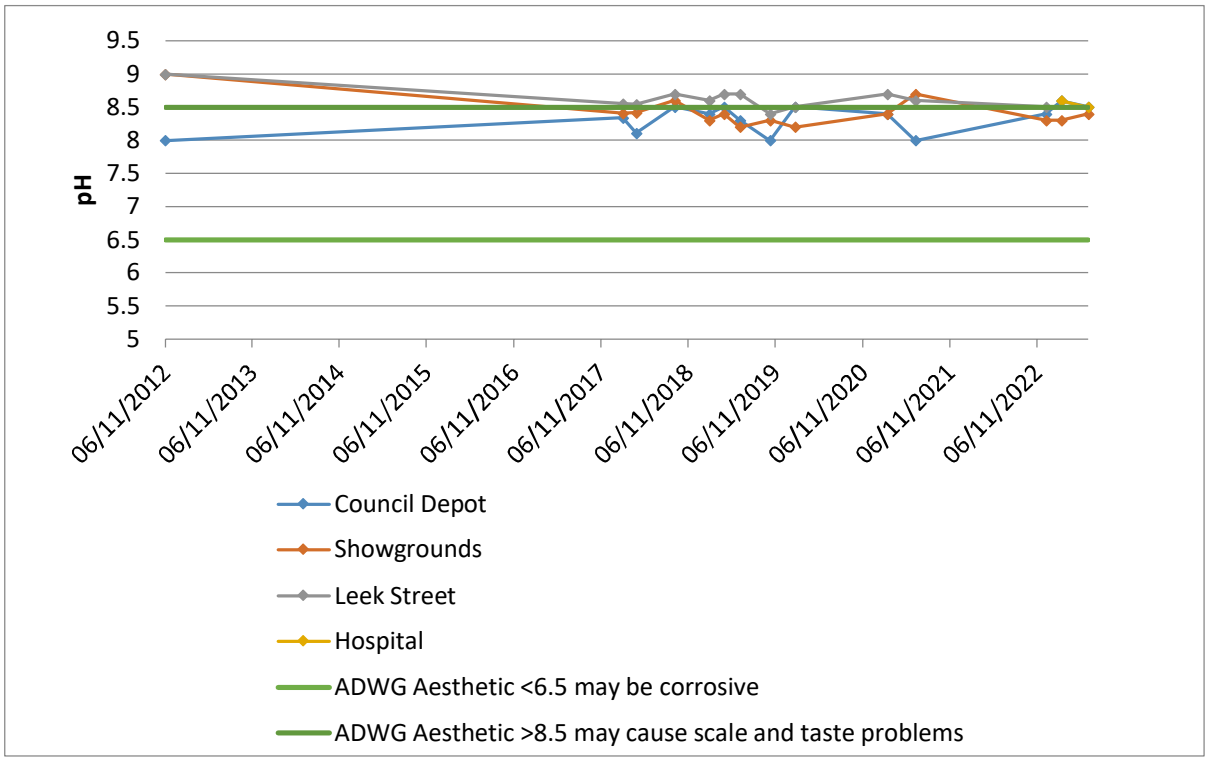


Figure 13: Blackall verification monitoring trends for pH (2012- 2023).

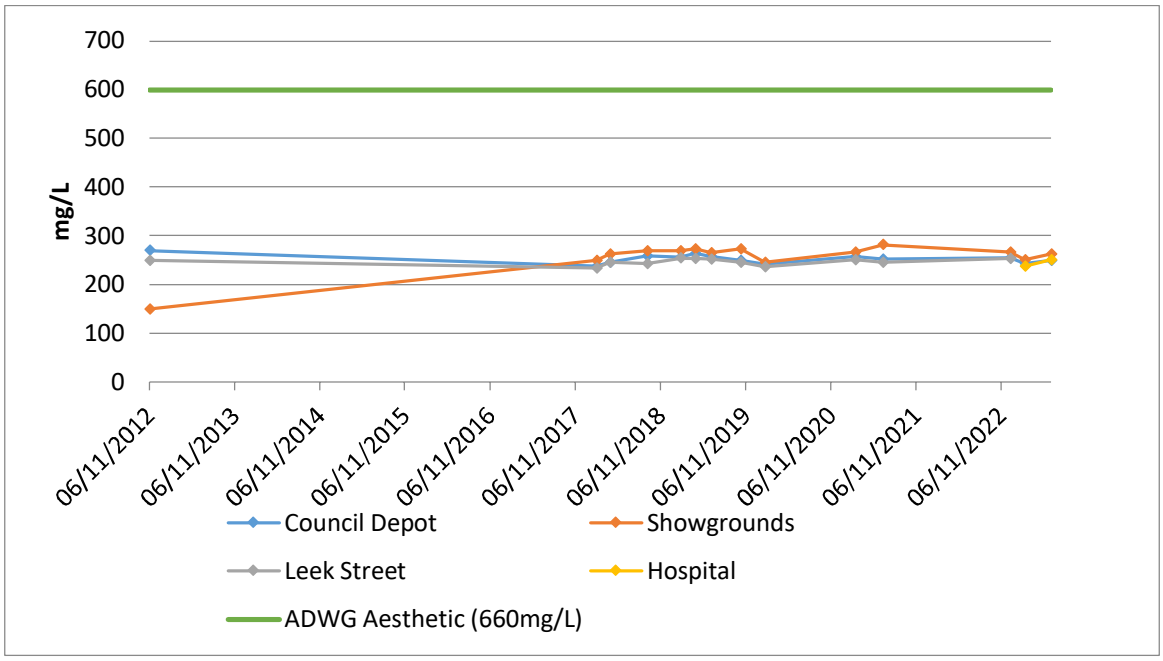


Figure 14: Blackall verification monitoring trends for Total Dissolved Solids (2012- 2023).

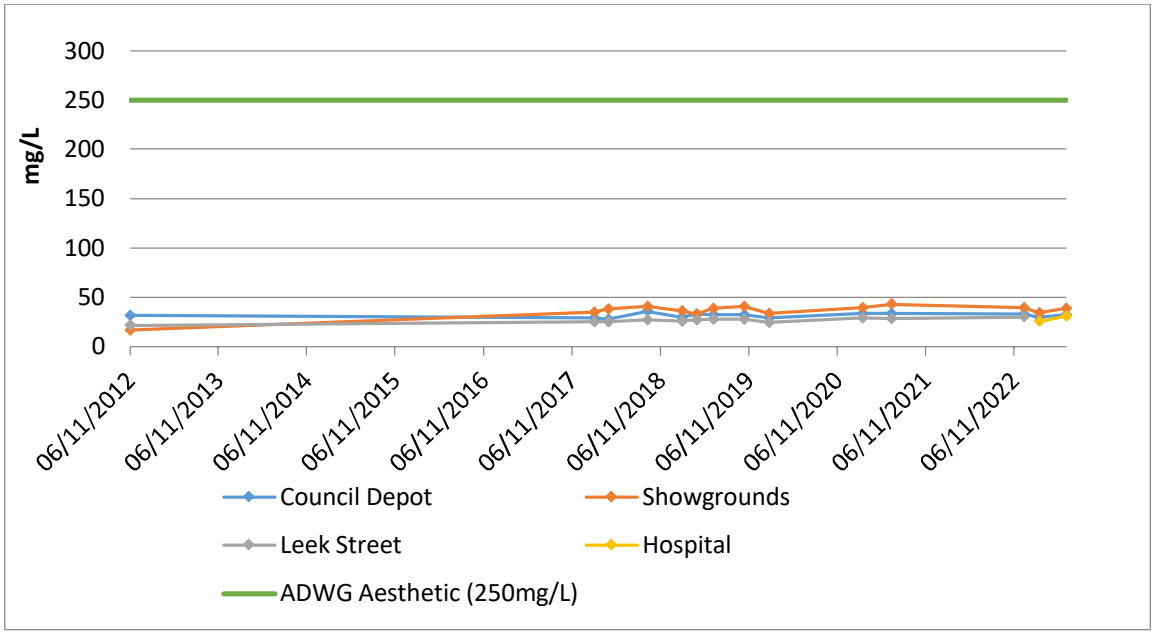


Figure 15: Blackall verification monitoring trends for Chloride (2012- 2023).

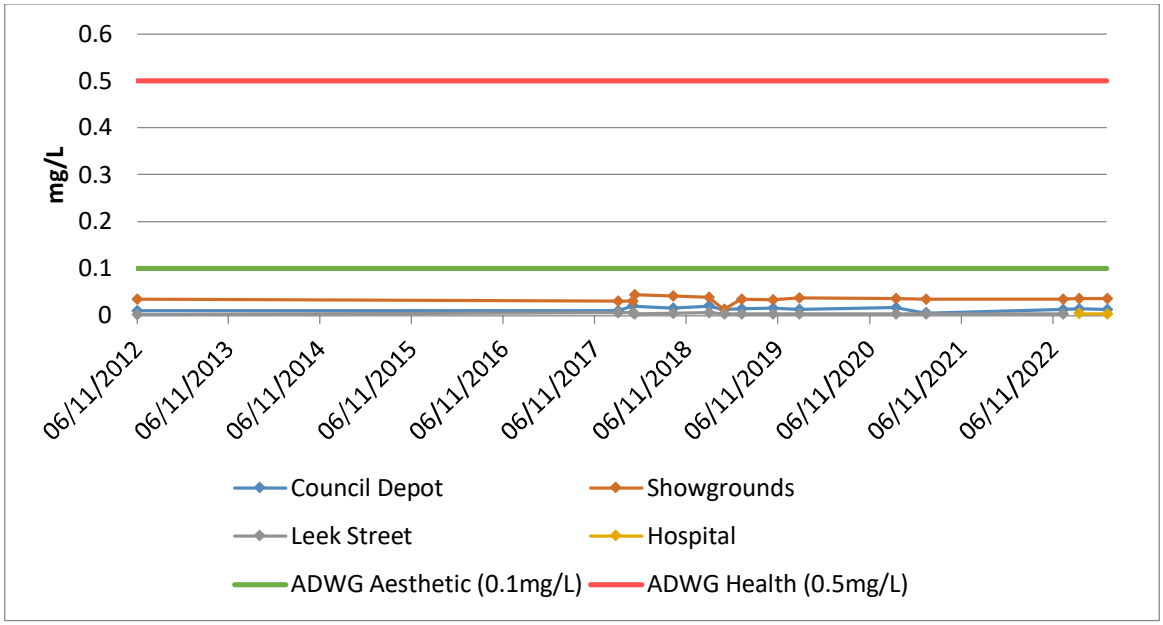


Figure 16: Blackall verification monitoring trends for Total Manganese (2012- 2023).

