PAROO SHIRE COUNCIL

DRINKING WATER QUALITY MANAGEMENT PLAN

August 2018

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DOCUMENT CONTROL

Version	Date	Author	Reviewer
Draft P2	May 2013	D. Turner	G. Cook
A	June 2013	D. Turner	G. Cook
B	November 2013	D. Turner	G. Cook
C	August 2018	S. Hinton	P. See

1 INTRODUCTION

Paroo Shire Council aims to protect public health through the identification and minimisation of any public health related risks associated with the reticulated drinking water supplies.

This Drinking Water Quality Management Plan (DWQMP) is Paroo Shire Council's documented, risk-based system for managing the safe supply of drinking water. It is intended that this plan be a living document that reflects the current obligations of Council as the service provider as well as the improvements required to ensure a safe supply of water into the future. To ensure that these goals are met, senior management has been actively involved in the development and implementation of the plan and encourage an organisational philosophy and culture that supports drinking water quality. The plan is viewed by Council as a means of achieving drinking water quality outcomes (in the short and long term) and demonstrating that drinking water quality management measures are in place.

This Drinking Water Quality Management Plan (DWQMP) has been prepared in accordance with the *Water Supply (Safety & Reliability) Act 2008* and the Drinking Water Quality Management Plan Guideline (DNRME 2010).

1.1 Registered service details

This DWQMP relates to water supply services in Cunnamulla, Eulo, Wyandra and Yowah, all of which are owned and operated by:

Paroo Shire Council
PO Box 75
Cnr Stockyard and Louise Street
Cunnamulla QLD 4490
Tel: (07) 4655 8400
Service Provider No. 101
Contact Person: Chief Operations Officer, Peter See

Paroo Shire Council's (hereafter referred to as Council) water supply schemes draw water from the Great Artesian Basin. There are no surface water sources used for drinking water supply.

The Paroo Shire geographical area is shown in Figure 1 below.

Figure 1 Paroo Shire Overview

The water supply schemes, including current and future populations, connections and water demands, are summarised in Table 1. The table also includes an estimate of the future population and water demand volumes.

Table 1 Water Supply Details

Scheme	Current (2018)			Future (2028)		
	Population	Connections	Demand (ML/day)	Population	Connections	Demand (ML/day)
Cunnamulla	1022	740	2.1	1022	740	2.1
Eulo	95	52	1.2	95	52	1.2
Wyandra	99	60	0.5	99	60	0.5
Yowah	141	132	1.3	141	132	1.3

According to Queensland Government projections, the population of Paroo Shire is expected to decline over the foreseeable future. For the purposes of the DWQMP, and in the absence of any significant developments, the number of future connections is predicted to be the same as at the current time.

The projected demand for the next 10 years is similar to current demand. This reflects the small change in projected populations and unchanged consumption practices.

1.2 Key Stakeholders

Paroo Shire Council is in full control of its water supplies and being catchment-independent, the major stakeholders are the communities serviced. Other Stakeholders include service contractors and suppliers. Stakeholders involved in the management of drinking water quality and how they have been engaged in the process of preparing this Plan are shown in Table 2.

Complaints from the community are received through the Council office and enquires are sent to the plumber, who then investigates. A record of complaints is maintained by Council.

Table 2 Key Stakeholder List

Organisation	Contact details	Relevance to management of drinking water quality	How the stakeholder is engaged in the DWQMP
Paroo Shire Council	Chief Operations Officer	General concerns regarding suitable quality of water supplies	Participation in review of risks, hazards and hazardous events associated with all water supplies. Review of draft documentation.
Paroo Shire Council	Water & Sewerage Supervisor / Assets Officer / Shire Services Officer	Responsible for day to day operations of the Paroo Shire Water supplies.	Participation in review of risks, hazards and hazardous events associated with all water supplies. Input to existing preventive barriers, operational initiatives and monitoring programs.
Water Supply Regulator	Director, Water Supply Regulation 1300 596 709 DrinkingWater.Reporting@dews.qld.gov.au	Responsible for regulation of water providers in QLD	Approval of the DWQMP documentation.
Queensland Health (Darling Downs PHU)	Peter Boland, Manager Environmental Health (07) 4699 8252 Amanda Hutchings, Senior Environmental Health Officer (07) 4699 8244	Responsible for regulation of public health in QLD	Contacted for public health advice as necessary.
Cunnamulla Hospital	(07) 4655 8100	Vulnerable customer	Water supply must be reinstated as quickly as possible following outages.

2 DETAILS OF THE WATER SUPPLY SYSTEMS

2.1 Catchment Characteristics

Paroo Shire Council has an area of 48,000 square kilometres, is located in South West Queensland and includes the towns of Cunnamulla, Eulo, Wyandra and Yowah each of which has a potable water supply.

The predominant land use for the entire Shire is cattle grazing, with the Shire's major industries being sheep and beef cattle. Cunnamulla was settled in 1867 to act as support centre for these industries. Horticulture and fodder crop opportunities have been developed in recent times in and around Cunnamulla. Dates, figs, cotton, table grapes, and more recently rockmelons have all been grown successfully in the past, though are not currently grown.

Cunnamulla, the administrative centre of the Shire has a population of about 1000, is situated on the banks of the Warrego River in south west Queensland.

Eulo is located approximately 70 km west of Cunnamulla on the 'Adventure Highway' and has a population of about 100. Wyandra is located approximately half way between Cunnamulla and Charleville on the Mitchell Highway. It has a population of about 100. Yowah is located on the Yowah Opal fields about 160 km west of Cunnamulla. The community acts as a service centre for the opal mining activities in the area and for tourism.

The bores that supply drinking water to the Paroo Shire Council drinking water schemes all tap aquifers in the Great Artesian Basin (GAB) which is the largest underground water reservoir in the world, storing over 65,000 million megalitres of water. The GAB extends over 1.7 million km^2 or 22% of the Australian continent (Smerdon et al. 2012). The main recharge areas for the GAB are shown in Figure 2.

The composition of the water is affected as it flows through the aquifers from the recharge zones. Artesian water is dominated by sodium carbonate types with some chloride and sulphate. This process produces the distinctive taste and smell of artesian water found in many locations including Cunnamulla, Eulo, Wyandra and Yowah. Fluoride is also naturally present in the groundwater in these localities although it is below the drinking water health guideline value.

The bores in the Paroo Shire are of varying age; with some having been drilled in the early 1900's and others having been drilled as recently as 2018. The bores supply 100% of each town's water supply. The Warrego River which flows through Cunnamulla is not used for the town water supply.

Weather conditions do not affect the water supply source but do play a part in high demand especially during the hot summer months when high consumption through irrigation and evaporative air conditioning causes the bores to run for excessively long hours especially in Cunnamulla. As a result of this, detention time in the reticulation network is reduced and the bore water remains hotter than usual.

With the source of each of the town's water supply coming from deep underground, there is limited likelihood of contamination of the source. The potential for pollutants to reach the bores and contaminate the water via surface flows is also negligible because each of the bores is suitably sealed and the bores themselves are well out of any area likely to be affected by floodwaters in local streams and creeks.

Management of the bore compounds and surrounding land areas in each town is the first step in protecting water quality and ensuring a safe drinking water supply. To this end each of the

bore areas is fenced with the exception of the bores drilled in 2018. These bores will be fenced by the end of 2018 as per the Risk Management Improvement Program.

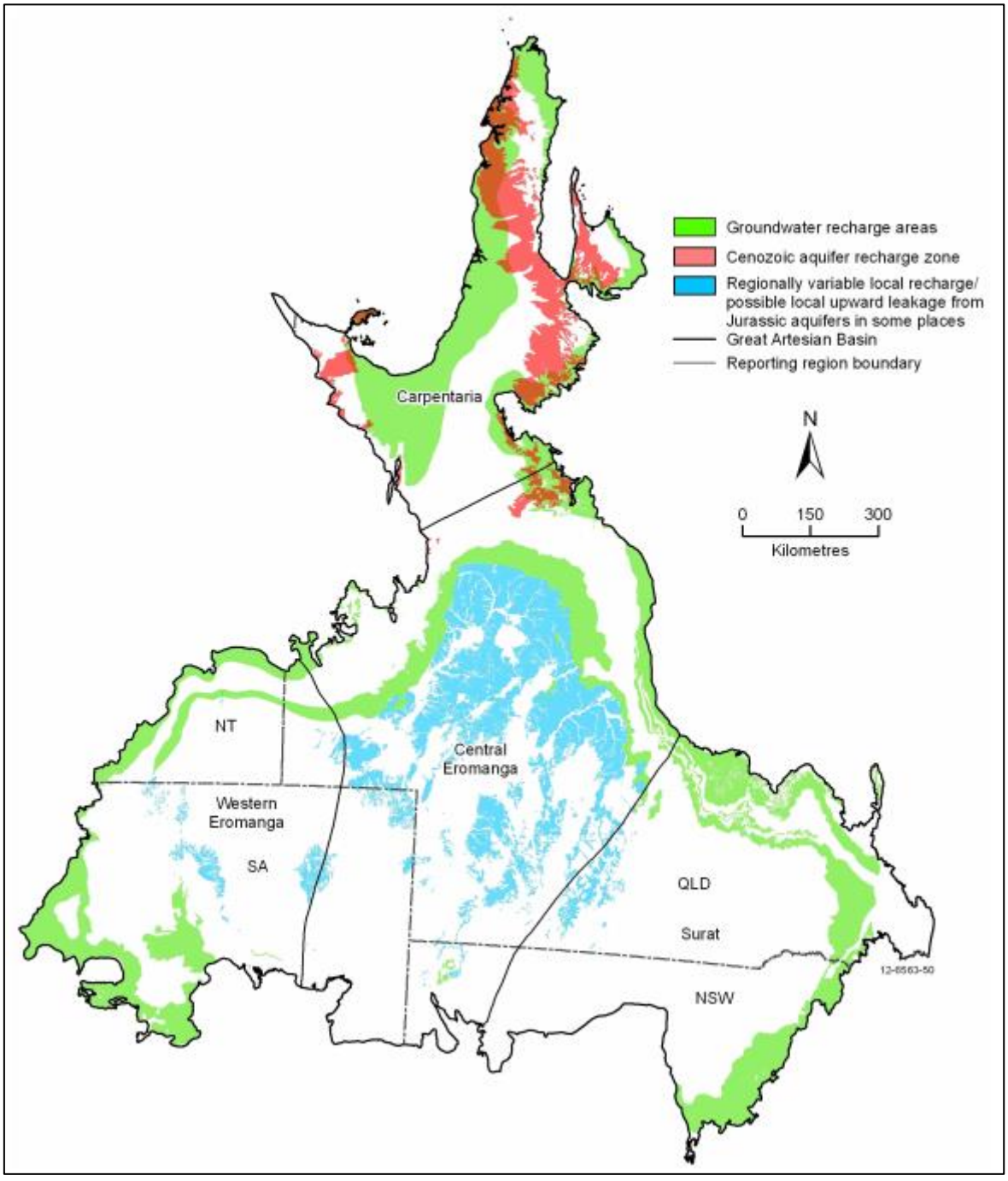

Figure 2 Great Artesian Basin showing recharge areas (Smerdon et al. 2012)

2.2 Cunnamulla Water Supply

The Cunnamulla Water Supply is based on four bores drawing from the Great Artesian Basin (Bore Report cards are included in Appendix B). The bore pumps supply reticulation and then flow to the elevated water tower. When the water tower is full a sensor shuts down the pumps and the reticulation system is gravity fed from the tower.

Operation of the Cunnamulla water supply system is based on the following:

- Bore 1 (9L/s) and Bore 3 (60L/s) are the primary bores, operating at the elevated storage water level of 75% to 90% on an average of 10-12 hours per day;
- Bore 4 (25L/s) is the secondary bore, operating at the elevated storage level of 70% to 95% on an average of 9 hours per day;
- Bore 2 (10L/s) is the back-up bore, operating at the elevated storage level of 45 to 50 % on an average of 3 hours per day.

The Cunnamulla water supply system has a telemetry system that monitors bore pump operation and reservoir level. When the 0.45 ML high level reservoir reaches maximum level, the bore pumps are shut down. When the level in the reservoir drops to a trigger level the pumps are started. Should the automatic system fail, and the reservoir reaches a critical low level, a signal is sent to the plumber via mobile phone.

There are mobile standby generators in the event of power failure to pumps. This allows normal operation of the water supply system in the event of extended power outages.

The water tower has the capacity to supply town requirements during peak demand.

Residents do not generally consider taste and odour problems associated with the use of bore water to be a significant issue although some visitors to the town often find the town water unpalatable.

There is a total of 24,970m of reticulation mains in the Cunnamulla water supply system. The length, age and materials of the mains are shown in the following Tables.

Table 3 Cunnamulla Water Mains – Pipe Diameter and Age Characteristics

Pipe Diameter (mm)	Length of Pipe (m)	Average Age of Pipe (Years)
50	2,431	37
75	152	37
90	599	23
100	18,429	72
150	2,141	63
225	376	52
250	842	57

The schematic layout of the Cunnamulla water supply scheme is shown in Figure 2.

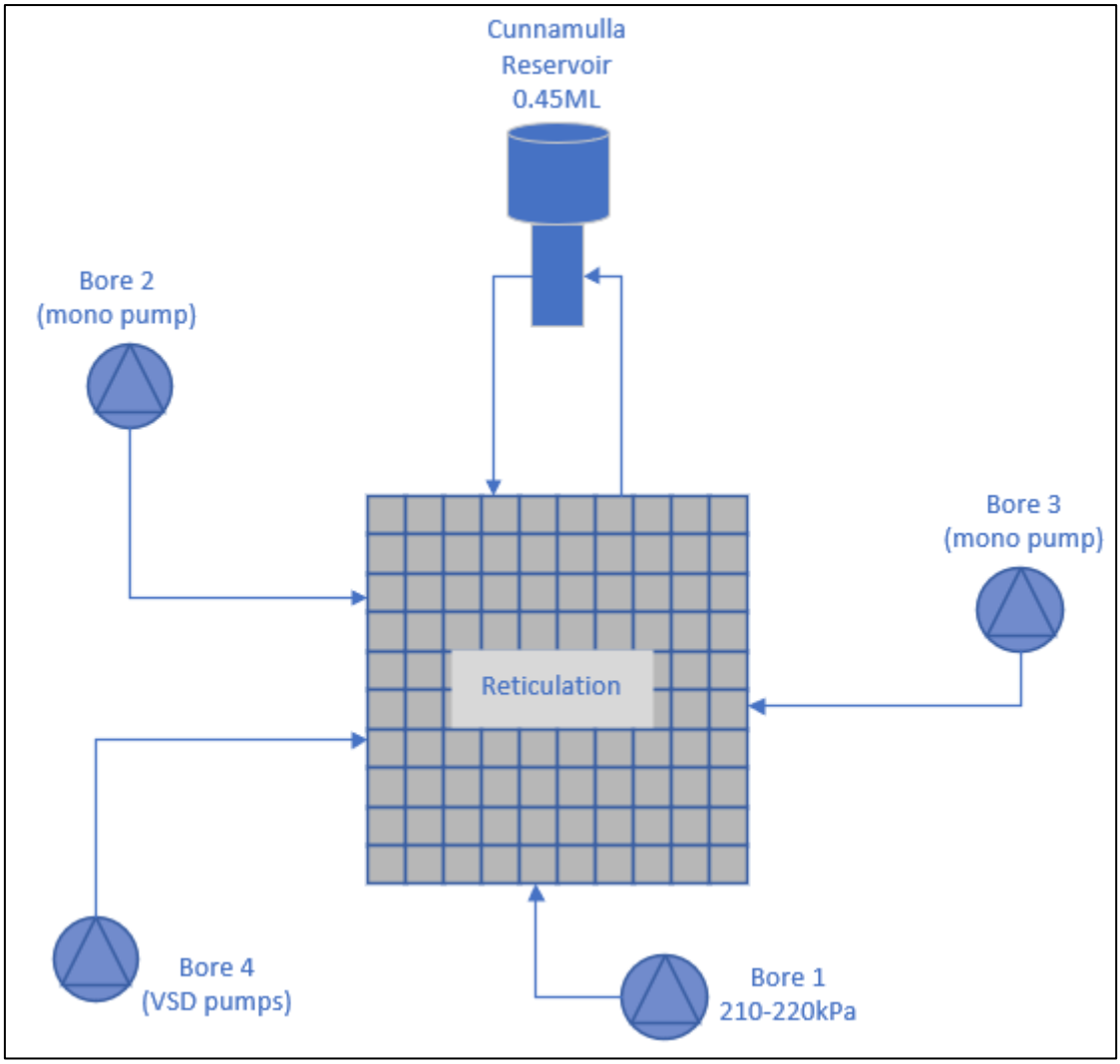

Figure 3 Schematic of Cunnamulla Water Supply System

Table 4 Infrastructure Details – Cunnamulla Water Supply System

Component		Cunnamulla Scheme
Sources	Name	4 bores
	Type	Artesian Bores
	% of supply	100% Bore 1 – 9L/s (10 – 12 hrs/day) Bore 2 – 10L/s (3 hrs/day) Bore 3 – 60L/s (10 – 12 hrs/day) Bore 4 – 25L/s (9 hrs/day)
	Reliability	Reliable
	Water quality issues	Soft, high pH
Sourcing Infrastructure	Type	Bore 4 equipped with variable speed pump; other bores equipped with mono pumps.
	Description	All bores draw from the Great Artesian Basin at depths of between 550m and 650m. All bores have steel casing.
Are there any sources that **do not** undergo treatment or disinfection prior to supply?	None of the bore sources for the Cunnamulla Water Supply undergoes treatment or disinfection prior to supply. Historic water quality testing has shown that the risk of faecally derived pathogens in source water is low.	
Distribution and Reticulation System	Pipe material	Asbestos cement
	Age range	30-70 years
	Approx % of total length	63
	Pipe material	PVC
	Age range	0-38 years
	Approx % of total length	35
	Pipe material	Cast iron
	Age range	52 years
	Approx. % of total length	1
	Pipe material	Galvanised wrought iron
	Age range	88 years
	Approx. % of total length	1
	Areas where potential long detention periods could be expected	N/A
	Areas where low water pressure (eg < 12 m) could be expected during peak or other demand periods)	Southeast corner of town
Reservoirs	**Elevated (No)**	1
	Name	Water tower
	Capacity (ML)	0.45
	Roofed (Y/N)	Yes
	Vermin-proof (Y/N)	Yes
	Runoff directed off roof (Y/N)	Yes

2.3 Eulo Water Supply

The Eulo water supply scheme is based on a single bore pumping into a ground level reservoir in close proximity to the bore head. The bore was commissioned in 2018. The water then flows through into reticulation via variable speed pumps. There is an ultraviolet disinfection unit on the outlet to the reservoir to disinfect the water prior to distribution in the reticulation network. There is an elevated reservoir which has been isolated from service and it is not intended to be used again.