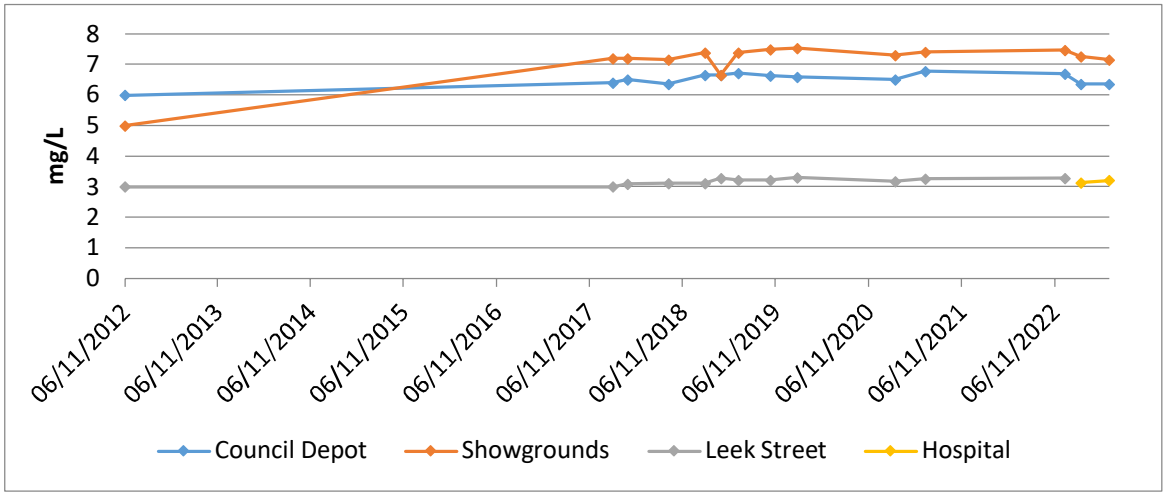


Figure 17: Blackall verification monitoring trends for Calcium (2012- 2023).

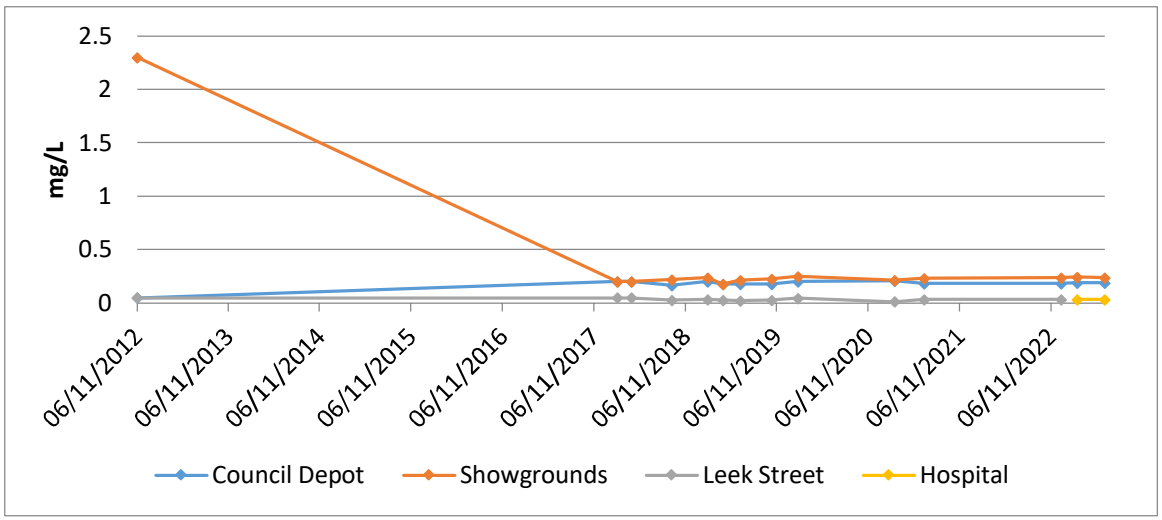


Figure 18: Blackall verification monitoring trends for Magnesium (2012- 2023).

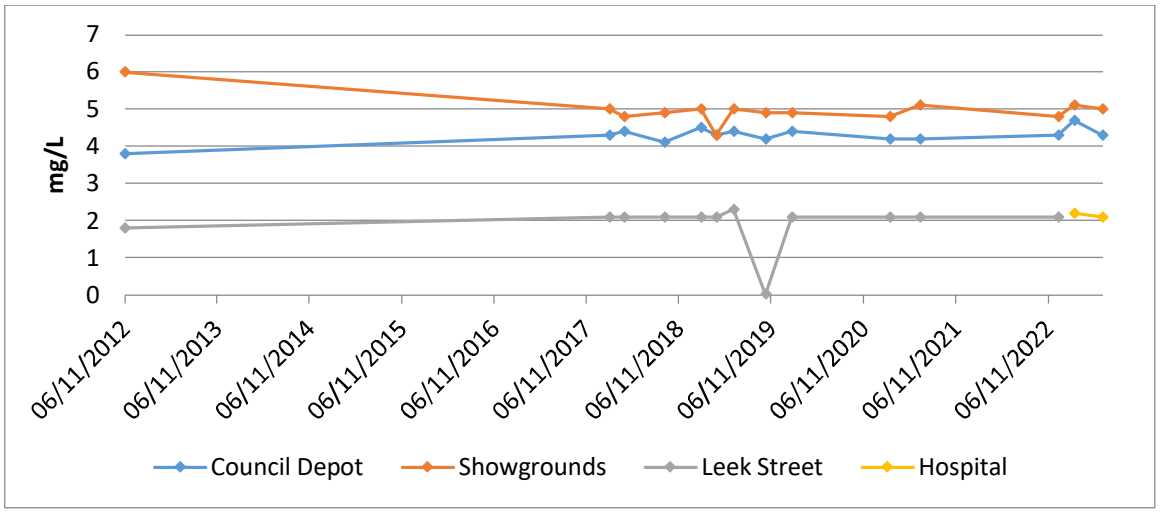


Figure 19: Blackall verification monitoring trends for Potassium (2012- 2023).

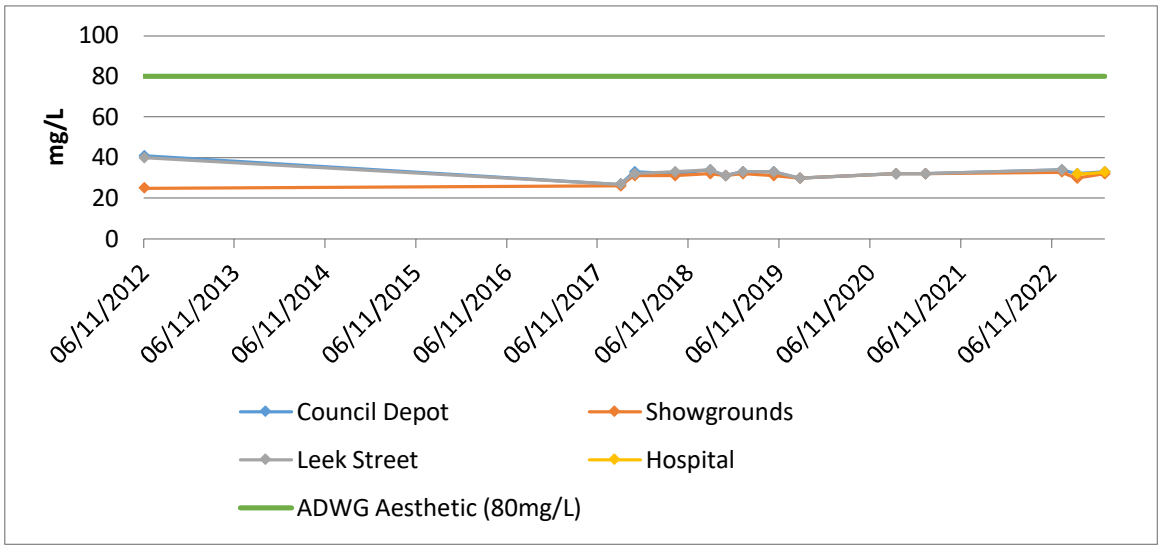


Figure 20: Blackall verification monitoring trends for Silica (2012- 2023).

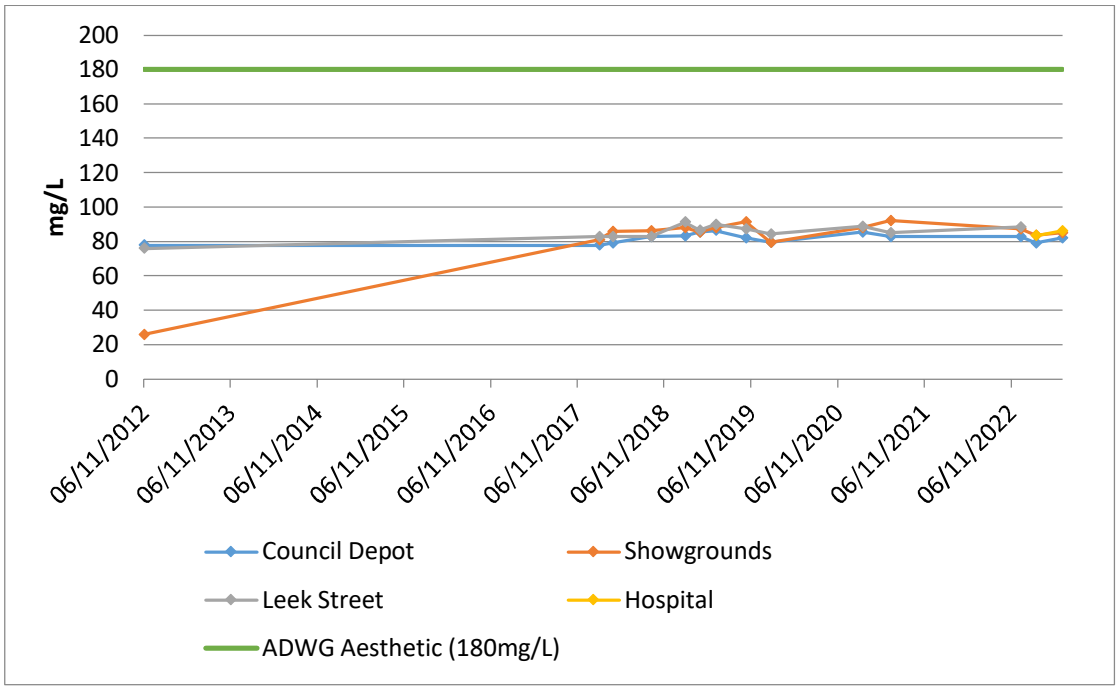


Figure 21: Blackall verification monitoring trends for Sodium (2012- 2023).

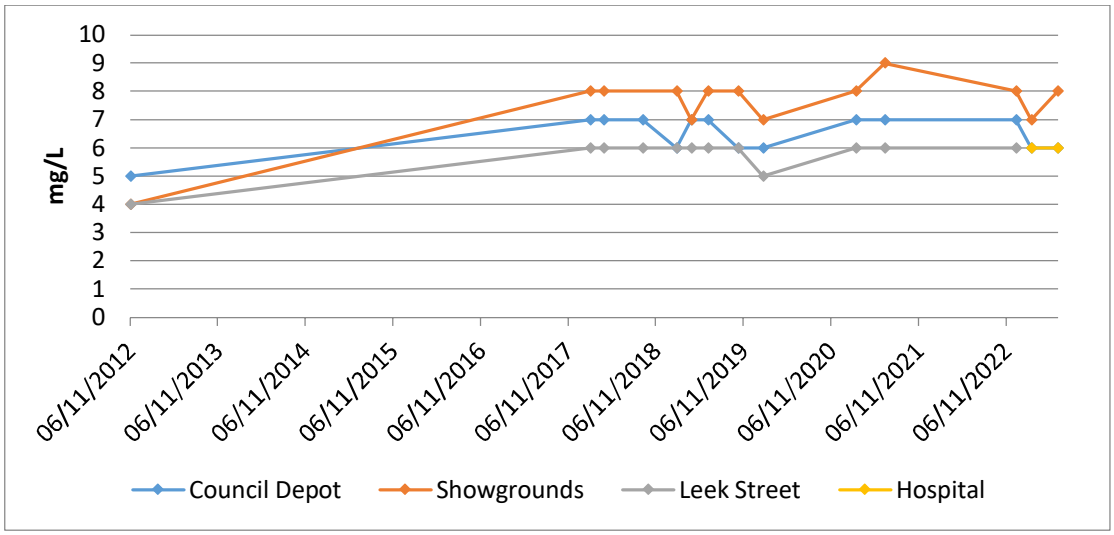


Figure 22: Blackall verification monitoring trends for Sulphate (2012- 2023).

Figure 23: Blackall verification monitoring trends for Phosphate (2018- 2023).

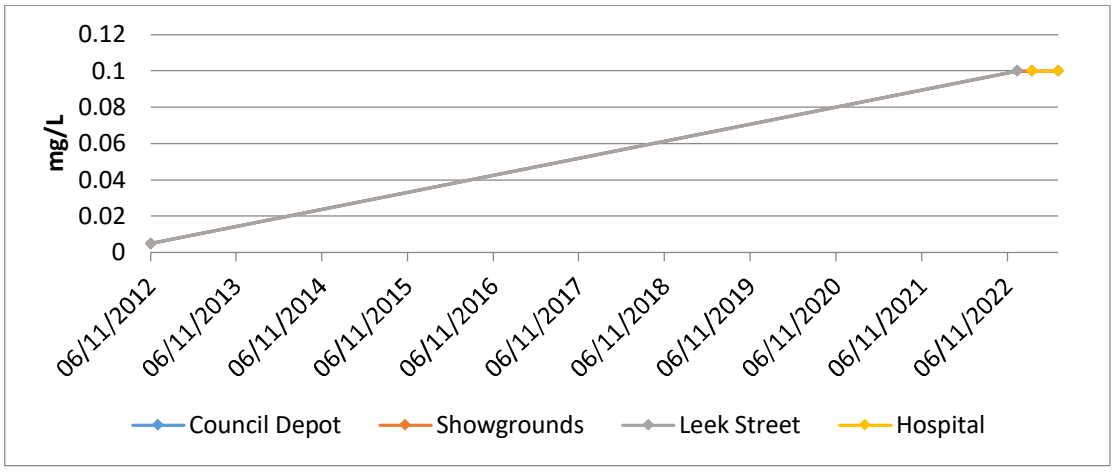


Figure 24: Blackall verification monitoring trends for Nitrite (2012- 2023).

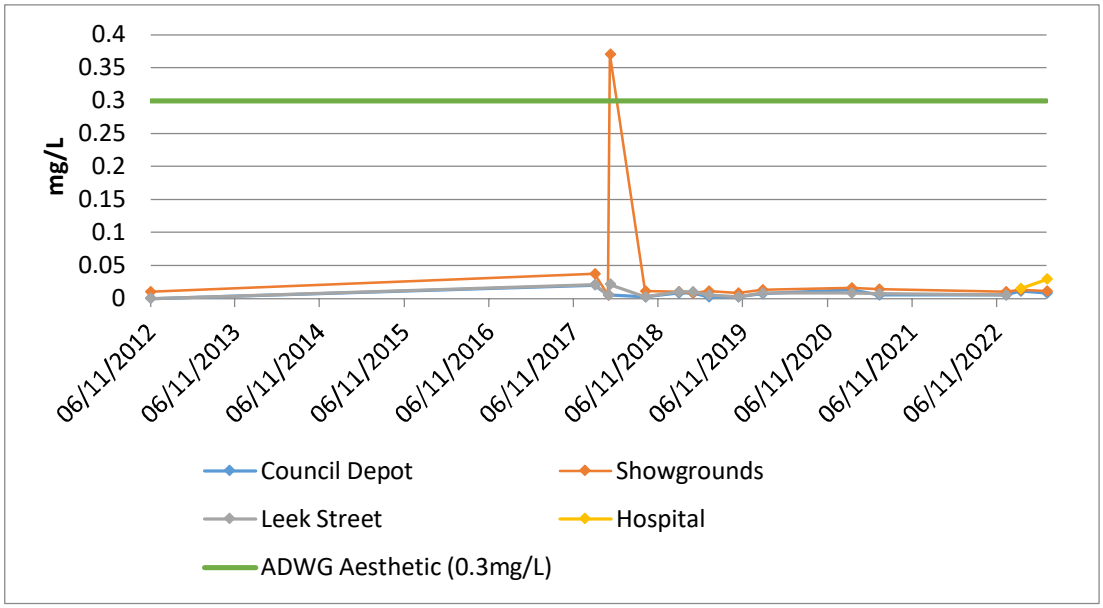


Figure 25: Blackall verification monitoring trends for Total Iron (2012- 2023).

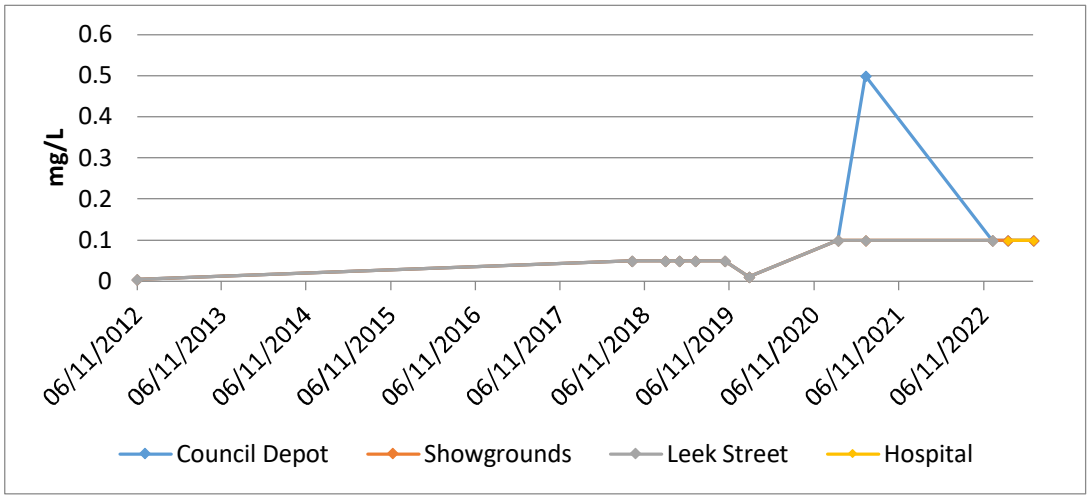


Figure 26: Blackall verification monitoring trends for Nitrate (2012- 2023).

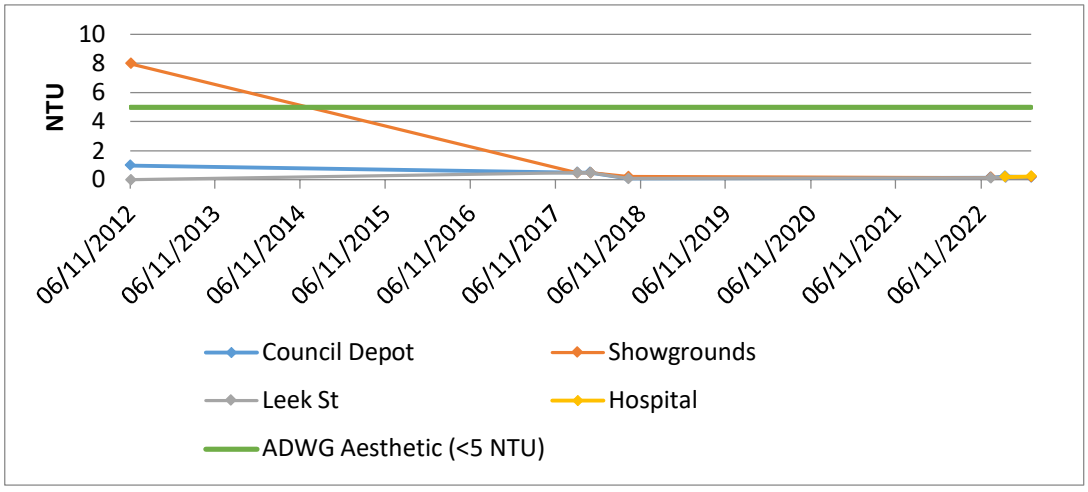


Figure 27: Blackall verification monitoring trends for Turbidity (2012- 2023).