Council maintains an emergency generator in the event of power failure to the pumps.

There is a standby bore (previously the production bore until 2018) which is brought into service in the event of a breakdown/problem with the main bore.

Bores are fenced (new production bore will be fenced in October 2018) and the boreheads sealed to prevent ingress of any foreign materials.

There is a total of 2,420m of reticulation mains in the Eulo water supply system. The length, age and materials of the mains are shown in the following Table.

Table 5 Eulo Water Mains – Pipe Diameter and Age Characteristics

Pipe Diameter (mm)	Length of Pipe (m)	Average Age of Pipe (Years)
20	404	49
25	272	47
50	690	39
100	1,054	39

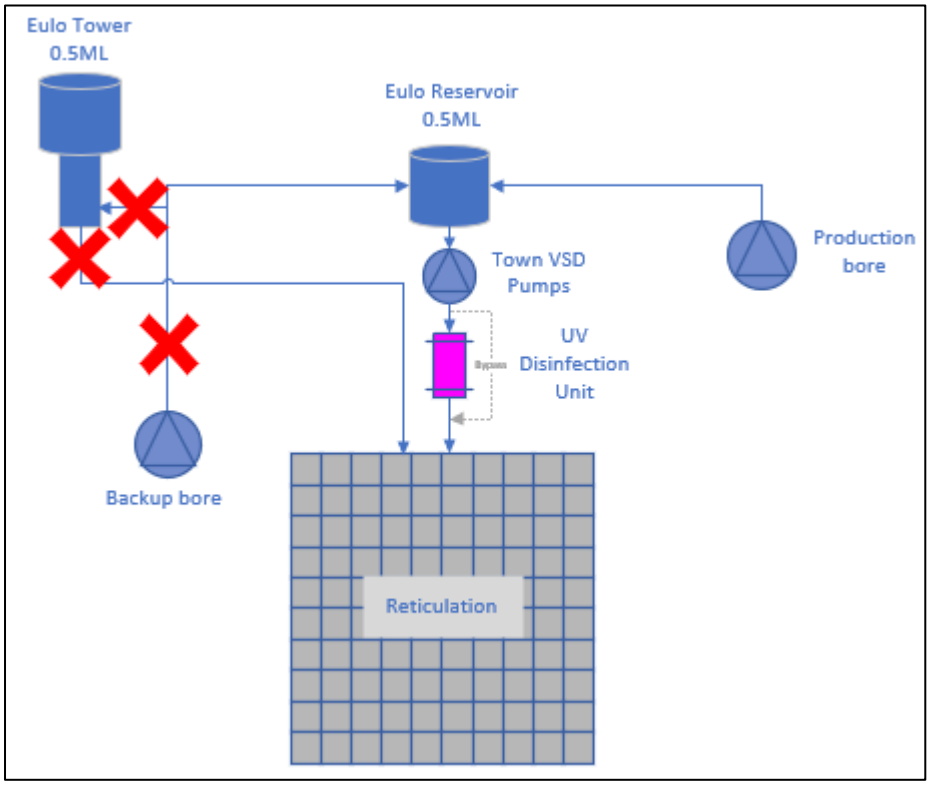

Figure 4 Schematic of Eulo Water Supply System

Table 6 Infrastructure Details – Eulo Water Supply System

Component		Eulo Scheme
Sources	Name	2 bores (1 production, 1 backup)
	Type	Artesian Bore
	% of supply	100%
	Reliability	Reliable
	Water quality issues	High pH, previous issues with microbiological quality in reservoir
Sourcing Infrastructure	Type	Both bores are equipped with standard submersible pumps.
	Description	Both bores draw from the Great Artesian Basin at depths of 279 & 223m respectively. Both bores have steel casing.
Sources that **do not** undergo treatment prior to supply?	Eulo bore water is not treated prior to supply. Historic water quality testing proves that the GAB water does not require treatment. However to overcome issues associated with the ground level reservoir and contamination of the water, a UV disinfection unit has been installed to disinfect the supply prior to distribution to the reticulation network.	
Disinfection	Location	UV unit is in pump house
	Type	Purion Ultraviolet
	Dose rate	>25mJ/cm^2 at 14L/sec (peak flow rate for Eulo in summer), 98% UVT, at end of lamp life
	Dosing arrangements	Water is dosed at the reservoir outlet before it is pumped into reticulation network.
	Alarms	Yes – at 70% lamp life
Distribution and Reticulation System	Pipe material	Asbestos Cement
	Age range	40 - 58 years
	Approx. % of total length	18
	Pipe material	Poly
	Age range	47 - 54 years
	Approx. % of total length	43
	Pipe material	Galvanised Wrought iron
	Age range	52 years
	Approx. % of total length	13
	Pipe material	PVC
	Age range	25 years
	Approx. % of total length	19
	Pipe material	Ductile iron cement lined
	Age range	13 years
	Approx. % of total length	7
	Areas where potential long detention periods could be expected	N/A
	Areas where low water pressure (e.g. < 12 m) could be expected during peak or other demand periods)	N/A
Reservoirs	Number/name	1 x ground level res (1 x elevated res offline)
	Capacity (ML)	0.5
	Roofed (Y/N)	Yes
	Vermin-proof (Y/N)	Y
	Runoff directed off roof	Yes

2.4 Wyandra Water Supply

The Wyandra Water Supply is based on one bore drawing from the Great Artesian Basin. The bore feeds supply straight into the reticulation system relying on natural artesian pressure with no storage in the system. Surplus artesian water discharges into a bore drain.

The water temperature from the bore is approximately 46^{o}C.

There is a total of 3,492m of reticulation mains in the Wyandra water supply system. The length, age and materials of the mains are shown in the following Table.

Table 7 Wyandra Water Mains – Pipe Diameter and Age Characteristics

Pipe Diameter (mm)	Length of Pipe (m)	Average Age of Pipe (Years)
20	565	22
25	70	22
50	457	22
100	2,400	39

The schematic of the Wyandra water supply scheme is shown in Figure 2.3.

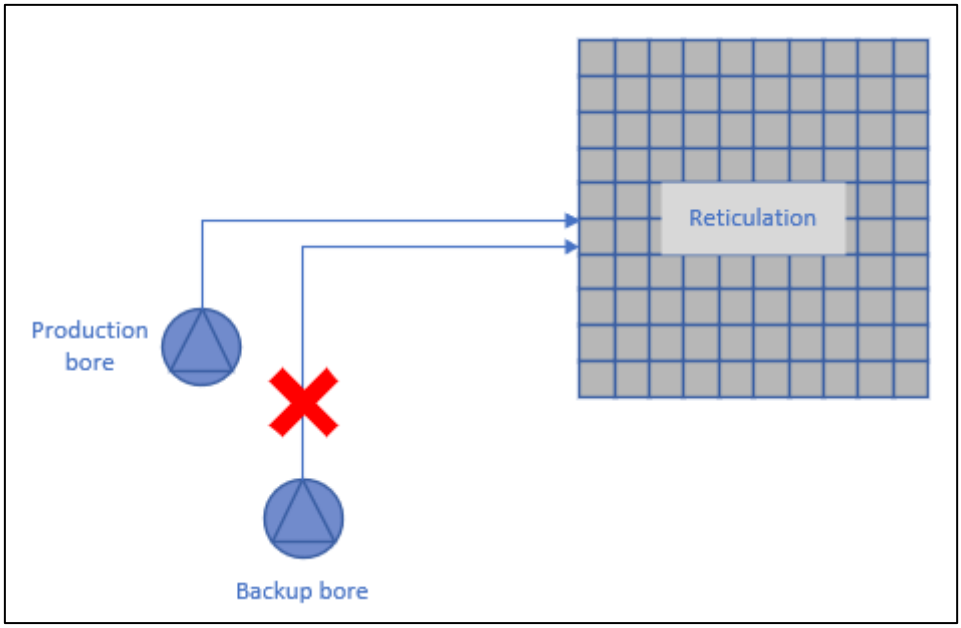

Figure 5 Schematic of Wyandra Water Supply System

Table 8 Infrastructure Details – Wyandra Water Supply System

Component		Wyandra Scheme
Sources	Name	2 bores (1 production, 1 backup)
	Type	Artesian Bore
	% of supply	100% from production bore
	Reliability	Reliable
	Water quality issues	Soft, high pH
Sourcing Infrastructure	Type	Free flowing bore
	Description	Bores draw from the Great Artesian Basin at depths of 596m and 569m and with steel casing.
Are there any sources that **do not** undergo treatment or disinfection prior to supply?	Water is not treated or disinfected prior to supply. Historic water quality testing has shown that the risk of faecally derived pathogens in source water is low.	
Distribution and Reticulation System	Pipe material	Asbestos cement
	Age range	35 – 57 years+
	Approx % of total length	65
	Pipe material	Poly
	Age range	23 years
	Approx % of total length	31
	Pipe material	Cast iron
	Age range	57 years
	Approx. % of total length	4
	Areas where potential long detention periods could be expected	N/A
	Areas where low water pressure (e.g. < 12 m) could be expected during peak or other demand periods)	N/A

2.5 Yowah Water Supply

The Yowah Water Supply is based on one bore drawing from the Great Artesian Basin. The bore supplies water directly into the reticulation network under artesian pressure.

The relatively high temperature of the bore water (57^{o}C) is cooled to lower temperatures as it flows through the distribution network and through pressure tanks fitted to the majority of the residences in town.

There are no pumping or storage facilities in the town and the town relies on natural artesian pressure to supply the town. Surplus artesian water discharges into a bore drain.

There are no standby facilities for Yowah and if the bore fails there would be a need to transport water from one of the other water supplies in the town for the duration of the problem.

There is a total of 5,300m of reticulation mains in the Yowah water supply system. The length, age and materials of the mains are shown in the following Table.

Table 9 Yowah Water Mains – Pipe Diameter and Age Characteristics

Pipe Diameter (mm)	Length of Pipe (m)	Average Age of Pipe (Years)
90	5,300	18

The schematic for the Yowah water supply is shown in Figure 4.

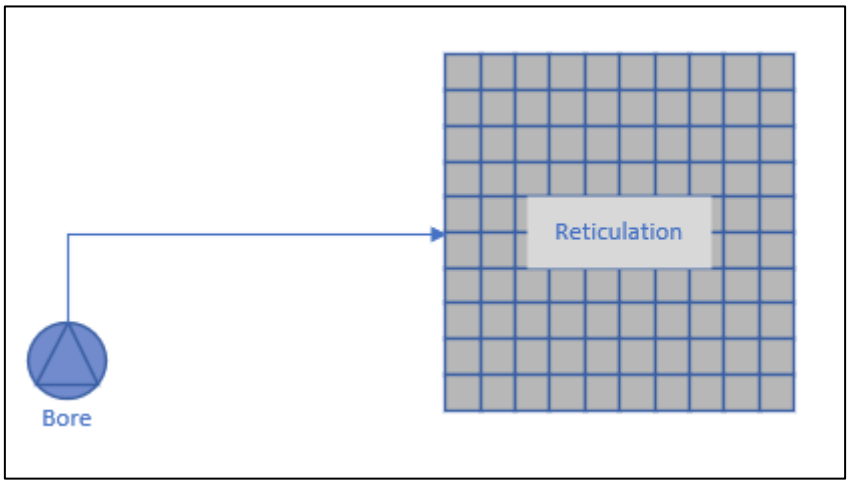

Figure 6 Schematic of Yowah Water Supply System

Details of the infrastructure for providing the service are provided in Table 9.

Table 10 Infrastructure Details – Yowah Water Supply System

Component		Yowah Scheme
Sources	Name	1 bore
	Type	Artesian Bore
	% of supply	100%
	Reliability	Reliable
	Water quality issues	Soft, high pH, high temperature.
Sourcing Infrastructure	Type	Free flowing bore
	Description	Bore draws from the Great Artesian Basin at a depth of 512m. The bore has steel casing.
Sources that **do not** undergo treatment or disinfection prior to supply	Water is not treated or disinfected prior to supply. Historic water quality testing has shown that the risk of faecally derived pathogens in source water is low.	
Distribution and Reticulation System	Pipe material	Poly
	Age range	24 years+
	Approx % of total length	100
	Areas where potential long detention periods could be expected	Nil
	Areas where low water pressure (e.g. < 12 m) could be expected during peak or other demand periods)	

3 WATER QUALITY ASSESSMENT

3.1 Review of water quality data

All available water quality data has been compiled and reviewed. While there is more data available than was the case for the original DWQMP in 2013, there are still periods for which no data is available. The results are from various points within the supply, either at the bore or within the reticulation system. Because there is no treatment, these data have been grouped and analysed together.

Tabulated data summaries are attached in Appendix A. A general summary of performance is provided below.

3.1.1 Health related performance

Since mid-2015, there have been no detections of *E. coli* in any of the water supply schemes. Prior to this time there had been isolated detections in Cunnamulla, and frequent detections in Eulo (to 2012). The Eulo incidents were believed to be related to frogs accessing the reservoir, and since the isolation of the elevated reservoir and installation of the UV disinfection unit, there have been no further detections.

For the parameters tested (those included under Queensland Health's standard water analysis suite), there have been no exceedances of any ADWG health guidelines.

Fluoride is measured at concentrations ranging from 0.4-0.6mg/L in Cunnamulla, Eulo and Wyandra, and 1.0-1.2mg/L in Yowah.

3.1.2 Aesthetic performance

The natural water characteristics varies slightly from town to town, however in general, pH and sodium are elevated to the point where aesthetic guideline limits are approached or slightly exceeded. In particular, sodium is consistently above 180mg/L in Eulo and Yowah, and pH is consistently above 8.5 in Wyandra.

There was a single turbidity result above 5NTU in Cunnamulla prior to 2013, and a single true colour result above 15HU in Wyandra also. These results are considered to be related to isolated instances of corrosion or sediment disturbance.

3.2 Customer complaints

There are few customer complaints on file; however from operational experience complaints are almost exclusively from tourists or new residents who are unaccustomed to the sulphurous odour of the artesian water.

4 HAZARD IDENTIFICATION AND RISK ASSESSMENT

4.1 Methodology

Paroo Shire Council has adopted the risk assessment methodology presented in the Drinking Water Quality Management Plan Guideline (DNRME, 2010). This incorporates the framework for the management of drinking water quality based on a risk management approach from the Australian Drinking Water Guidelines. The methodology is explained below.

The level of risk associated with each hazard or hazardous event can be estimated by identifying the likelihood of the occurrence and evaluating the severity of consequences if the hazard were to occur.

The risk assessment follows the process discussed below:

- Identify the hazards
- Determine the unmitigated risks
- Identify the preventive measures
- Determine the mitigated risks
- Identify the procedures used to ensure the preventive measures are effective
- Where mitigated risks are unacceptable, identify risk management improvements

4.1.1 Hazard identification

Drinking water quality hazards may be biological, chemical, physical or radiological in nature. The type of hazard is identified, followed by identifying the source(s) for each of the hazards (the 'hazardous event').

4.1.2 Unmitigated risk assessment

Unmitigated risk is determined by considering the consequence and likelihood of a hazard in the absence of any other controls. The consequence and likelihood descriptors are described below.

Once the consequence and likelihood are determined, the risk is read from the risk matrix.

For example, the unmitigated risk may consider that an artesian supply scheme was constructed and commissioned many years ago, but there is now no longer any asset inspection or maintenance program. For Eulo, which is the sole scheme in which water treatment is applied, the unmitigated risk would consider the ultraviolet system to not be operating.

The uncertainty of the unmitigated risk assessment is then determined, and any comments captured.

4.1.3 Preventive measures and mitigated risk assessment

The mitigated risk assessment is undertaken by considering the hazardous events that could lead to the hazard being present. The unmitigated risk is brought forward from the unmitigated risk assessment, and the barriers that prevent or minimise the risk of that hazard are identified.

Barriers include any current treatment barriers (e.g. UV disinfection), as well as programs or procedures that verify the integrity of assets such as water storage reservoirs.

In general, the consequence of a hazard will remain the same as for the unmitigated risk assessment, and the likelihood will change as a result of the preventive measures that are implemented. For example, if bacterial contamination is present in the Eulo drinking water supply, the consequence of a bacterial infection is the same regardless of control measures. However it would be expected that the UV disinfection system would significantly reduce the numbers of bacteria present, and therefore lower the likelihood of there being an infectious dose.

4.1.4 Risk descriptors

The following tables (11, 12 and 13) summarise the consequence, likelihood and uncertainty descriptors, and the risk matrix is provided in Table 14. These tables are based on the risk descriptor examples provided in the DNRME guideline document *Preparing a Drinking Water Quality Management Plan Supporting Information* (DNRME, 2010). The uncertainty descriptors were modified in order to better suit Council's circumstances.

Table 11 Consequence descriptors

Consequence	Description
Catastrophic	Potential acute health impact, declared outbreak expected
Major	Potential acute health impact, no declared outbreak expected
Moderate	Potential widespread aesthetic impact or repeated breach of chronic health parameter
Minor	Potential local aesthetic, isolated exceedance of chronic health parameter
Insignificant	Isolated exceedance of aesthetic parameter with little or no disruption to normal operation

Table 12 Likelihood descriptors

Likelihood	Description
Almost Certain	Occurs more often than once per week (52/yr)
Likely	Occurs more often than once per month (12/yr) and up to once per week (52/yr)
Possible	Occurs more often than once per year and up to once a month (12/yr)
Unlikely	Occurs more often than once every 5 years and up to once per year
Rare	Occurs less than or equal to once every 5 years

Table 13 Uncertainty descriptors

Uncertainty	Description
Certain	The processes involved are thoroughly understood and supported by very extensive on-site knowledge, and/or high frequency (weekly or better) water quality monitoring data.
Confident	The processes involved are well understood and supported by extensive on-site knowledge, and/or monthly water quality data
Reliable	There is a good understanding of the process which is supported by quarterly water quality data and operational experience that covers several years.
Estimate	The process is reasonably well understood, and some data exists over several years.
Unreliable	The process is not well understood, and water quality data is not adequate to draw conclusions

Table 14 Risk matrix

		Consequence				
		Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood	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)

4.1.5 Procedures

Where there is a documented procedure, this is listed in the Risk Register. Where the process is not documented, then more detail is provided around the preventive measure within the risk register.

4.1.6 Risk acceptability

Paroo Shire Council accepts risk of Medium and below. The goal is to reduce all Extreme or High risks to acceptable levels through the application of appropriate preventive measures and/or treatment barriers.

Any risks which were not able to be mitigated to an acceptable level have an action item in the Risk Management Improvement Plan to reduce the risk.

4.2 Risk Assessment Workshop

A risk assessment was undertaken in 2012 during the preparation of the original DWQMP. This risk assessment was revisited on 7 August 2018 by the team outlined in Table 15:

The team reconsidered all of the previously identified risks as well as any new risks able to be identified.