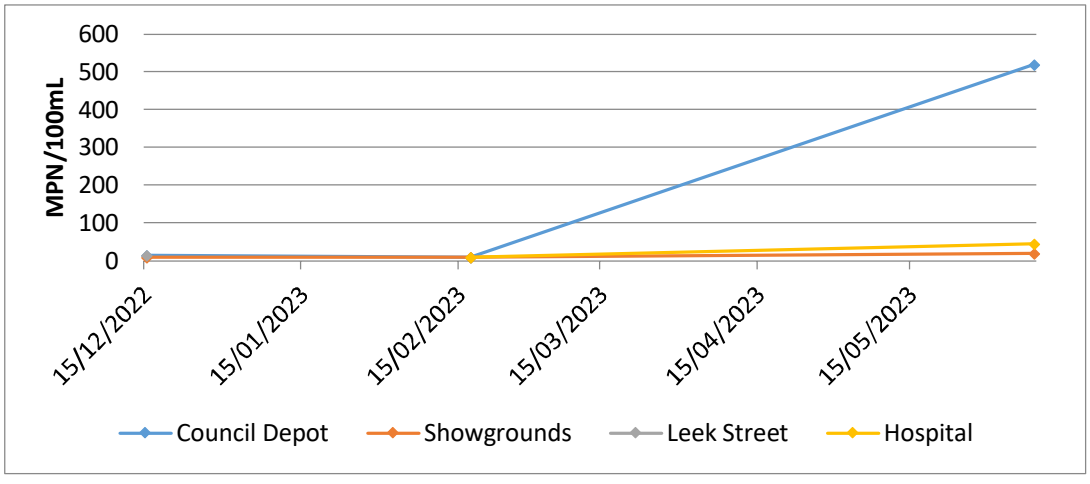


Figure 28: Blackall verification monitoring trends for Heterotrophic Plate Count (2022- 2023).

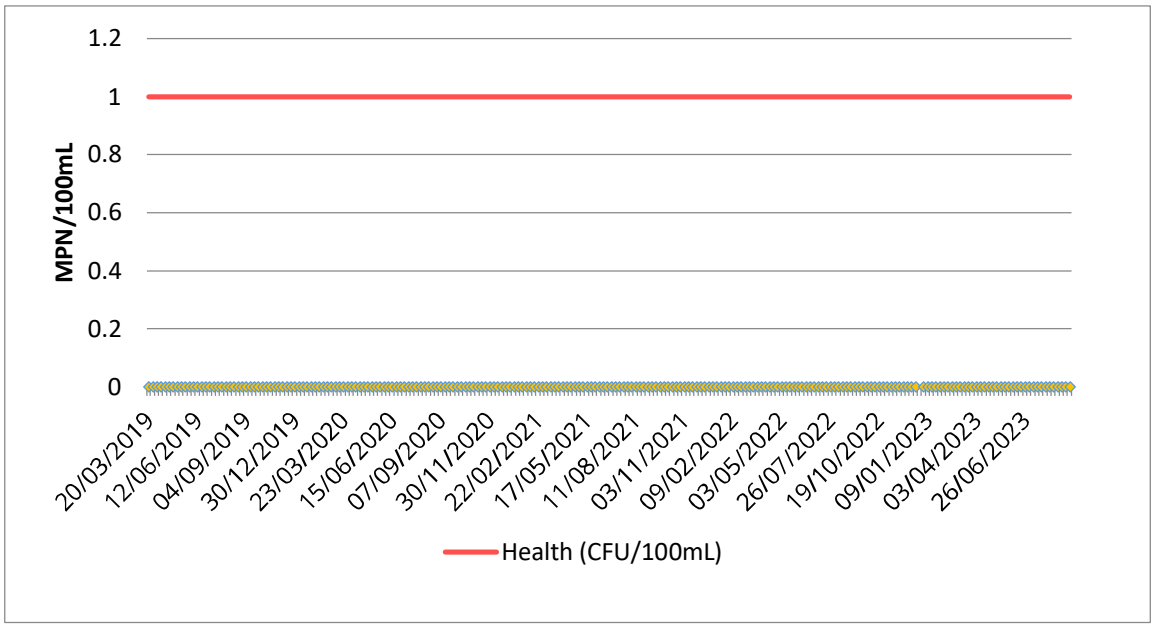


Figure 29: Blackall operational monitoring trends for E.coli (2019- 2023).

APPENDIX D

TAMBO WATER QUALITY TRENDS

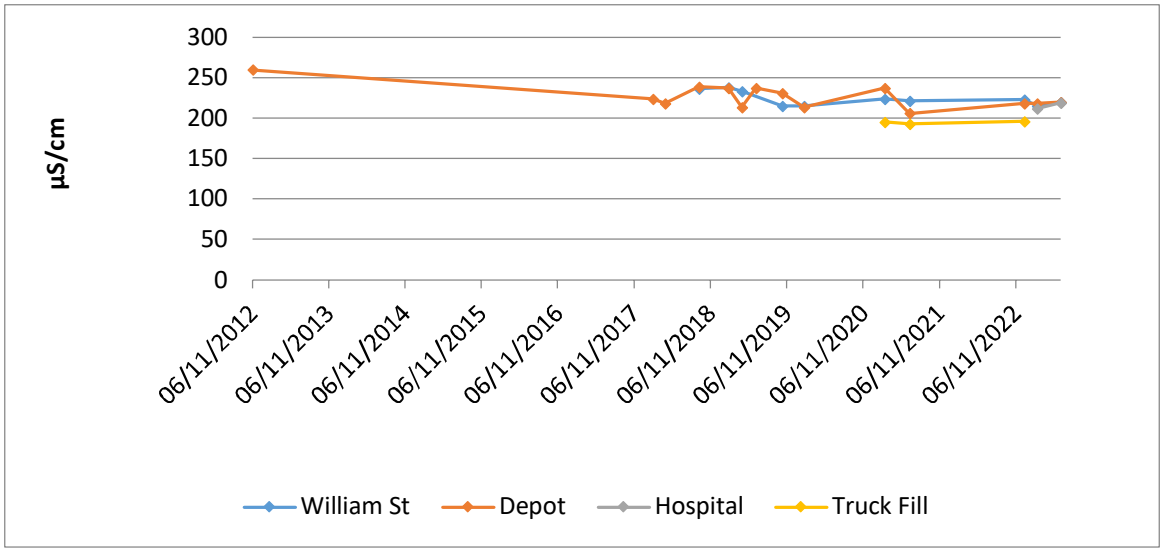


Figure 30: Tambo verification monitoring trends for Conductivity (2012- 2023).

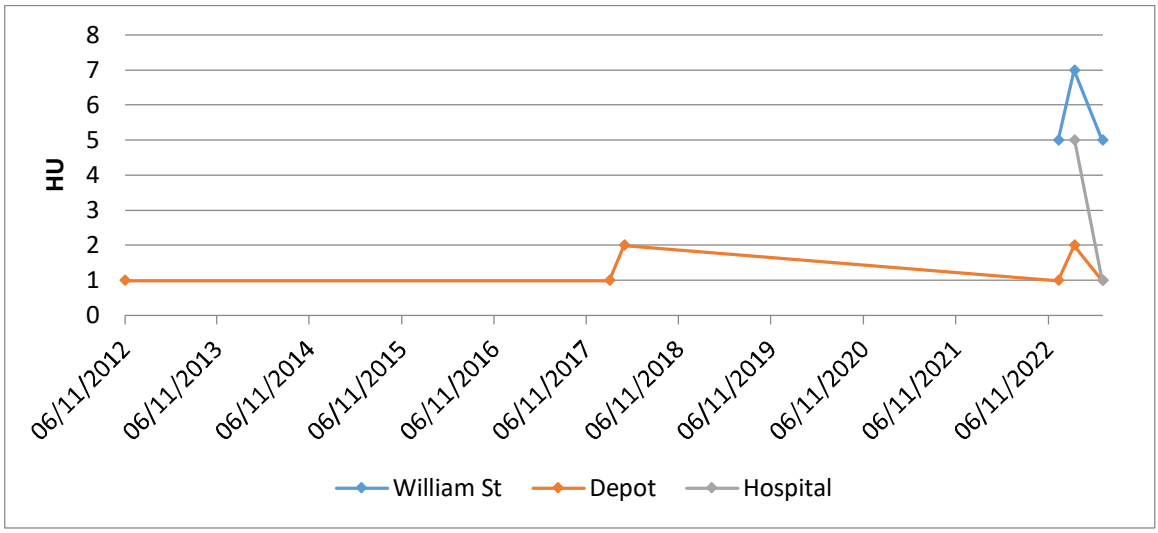


Figure 31: Tambo verification monitoring trends for True Colour (2012- 2023).

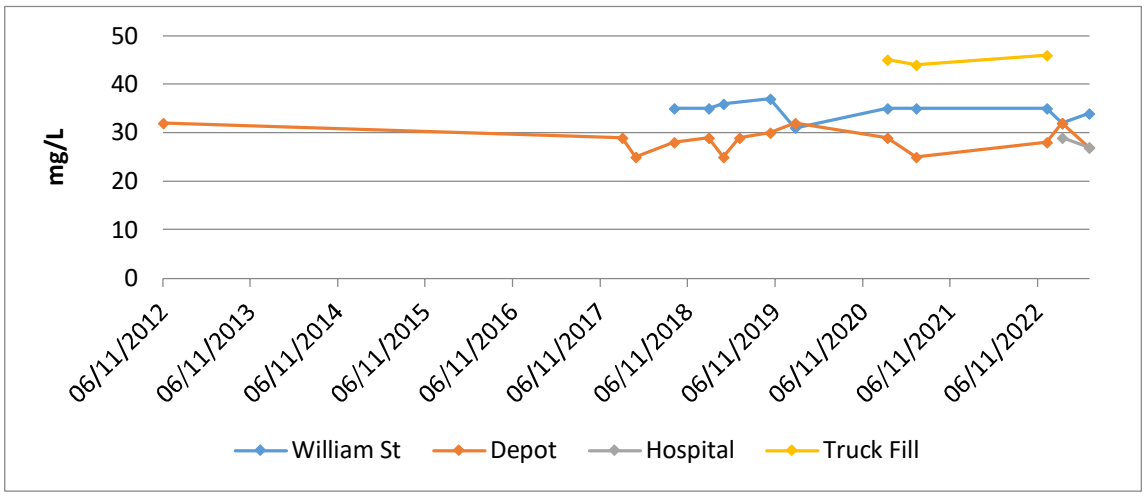


Figure 32: Tambo verification monitoring trends for Total Hardness (2012- 2023).

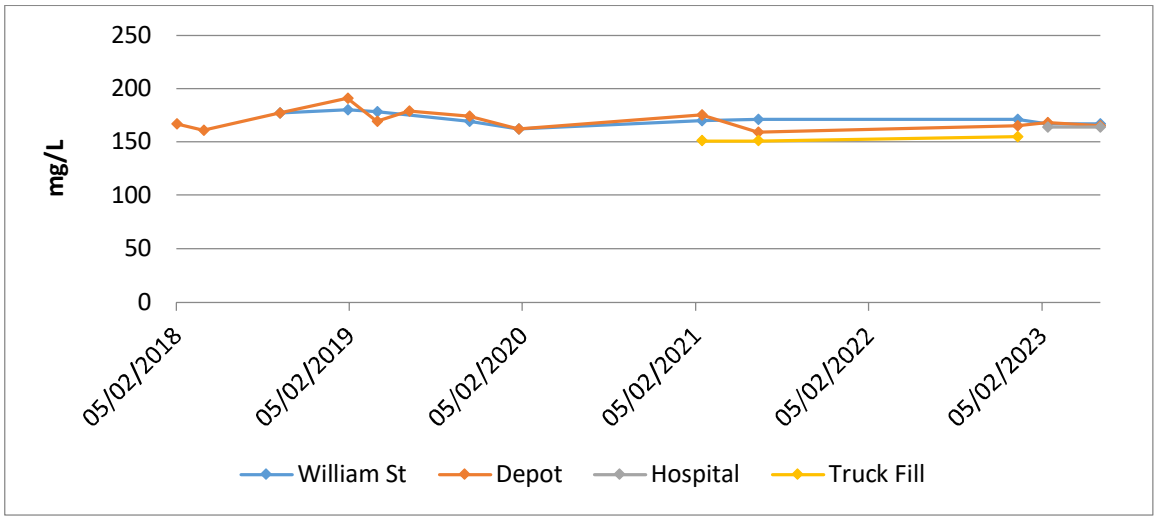


Figure 33: Tambo verification monitoring trends for Total Dissolved Ions (2018- 2023).

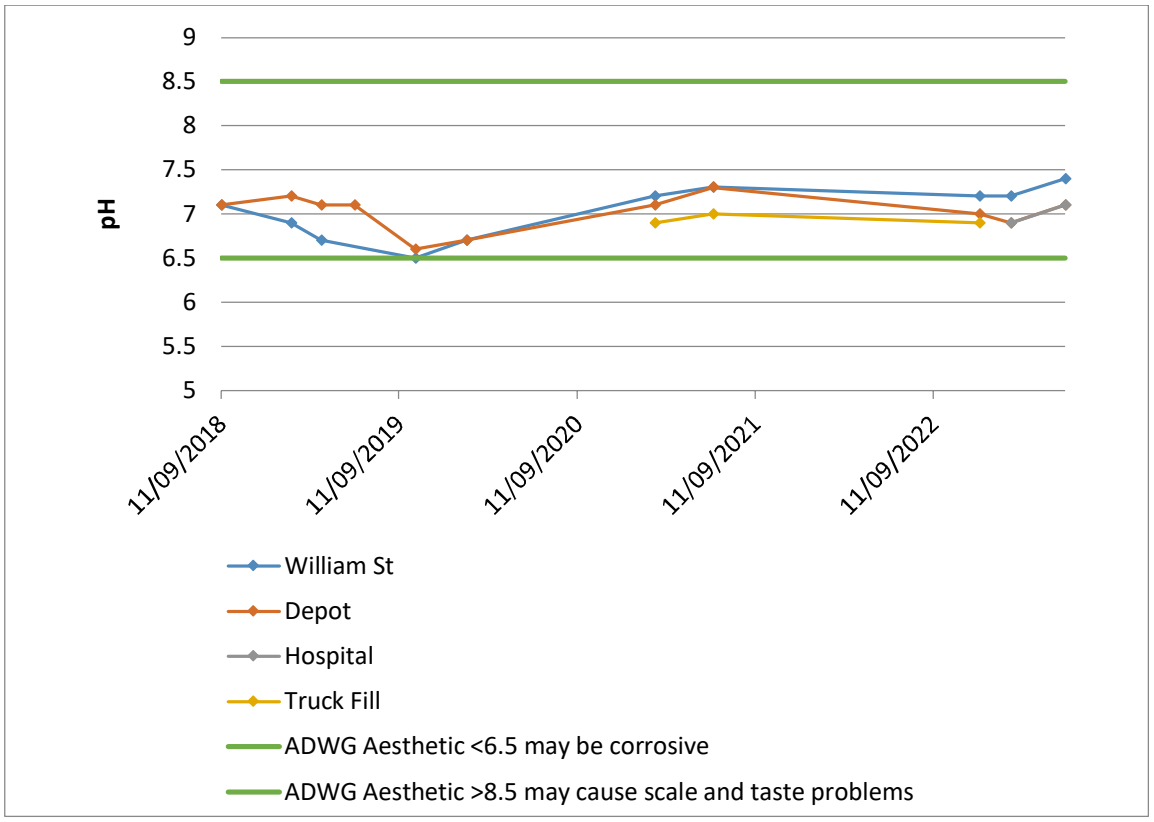


Figure 34: Tambo verification monitoring trends for pH (2018- 2023).

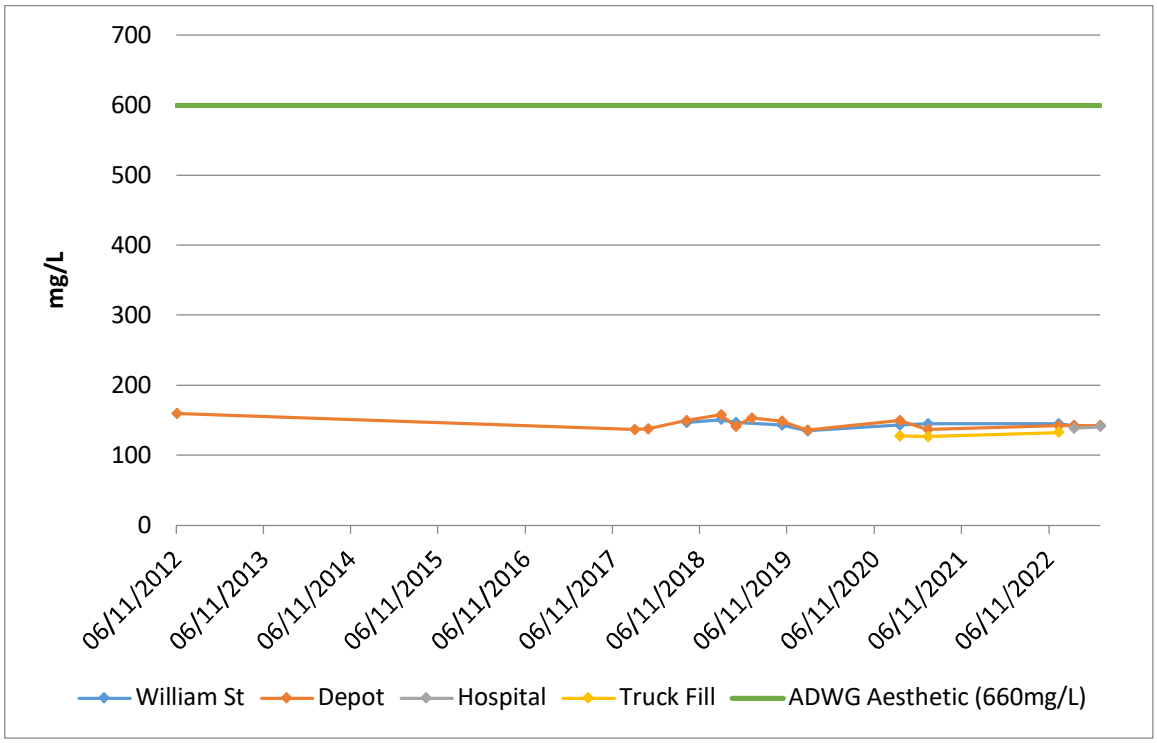


Figure 35: Tambo verification monitoring trends for Total Dissolved Solids (2012- 2023).

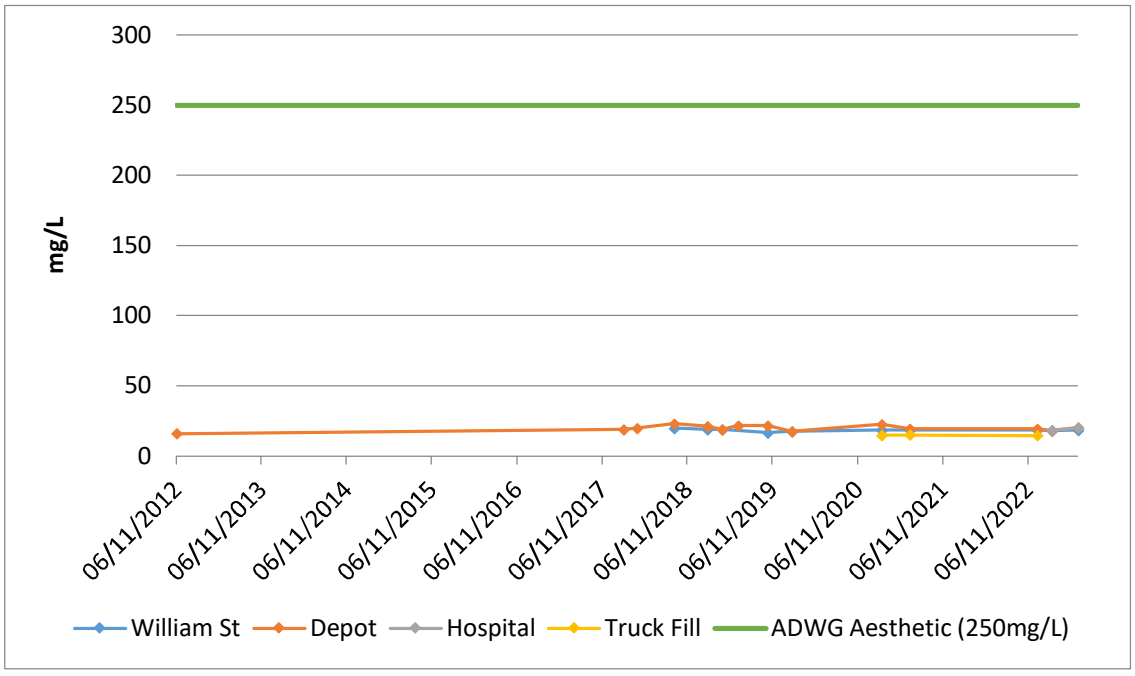


Figure 36: Tambo verification monitoring trends for Chloride (2012- 2023).