Table 15 Risk Assessment Team

Name	Role	Years at PSC / Water Industry	Relevant skills, experience or qualifications
Peter See	Chief Operations Officer	<1 / 12	Professional Engineer, ultimate responsibility for water supply and DWQMP
Paul Doyle	Water & Sewerage Supervisor/ Plumber	35 / 48	Plumber, Water Officer, private contractor plumbing and drainage, water works supervisor. Significant operational experience.
Angela McKellar	EHO/Assets/ Administration Officer	<1 / <1	Responsible for water testing, environmental health, assets
Trevor Jones	Team Leader Shire Services	16 / 16	Previously responsible for water testing (~10 years) and water assets. Significant operational experience.
Sean Hinton	Principal Scientist / Facilitator	0 / 12	Water quality - chemistry/microbiology; food and water safety management systems; WQMS lead auditor

4.3 Risk Assessment Outcomes

The results from the unmitigated hazard assessment are summarised in Table 16.

The complete risk register is presented in Table 17.

Table 16 Unmitigated Hazard Assessment Results

Hazard	Type of Hazard	Sources of Hazard	Unmitigated Risk			Uncertainty	Comments
			Consequence	Likelihood	Risk		
Bacteria / Virus (Source)	Biological	Faecal contamination into bores (via casing or bore heads)	Catastrophic	Possible	High 15	Unreliable	
Bacteria / Virus (Recontamination)	Biological	Faecal contamination of reservoirs, or reticulation	Catastrophic	Almost Certain	Extreme 25	Reliable	For example, frogs accessing Eulo Reservoirs led to *E. coli* detections
Bacteria / Virus (Backflow, small towns)	Biological	Activities on customer's property	Catastrophic	Rare	Medium 6	Unreliable	Applies to Eulo, Wyandra, Yowah. No identifiable backflow contamination risks in these schemes.
Colour	Physical	Corrosion, biofilm / sediment disturbance	Minor	Possible	Medium 6	Reliable	
Fluoride	Chemical	Naturally occurring	Insignificant	Rare	Low 1	Confident	Concentrations are at a beneficial level and very stable
Heavy metals	Chemical	Asset corrosion, leaching from plumbing	Minor	Unlikely	Low 4	Estimate	
Iron	Chemical	Asset corrosion	Minor	Rare	Low 2	Reliable	
Manganese	Chemical	Naturally occurring, network accumulation	Minor	Rare	Low 2	Reliable	Mn consistently >0.02mg/L can cause dirty water issues over time
Nitrate	Chemical	Sewage, fertilisers	Minor	Rare	Low 2	Reliable	
Opportunistic Pathogens (e.g. *Naegleria, Legionella*)	Biological	Growth in network when water temperature is warm	Major	Possible	High 15	Unreliable	
Petroleum based chemicals or lubricants	Chemical	Maintenance activities, pump failure	Minor	Rare	Low 2	Unreliable	
pH	Physical	Bulk water characteristics, water age	Insignificant	Almost Certain	Medium 6	Reliable	Consequence of Insignificant was chosen as there is little to no impact on operations and customers do not complain about taste.
Protozoa (Source)	Biological	Faecal contamination of bores	Catastrophic	Possible	High 15	Unreliable	
Protozoa (Recontamination)	Biological	Faecal contamination of reservoirs, or reticulation	Catastrophic	Possible	High 15	Unreliable	
Radiological	Radiological	Naturally occurring	Moderate	Rare	Low 3	Unreliable	
Sodium	Chemical	Naturally occurring	Moderate	Almost Certain	High 15	Confident	
Taste and odour	Physical	Water age, pH	Minor	Possible	Medium 6	Reliable	Tourists or new residents notice the sulphurous smell
Turbidity	Physical	Ingress, sediment disturbance	Minor	Possible	Medium 6	Reliable	
Loss of Supply	Physical	Infrastructure failure	Catastrophic	Unlikely	High 10	Confident	Scenario under consideration is loss of supply for >12 hours

Table 17 Risk Assessment Results

Scheme	Component	Source of Hazard/Event	Primary hazard	Other hazards managed by same barriers	Max. Risk	Primary Preventive Measure	Other Preventative Measures	Comments	Residual Risk				RMIP		
									Consequence	Likelihood	Risk Level	Uncertainty	Immediate	Short Term	Long Term
Cunnamulla	Bores	Inadequate borehead protection and contamination from surface	Bacteria / Virus (Source)	Protozoa, turbidity	High 15	Sealed boreheads	Fencing, daily to weekly inspections of boreheads	Bores are artesian, leakage would be visible	Catastrophic	Rare	Medium 6	Reliable		Raise Cunnamulla bore 1 headworks by 0.5m to bring above flood level	
Cunnamulla	Bores	Damaged or inadequate bore casing	Bacteria / Virus (Source)	Protozoa, turbidity	High 15	Bores all relined in late 1990's			Catastrophic	Rare	Medium 6	Reliable	Review opportunities to group tender for bore inspections with neighbouring Councils		
Cunnamulla	Bores	Accidental or intentional physical damage to bore headworks, or pump failure	Loss of Supply		High 10	Reservoir, and other 3 bores able to maintain supply			Catastrophic	Rare	Medium 6	Confident			
Cunnamulla	Bore 1	Flood	Bacteria / Virus (Source)		High 15	Artesian bore, headworks sealed and secure		Cunnamulla bore 1 at or below flood level	Catastrophic	Possible	High 15	Estimate		Raise Cunnamulla bore 1 headworks by 0.5m to bring above flood level	
Cunnamulla	Reservoir	Reservoir not adequately vermin proofed	Bacteria / Virus (Recontamination)	Protozoa, turbidity	Extreme 25	Reservoir is sealed and roofed to prevent access and also cleaned as required.		There is currently a hole in the Cunnamulla Reservoir roof (300mm diamater) which has been temporarily covered	Catastrophic	Unlikely	High 10	Reliable	Custom manufacture a new air vent for Cunnamulla Reservoir (PE or PVC)	Develop a Reservoir Inspection Procedure and Schedule	
Cunnamulla	Reservoir	Reservoir below critical level due to leakage or failure of telemetry	Loss of Supply	Turbidity	High 10	Float sensor in reservoir and checked daily. Telemetry system checked regularly.			Catastrophic	Rare	Medium 6	Confident			
Cunnamulla	Reticulation	Backflow	Bacteria / Virus (Recontamination)	All	Extreme 25	Dual check valves on domestic & commercial connections, RPZ on sewage treatment works, Depot, Hospital. Non-return valves on bores		Water tanker filling station does not have backflow prevention device	Catastrophic	Unlikely	High 10	Reliable		Install backflow prevention on Cunnamulla tanker filling station, and consider standpipe at airport	
Cunnamulla	Reticulation	Cross connection with river water system	Bacteria / Virus (Recontamination)	Protozoa, turbidity	Extreme 25	Completely separate systems, not connected		Used to be a location where they were connected and valved off, but now pipework is physically air gapped	Catastrophic	Rare	Medium 6	Confident			
Eulo	Bores	Inadequate borehead protection and contamination from surface	Bacteria / Virus (Source)	Protozoa, turbidity	High 15	Sealed boreheads	Backup bore is fenced, weekly inspections of boreheads	Bores are artesian, leakage would be visible	Catastrophic	Rare	Medium 6	Reliable	Fence the new bores (all schemes)		
Eulo	Bores	Damaged or inadequate bore casing	Bacteria / Virus (Source)	Protozoa, turbidity	High 15	Primary bore is brand new	Backup bore casing was inspected approx 2015, no issues found (minor surface rust)		Catastrophic	Rare	Medium 6	Reliable			
Eulo	Bores	Accidental or intentional physical damage to bore headworks, or pump failure	Loss of Supply		High 10	Backup bore and reservoir can maintain supply			Catastrophic	Rare	Medium 6	Confident			

Scheme	Component	Source of Hazard/Event	Primary hazard	Other hazards managed by same barriers	Max. Risk	Primary Preventive Measure	Other Preventative Measures	Comments	Residual Risk				RMIP		
									Consequence	Likelihood	Risk Level	Uncertainty	Immediate	Short Term	Long Term
Eulo	Bores	Leakage or unauthorised use of bore water	Loss of Supply		High 10	Water restrictions are always enforced during summer.		Potential unauthorised usage by one or two customers (assumption not proven)	Catastrophic	Rare	Medium 6	Reliable			
Eulo	Reservoir	Reservoir not adequately vermin proofed	Bacteria / Virus (Recontamination)	Protozoa, turbidity	Extreme 25	Reservoir is sealed and roofed to prevent vermin access and also cleaned as required. UV disinfection system fitted to reservoir outlet pipe.		Peeling ridge capping	Catastrophic	Unlikely	High 10	Reliable	Repair ridge capping on Eulo Reservoir	Develop a Reservoir Inspection Procedure and Schedule	
Eulo	Reservoir	Reservoir below critical level due to leakage, excess usage or pump failure	Loss of Supply	Turbidity	High 10	Reservoir level stop/start probe	Apply water restrictions	Has failed in the past, couldn't keep up with demand when bore pump failed	Catastrophic	Unlikely	High 10	Confident		Review options for gaining funding for installation of SCADA & alarming in future	
Eulo	Reservoir	Failure of Eulo Tower isolation valve	Bacteria / Virus (Recontamination)	Protozoa, turbidity	Extreme 25	Stop valve			Catastrophic	Possible	High 15	Estimate		Air gap the Eulo Tower outlet pipe	
Eulo	UV Disinfection	Insufficient UV dose	Bacteria (Recontamination)	Protozoa	Extreme 25	UV dose is sufficient for 4 log bacteria/protozoa reduction even at end of lamp life (UV Management Procedure)	Regular annual maintenance program for UV unit (changing the lamp, clean sleeve, replace sleeve every 2 years)	UV dose insufficient for virus reduction (though unlikely to be a virus contamination source).	Catastrophic	Rare	Medium 6	Confident	Undertake UVT testing to confirm UVT assumptions		
Eulo	UV Disinfection	Loss of power to UV	Bacteria (Recontamination)	Protozoa	Extreme 25	Backup generator runs UV unit as well as pumps in the event of a power outage.	Reservoir integrity		Catastrophic	Rare	Medium 6	Confident			
Eulo	UV Disinfection	UV bypassed	Bacteria (Recontamination)	Protozoa	Extreme 25	Bypass only operated for annual maintenance, which is only conducted by trained staff		The residual risk assumes that the integrity issues at Eulo Reservoir are resolved prior to the next UV system maintenance	Catastrophic	Rare	Medium 6	Confident			
Eulo	Reticulation	Backflow	Bacteria / Virus (Backflow, small towns)	All	Medium 6	Dual check valves on all meters		Don't believe there are significant hazards on properties	Catastrophic	Rare	Medium 6	Reliable			
Wyandra	Bores	Inadequate borehead protection and contamination from surface	Bacteria / Virus (Source)	Protozoa, turbidity	High 15	Sealed boreheads	Monthly inspections of boreheads	Bores are artesian, leakage would be visible	Catastrophic	Rare	Medium 6	Reliable	Fence the new bores (all schemes)		
Wyandra	Bores	Damaged or inadequate bore casing	Bacteria / Virus (Source)	Protozoa, turbidity	High 15	One bore is brand new	Bores are free flowing under own pressure	Old bore is backup only, hasn't been inspected since 1980s.	Catastrophic	Rare	Medium 6	Reliable	Review opportunities to group tender for bore inspections with neighbouring Councils		
Wyandra	Bores	Accidental or intentional physical damage to bore headworks	Loss of Supply		High 10	Backup bore			Catastrophic	Rare	Medium 6	Confident	Fence the new bores (all schemes)		
Wyandra	Reticulation	Old cast iron pipes in reticulation	Turbidity	Iron	Medium 6	Mains are flushed whenever complaints are received.			Minor	Possible	Medium 6	Reliable		Replace cast iron mains in Wyandra	
Wyandra	Reticulation	Backflow	Bacteria / Virus (Backflow, small towns)	All	Medium 6	No water meters		Don't believe there are significant hazards on properties	Catastrophic	Rare	Medium 6	Unreliable			
Yowah	Bores	Inadequate borehead protection and contamination from surface	Bacteria / Virus (Source)	Protozoa, turbidity	High 15	Sealed boreheads	Weekly inspections of boreheads	Bores are artesian, leakage would be visible	Catastrophic	Rare	Medium 6	Reliable	Fence the new bores (all schemes)		

Scheme	Component	Source of Hazard/Event	Primary hazard	Other hazards managed by same barriers	Max. Risk	Primary Preventive Measure	Other Preventative Measures	Comments	Residual Risk				RMIP		
									Consequence	Likelihood	Risk Level	Uncertainty	Immediate	Short Term	Long Term
Yowah	Bores	Damaged or inadequate bore casing	Bacteria / Virus (Source)	Protozoa, turbidity	High 15	The bore is brand new			Catastrophic	Rare	Medium 6	Reliable	Review opportunities to group tender for bore inspections with neighbouring Councils		
Yowah	Bores	Accidental or intentional physical damage to bore headworks	Loss of Supply		High 10	Disaster Management Plan		No backup bore in Yowah. Bore fencing may not lower the risk, however this is considered as low as reasonably possible	Catastrophic	Unlikely	High 10	Confident	Fence the new bores (all schemes)	Contact landowners and consider testing local private bore(s) to check water quality – could be used to fill tanker as an emergency supply for Yowah if needed	
Yowah	Reticulation	Backflow	Bacteria / Virus (Backflow, small towns)	All	Medium 6	No water meters		Don't believe there are significant hazards on properties	Catastrophic	Rare	Medium 6	Unreliable			
All Schemes	Whole of System	Natural water quality	Sodium	Fluoride, TDS, pH	High 15	None			Moderate	Almost Certain	High 15	Confident	Send letter to Cunnamulla Hospital advising them of the sodium levels in the water supplies Start heavy metals testing once/year		
All Schemes	Whole of System	Mains breaks and repairs	Bacteria / Virus (Recontamination)	Protozoa, turbidity	Extreme 25	Effective maintenance procedures for mains repairs in a manner that prevents/limits contamination	On the job training		Catastrophic	Rare	Medium 6	Reliable			
All Schemes	Whole of System	Growth of opportunistic pathogens in summer due to favourable water temperatures	Opportunistic Pathogens (e.g. *Mycobacteria, Naegleria, Legionella*)		High 12	No controls		As low as reasonably practical (chlorine disinfection is not planned in the short to medium term)	Major	Unlikely	High 12	Unreliable			Reassess after health-based targets adopted and regulatory advice received
All Schemes	Whole of System	Operator error	Loss of Supply		High 10	On the job training		Most foreseeable error would be change to telemetry settings on reservoirs, or incorrect valve operation	Catastrophic	Rare	Medium 6	Estimate			
All Schemes	Whole of System	Sabotage or intentional contamination	Bacteria / Virus (Recontamination)	All	Extreme 25	Aquifers are deep and bores are secure and sealed. Most bores are enclosed by fences. Cunnamulla Tower is fenced with a controlled lock on the door, Eulo Reservoir is fenced			Catastrophic	Rare	Medium 6	Estimate	Fence the new bores (all schemes) Install a lock on Eulo Reservoir hatch		
All Schemes	Whole of System	Failure to follow DWQMP and/or procedures	Bacteria / Virus (Recontamination)		Extreme 25	Multiple staff trained in DWQMP requirements (e.g. water testing)		With current staff this is considered Rare, however if any of the key positions leave this may need to be revisited	Catastrophic	Rare	Medium 6	Estimate			
All Schemes	Whole of System	Flood	Bacteria / Virus (Source)		High 15	Artesian bores, headworks sealed and secure	Bores are above flood level	Cunnamulla bore 1 discussed under Cunnamulla scheme	Catastrophic	Rare	Medium 6	Estimate			

5 RISK MANAGEMENT

5.1 Secure supplies

Council is fortunate to obtain drinking water solely from the GAB. All bores are artesian; with the natural water pressure being boosted in Cunnamulla and Eulo to provide additional flow.

The benefit of sourcing artesian water is that borehead integrity issues would be apparent via water leakage. Council inspects boreheads at a high frequency in Cunnamulla (daily to weekly), and at a lower frequency in the remaining schemes (weekly to monthly, based on resourcing).

For the Cunnamulla and Eulo bores in which water pressure is boosted; any faults in the bore casing may allow water from shallower aquifers to enter while the pumps are operating. As noted in the RMIP, Council is investigating opportunities to engage an appropriately qualified contractor to conduct bore casing inspections; ideally through a group tender with neighbouring Councils (due to the remoteness, there can be difficulties in sourcing contractors for this type of work).

All schemes have a backup bore with the exception of Yowah. Damage to the production bore that could not be resolved within a day would likely require water to be carted from another source; a scenario that would be managed under the Disaster Management Plan. As noted in the RMIP, Council is considering approaching nearby farmers with private bore supplies, and conducting water quality testing to determine the viability of these private bores as an emergency water source in a disaster scenario.

5.2 Reservoir integrity

Council manages three reservoirs; one operational reservoir in both Cunnamulla and Eulo, and one offline elevated reservoir in Eulo. Issues with these structures are noted in the risk assessment and improvements have been committed to in the RMIP.

A procedure for inspecting drinking water reservoirs will be developed (see Table 18).

5.3 Network integrity

All networks are under pressure, and work on the water networks is conducted in accordance with the operational procedures detailed in Table 18. Accordingly, the risk of contamination during network maintenance is considered low.

Water connections in Cunnamulla and Eulo are metered, and water meters contain dual check valves to prevent backflow. There are some higher risk locations in Cunnamulla (hospital, sewage treatment works) which have reduced pressure zone (RPZ) devices as a heightened backflow prevention measure. The one location which may represent a higher risk which currently does not have backflow prevention is the Cunnamulla water tanker filling station. As noted in the RMIP, this will be rectified in the near future.

There are no known higher risk connections in Eulo, Wyandra or Yowah.

5.4 Disinfection

At this time, only the Eulo supply is disinfected, via a UV disinfection system on the reservoir outlet. This was implemented in response to multiple *E. coli* detections in past years that were attributed to frogs accessing the water reservoir through breaches in integrity. The operation

of the UV disinfection system is verified through inspections 2-3 times per week, and annual maintenance.

5.5 Operation and Maintenance Procedures

Council maintains a number of operational procedures covering the key activities that ensure the integrity of preventive measures stated in the risk assessment.

Table 18 lists the procedures, both those already developed and those which will be developed in future.