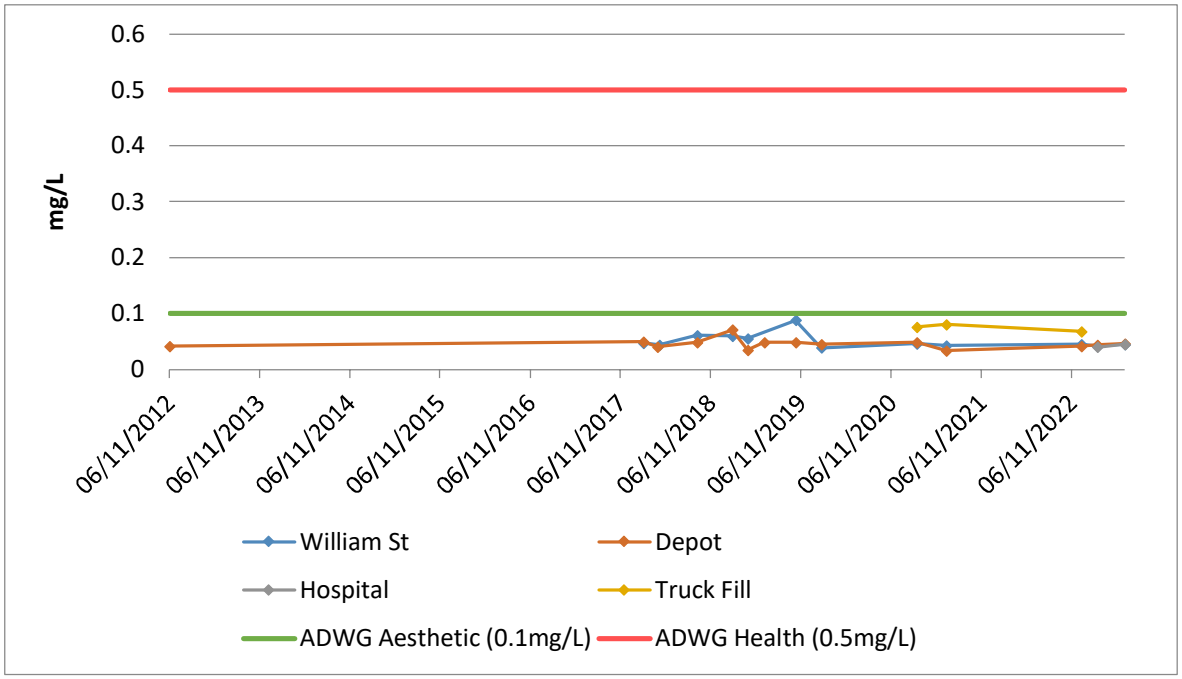


Figure 37: Tambo verification monitoring trends for Total Manganese (2012- 2023).

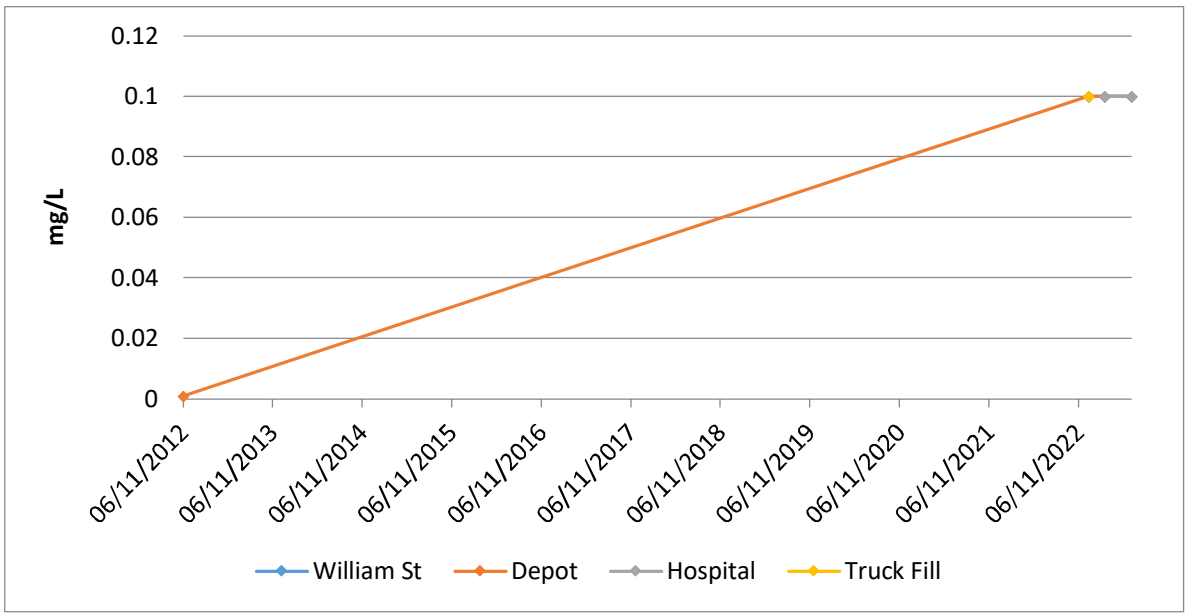


Figure 38: Tambo verification monitoring trends for Nitrite (2012- 2023).

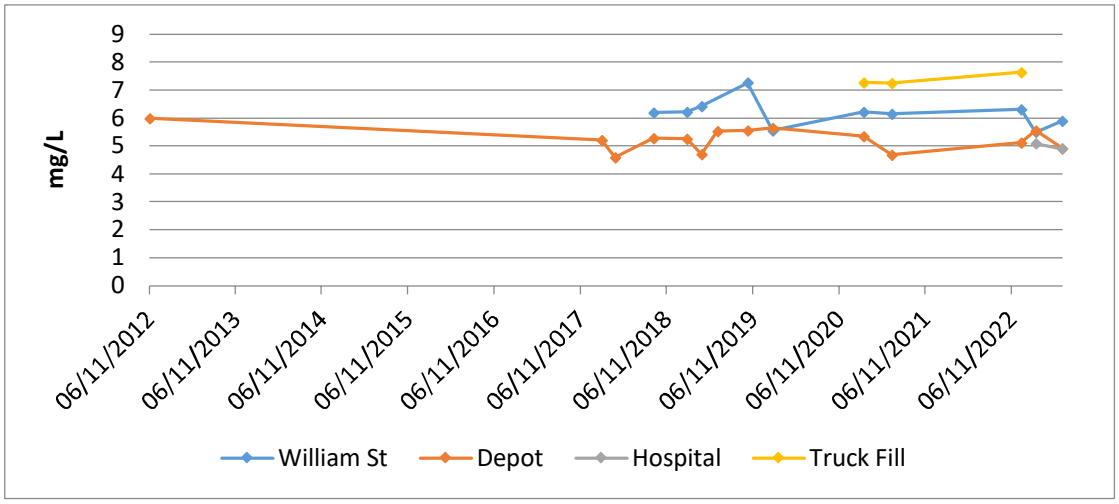


Figure 39: Tambo verification monitoring trends for Calcium (2012- 2023).

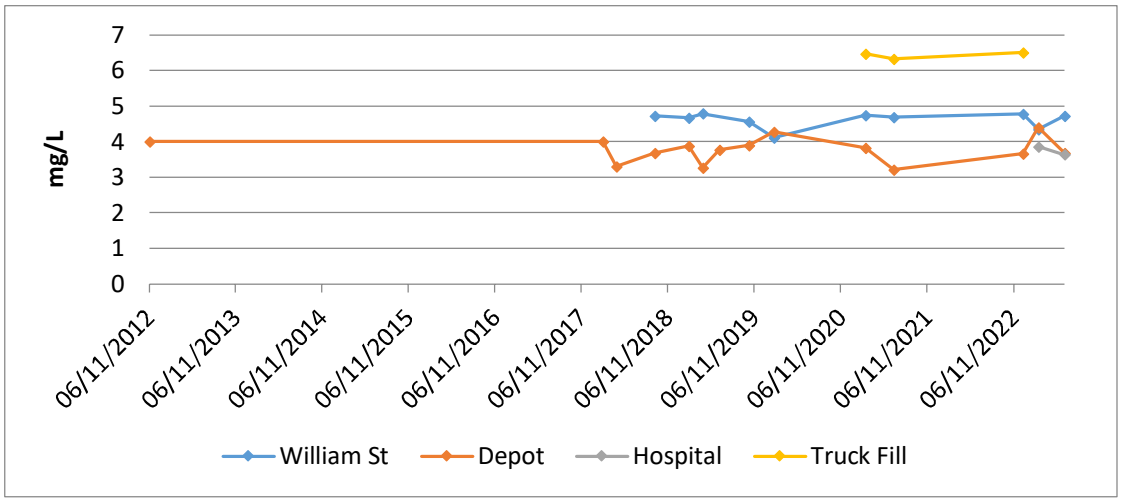


Figure 40: Tambo verification monitoring trends for Magnesium (2012- 2023).

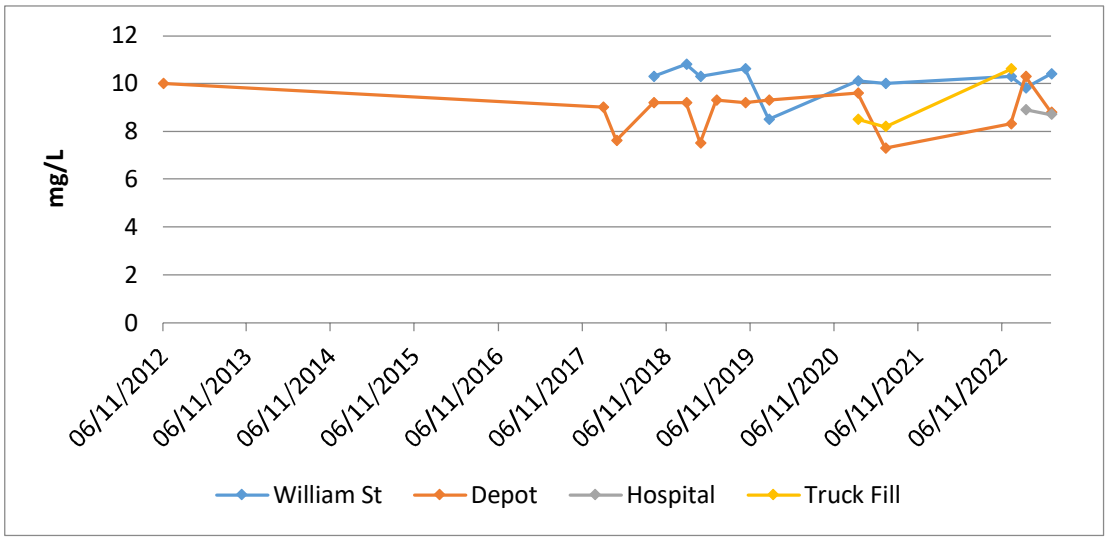


Figure 41: Tambo verification monitoring trends for Potassium (2012- 2023).

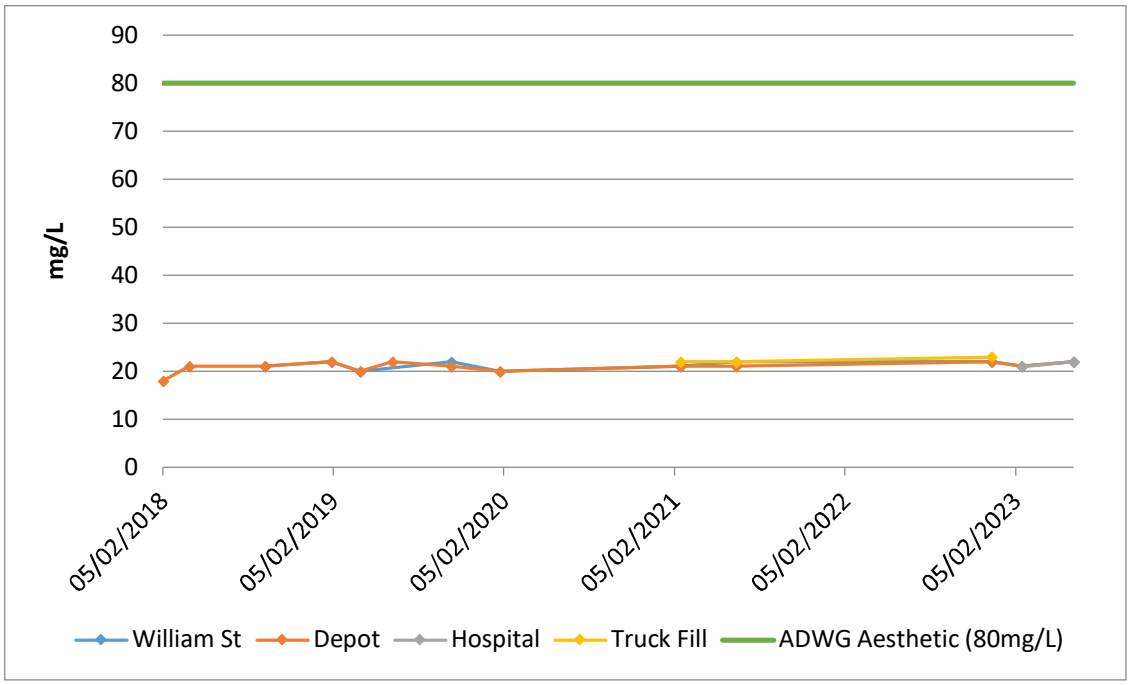


Figure 42: Tambo verification monitoring trends for Silica (2018- 2023).

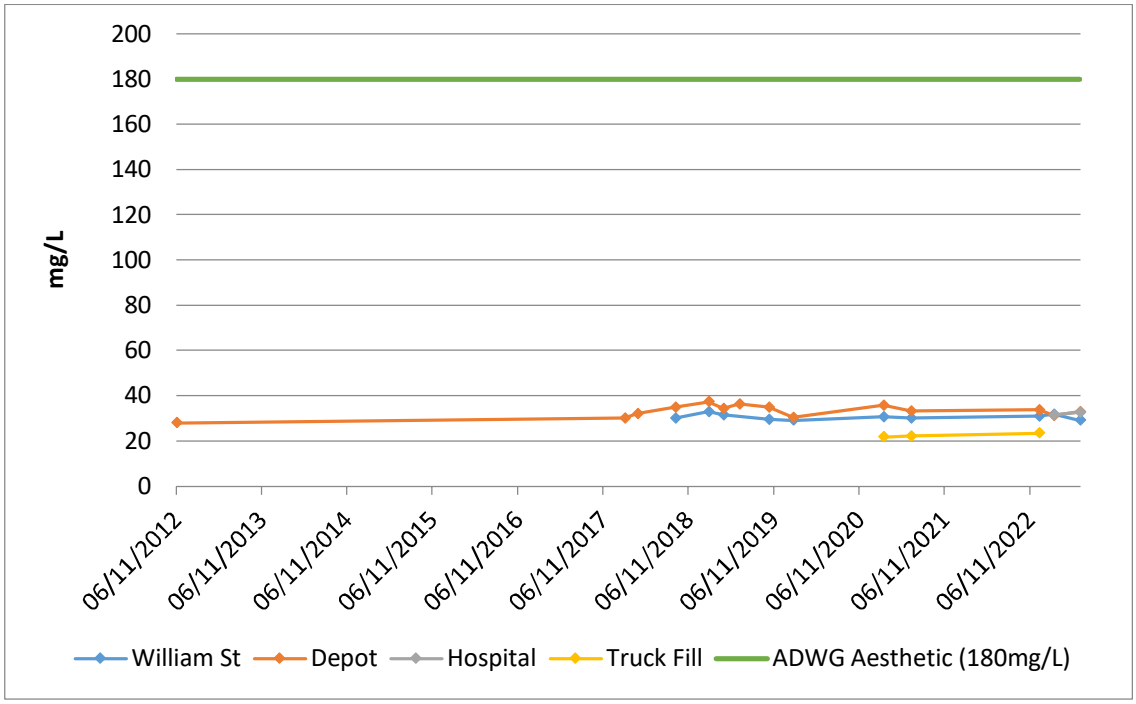


Figure 43: Tambo verification monitoring trends for Sodium (2012- 2023).

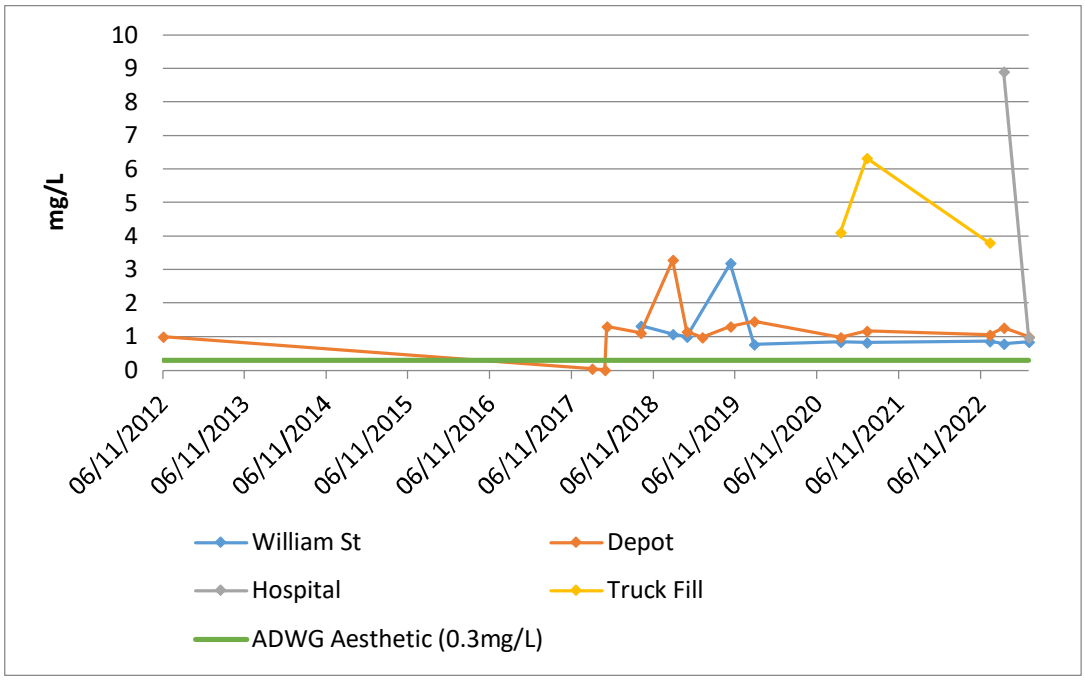


Figure 44: Tambo verification monitoring trends for Total Iron (2012- 2023).

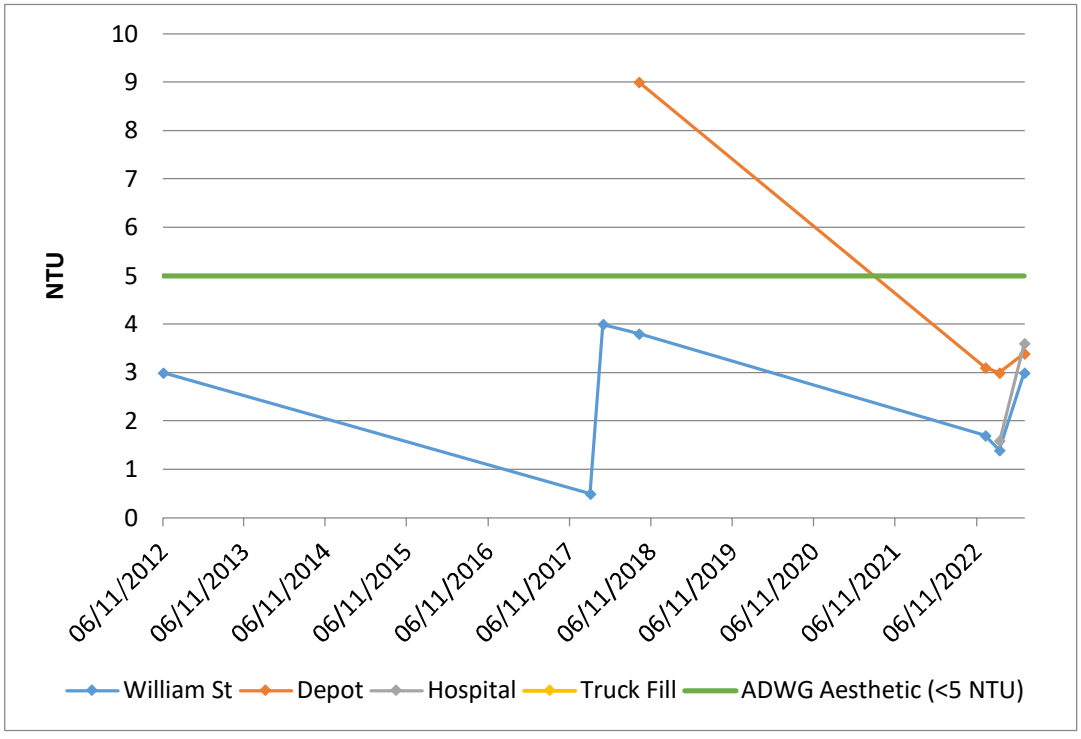


Figure 45: Tambo verification monitoring trends for Turbidity (2012- 2023).