Table 18 Operations and Maintenance Procedures

Title	Revision date	Next review due	Position responsible
Water Mains Repair – Reactive Maintenance	August 2018	February 2020	Water & Sewerage Supervisor
Centrifugal Pump – Routine Maintenance	August 2018	February 2020	Water & Sewerage Supervisor
Trunk Main Shutdown – Planned Maintenance	August 2018	February 2020	Water & Sewerage Supervisor
Hydrant Maintenance	August 2018	February 2020	Water & Sewerage Supervisor
Water Main Flushing	August 2018	February 2020	Water & Sewerage Supervisor
Valve Maintenance	August 2018	February 2020	Water & Sewerage Supervisor
Switchboard Maintenance	August 2018	February 2020	Water & Sewerage Supervisor
Notification of Water Supply Interruption – Programmed Works	August 2018	February 2020	Water & Sewerage Supervisor
UV Disinfection System Operations	September 2018	February 2020	Water & Sewerage Supervisor
Reservoir Inspections	*Not yet developed*	*Not yet developed*	*Water & Sewerage Supervisor*
Bore Inspections	*Not yet developed*	*Not yet developed*	*Water & Sewerage Supervisor*
Customer complaints	*Not yet developed*	*Not yet developed*	*Water & Sewerage Supervisor*
Water quality testing	*Not yet developed*	*Not yet developed*	*EHAA Officer*

5.6 Records Management

Some historical information was lost in a fire that destroyed Council's work depot in early 2013. Council has since moved to electronic documentation and records management.

Staff are progressively being trained and re-trained in records management as it was identified in the 2018 audit that some records relating to the DWQMP could not be located. An additional contributing factor for this has been the high turnover of professional staff during the period since the DWQMP was developed and initially approved.

The current process for management of documentation and records is described in Table 19. The stated position is responsible for ensuring document currency is maintained.

All Council staff have access to the information shown in the Table via the Records Management System. The system maintains metadata for saved documents which provides an audit trail.

Though there have been past issues with management of records, Council has committed to improving in this area to ensure compliance not only with this DWQMP but also the *Public Records Act 2002* and subordinate documentation.

Table 19 Management of Documentation and Records

Information / record	Location	Position responsible
Operational / verification monitoring data	Spreadsheet saved electronically in Records Management System; original PDFs also saved electronically	EHAA Officer
Operational procedures	Saved electronically in Records Management System, hardcopies printed as required	Water & Sewerage Supervisor
Incident reports	Saved electronically in Records Management System	EHAA Officer
DWQMP reports	Saved electronically in Records Management System; published on Council website	EHAA Officer
Audit reports	Saved electronically in Records Management System	EHAA Officer
Regulator correspondence	Saved electronically in Records Management System	EHAA Officer
Water quality complaints	Managed through Practical Plus work order system	Water & Sewerage Supervisor

6 INCIDENTS AND EMERGENCIES

Drinking water incidents and emergencies are defined in Table 20, along with the summary of actions taken and the position(s) responsible.

Table 20 Incident and Emergency Levels

Level	Description of incident	Summary of Actions	Position(s) responsible
3	Disaster scenario Outbreak of waterborne disease Loss of supply and inability to restore within 1 day	Alert CEO Implement Disaster Management Plan Issue boil water alert / do not drink alert Undertake actions as per Level 2 incidents	Chief Operations Officer
2	Detection of *E. coli* in drinking water Chemical result above ADWG health guideline 'Event' that has occurred, or detection of a parameter without a guideline value which may represent a public health risk and can't be managed under the DWQMP	Report to Chief Operations Officer Report to DNRME by phone immediately Commence contamination investigation Determine affected areas and isolate if possible Issue boil water alert if necessary (consult with QLD Health) Consider need for emergency disinfection and/or flushing of water mains Begin regular re-sampling procedures until emergency is passed Written initial report of incident to DNRME within 24 hours Repair infrastructure as necessary Written close out report to DNRME at conclusion of incident	Water & Sewerage Supervisor Environmental Health/Assets/ Admin Officer
	Unplanned loss of supply for >6 hours and <1 day	Repair infrastructure as necessary Arrange alternative supply if necessary Consider whether contamination could have occurred Determine affected areas and isolate if possible Consider need for emergency disinfection and/or flushing of water mains Consider need for boil water alert	Water & Sewerage Supervisor
1	ADWG aesthetic guideline exceeded Unplanned loss of supply for <6 hours	Manage as per normal processes and operational procedures	Water & Sewerage Supervisor

Key emergency contacts are summarised in Table 21.

Table 21 Emergency Contacts List

Organisation / Contact	Contact Details	Communications Protocols
Department of Natural Resources, Mines and Energy	1300 596 709 DrinkingWater.Reporting@dews.qld.gov.au	Contacted in event of water incidents as per Table 20 Incident reporting forms are found on the DNRME website: https://www.business.qld.gov.au/industries/mining-energy-water/water/sewerage-service-providers/industry-regulation/drinking-water/incidents-reporting
Queensland Health, Darling Downs PHU	07 4699 8240	Contacted as required for public health advice, e.g. discussions on issuing boil water alerts or do not drink alerts
Cunnamulla Hospital	07 4655 8100	Contacted directly if affected by a drinking water incident.
Cunnamulla Medical Clinic	07 4655 1231	
Churches of Christ Care Yapunyah Aged Care Centre	07 4655 1449	
Cunnamulla State School	07 4655 8333	
Sacred Heart Parish School Cunnamulla	07 4655 1486	
Churches of Christ Care Early Childhood Centre Cunnamulla	07 4655 8433	
Eulo State School	07 4655 4898	
Wyandra State School	07 4654 0280	

As the towns in the Paroo Shire are only small and relatively close knit, it is not difficult to advise residents of any emergency with regards to the water supply. A notice on the Council Office public noticeboard and verbal communication with residents as part of a drive-by by Council Officers is easily achieved and has been found to be a satisfactory way of notifying the community in the past.

A boil water alert template from Queensland Health will be kept on file and if necessary under an incident, this will be issued to the community via letter box drop and/or website publication and/or display in prominent community locations (as appropriate to the town).

After any emergency a review is conducted with a view to establishing better methods or whether any revision to existing procedures is required. Where changes to protocols are determined to be necessary these changes are made and staff are instructed in these changes.

7 WATER QUALITY MONITORING

7.1 Operational Monitoring

Operational monitoring provides information that can be acted upon in real-time (or close to it) to ensure the system is performing appropriately. Table 22 summarises Council's drinking water operational monitoring program.

Table 22 Operational Monitoring

Preventive Measure	What is monitored, and how	Frequency	Position Responsible	Corrective Action
Bore heads and fencing (all schemes)	Visual inspection of integrity	Several times per week	Water & Sewerage Supervisor (Cunnamulla); Town Orderly's (other towns)	Repair / maintain as necessary
Reservoir levels maintained (Cunnamulla)	Reservoir level via telemetry	Continuous	Water & Sewerage Supervisor	Repair fault
UV disinfection system operational (Eulo)	System operational Lamp life % *Target >70%*	2-3 times per week	Town Orderly	Check reservoir for integrity and any evidence of access by vermin, frogs, etc. If any potential contamination sources identified, treat as a Level 2 incident
Customer complaints (all schemes)	Customer complaints	As received	Water & Sewerage Supervisor	Attend property and investigate

7.2 Verification Monitoring

Verification of water quality is achieved through routine monitoring of *E. coli*, and periodic physical and chemical analyses according to the 'Standard Water Analysis' suite provided by Queensland Health's Forensic and Scientific Services Laboratory. These parameters are deemed to be appropriate for artesian supplies, with the *E. coli* monitoring providing an indicator for faecal contamination as well as meeting Council's requirements under the *Public Health Regulation 2005*, and the Standard Water Analysis providing an overall characterisation of the inherent water quality (e.g. pH, dissolved salts, hardness, fluoride, other minerals) as well as issues that can be representative of asset condition and/or network ingress (turbidity, colour, iron, copper).

Samples are collected by the EHAA Officer (with backup from the Shire Services Officer for periods of absence), following disinfection of the sample tap with a propane torch and flushing the line for approximately two minutes. Samples are transported in eskies back to the Council

Depot for processing. *E. coli* monitoring is undertaken in-house, with occasional samples sent externally for verification (this is not undertaken at a set frequency). Monitoring frequencies and sample sites are summarised in Table 23. The Colilert method is utilised for presence/absence testing. The method is displayed on the wall of the laboratory room.

Table 23 Verification Monitoring – *E. coli*

Scheme	Frequency	Number of Samples	Locations
Cunnamulla	Weekly	3	Rotate between: Depot, Civic Centre, Tourist Centre, Shire Hall, JKP, Swimming Pool, Bore 1, Water Tower, Catholic School
Eulo	Weekly	3	Rotate between: Bore Tap, Shire Hall, Road Garden, Shop, Church, Police Station
Wyandra	Weekly	3	Rotate between: Hall, Public Toilet, Pub, Road Garden, School
Yowah	Weekly	3	Rotate between: Hall, Tennis Court, Bore Tap, Campground

Standard water analysis is undertaken on a single sample from each scheme on a quarterly basis, with samples sent to the Queensland Health laboratory. The parameters tested are listed in Table 24.

Table 24 Verification Monitoring – Physical and Chemical Parameters

Parameters			
Conductivity	True Colour	Bicarbonate	Iron
pH	Turbidity	Carbonate	Manganese
Hardness	Sodium	Chloride	Zinc
Alkalinity	Potassium	Fluoride	Aluminium
Silica	Calcium	Nitrate	Boron
TDS	Magnesium	Sulphate	Copper

7.2.1 Responses and Corrective Actions

The EHAA Officer reads the *E. coli* results, and if a result shows the presence of *E. coli*, this is immediately treated as a Level 2 incident with actions undertaken as per Table 20.

Physical / chemical results are received from the external laboratory. If an ADWG health guideline was exceeded (fluoride, nitrate, manganese, boron or copper), this would also be reported as a Level 2 incident, however the response would likely initially focus on determining whether the result was reflective of supplied water quality. Chemical results are historically very stable across the drinking water schemes, and a sudden health guideline breach would need to consider the potential for localised plumbing contamination, sample contamination and/or laboratory error. Council would likely rely on expertise from DNRME and/or Queensland Health to assist with deciding on actions to be taken under these circumstances (and recognising the timeframes before repeat samples can be collected and analysed).

8 RISK MANAGEMENT IMPROVEMENT PROGRAM

For all unacceptable risks, improvement items were identified by the Risk Assessment team which will help to mitigate the risk further. The improvement items are listed in the final three columns of the Risk Register, and repeated in Table 25 below along with the position responsible for the action, and the action due date.

Table 25 Risk Management Improvement Program

Action	Responsibility	Due date
Raise Cunnamulla bore 1 headworks by 0.5m to bring above flood level	Water & Sewerage Supervisor	30/06/2020
Review opportunities to group tender for bore inspections with neighbouring Councils	Chief Operations Officer	30/06/2019
Custom manufacture a new air vent for Cunnamulla Reservoir (PE or PVC)	Water & Sewerage Supervisor	31/12/2018
Install backflow prevention on Cunnamulla tanker filling station, and consider standpipe at airport	Water & Sewerage Supervisor	31/12/2018
Fence the new bores (all schemes)	Water & Sewerage Supervisor	31/12/2018
Repair ridge capping on Eulo Reservoir	Water & Sewerage Supervisor	31/12/2018
Undertake UV Transmittance testing to confirm assumptions	Water & Sewerage Supervisor	31/12/2018
Review options for gaining funding for installation of SCADA & alarming in future	Chief Operations Officer	30/06/2020
Air gap the Eulo Tower outlet pipe	Water & Sewerage Supervisor	31/12/2018
Replace cast iron mains in Wyandra	Water & Sewerage Supervisor	30/06/2020
Contact landowners and consider testing local private bore(s) to check water quality - could be used to fill tanker as an emergency supply for Yowah if needed	Chief Operations Officer	30/06/2020
Send letter to Cunnamulla Hospital advising them of the sodium levels in the water supplies	Chief Operations Officer	31/12/2018
Start heavy metals testing once/year	EHAA Officer	30/06/2019
Install a lock on Eulo Reservoir hatch	Water & Sewerage Supervisor	31/12/2018
Develop remaining operational procedures (those stated in Table 18)	Water & Sewerage Supervisor / EHAA Officer	30/06/2020

9 REVIEW AND AUDIT

9.1 DWQMP Review

The DWQMP is reviewed at the frequency specified in the Information Notice for the Decision. Reviews include but are not limited to:

- Confirmation of scheme and infrastructure details
- Review of water quality data
- Consideration of any new hazards and risks
- Review of preventive measures
- Incident learnings
- Completion of risk management improvement program actions
- Appropriateness of operational and verification monitoring programs

Additional guidance is provided in the Drinking Water Quality Management Plan Review and Audit Guideline (DNRME 2010).

9.2 DWQMP Audit

The DWQMP is audited by an appropriately qualified person at the frequency specified in the Information Notice for the Decision.

10 REFERENCES

NHMRC & NRMMC (2011), National Water Quality Management Strategy: *Australian Drinking Water Guidelines 6*, National Health and Medical Research Council and Natural Resource Management Ministerial Council, Australian Government, Canberra.

Queensland Department of Natural Resources, Mines and Energy (2010) *Drinking Water Quality Management Plan Guideline, September 2010*. Queensland Government, Brisbane.

Queensland Department of Natural Resources, Mines and Energy (2010) *Preparing a Drinking Water Quality Management Plan Supporting Information, September 2010*. Queensland Government, Brisbane.

Smerdon BD, Ransley TR, Radke BM and Kellett JR (2012) *Water resource assessment for the Great Artesian Basin. A report to the Australian Government from the CSIRO Great Artesian Basin Water Resource Assessment.* CSIRO Water for a Healthy Country Flagship, Australia.

APPENDIX A – WATER QUALITY SUMMARY

WATER QUALITY SUMMARY

Microbiological water quality is assessed through routine testing of *E. coli*, the faecal indicator organism. Paroo Shire Council has *E. coli* monitoring records dating back to 2008, with some missing periods (2008 for Wyandra and Yowah, and 2013 for all schemes).

As can be seen in Figure 1 and Table 1, performance has generally been satisfactory in most schemes with the exception of Eulo (discussed below).

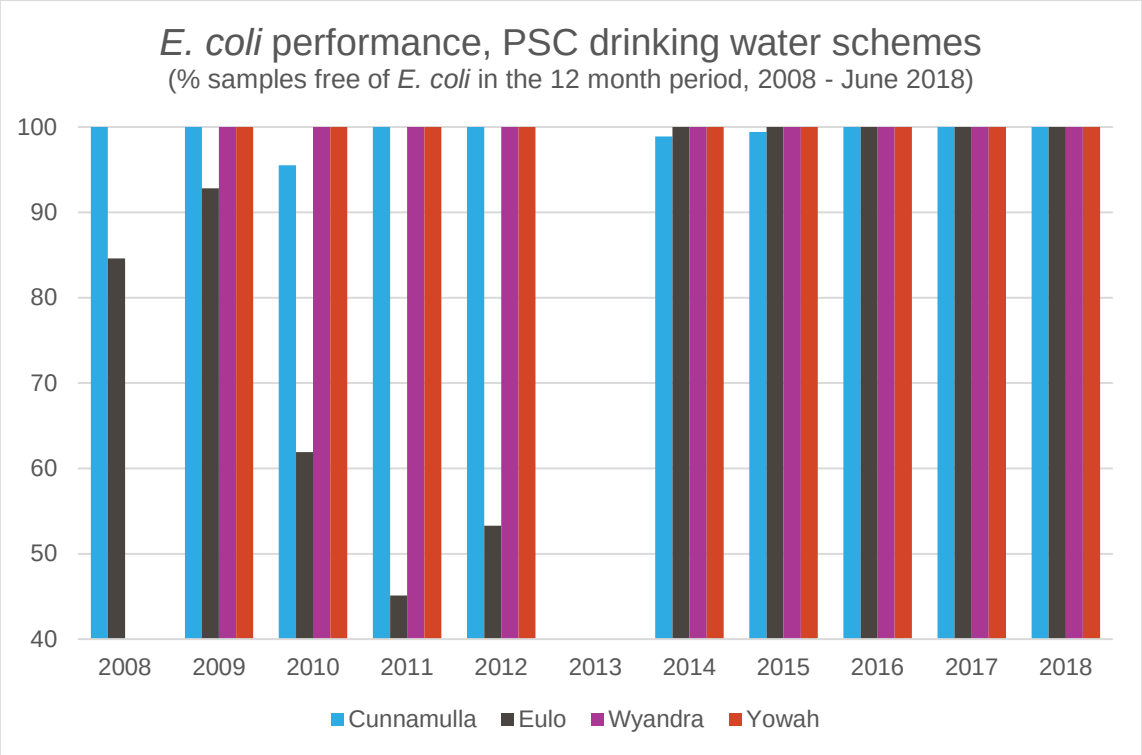

Figure 1 *E. coli* performance chart

E. coli detections

- Eulo scheme, pre-2014, multiple detections – frogs carried contamination into reservoir, ceased following installation of UV disinfection system on reservoir outlet.
- Cunnamulla, 2010, 2 detections – circumstances unknown (incident reports unavailable)
- Cunnamulla 2014, 2 detections – circumstances unknown (incident reports unavailable)
- Cunnamulla Shire Hall, 3 February 2015, 1cfu/100mL – this was assumed to be sample tap contamination at the time of reporting.

Table 1 ***E. coli*** **performance**

Year		Cunnamulla	Eulo	Wyandra	Yowah
2008	# Samples	41	13	ND	ND
	# Detects	0	**2**	ND	ND
	% Negative	100	**84.6**	ND	ND
2009	# Samples	96	69	3	5
	# Detects	0	**5**	0	0
	% Negative	100	**92.8**	100	100
2010	# Samples	44	63	4	8
	# Detects	**2**	**24**	0	0
	% Negative	**95.5**	**61.9**	100	100
2011	# Samples	12	51	3	2
	# Detects	0	**28**	0	0
	% Negative	100	**45.1**	100	100
2012	# Samples	15	30	3	3
	# Detects	0	**14**	0	0
	% Negative	100	**53.3**	100	100
2013	# Samples	ND	ND	ND	ND
	# Detects	ND	ND	ND	ND
	% Negative	ND	ND	ND	ND
2014	# Samples	182	36	36	36
	# Detects	**2**	0	0	0
	% Negative	**98.9**	100	100	100
2015	# Samples	157	36	36	36
	# Detects	**1**	0	0	0
	% Negative	**99.4**	100	100	100
2016	# Samples	156	36	36	36
	# Detects	0	0	0	0
	% Negative	100	100	100	100
2017	# Samples	156	36	36	36
	# Detects	0	0	0	0
	% Negative	100	100	100	100
2018 (half year to July)	# Samples	92	31	33	33
	# Detects	0	0	0	0
	% Negative	100	100	100	100

ND = no data available

Physical / chemical performance

There have been no breaches of the water quality criteria (ADWG health guideline values) in either the 2016-2018, or pre-2013 datasets. Performance is summarised in the proceeding tables. It is not possible to create a single statistical summary, as the raw data for the pre-2013 summary is not available.

The following issues were noted from the data:

- Cunnamulla – pH slightly above 8.5 on several occasions pre-2013, however has not exceeded 8.5 from 2016 to 2018;
- Cunnamulla – turbidity result of 13NTU in the pre-2013 dataset; circumstances unknown;
- Eulo - pH slightly above 8.5 on several occasions pre-2013, however has not exceeded 8.5 from 2016 to 2018;
- Eulo – sodium consistently above the aesthetic guideline
- Wyandra – pH consistently above the aesthetic guideline
- Yowah - sodium consistently above the aesthetic guideline

Table 2 Cunnamulla Physical/Chemical Drinking Water Results, 2016-2018

Parameter	Count	Min	Max	Mean	Std Dev	95%ile	>Aesthetic (ADWG)	>Health (ADWG)
Conductivity (µS/cm)	8	625	678	649	21	678	N/A	N/A
pH	8	8.3	8.5	8.4	0.1	8.5	0	N/A
Hardness (mg/L as $CaCO_3$)	8	5	6	6	0.4	6	0	N/A
Alkalinity (mg/L as $CaCO_3$)	8	239	265	248	9	262	N/A	N/A
Silica (mg/L)	8	20	22	21	1	22	0	N/A
TDS (mg/L)	8	370	495	396	41	462	0	N/A
True Colour (HU)	8	<1	3.0	1.0	<1	2.3	0	N/A
Turbidity (NTU)	8	<1	<1	<1	<1	<1	0	N/A
Sodium (mg/L)	8	140	160	149	6	157	0	N/A
Potassium (mg/L)	8	1.3	1.3	1.3	<1	1.3	N/A	N/A
Calcium (mg/L)	8	2.0	2.5	2.3	<1	2.5	N/A	N/A
Magnesium (mg/L)	8	<1	<1	<1	<1	<1	N/A	N/A
Chloride (mg/L)	8	54	57	56	1	57	0	N/A
Fluoride (mg/L)	8	0.4	0.5	0.5	<0.1	0.5	N/A	0
Nitrate (mg/L)	8	<0.5	1.2	0.5	<0.5	1.2	N/A	0
Sulphate (mg/L)	8	<1	2.0	<1	<1	1.7	0	N/A
Iron (mg/L)	8	<0.01	0.02	<0.01	<0.01	0.02	0	N/A
Manganese (mg/L)	8	<0.01	0.01	<0.01	<0.01	0.01	0	0
Zinc (mg/L)	8	<0.01	0.02	<0.01	<0.01	0.02	0	N/A
Aluminium (mg/L)	8	<0.05	<0.05	<0.05	<0.05	<0.05	0	N/A
Boron (mg/L)	8	0.09	0.11	0.10	0.01	0.11	N/A	0
Copper (mg/L)	8	<0.03	0.53	0.08	0.18	0.36	0	0

Table 3 Cunnamulla Physical/Chemical Drinking Water Results, pre-2013 (from original DWQMP)

Parameter	Count	Min	Max	Mean	Std Dev	95%ile	>Aesthetic (ADWG)	>Health (ADWG)
pH	6	8.47	8.6	8.5	0.05	8.59	5	N/A
Hardness (mg/L as $CaCO_3$)	6	5.4	6.2	5.9	0.37	6.2	0	N/A
Alkalinity (mg/L as $CaCO_3$)	6	232	250	238	6.42	247	N/A	N/A
Conductivity (µS/cm)	6	621	671	638.2	19.28	664.75	N/A	N/A
TDS (mg/L)	6	362	381	370	6.72	378.75	0	N/A
Sodium (mg/L)	6	140	148	144.7	3.33	147.75	0	N/A
Chloride (mg/L)	6	57	58	57.8	0.41	58	0	N/A
Sulphate (mg/L)	6	<1	1	-	-	-	0	0
Total Iron (mg/L)	6	<0.01	0.04	-	-	-	0	N/A
Manganese (mg/L)	6	<0.01	<0.01	-	-	-	0	0
Fluoride (mg/L)	6	0.43	0.49	0.5	0.02	0.49	N/A	0
Nitrate (mg/L)	6	<0.5	0.5	-	-	-	N/A	0
Copper (mg/L)	6	<0.03	<0.03	-	-	-	0	0
Silica (mg/L)	6	20	21	20.2	0.41	20.75	0	N/A
True Colour (HU)	6	<1	6	3.2	2.17	5.8	0	N/A
Turbidity (NTU)	6	<1	13	7	8.49	12.4	1	N/A
Aluminium (mg/L)	6	<0.05	<0.05	-	-	-	0	N/A
Zinc (mg/L)	6	<0.01	<0.01	-	-	-	0	N/A

Table 4 Eulo Physical/Chemical Drinking Water Results, 2016-2018

Parameter	Count	Min	Max	Mean	Std Dev	95%ile	>Aesthetic (ADWG)	>Health (ADWG)
Conductivity (µS/cm)	7	774	805	787	10	801	N/A	N/A
pH	7	8.4	8.5	8.5	0.0	8.5	0	N/A
Hardness (mg/L as $CaCO_3$)	7	7	8	7	0	7	0	N/A
Alkalinity (mg/L as $CaCO_3$)	7	354	475	380	42	443	N/A	N/A
Silica (mg/L)	7	18	19	19	0	19	0	N/A
TDS (mg/L)	7	465	475	471	3	475	0	N/A
True Colour (HU)	7	<1	4.0	2.2	1.1	3.7	0	N/A
Turbidity (NTU)	7	<1	<1	<1	<1	<1	0	N/A
Sodium (mg/L)	7	190	190	190	0	190	7	N/A
Potassium (mg/L)	7	1.5	1.6	1.6	<1	1.6	N/A	N/A
Calcium (mg/L)	7	2.1	2.4	2.2	<1	2.3	N/A	N/A
Magnesium (mg/L)	7	<1	<1	<1	<1	<1	N/A	N/A
Chloride (mg/L)	7	37	40	38	1	40	0	N/A
Fluoride (mg/L)	7	0.5	0.6	0.6	<0.1	0.6	N/A	0
Nitrate (mg/L)	7	<0.5	<0.5	<0.5	<0.5	<0.5	N/A	0
Sulphate (mg/L)	7	<1	<1	<1	<1	<1	0	N/A
Iron (mg/L)	7	<0.01	0.03	0.02	0.01	0.03	0	N/A
Manganese (mg/L)	7	<0.01	0.01	0.01	0.00	0.01	0	0
Zinc (mg/L)	7	<0.01	0.08	0.02	0.03	0.06	0	N/A
Aluminium (mg/L)	7	<0.05	<0.05	<0.05	<0.05	<0.05	0	N/A
Boron (mg/L)	7	0.21	0.22	0.21	0.00	0.22	N/A	0
Copper	7	<0.03	<0.03	<0.03	<0.03	<0.03	0	0

Table 5 Eulo Physical/Chemical Drinking Water Results, pre-2013 (from original DWQMP)

Parameter	Count	Min	Max	Mean	Std Dev	95%ile	>Aesthetic (ADWG)	>Health (ADWG)
pH	8	8.5	8.7	8.6	0	8.65	7	N/A
Total Hardness(mg/L)	8	6.7	7.2	6.9	0.2	7.17	0	N/A
Total Alkalinity (mg/L)	8	354	359	357.5	1.8	359	N/A	N/A
Conductivity (µS/cm)	8	764	798	771.5	11.2	789.95	N/A	N/A
TDS (mg/L)	8	454	466	461.4	4.1	465.65	0	N/A
Sodium (mg/L)	8	179	189	184.8	3.3	188.3	7	N/A
Chloride (mg/L)	8	38	39	38.8	0.5	39	0	N/A
Sulphate (mg/L)	8	<1	<1	-	-	-	0	0
Total Iron (mg/L)	8	<0.01	0.06	-	-	-	0	N/A
Manganese (mg/L)	8	<0.01	<0.01	-	-	-	0	0
Fluoride (mg/L)	8	0.55	0.62	0.58	0.02	0.61	N/A	0
Nitrate (mg/L)	8	<0.5	<0.5	-	-	-	N/A	0
Copper (mg/L)	8	<0.03	<0.03	-	-	-	0	0
Silica (mg/L)	8	18	19	18.5	0.5	19	N/A	0
True Colour (Hazen)	8	3	8	5.6	2.3	8	0	N/A
Turbidity (NTU)	8	<1.0	1	-	-	-	0	N/A
Aluminium (mg/L)	8	<0.05	<0.05	-	-	-	0	N/A
Zinc (mg/L)	8	<0.01	<0.01	-	-	-	0	N/A

Table 6 Wyandra Physical/Chemical Drinking Water Results, 2016-2018

Parameter	Count	Min	Max	Mean	Std Dev	95%ile	>Aesthetic (ADWG)	>Health (ADWG)
Conductivity (µS/cm)	7	771	799	780	10	797	N/A	N/A
pH	7	8.6	8.7	8.7	0.1	8.7	7	N/A
Hardness (mg/L as $CaCO_3$)	7	6	7	6	0.2	6	0	N/A
Alkalinity (mg/L as $CaCO_3$)	7	241	249	245	3	248	N/A	N/A
Silica (mg/L)	7	26	26	26	0	26	0	N/A
TDS (mg/L)	7	449	458	454	3	457	0	N/A
True Colour (HU)	7	<1	2.0	<1	<1	1.7	0	N/A
Turbidity (NTU)	7	<1	<1	<1	<1	<1	0	N/A
Sodium (mg/L)	7	170	180	174	5	180	0	N/A
Potassium (mg/L)	7	1.2	1.2	1.2	<1	1.2	N/A	N/A
Calcium (mg/L)	7	2.4	2.5	2.4	<1	2.5	N/A	N/A
Magnesium (mg/L)	7	<1	<1	<1	<1	<1	N/A	N/A
Chloride (mg/L)	7	88	90	89	1	90	0	N/A
Fluoride (mg/L)	7	0.4	0.5	0.4	<0.1	0.5	N/A	0
Nitrate (mg/L)	7	<0.5	<0.5	<0.5	<0.5	<0.5	N/A	0
Sulphate (mg/L)	7	14	15	14	<1	15	0	N/A
Iron (mg/L)	7	<0.01	<0.01	<0.01	<0.01	<0.01	0	N/A
Manganese (mg/L)	7	<0.01	<0.01	<0.01	<0.01	<0.01	0	0
Zinc (mg/L)	7	<0.01	0.07	0.01	0.02	0.05	0	N/A
Aluminium (mg/L)	7	<0.05	<0.05	<0.05	<0.05	<0.05	0	N/A
Boron (mg/L)	7	0.16	0.17	0.16	0.00	0.17	N/A	0
Copper (mg/L)	7	<0.03	0.04	<0.03	<0.03	0.03	0	0

Table 7 Wyandra Physical/Chemical Drinking Water Results, pre-2013 (from original DWQMP)

Parameter	Count	Min	Max	Mean	Std Dev	95%ile	>Aesthetic (ADWG)	>Health (ADWG)
pH	2	8.62	8.74	8.68	0.1	8.73	2	N/A
Total Hardness(mg/L)	2	9	9.4	9.2	0.3	9.38	0	N/A
Total Alkalinity (mg/L)	2	239	242	240.5	2.1	241.85	N/A	N/A
Conductivity (µS/cm)	2	756	764	760	5.7	763.6	N/A	N/A
TDS (mg/L)	2	442	455	448.5	9.2	454.35	0	N/A
Sodium (mg/L)	2	168	173	170.5	3.5	172.75	0	N/A
Chloride (mg/L)	2	86	90	88	2.8	89.8	0	N/A
Sulphate (mg/L)	2	14.7	14.7	14.7	0	14.7	0	0
Total Iron (mg/L)	2	<0.01	<0.01	-	-	-	0	N/A
Manganese (mg/L)	2	<0.01	<0.01	-	-	-	0	0
Fluoride (mg/L)	2	0.48	0.51	0.5	0.02	0.51	N/A	0
Nitrate (mg/L)	2	<0.5	<0.5	-	-	-	N/A	0
Copper (mg/L)	2	<0.03	<0.03	-	-	-	0	0
Silica (mg/L)	2	24	27	25.5	2.1	26.85	N/A	0
True Colour (Hazen)	2	4	29	16.5	17.7	27.75	1	N/A
Turbidity (NTU)	2	<1.0	<1	-	-	-	0	N/A
Aluminium (mg/L)	2	<0.05	<0.05	-	-	-	0	N/A
Zinc (mg/L)	2	<0.01	<0.01	-	-	-	0	N/A

Table 8 Yowah Physical/Chemical Drinking Water Results, 2016-2018

Parameter	Count	Min	Max	Mean	Std Dev	95%ile	>Aesthetic (ADWG)	>Health (ADWG)
Conductivity (µS/cm)	7	871	905	882	11	899	N/A	N/A
pH	7	8.2	8.3	8.2	0.1	8.3	0	N/A
Hardness (mg/L as $CaCO_3$)	7	8.8	9	9	0.1	9	0	N/A
Alkalinity (mg/L as $CaCO_3$)	7	336	345	340	3	344	N/A	N/A
Silica (mg/L)	7	27	28	28	0.4	28	0	N/A
TDS (mg/L)	7	515	528	522	4	527	0	N/A
True Colour (HU)	7	<1	1.0	<1	<1	1.0	0	N/A
Turbidity (NTU)	7	<1	<1	<1	<1	<1	0	N/A
Sodium (mg/L)	7	200	210	204	5	210	7	N/A
Potassium (mg/L)	7	2.7	2.8	2.8	<1	2.8	N/A	N/A
Calcium (mg/L)	7	3.4	3.5	3.4	<1	3.5	N/A	N/A
Magnesium (mg/L)	7	<1	<1	<1	<1	<1	N/A	N/A
Chloride (mg/L)	7	76	80	79	1	80	0	N/A
Fluoride (mg/L)	7	1.0	1.2	1.1	0.1	1.2	N/A	0
Nitrate (mg/L)	7	<0.5	<0.5	<0.5	<0.5	<0.5	N/A	0
Sulphate (mg/L)	7	<1	<1	<1	<1	<1	0	N/A
Iron (mg/L)	7	<0.01	0.02	<0.01	<0.01	0.02	0	N/A
Manganese (mg/L)	7	0.02	0.02	0.02	<0.01	0.02	0	0
Zinc (mg/L)	7	<0.01	0.10	0.03	0.04	0.09	0	N/A
Aluminium (mg/L)	7	<0.05	<0.05	<0.05	<0.05	<0.05	0	N/A
Boron (mg/L)	7	0.28	0.30	0.29	0.01	0.30	N/A	0
Copper (mg/L)	7	<0.03	0.03	<0.03	<0.03	<0.03	0	0

Table 9 Yowah Physical/Chemical Drinking Water Results, pre-2013 (from original DWQMP)

Parameter	Count	Min	Max	Mean	Std Dev	95%ile	>Aesthetic (ADWG)	>Health (ADWG)
pH	3	8.43	8.51	8.47	0.1	8.51	1	N/A
Total Hardness(mg/L)	3	8.8	8.9	8.9	0.1	8.9	0	N/A
Total Alkalinity (mg/L)	3	332	340	336	4	339.6	N/A	N/A
Conductivity (µS/cm)	3	866	867	866.7	0.6	867	N/A	N/A
TDS (mg/L)	3	503	520	513.3	9.1	519.7	0	N/A
Sodium (mg/L)	3	191	201	197	5.3	200.8	3	N/A
Chloride (mg/L)	3	78	80	79	1	79.9	0	N/A
Sulphate (mg/L)	3	<1.0	<1.0	-	-	-	0	0
Total Iron (mg/L)	3	0.02	0.04	0.03	0	0.04	0	N/A
Manganese (mg/L)	3	0.01	0.02	0.01	0	0.02	0	0
Fluoride (mg/L)	3	1.1	1.2	1.13	0.06	1.19	N/A	0
Nitrate (mg/L)	3	<0.5	<0.5	-	-	-	N/A	0
Copper (mg/L)	3	<0.03	<0.03	-	-	-	0	0
Silica (mg/L)	3	27	29	28.3	1.2	29	N/A	0
True Colour (Hazen)	3	1	14	5.7	7.2	12.8	0	N/A
Turbidity (NTU)	3	<1.0	1	-	-	-	0	N/A
Aluminium (mg/L)	3	<0.05	<0.05	-	-	-	0	N/A
Zinc (mg/L)	3	<0.01	<0.01	-	-	-	0	N/A

APPENDIX B – BORE REPORTS

BORE REPORT

REG NUMBER 338

REGISTRATION DETAILS

		BASIN	4232	**LATITUDE**	28-04-17	**MAP-SCALE**	254
OFFICE	Charleville	**SUB-AREA**		**LONGITUDE**	145-41-03	**MAP-SERIES**	M
DATE LOG RECD		**SHIRE**	5800-PAROO	**EASTING**	370717	**MAP-NO**	SH55-2
D/O FILE NO.	V17 0454/1	**LOT**		**NORTHING**	6894175	**MAP NAME**	CUNNAMULLA
R/O FILE NO.	551777	**PLAN**		**ZONE**	55	**PROG SECTION**	
H/O FILE NO.	L02002B	**ORIGINAL DESCRIPTION**	LOCAL GOVT & WATER SUPPLY RES R86	**ACCURACY**		**PRES EQUIPMENT**	
				GPS ACC			
GIS LAT	-28.071505287	**PARISH NAME**	1384-CUNNAMULLA			**ORIGINAL BORE NO**	CUNNAMULLA NO 1 TOWN
GIS LNG	145.684241281	**COUNTY**	WELLINGTON			**BORE LINE**	-
CHECKED	N						
						POLYGON	
						RN OF BORE REPLACED	
FACILITY TYPE	Artesian - Controlled Flow	**DATE DRILLED**	01/01/1901			**DATA OWNER**	
STATUS	Existing	**DRILLERS NAME**					
ROLES		**DRILL COMPANY**					
		METHOD OF CONST.	CABLE TOOL				

CASING DETAILS

PIPE	DATE	RECORD NUMBER	MATERIAL DESCRIPTION	MAT SIZE (mm)	SIZE DESC	OUTSIDE DIAM (mm)	TOP (m)	BOTTOM (m)
A	02/04/1911	1	Steel Casing		WT	254	0.00	30.50
A	02/04/1911	2	Steel Casing		WT	203	0.00	43.30
A	02/04/1911	3	Steel Casing		WT	152	43.30	320.00
A	02/04/1911	4	Steel Casing		WT	127	320.00	548.60

STRATA LOG DETAILS

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
1	0.00	188.06	CLAY
2	188.06	237.74	STRATA UNKNOWN
3	237.74	310.90	SHALE
4	310.90	350.52	SANDSTONE
5	350.52	381.00	SHALE

BORE REPORT

REG NUMBER 338

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
6	381.00	396.24	SANDSTONE
7	396.24	417.58	HARD ROCK
8	417.58	427.33	ROCK AND SHALE

STRATIGRAPHY DETAILS

SOURCE	RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
DNR	1	0.00		QUATERNARY*TERTIARY
DNR	2		310.90	WALLUMBILLA FORMATION
DNR	3	310.90		WYANDRA SANDSTONE MEMBER
DNR	4			CADNA-OWIE FORMATION
DNR	5		548.60	HOORAY SANDSTONE