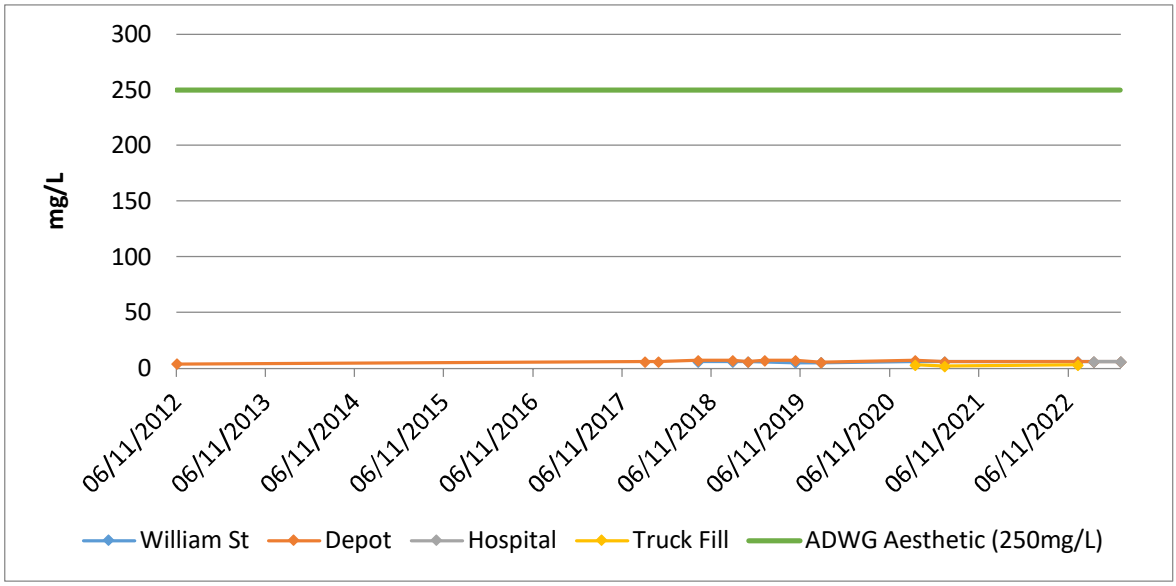


Figure 46: Tambo verification monitoring trends for Sulphate (2012- 2023).

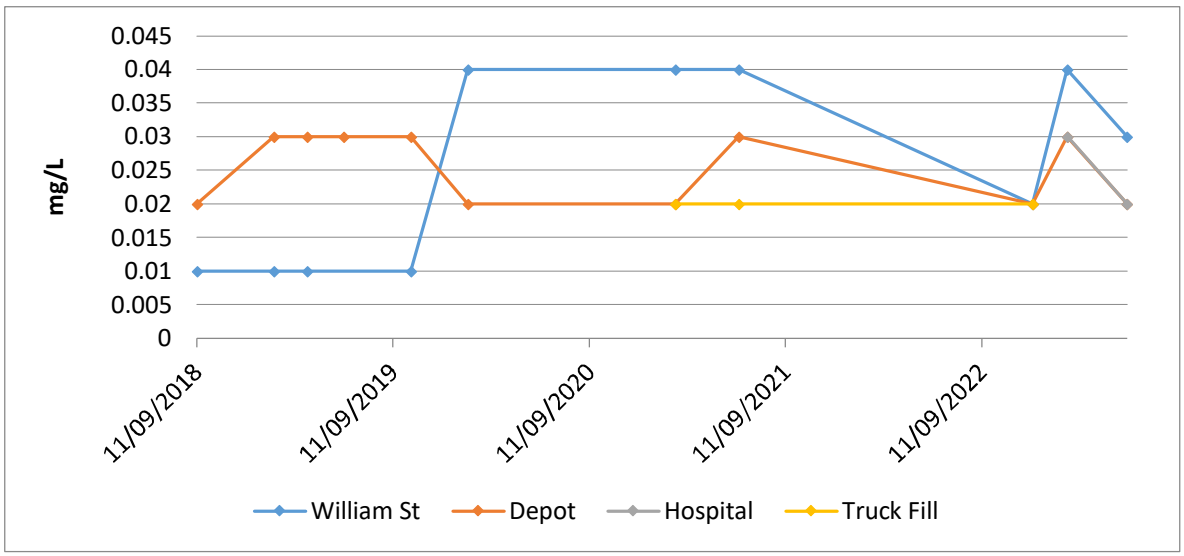


Figure 47: Tambo verification monitoring trends for Phosphate (2018- 2023).

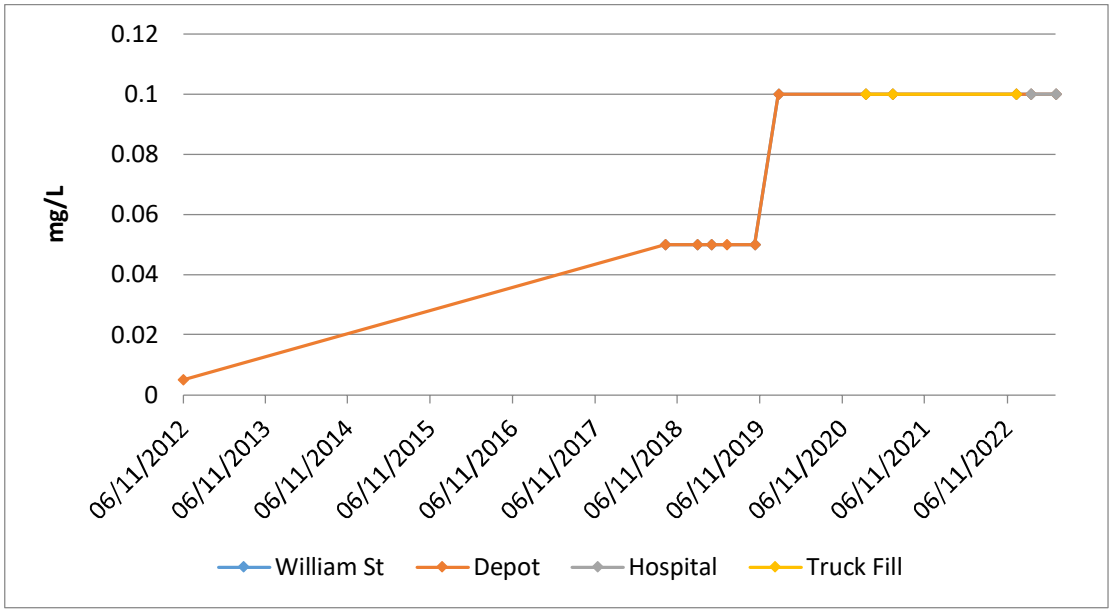


Figure 48: Tambo verification monitoring trends for Nitrate (2012- 2023).

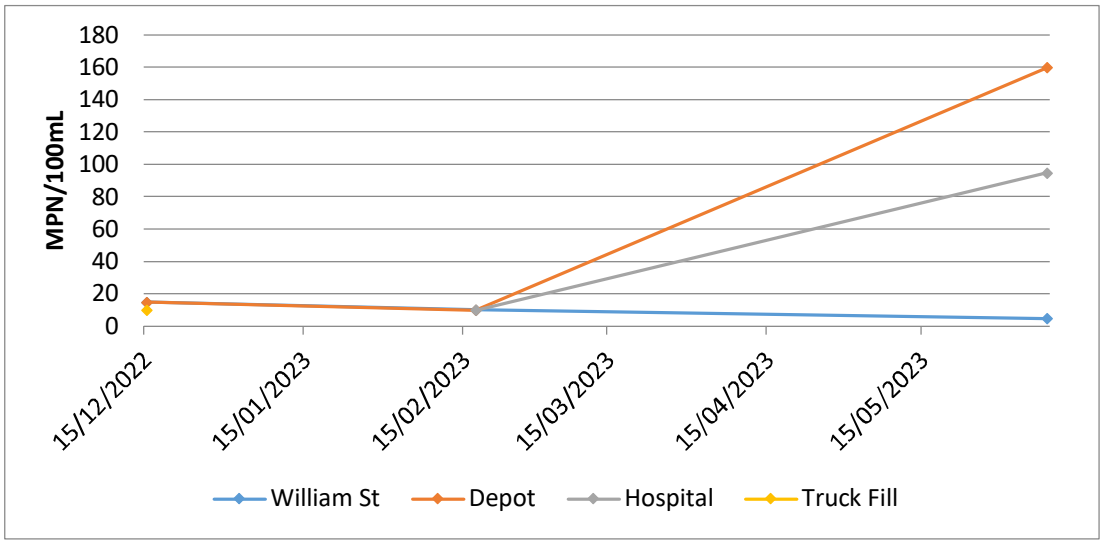


Figure 49: Tambo verification monitoring trends for Heterotrophic Plate Count (2022- 2023).

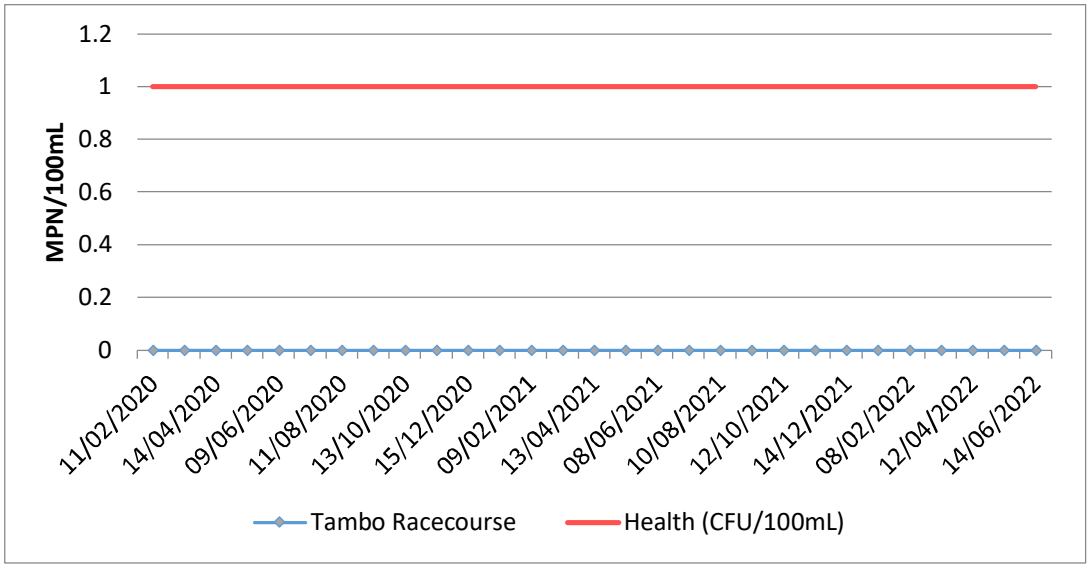


Figure 50: Tambo operational monitoring trends for E.coli (2020- 2023).