AQUIFER DETAILS

REC	TOP BED(M)	BOTTOM BED(M)	BED LITHOLOGY	DATE	SWL (m)	FLOW	QUALITY	YIELD (l/s)	CTR	CONDIT	FORMATION NAME
1	388.60		SDST							PS	WYANDRA SANDSTONE MEMBER
2	548.60									XX	HOORAY SANDSTONE

PUMP TEST DETAILS PART 1

PIPE	DATE	REC NO.	RN OF PUMP-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 (min)	PRES ON ARRIV (m)	Q ON ARRIV (l/s)
A	17/11/1901	20	338	548.60		0.00	F/F	FR						93.21
A	09/04/1911	20	338	548.60		0.00	F/F	FR						63.17
A	03/04/1912	1					ART							
A	03/02/1913	1					ART							
A	23/09/1915	1					ART							
A	05/11/1919	1					ART							
A	26/11/1924	1					ART							

BORE REPORT

REG NUMBER 338

A	03/11/1925	20	338	548.60	0.00	F/F	FR					49.97
A	17/11/1927	21	388	548.60	0.00	F/F	FR					32.09
A	26/11/1948	22	388	548.60	0.00	F/F	FR					17.88
A	04/03/1958	23	338	548.60	0.00	F/F	FR				4.58	
A	29/10/1963	24	338	548.60	0.00	F/F	FR					8.60
A	03/08/1972	1	338		0.25	ART	FR ST					3.63
A	03/09/1972	25	338			ART	CQ					
A	08/11/1979	26	338		0.25	ART	FR ST					1.89

PUMP TEST DETAILS PART 2

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	17/11/1901	20						93.22		93.21						
A	09/04/1911	20		69.80				63.18		63.17						
A	03/04/1912	1		67.67												
A	03/02/1913	1		67.36												
A	23/09/1915	1		54.86												
A	05/11/1919	1		44.50												
A	26/11/1924	1		31.39												
A	03/11/1925	20						49.96		49.97						
A	17/11/1927	21		28.96				32.08		32.09						
A	26/11/1948	22		10.56				17.88		17.88						
A	04/03/1958	23		7.32												
A	29/10/1963	24		5.92				8.60		9.23						
A	03/08/1972	1	300	3.49			3.07	3.63	150	3.64					164	
A	03/09/1972	25		0.26			3.07	3.57	150	3.64						
A	08/11/1979	26	180	4.49			3.27	6.42	120	7.15	4.99				165	

BORE CONDITION

BORE REPORT

REG NUMBER 338

****** NO RECORDS FOUND ******

ELEVATION DETAILS

PIPE	DATE	ELEVATION	PRECISION	DATUM	MEASUREMENT POINT	SURVEY SOURCE
X	02/04/1911	188.70	SVY	STD	N	

WATER ANALYSIS PART1

PIPE	DATE	RD ANALYST	QAN	DEPTH (m)	RMK	SRC	COND (uS/cm)	pH	Si (mg/L)	TOTAL IONS (mg/L)	TOTAL SOLIDS (mg/L)	HARD	ALK	FIG. OF MERIT	SAR	RAH
A	03/08/1972	1 GCL	053880	549.00	PU	GB	640	8.5		518.40	0.00	13	255	0.0	19.0	4.83
A	08/11/1979	1 GCL	084772			GB	730	8.6	23	570.80	427.08	8	284	0.0	26.9	5.53
A	27/01/1987	1 GCL	118187	548.00	PU	GB	700	8.3	21	600.00	470.00	205	295	1.1	2.6	1.80
A	30/01/1987	1 GCL	118761	0.00	PU	GB	790	8.5	24	680.00	490.00	9	360	0.0	26.6	7.00

WATER ANALYSIS PART 2

PIPE	DATE	RD	Na	K	Ca	Mg	Mn	HCO3	Fe	CO3	Cl	F	NO3	SO4	Zn	Al	B	Cu
A	03/08/1972	1	159.0		2.0	2.0		250.0	0.00	30.0	75.0	0.40		0.0				
A	08/11/1979	1	169.0	1.5	3.0	0.0		328.0		9.2	58.0	0.40	1.7	0.0				
A	27/01/1987	1	160.0	1.3	2.9	0.2	0.00	335.0	0.00	4.3	58.0	0.50	1.6	2.0				
A	30/01/1987	1	190.0	1.5	3.7	0.1	0.00	420.0	0.00	8.9	55.0	0.50	1.7	0.0				

WATER LEVEL DETAILS

PIPE	DATE	MEASURE (m)	N/R	RMK	MEAS TYPE	PIPE	DATE	MEASURE (m)	N/R	RMK	MEAS TYPE	PIPE	DATE	MEASURE (m)	N/R	RMK	MEAS TYPE
X	02/04/1911	69.80	N		NR												

WIRE LINE LOG DETAILS

****** NO RECORDS FOUND ******

FIELD MEASUREMENTS

PIPE	DATE	DEPTH (m)	COND (uS/cm)	pH	TEMP (C)	NO3 (mg/L)	DO (mg/L)	Eh (mV)	ALK (mEq)	METH	SOURCE
A	17/11/1901				42.0					PU	GB
A	09/04/1911				41.0					PU	GB

BORE REPORT

REG NUMBER 338

PIPE	DATE	DEPTH (m)	COND (uS/cm)	pH	TEMP (C)	NO3 (mg/L)	DO (mg/L)	Eh (mV)	ALK (mEq)	METH	SOURCE
A	03/11/1925				41.0					PU	GB
A	17/11/1927				41.0					PU	GB
A	26/11/1948				41.0					PU	GB
A	04/03/1958				40.0					PU	GB
A	29/10/1963				43.0					PU	GB
A	03/09/1972				42.0					PU	GB
A	08/11/1979				42.0					PU	GB

SPECIAL WATER ANALYSIS

****** NO RECORDS FOUND ******

BORE REPORT

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GROUNDWATER DATABASE

BORE REPORT

REG NUMBER 4997

REGISTRATION DETAILS

		BASIN	4232	**LATITUDE**	28-03-57	**MAP-SCALE**	104
OFFICE	Charleville	**SUB-AREA**		**LONGITUDE**	145-41-19	**MAP-SERIES**	M
DATE LOG RECD		**SHIRE**	5800-PAROO	**EASTING**	371143	**MAP-NO**	8041
D/O FILE NO.	V17 0454/2	**LOT**		**NORTHING**	6894793	**MAP NAME**	CUNNAMULLA
R/O FILE NO.	551777	**PLAN**		**ZONE**	55	**PROG SECTION**	
H/O FILE NO.	L02002B	**ORIGINAL DESCRIPTION**	LOT 2 OF SECTION XL1 CUNNAMULLA TOWN	**ACCURACY**		**PRES EQUIPMENT**	
				GPS ACC			
GIS LAT	-28.065949695	**PARISH NAME**	1384-CUNNAMULLA			**ORIGINAL BORE NO**	CUNNAMULLA NO 2 TOWN
GIS LNG	145.688685572	**COUNTY**	WELLINGTON			**BORE LINE**	-
CHECKED	N						
						POLYGON	
						RN OF BORE REPLACED	
FACILITY TYPE	Artesian - Controlled Flow	**DATE DRILLED**	30/11/1943			**DATA OWNER**	
STATUS	Existing	**DRILLERS NAME**					
ROLES		**DRILL COMPANY**					
		METHOD OF CONST.	CABLE TOOL				

CASING DETAILS

PIPE	DATE	RECORD NUMBER	MATERIAL DESCRIPTION	MAT SIZE (mm)	SIZE DESC	OUTSIDE DIAM (mm)	TOP (m)	BOTTOM (m)
A	30/11/1943	1	Steel Casing		WT	254	0.00	18.30
A	30/11/1943	2	Steel Casing		WT	203	0.00	67.10
A	30/11/1943	3	Steel Casing		WT	152	37.20	653.20
A	30/11/1943	5	Perforated or Slotted Casing		AP		342.90	344.40
A	30/11/1943	6	Perforated or Slotted Casing		AP		488.60	489.80
A	30/11/1943	7	Perforated or Slotted Casing		AP		492.30	493.50
A	30/11/1943	8	Perforated or Slotted Casing		AP		496.80	498.00
A	30/11/1943	9	Perforated or Slotted Casing		AP		484.30	485.50
A	30/11/1943	10	Perforated or Slotted Casing		AP		501.40	502.60
A	04/10/1986	4	Steel Casing	4.760	WT	168	0.00	37.20
X	06/11/1986	11	Grout			203	36.20	37.20

STRATA LOG DETAILS

BORE REPORT

REG NUMBER 4997

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
1	0.00	1.83	BLACK SOIL
2	1.83	11.58	YELLOW SANDY CLAY
3	11.58	19.81	RED SAND
4	19.81	22.86	YELLOW SAND 75 FT SOAKAGE SUPPLY
5	22.86	27.43	WHITE SAND
6	27.43	35.66	RED CLAY
7	35.66	37.80	YELLOW SANDSTONE
8	37.80	40.84	RED SANDSTONE
9	40.84	55.47	PINK SANDY CLAY
10	55.47	59.74	YELLOW CLAY
11	59.74	62.79	BLUE CLAY
12	62.79	66.14	YELLOW CLAY
13	66.14	98.45	BLUE SHALE
14	98.45	99.06	HARD ROCK
15	99.06	100.28	BROWN CLAY
16	100.28	113.08	WHITE SANDY CLAY
17	113.08	159.11	BLUE SHALE
18	159.11	168.86	GREY SAND SHALE 525 FT SUB-ARTESIAN
19			SUPPLY
20	168.86	305.41	BLACK SHALE
21	305.41	310.90	GREY SANDSTONE
22	310.90	317.61	BLACK SHALE
23	317.61	327.66	GREY SANDSTONE
24	327.66	356.93	BROWN CLAY
25	356.93	357.23	HARD ROCK
26	357.23	399.29	BLUE SHALE
27	399.29	416.97	GREY SANDSTONE
28	416.97	426.12	GREY SANDY CLAY
29	426.12	427.64	HARD ROCK
30	427.64	442.88	GREY SAND 1405 FT 75000 GPD
31	442.88	443.79	HARD GREY ROCK

BORE REPORT

REG NUMBER 4997

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
32	443.79	484.33	GREY SANDSTONE HARD STREAKS & PATCHES
33			OF CLAY
34	484.33	487.99	GREY SANDSTONE
35	487.99	496.22	WATER BEARING SANDSTONE 1603 FT
36			388000 GPD
37	496.22	520.00	HARD GREY SANDSTONE
38	520.00	525.18	RED GRAVELLY SANDSTONE
39	525.18	558.10	GREY SANDSTONE
40	558.10	579.74	FINE-GRAIN SANDSTONE
41	579.74	585.22	HARD BROWN ROCK
42	585.22	592.23	BLUE GREY SLATE
43	592.23	594.37	HARD BROWN ROCK
44	594.37	603.21	HARD GREY ROCK
45	603.21	605.64	HARD RED ROCK
46	605.64	635.21	HARD GREY ROCK
47	635.21	638.26	HARD RED ROCK
48	638.26	639.78	HARD GREY ROCK
49	639.78	641.61	HARD RED ROCK
50	641.61	643.14	HARD GREY ROCK
51	643.14	646.79	HARD RED ROCK
52	646.79	651.37	HARD GREY ROCK
53	651.37	651.98	HARD RED ROCK
54	651.98	653.19	GREY SLATE ROCK

STRATIGRAPHY DETAILS

SOURCE	RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
DNR	1	0.00		ALLUVIUM
DNR	2		40.80	TERTIARY SEDIMENTS
DNR	3	40.80		COREENA MEMBER
DNR	4		305.40	DONCASTER MEMBER

BORE REPORT

REG NUMBER 4997

SOURCE	RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
DNR	5	305.40	327.20	WYANDRA SANDSTONE MEMBER
DNR	6	327.20	427.60	CADNA-OWIE FORMATION
DNR	7	427.60	585.20	HOORAY SANDSTONE
DNR	8	585.20	653.20	TIMBURY HILLS FORMATION

AQUIFER DETAILS

REC	TOP BED(M)	BOTTOM BED(M)	BED LITHOLOGY	DATE	SWL (m)	FLOW	QUALITY	YIELD (l/s)	CTR	CONDIT	FORMATION NAME
1	22.90		SDST							PS	TERTIARY SEDIMEFORM
2	160.00									XX	COREENA MEMBER
3	428.20		SDST							PS	HOORAY SANDSTONE
4	488.60	496.20	SDST							PS	HOORAY SANDSTONE

PUMP TEST DETAILS PART 1

PIPE	DATE	REC NO.	RN OF PUMP-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 (min)	PRES ON ARRIV (m)	Q ON ARRIV (l/s)
A	07/03/1935	20	4997	428.20	496.20	0.00	F/F	FR						31.16
A	30/05/1941	1												
A	05/12/1941	1											7.04	
A	30/11/1943	21	4997	428.20	496.20	0.00	F/F	FR						25.88
A	30/10/1963	22	4997	428.20	496.20	0.00	F/F	FR						
A	05/09/1972	23	4997	428.20	496.20	0.81	ART	FR ST					3.57	

PUMP TEST DETAILS PART 2

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	07/03/1935	20		18.31				31.16		31.16						

BORE REPORT

REG NUMBER 4997

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	30/05/1941	1		10.36												
A	05/12/1941	1		13.38												
A	30/11/1943	21						25.88		25.88						
A	30/10/1963	22						15.78		15.78						
A	05/09/1972	23	420	4.32			3.24	6.32	240	6.56	4.41				195	

BORE CONDITION

****** NO RECORDS FOUND ******

ELEVATION DETAILS

PIPE	DATE	ELEVATION	PRECISION	DATUM	MEASUREMENT POINT	SURVEY SOURCE
X	30/11/1943	187.80	SVY	STD	N	

WATER ANALYSIS PART1

PIPE	DATE	RD	ANALYST	QAN	DEPTH (m)	RMK	SRC	COND (uS/cm)	pH	Si (mg/L)	TOTAL IONS (mg/L)	TOTAL SOLIDS (mg/L)	HARD	ALK	FIG. OF MERIT	SAR	RAH
A	05/09/1972	1	GCL	053881		PU	GB	650	7.9		542.40	0.00	9	255	0.0	22.8	4.91

WATER ANALYSIS PART 2

PIPE	DATE	RD	Na	K	Ca	Mg	Mn	HCO3	Fe	CO3	Cl	F	NO3	SO4	Zn	Al	B	Cu
A	05/09/1972	1	158.0		2.0	1.0		311.0	0.00	0.0	70.0	0.40		0.0				

WATER LEVEL DETAILS

PIPE	DATE	MEASURE (m)	N/R	RMK	MEAS TYPE	PIPE	DATE	MEASURE (m)	N/R	RMK	MEAS TYPE	PIPE	DATE	MEASURE (m)	N/R	RMK	MEAS TYPE
X	30/11/1943	18.30	N		NR	X	05/09/1972	14.14	N		NR						

WIRE LINE LOG DETAILS

DATE	RUN	OPERATOR	TYPE	SOURCE	TOP (m)	BOTTOM (m)	COMMENTS
19/05/1998	2	B ISBISTER	CAL3	CUNNAMULLA SHIRE	-1.17	486.08	

BORE REPORT

REG NUMBER 4997

DATE	RUN	OPERATOR	TYPE	SOURCE	TOP (m)	BOTTOM (m)	COMMENTS
19/05/1998	1	B ISBISTER	GR	CUNNAMULLA SHIRE	-.12	611.68	
19/05/1998	1	B ISBISTER	FLOW	CUNNAMULLA SHIRE	1.14	603.19	
19/05/1998	2	B ISBISTER	FLOW	CUNNAMULLA SHIRE	21.51	51.01	
19/05/1998	1	B ISBISTER	CAL3	CUNNAMULLA SHIRE	489.25	610.1	
12/06/1998	1	B ISBISTER	CAL3	CUNNAMULLA SHIRE	593.6	617.4	

FIELD MEASUREMENTS

PIPE	DATE	DEPTH (m)	COND (uS/cm)	pH	TEMP (C)	NO3 (mg/L)	DO (mg/L)	Eh (mV)	ALK (mEq)	METH	SOURCE
A	07/03/1935				40.0					PU	GB
A	30/11/1943				40.0					PU	GB
A	30/10/1963				42.0					PU	GB
A	05/09/1972				41.0					PU	GB

SPECIAL WATER ANALYSIS

****** NO RECORDS FOUND ******

BORE REPORT

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GROUNDWATER DATABASE

BORE REPORT

REG NUMBER 43126

REGISTRATION DETAILS

		BASIN	4232	**LATITUDE**	28-04-02	**MAP-SCALE**	104
OFFICE	Charleville	**SUB-AREA**		**LONGITUDE**	145-41-42	**MAP-SERIES**	M
DATE LOG RECD		**SHIRE**	5800-PAROO	**EASTING**	371780	**MAP-NO**	8041
D/O FILE NO.	V17 0454/3	**LOT**		**NORTHING**	6894649	**MAP NAME**	CUNNAMULLA
R/O FILE NO.	551777	**PLAN**		**ZONE**	55	**PROG SECTION**	
H/O FILE NO.	2002B	**ORIGINAL DESCRIPTION**	SUB 2 ALLOT 4 SECT 35	**ACCURACY**		**PRES EQUIPMENT**	TE
				GPS ACC			
GIS LAT	-28.067338558	**PARISH NAME**	1384-CUNNAMULLA			**ORIGINAL BORE NO**	CUNNAMULLA TOWN NO 3
GIS LNG	145.695074409	**COUNTY**	WELLINGTON			**BORE LINE**	-
CHECKED	N						
						POLYGON	
						RN OF BORE REPLACED	
FACILITY TYPE	Artesian - Controlled Flow	**DATE DRILLED**	19/03/1974			**DATA OWNER**	
STATUS	Existing	**DRILLERS NAME**	J. CLARKE				
ROLES		**DRILL COMPANY**	C & W DRILLING				
		METHOD OF CONST.	ROTARY RIG				

CASING DETAILS

PIPE	DATE	RECORD NUMBER	MATERIAL DESCRIPTION	MAT SIZE (mm)	SIZE DESC	OUTSIDE DIAM (mm)	TOP (m)	BOTTOM (m)
A	19/03/1974	1	Steel Casing		WT	254	0.00	118.00
A	19/03/1974	2	Steel Casing		WT	152	108.00	439.00
A	19/03/1974	3	Steel Casing		WT	127	432.00	452.10
A	19/03/1974	4	Screen	0.640	AP	127	452.10	455.20
A	19/03/1974	5	Steel Casing		WT	127	455.20	503.20
A	19/03/1974	6	Screen	0.640	AP	127	503.20	506.50
A	19/03/1974	7	Steel Casing		WT	127	506.50	507.90
A	19/03/1974	8	Screen	0.640	AP	127	507.90	511.10
A	19/03/1974	9	Steel Casing		WT	127	511.10	512.60
A	19/03/1974	10	Screen	0.640	AP	127	512.60	515.80
A	19/03/1974	11	Steel Casing		WT	127	515.80	517.40
A	19/03/1974	12	Screen	0.640	AP	127	517.40	520.50

BORE REPORT

REG NUMBER 43126

PIPE	DATE	RECORD NUMBER	MATERIAL DESCRIPTION	MAT SIZE (mm)	SIZE DESC	OUTSIDE DIAM (mm)	TOP (m)	BOTTOM (m)
A	19/03/1974	13	Steel Casing		WT	127	520.50	523.30
A	19/03/1974	14	Screen	0.640	AP	127	523.30	525.40
A	19/03/1974	15	Steel Casing		WT	127	525.40	533.70
A	19/03/1974	16	Screen	0.640	AP	127	533.70	535.30
A	19/03/1974	17	Steel Casing		WT	127	535.50	548.60
X	19/03/1974	18	Grout				0.00	439.50

STRATA LOG DETAILS

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
1	0.00	4.57	SANDY BLACK SOIL
2	4.57	19.81	COARSE SAND
3	19.81	35.66	MULTI COLOURED CLAY
4	35.66	37.49	VERY HARD SANDSTONE
5	37.49	44.20	GREY CLAY
6	44.20	70.10	MULTI COLOURED CLAY WITH SANDSTONE
7			BANDS
8	70.10	74.68	SANDY CLAY
9	74.68	103.63	MULTI COLOURED CLAY
10	103.63	147.83	BLUE SHALE
11	147.83	148.74	WATER BED ***
12	148.74	168.25	BLACK SHALE
13	168.25	168.86	HARD SANDSTONE
14	168.86	301.45	BLACK SHALE
15	301.45	312.72	BLACK SHALE WITH HARD BANDS
16	312.72	318.52	SANDSTONE WITH SHALE BANDS
17	318.52	319.13	WATER BED ***
18	319.13	321.56	SANDSTONE
19	321.56	322.48	WATER BED ***
20	322.48	325.53	GREY SANDSTONE
21	325.53	342.60	SANDSTONE WITH SHALE BANDS

BORE REPORT

REG NUMBER 43126

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
22	342.60	362.71	BLACK SHALE
23	362.71	363.32	VERY HARD SANDSTONE
24	363.32	400.20	SHALE WITH SANDSTONE BANDS
25	400.20	428.55	SOFT SANDSTONE
26	428.55	445.31	SOFT SANDSTONE WITH SHALE BANDS
27	445.31	445.62	VERY HARD SANDSTONE
28	445.62	449.58	WATER BED ***
29	449.58	452.02	HARD SANDSTONE
30	452.02	484.94	SANDSTONE WITH SHALE BANDS
31	484.94	515.72	INTERMITTENT SAND ***WATER
32	515.72	519.38	HARD SANDSTONE
33	519.38	520.90	WATER SAND
34	520.90	528.22	SANDSTONE
35	528.22	530.66	WATER SAND
36	530.66	546.81	SEMI HARD SANDSTONE
37	546.81	563.88	VERY HARD SANDSTONE
903			28/01/1974 DISCH 1000.0 M3D DRILLER
910	447.10	449.50	QUALITY DESCRIP/CONDUCT: 620

STRATIGRAPHY DETAILS

SOURCE	RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
DNR	1	0.00		QUATERNARY*TERTIARY
DNR	2		312.70	WALLUMBILLA FORMATION
DNR	3	312.70		WYANDRA SANDSTONE MEMBER
DNR	4			CADNA-OWIE FORMATION
DNR	5		546.80	HOORAY SANDSTONE
DNR	6	546.80	563.90	TIMBURY HILLS FORMATION

AQUIFER DETAILS

REC	TOP BED(M)	BOTTOM BED(M)	BED LITHOLOGY	DATE	SWL (m)	FLOW	QUALITY	YIELD (l/s)	CTR	CONDIT	FORMATION NAME

BORE REPORT

REG NUMBER 43126

REC	TOP BED(M)	BOTTOM BED(M)	BED LITHOLOGY	DATE	SWL (m)	FLOW	QUALITY	YIELD (l/s)	CTR	CONDIT	FORMATION NAME
1	318.50	319.10								XX	WYANDRA SANDSTONE MEMBER
2	321.60	322.50								XX	WYANDRA SANDSTONE MEMBER
3	447.10	449.50								XX	HOORAY SANDSTONE
4	484.90	515.50								XX	HOORAY SANDSTONE
5	519.40	520.90								XX	HOORAY SANDSTONE
6	528.20	530.60								XX	HOORAY SANDSTONE

PUMP TEST DETAILS PART 1

PIPE	DATE	REC NO.	RN OF PUMP-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 (min)	PRES ON ARRIV (m)	Q ON ARRIV (l/s)
A	01/01/1974	1												
A	18/03/1974	20	43126	447.10	530.60	0.77	ART	FR DT ST					5.11	
A	20/05/1976	1	43126				ART	FR ST			14.35			

PUMP TEST DETAILS PART 2

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	01/01/1974	1						11.57		11.57						
A	18/03/1974	20	520	5.52			5.52	11.48	1140	11.48	5.77				570	
A	20/05/1976	1	300	5.92			4.63	14.35	180	14.35	6.41				567	

BORE CONDITION

****** NO RECORDS FOUND ******

ELEVATION DETAILS

PIPE	DATE	ELEVATION	PRECISION	DATUM	MEASUREMENT POINT	SURVEY SOURCE
A	28/01/1974	187.80	EST	STD	N	

BORE REPORT

REG NUMBER 43126

WATER ANALYSIS PART1

PIPE	DATE	RD ANALYST	QAN	DEPTH (m)	RMK	SRC	COND (uS/cm)	pH	Si (mg/L)	TOTAL IONS (mg/L)	TOTAL SOLIDS (mg/L)	HARD	ALK	FIG. OF MERIT	SAR	RAH
A	18/03/1974	1 GCL	061016	519.00	PU	GB	620	8.5		499.88	363.15	8	230		22.4	4.43
A	10/07/1982	1 GCL	094509		PU	GB	600	8.1	22	494.80	369.39	8	241		21.1	4.66
A	10/07/1982	2 GCL	94511		PU	GB	610	8.4	22	493.80	370.93	6	240			4.68
A	11/07/1982	1 GCL	094514		PU	GB	610	8.4	22	498.20	372.79	6	244			4.75
A	12/07/1982	1 GCL	94513		PU	GB	610	8.4	22	493.90	371.03	6	241			4.68
A	13/07/1982	1 GCL	94512		PU	GB	610	8.4	22	493.40	370.53	6	240			4.67
A	14/07/1982	1 GCL	94510		PU	GB	610	8.3	22	492.70	369.83	6	239			4.64

WATER ANALYSIS PART 2

PIPE	DATE	RD	Na	K	Ca	Mg	Mn	HCO3	Fe	CO3	Cl	F	NO3	SO4	Zn	Al	B	Cu
A	18/03/1974	1	145.0	2.0	3.0	0.1		269.0	0.26	5.4	75.0	0.12						
A	10/07/1982	1	140.0	1.2	2.5	0.5		290.0		2.1	58.0	0.50	0.0	0.0				
A	10/07/1982	2	140.0	1.3	2.5	0.0	0.00	285.0	0.00	4.0	58.0	0.50	0.5	2.0				
A	11/07/1982	1	140.0	1.5	2.5	0.0		290.0		3.7	60.0	0.50	0.0	0.0				
A	12/07/1982	1	140.0	1.3	2.5	0.0	0.00	285.0	0.00	4.1	58.0	0.50	0.5	2.0				
A	13/07/1982	1	140.0	1.3	2.5	0.0	0.00	285.0	0.00	3.6	58.0	0.50	0.5	2.0				
A	14/07/1982	1	140.0	1.3	2.5	0.0	0.00	285.0	0.00	2.9	58.0	0.50	0.5	2.0				

WATER LEVEL DETAILS

PIPE	DATE	MEASURE (m)	N/R	RMK	MEAS TYPE	PIPE	DATE	MEASURE (m)	N/R	RMK	MEAS TYPE	PIPE	DATE	MEASURE (m)	N/R	RMK	MEAS TYPE
X	19/03/1974	6.60	N		NR												

WIRE LINE LOG DETAILS

DATE	RUN	OPERATOR	TYPE	SOURCE	TOP (m)	BOTTOM (m)	COMMENTS
24/05/1998	1	B ISBISTER	CAL3	CUNNAMULLA COUNCI	431.71	491.01	
25/05/1998	1	B ISBISTER	CAL3	CUNNAMULLA COUNCI	-.19	450.91	
25/05/1998	1	B ISBISTER	FLOW	CUNNAMULLA COUNCI	1.23	486.08	
18/06/1998	1	B ISBISTER	GR	CUNNAMULLA COUNCI	-.17	490.53	
18/06/1998							

BORE REPORT

REG NUMBER 43126

DATE	RUN	OPERATOR	TYPE	SOURCE	TOP (m)	BOTTOM (m)	COMMENTS
	1	B ISBISTER	FLOW	CUNNAMULLA COUNCI	409.46	489.31	
29/11/1998	1	B ISBISTER	GR	CUNNAMULLA SHIRE	439.67	544.22	

FIELD MEASUREMENTS

PIPE	DATE	DEPTH (m)	COND (uS/cm)	pH	TEMP (C)	NO3 (mg/L)	DO (mg/L)	Eh (mV)	ALK (mEq)	METH	SOURCE
A	28/01/1974				44.0					PU	GB
A	18/03/1974				44.0					PU	GB

SPECIAL WATER ANALYSIS

****** NO RECORDS FOUND ******

BORE REPORT

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BORE REPORT

REG NUMBER 50894

REGISTRATION DETAILS

		BASIN	4232	**LATITUDE**	28-03-59	**MAP-SCALE**	104
OFFICE	Charleville	**SUB-AREA**		**LONGITUDE**	145-41-10	**MAP-SERIES**	C
DATE LOG RECD		**SHIRE**	5800-PAROO	**EASTING**	370889	**MAP-NO**	8041
D/O FILE NO.	V17 50894	**LOT**	1	**NORTHING**	6894739	**MAP NAME**	CUNNAMULLA
R/O FILE NO.		**PLAN**	47904	**ZONE**	55	**PROG SECTION**	
H/O FILE NO.		**ORIGINAL DESCRIPTION**		**ACCURACY**		**PRES EQUIPMENT**	HW
				GPS ACC			
GIS LAT	-28.066459407	**PARISH NAME**	1384-CUNNAMULLA			**ORIGINAL BORE NO**	
GIS LNG	145.686124308	**COUNTY**	WELLINGTON			**BORE LINE**	-
CHECKED	Y						
						POLYGON	
						RN OF BORE REPLACED	
FACILITY TYPE	Artesian - Controlled Flow	**DATE DRILLED**	30/11/1998			**DATA OWNER**	
STATUS	Existing	**DRILLERS NAME**	TONY HOWSE				
ROLES	WS	**DRILL COMPANY**	ARTESIAN DRILLING CONT.				
		METHOD OF CONST.	MUD ROTARY				

CASING DETAILS

PIPE	DATE	RECORD NUMBER	MATERIAL DESCRIPTION	MAT SIZE (mm)	SIZE DESC	OUTSIDE DIAM (mm)	TOP (m)	BOTTOM (m)
A	28/10/1998	1	Steel Casing	9.500	WT	323	0.00	102.00
A	04/11/1998	2	Steel Casing	6.400	WT	219	0.00	226.00
A	21/11/1998	3	Steel Casing	6.400	WT	168	206.00	518.00
A	27/11/1998	4	Steel Casing	4.760	WT	142	514.50	572.00
X	28/10/1998	5	Grout			362	0.00	102.00
X	04/11/1998	6	Grout			270	102.00	226.00
X	21/11/1998	7	Grout			200	206.00	518.00
X	21/11/1998	8	Perforated or Slotted Casing	4.000	AP	142	520.00	570.00

STRATA LOG DETAILS

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
1	0.00	1.00	BLACK SOIL

BORE REPORT

REG NUMBER 50894

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
2	1.00	3.00	BROWN CLAY
3	3.00	25.00	COLOURED SANDY CLAY
4	25.00	28.00	SAND ***
5	28.00	32.00	WHITE SANDY CLAY
6	32.00	37.00	HARD BAND
7	37.00	52.00	GREY SANDY CLAY
8	52.00	96.00	COLOURED CLAYS
9	96.00	104.00	BROWN SHALE
10	104.00	114.00	WHITE SANDY CLAY ***
11	114.00	163.00	DARK GREY CLAY
12	163.00	210.00	CLAY & SHALE BANDS
13	210.00	285.00	DARK SHALE TRICKLE
14	285.00	303.00	DARK MUDSTONE & FINE SANDSTONE ***
15	303.00	314.00	HARD BROWN SHALE
16	314.00	322.00	DIRTY GREEN SANDSTONE ***
17	322.00	369.00	BROWN SANDY CLAY
18	369.00	378.00	BROWN CLAY
19	378.00	388.00	SANDSTONE & CLAY
20	388.00	427.00	DIRTY SANDSTONE & QUARTZ ***
21	427.00	429.00	HARD BAND
22	429.00	436.00	SANDSTONE ***
23	436.00	442.00	VERY HARD SANDSTONE
24	442.00	471.00	SANDSTONE ***
25	471.00	490.00	SANDY CLAY & HARD BANDS
26	490.00	508.00	SANDSTONE & QUARTZ ***
27	508.00	510.00	SANDY CLAY
28	510.00	514.00	SANDSTONE ****
29	514.00	521.00	BROWN MUDSTONE
30	521.00	532.00	TIGHT SANDSTONE
31	532.00	533.50	SANDSTONE ****
32	533.50	558.00	HARD SANDSTONE & WATER SAND ****

BORE REPORT

REG NUMBER 50894

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
33	558.00	566.00	HARD SANDY MUDSTONE
34	566.00	572.00	VERY HARD FINE SDST & WHITE CLAY ****
901			1/6/99 SWL 4.9M TEMP 43C
902			1/6/1999 DISCH 1175M3D
903			QUALITY / CONDT 637 PH 9.6

STRATIGRAPHY DETAILS

****** NO RECORDS FOUND ******

AQUIFER DETAILS

REC	TOP BED(M)	BOTTOM BED(M)	BED LITHOLOGY	DATE	SWL (m)	FLOW	QUALITY	YIELD (l/s)	CTR	CONDIT	FORMATION NAME
1	532.00	558.00	SDST	20/11/1998	4.90	Y	POTABLE	13.59	N	PS	HOORAY SANDSTONE

PUMP TEST DETAILS PART 1

PIPE	DATE	REC NO.	RN OF PUMP-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 (min)	PRES ON ARRIV (m)	Q ON ARRIV (l/s)
A	01/06/1999	1	50894	532.00	572.00	0.50	ART	FR SD DT			0.00	10	4.29	3.50

PUMP TEST DETAILS PART 2

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	01/06/1999	1	350	5.61			3.57	13.59	130	13.59	5.79				692	

BORE CONDITION

DATE	DRAIN DETAILS TOT LEN (km)	MAX RUN (km)	C D N	HEADWORKS RET LEN (km)	C D N	C T L	LEAK	FLOW IRREGULARITY	PRECIPITATE	EST USE (ML/yr)	STOCK CATTLE	STOCK SHEEP	COMMENT
01/06/1999					G	P							TOWN WATER SUPPLY

BORE REPORT

REG NUMBER 50894

ELEVATION DETAILS

**** NO RECORDS FOUND ****

WATER ANALYSIS PART1

PIPE	DATE	RD ANALYST	QAN	DEPTH (m)	RMK	SRC	COND (uS/cm)	pH	Si (mg/L)	TOTAL IONS (mg/L)	TOTAL SOLIDS (mg/L)	HARD	ALK	FIG. OF MERIT	SAR	RAH
A	01/06/1999	1 GCL	187037	532.00	PU	GB	608	8.6	19	481.83	362.85	6	235	0.0	24.9	4.58

WATER ANALYSIS PART 2

PIPE	DATE	RD	Na	K	Ca	Mg	Mn	HCO3	Fe	CO3	Cl	F	NO3	SO4	Zn	Al	B	Cu
A	01/06/1999	1	138.8	1.0	2.2	0.1	0.00	272.0	0.01	7.3	59.4	0.53	0.0	0.4	0.00	0.01	0.10	0.02

WATER LEVEL DETAILS

**** NO RECORDS FOUND ****

WIRE LINE LOG DETAILS

DATE	RUN	OPERATOR	TYPE	SOURCE	TOP (m)	BOTTOM (m)	COMMENTS
07/09/1997	1	B ISBISTER	GR	CUNNAMULLA SHIRE	-.13	519.52	
11/09/1997	1	B ISBISTER	GR	CUNNAMULLA SHIRE	513.79	575.79	
12/09/1997	1	B ISBISTER	CCL	CUNNAMULLA SHIRE	1.05	435.1	
12/09/1997	2	B ISBISTER	CCL	CUNNAMULLA SHIRE	394.84	434.94	
13/09/1997	1	B ISBISTER	CCL	CUNNAMULLA SHIRE	393.94	533.14	
27/11/1998	1	B ISBISTER	CCL	CUNNAMULLA SHIRE	.14	533.29	

FIELD MEASUREMENTS

PIPE	DATE	DEPTH (m)	COND (uS/cm)	pH	TEMP (C)	NO3 (mg/L)	DO (mg/L)	Eh (mV)	ALK (mEq)	METH	SOURCE
A	01/06/1999		637	9.6	43.0					PU	

SPECIAL WATER ANALYSIS

**** NO RECORDS FOUND ****

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GROUNDWATER DATABASE

BORE REPORT

REG NUMBER 16733

REGISTRATION DETAILS

		BASIN	4242	**LATITUDE**	28-09-35	**MAP-SCALE**	254
OFFICE	Charleville	**SUB-AREA**		**LONGITUDE**	145-02-54	**MAP-SERIES**	M
DATE LOG RECD		**SHIRE**	5800-PAROO	**EASTING**	308386	**MAP-NO**	SH55-1
D/O FILE NO.	V17 0464	**LOT**	904	**NORTHING**	6883543	**MAP NAME**	EULO
R/O FILE NO.	551777	**PLAN**	E1813	**ZONE**	55	**PROG SECTION**	
H/O FILE NO.	L03358B	**ORIGINAL DESCRIPTION**	TOWN RESERVE R28	**ACCURACY**		**PRES EQUIPMENT**	
				GPS ACC			
GIS LAT	-28.159909851	**PARISH NAME**	1806-EULO			**ORIGINAL BORE NO**	EULO TOWN BORE NO 2
GIS LNG	145.048492554	**COUNTY**	WELLINGTON			**BORE LINE**	-
CHECKED	Y						
						POLYGON	
						RN OF BORE REPLACED	
FACILITY TYPE	Artesian - Controlled Flow	**DATE DRILLED**	28/08/1966			**DATA OWNER**	
STATUS	Existing	**DRILLERS NAME**					
ROLES		**DRILL COMPANY**					
		METHOD OF CONST.	CABLE TOOL CONTRACTOR: R D ALL				

CASING DETAILS

PIPE	DATE	RECORD NUMBER	MATERIAL DESCRIPTION	MAT SIZE (mm)	SIZE DESC	OUTSIDE DIAM (mm)	TOP (m)	BOTTOM (m)
A	01/08/1966	1	Steel Casing		WT	203	0.00	92.00
A	01/08/1966	2	Steel Casing		WT	152	81.90	223.40
A	01/08/1966	3	Perforated or Slotted Casing		AP			150.90
A	01/08/1966	4	Perforated or Slotted Casing		AP			153.60
A	01/08/1966	5	Perforated or Slotted Casing		AP			209.70
A	01/08/1966	6	Perforated or Slotted Casing		AP			212.40
A	01/08/1966	7	Perforated or Slotted Casing		AP			214.60
X	01/08/1966	8	Grout				0.00	92.00
X	01/08/1966	9	Grout				91.40	134.10

STRATA LOG DETAILS

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION

BORE REPORT

REG NUMBER 16733

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
1	0.00	1.22	RED SANDY TOP SOIL
2	1.22	4.88	SURFACE ROCK
3	4.88	6.40	SANDSTONE
4	6.40	12.80	SANDSTONE & IRONSTONE
5	12.80	13.72	GRAVEL * WATER
6	13.72	27.43	SANDSTONE & ROCK
7	27.43	30.48	COLOURED CLAY
8	30.48	45.72	COLOURED CLAY
9	45.72	55.78	COLOURED CAVING CLAY
10	55.78	57.91	COLOURED CLAY
11	57.91	60.66	MUDSTONE
12	60.66	66.75	MUDSTONE & HARD BANDS
13	66.75	71.93	MUDSTONE & HARD BANDS
14	71.93	79.55	MUDSTONE
15	79.55	83.21	MUDSTONE
16	83.21	83.82	SANDSTONE * WATER
17	83.82	92.05	MUDSTONE
18	92.05	98.45	GREY SHALE
19	98.45	99.06	SOFT SANDSTONE * WATER
20	99.06	120.40	GREY SHALE
21	120.40	122.53	SOFT SANDSTONE * WATER
22	122.53	150.27	GREY SHALE
23	150.27	154.53	HARD SANDSTONE
24	154.53	162.15	SANDY GREY SHALE
25	162.15	178.31	GREY & BROWN SANDY SHALE
26	178.31	181.36	SAND & SHALE BANDS
27	181.36	182.27	HARD SANDSTONE
28	182.27	195.07	LIGHT SANDY BROWN SHALE
29	195.07	208.18	SLIGHTLY SANDY GREY SHALE
30	208.18	211.84	SANDY GREY SHALE
31	211.84	212.45	SAND * WATER

BORE REPORT

REG NUMBER 16733

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
32	212.45	215.19	HARD SANDSTONE
33	215.19	219.46	MEDIUM HARD SANDSTONE
34	219.46	220.37	HARD SANDSTONE
35	220.37	223.42	PRESUMED BEDROCK
903			18/08/1966 DISCH: 260.80 M3/D DRILLER
910	12.80		QUALITY DESCRIP/CONDUCT: SALTY
911	83.20	83.80	QUALITY DESCRIP/CONDUCT: BRACKISH
912	98.50	99.10	QUALITY DESCRIP/CONDUCT: BRACKISH
913	150.30		QUALITY DESCRIP/CONDUCT: 750

STRATIGRAPHY DETAILS

SOURCE	RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
DNR	1	0.00		ALLUVIUM
DNR	2		27.40	TERTIARY
DNR	3	27.40	120.40	WALLUMBILLA FORMATION
DNR	4	120.40		WYANDRA SANDSTONE MEMBER
DNR	5			CADNA-OWIE FORMATION
DNR	6		220.40	HOORAY SANDSTONE
DNR	7	220.40	223.40	GRANITE

AQUIFER DETAILS

REC	TOP BED(M)	BOTTOM BED(M)	BED LITHOLOGY	DATE	SWL (m)	FLOW	QUALITY	YIELD (l/s)	CTR	CONDIT	FORMATION NAME
1	12.80		CONG							PS	TERTIARY FORM
2	83.20	83.80	SDST							PS	WALLUMBILLA FORMATION
3	98.50	99.10	SDST							PS	WALLUMBILLA FORMATION
4	120.40	122.50	SDST							PS	WALLUMBILLA FORMATION
5	150.30		SDST							PS	WYANDRA SANDSTONE MEMBER
6	211.80		SDST							PS	HOORAY SANDSTONE
7	214.00		SDST							PS	HOORAY SANDSTONE

BORE REPORT

REG NUMBER 16733

PUMP TEST DETAILS PART 1

PIPE	DATE	REC NO.	RN OF PUMP-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 (min)	PRES ON ARRIV (m)	Q ON ARRIV (l/s)
A	01/08/1966	1												
A	28/08/1966	20	16733	211.80	214.00	0.00	F/F	FR						
A	25/05/1972	20	16733	211.80	214.00	0.83	ART	FR ST DT					18.10	3.09
A	15/08/1979	21	16733	211.80	214.00	0.68	ART	FR ST					22.58	

PUMP TEST DETAILS PART 2

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	01/08/1966	1		27.47				3.02		4.61						
A	28/08/1966	20						3.02		3.02						
A	25/05/1972	20	360	21.55			20.92	3.09	120	4.73	22.98				10	
A	15/08/1979	21	240	24.52			23.39	3.26	120	5.13	25.78				10	

BORE CONDITION

****** NO RECORDS FOUND ******

ELEVATION DETAILS

****** NO RECORDS FOUND ******

WATER ANALYSIS PART1

PIPE	DATE	RD	ANALYST	QAN	DEPTH (m)	RMK	SRC	COND (uS/cm)	pH	Si (mg/L)	TOTAL IONS (mg/L)	TOTAL SOLIDS (mg/L)	HARD	ALK	FIG. OF MERIT	SAR	RAH
A	28/07/1966	1	GCL	34501		PU	GB	1080	8.3		910.70	659.60	26	442		22.7	8.30
A	28/07/1966	2	GCL	34500		PU	GB	815	8.4		740.60	507.80	23	407		18.8	7.68
A	28/07/1966	3	GCL	34499		PU	GB	2475	10.7		1773.60	1773.60	21	1269			24.92
A	06/10/1966	1	GCL	35870	3320.00	PU	GB	1000	8.6		810.60	584.41	9	425		35.2	8.31
A	25/05/1972	1	GCL	053449	150.00	PU	GB	750	8.2		737.60	0.00	16	385	0.0	22.7	7.39
A	15/08/1979	1	GCL	083898			GB	770	8.0	20	687.20	484.06	17	365	0.0	19.6	6.96

BORE REPORT

REG NUMBER 16733

WATER ANALYSIS PART 2

PIPE	DATE	RD	Na	K	Ca	Mg	Mn	HCO3	Fe	CO3	Cl	F	NO3	SO4	Zn	Al	B	Cu
A	28/07/1966	1	268.0		4.0	4.0		494.0		22.0	116.0	0.70		2.0				
A	28/07/1966	2	207.0		1.0	5.0		458.0		19.0	44.0	0.60		6.0				
A	28/07/1966	3	586.0		0.0	5.0		0.0		760.0	280.0	1.60		141.0				
A	06/10/1966	1	244.0		2.0	1.0		445.0		36.0	80.0	0.60		2.0				
A	25/05/1972	1	207.0		3.0	2.0		470.0	0.00	0.0	55.0	0.60		0.0				
A	15/08/1979	1	184.0	1.5	5.0	1.0		439.0		2.9	50.0	0.50	0.3	3.0				

WATER LEVEL DETAILS

PIPE	DATE	MEASURE (m)	N/R	RMK	MEAS TYPE	PIPE	DATE	MEASURE (m)	N/R	RMK	MEAS TYPE	PIPE	DATE	MEASURE (m)	N/R	RMK	MEAS TYPE
X	25/05/1972	34.40	N		NR												

WIRE LINE LOG DETAILS

****** NO RECORDS FOUND ******

FIELD MEASUREMENTS

PIPE	DATE	DEPTH (m)	COND (uS/cm)	pH	TEMP (C)	NO3 (mg/L)	DO (mg/L)	Eh (mV)	ALK (mEq)	METH	SOURCE
A	28/08/1966				33.0					PU	GB
A	25/05/1972				33.0					PU	GB
A	15/08/1979				33.0					PU	GB

SPECIAL WATER ANALYSIS

****** NO RECORDS FOUND ******

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GROUNDWATER DATABASE

BORE REPORT

REG NUMBER 116464

REGISTRATION DETAILS

		BASIN	4242	**LATITUDE**	28-09-36	**MAP-SCALE**	
OFFICE	Charleville	**SUB-AREA**		**LONGITUDE**	145-02-55	**MAP-SERIES**	
DATE LOG RECD		**SHIRE**	5800-PAROO	**EASTING**	308398	**MAP-NO**	
D/O FILE NO.	CHA 0464/2	**LOT**		**NORTHING**	6883533	**MAP NAME**	
R/O FILE NO.		**PLAN**		**ZONE**	55	**PROG SECTION**	
H/O FILE NO.		**ORIGINAL DESCRIPTION**	DRILL LOG 2016004	**ACCURACY**		**PRES EQUIPMENT**	
				GPS ACC			
GIS LAT	-28.16	**PARISH NAME**	6000-NO LONGER USED			**ORIGINAL BORE NO**	
GIS LNG	145.04861111	**COUNTY**				**BORE LINE**	-
CHECKED	Y						
						POLYGON	
						RN OF BORE REPLACED	
FACILITY TYPE	Artesian - Controlled Flow	**DATE DRILLED**	11/05/2018			**DATA OWNER**	
STATUS	Existing	**DRILLERS NAME**	BULL, DENNY				
ROLES	WS	**DRILL COMPANY**	DALY BROS				
		METHOD OF CONST.	ROTARY MUD				

CASING DETAILS

PIPE	DATE	RECORD NUMBER	MATERIAL DESCRIPTION	MAT SIZE (mm)	SIZE DESC	OUTSIDE DIAM (mm)	TOP (m)	BOTTOM (m)
A	11/05/2018	1	Steel Casing	6.350	WT	324	0.00	72.00
A	11/05/2018	2	Steel Casing	6.350	WT	219	0.00	191.40
A	11/05/2018	3	Steel Casing	6.350	WT	168	181.40	279.40
A	11/05/2018	4	Centraliser				0.00	72.00
A	11/05/2018	5	Perforated or Slotted Casing	6.000	AP	168	235.00	279.40
X	11/05/2018	6	Grout			363	0.00	72.00
X	11/05/2018	7	Grout			279	0.00	191.40

STRATA LOG DETAILS

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
1	0.00	1.00	TOP SOIL (RED SANDY)
2	1.00	5.00	WHITE CLAY/ROCK

BORE REPORT

REG NUMBER 116464

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
3	5.00	11.00	WEATHERED SANDSTONE
4	11.00	28.00	SANDSTONE WITH IRONSTONE BANDS (SOME HARD LAYERS)
5	28.00	33.00	GREY CLAY
6	33.00	35.00	PUGGY GREY CLAY
7	35.00	49.50	YELLOW CLAY
8	49.50	58.00	OLIVE COLOURED CLAY
9	58.00	73.70	MUDSTONE
10	73.70	79.00	MUDSTONE WITH SANDSTONE BANDS
11	79.00	98.00	MUDSTONE
12	98.00	104.00	SHALE
13	104.00	110.00	MUDSTONE
14	110.00	122.00	GREY SHALE
15	122.00	136.00	MUDSTONE
16	136.00	139.00	SHALE
17	139.00	145.00	MUDSTONE
18	145.00	192.00	MUDSTONE WITH BANDS OF LIGHT BROWN SHALE
19	192.00	209.00	GREY SHALE
20	209.00	209.50	SANDSTONE
21	209.50	219.00	GREY SHALE
22	219.00	219.50	SANDSTONE
23	219.50	236.50	GREY SHALE/ SANDSTONE BANDS
24	236.50	247.00	SANDSTONE *
25	247.00	278.80	SANDSTONE WITH SILTSTONE BANDS
26	278.80	279.40	BASEMENT (HARD)

STRATIGRAPHY DETAILS

****** NO RECORDS FOUND ******

AQUIFER DETAILS

****** NO RECORDS FOUND ******

PUMP TEST DETAILS PART 1

BORE REPORT

REG NUMBER 116464

**** NO RECORDS FOUND ****

PUMP TEST DETAILS PART 2

**** NO RECORDS FOUND ****

BORE CONDITION

**** NO RECORDS FOUND ****

ELEVATION DETAILS

**** NO RECORDS FOUND ****

WATER ANALYSIS PART1

**** NO RECORDS FOUND ****

WATER ANALYSIS PART 2

**** NO RECORDS FOUND ****

WATER LEVEL DETAILS

**** NO RECORDS FOUND ****

WIRE LINE LOG DETAILS

**** NO RECORDS FOUND ****

FIELD MEASUREMENTS

**** NO RECORDS FOUND ****

SPECIAL WATER ANALYSIS

**** NO RECORDS FOUND ****

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GROUNDWATER DATABASE

BORE REPORT

REG NUMBER 116467

REGISTRATION DETAILS

		BASIN	4232	**LATITUDE**	27-15-04	**MAP-SCALE**	
OFFICE	Charleville	**SUB-AREA**		**LONGITUDE**	145-58-48	**MAP-SERIES**	
DATE LOG RECD		**SHIRE**	5800-PAROO	**EASTING**	399023	**MAP-NO**	
D/O FILE NO.	CHA 0094/2	**LOT**	29	**NORTHING**	6985340	**MAP NAME**	
R/O FILE NO.		**PLAN**	P532	**ZONE**	55	**PROG SECTION**	
H/O FILE NO.		**ORIGINAL DESCRIPTION**	DRILL LOG 2016005	**ACCURACY**		**PRES EQUIPMENT**	
				GPS ACC			
GIS LAT	-27.25111111	**PARISH NAME**	6000-NO LONGER USED			**ORIGINAL BORE NO**	
GIS LNG	145.98	**COUNTY**				**BORE LINE**	-
CHECKED	Y						
						POLYGON	
						RN OF BORE REPLACED	
FACILITY TYPE	Artesian - Controlled Flow	**DATE DRILLED**	12/06/2018			**DATA OWNER**	
STATUS	Existing	**DRILLERS NAME**	BULL, DENNY				
ROLES	WS	**DRILL COMPANY**	DALY BROS				
		METHOD OF CONST.	ROTARY MUD				

CASING DETAILS

PIPE	DATE	RECORD NUMBER	MATERIAL DESCRIPTION	MAT SIZE (mm)	SIZE DESC	OUTSIDE DIAM (mm)	TOP (m)	BOTTOM (m)
A	12/06/2018	1	Steel Casing	6.350	WT	219	0.00	60.00
A	12/06/2018	2	Steel Casing	6.400	WT	168	0.00	420.00
A	12/06/2018	3	Steel Casing	4.800	WT	141	410.00	596.50
A	12/06/2018	4	Centraliser				0.00	60.00
A	12/06/2018	5	Perforated or Slotted Casing	10.000	AP	300	524.50	596.50
X	12/06/2018	6	Grout			279	0.00	60.00
X	12/06/2018	7	Grout			200	0.00	420.00

STRATA LOG DETAILS

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
1	0.00	1.50	BLACK SOIL
2	1.50	6.00	SANDY CLAY

BORE REPORT

REG NUMBER 116467

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
3	6.00	12.00	SANDY WITH SMALL GRAVEL BAND
4	12.00	28.00	SANDY WITH CLAY BANDS
5	28.00	30.00	CLAY WITH IRONSTONE BAND
6	30.00	73.00	WHITE SAND WITH FIRM BANDS
7	73.00	79.00	YELLOW CLAY
8	79.00	97.00	WHITE CLAY
9	97.00	113.50	FIRM SAND
10	113.50	403.50	GREY SHALE
11	403.50	409.50	GREY SHALE WITH HARD BANDS
12	409.50	421.50	MUDSTONE
13	421.50	489.50	SANDY GREY SHALE
14	489.50	513.00	GREY SHALE
15	513.00	519.00	SANDY GREY SHALE
16	519.00	525.00	SANDSTONE
17	525.00	530.00	SHALE WITH SANDSTONE BANDS
18	530.00	536.00	SHALE
19	536.00	540.00	SANDSTONE
20	540.00	554.00	SHALE
21	554.00	566.00	SANDSTONE (WITH CLAY BANDS)
22	566.00	578.00	SHALE
23	578.00	590.00	SANDSTONE (WITH CLAY BANDS)
24	590.00	596.50	SHALE

STRATIGRAPHY DETAILS

****** NO RECORDS FOUND ******

AQUIFER DETAILS

REC	TOP BED(M)	BOTTOM BED(M)	BED LITHOLOGY	DATE	SWL (m)	FLOW	QUALITY	YIELD (l/s)	CTR	CONDIT	FORMATION NAME
1	524.00	596.00	SDST	12/06/2018	27.50	Y	POTABLE	60.00	Y	XX	HOORAY SANDSTONE

BORE REPORT

REG NUMBER 116467

PUMP TEST DETAILS PART 1

****** NO RECORDS FOUND ******

PUMP TEST DETAILS PART 2

****** NO RECORDS FOUND ******

BORE CONDITION

****** NO RECORDS FOUND ******

ELEVATION DETAILS

****** NO RECORDS FOUND ******

WATER ANALYSIS PART1

****** NO RECORDS FOUND ******

WATER ANALYSIS PART 2

****** NO RECORDS FOUND ******

WATER LEVEL DETAILS

****** NO RECORDS FOUND ******

WIRE LINE LOG DETAILS

****** NO RECORDS FOUND ******

FIELD MEASUREMENTS

****** NO RECORDS FOUND ******

SPECIAL WATER ANALYSIS

****** NO RECORDS FOUND ******

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GROUNDWATER DATABASE

BORE REPORT

REG NUMBER 4983

REGISTRATION DETAILS

		BASIN	4232	**LATITUDE**	27-14-35	**MAP-SCALE**	104
OFFICE	Charleville	**SUB-AREA**		**LONGITUDE**	145-58-50	**MAP-SERIES**	M
DATE LOG RECD		**SHIRE**	5800-PAROO	**EASTING**	399074	**MAP-NO**	8043
D/O FILE NO.	V17 0094	**LOT**	29	**NORTHING**	6986212	**MAP NAME**	WYANDRA
R/O FILE NO.		**PLAN**	P532	**ZONE**	55	**PROG SECTION**	
H/O FILE NO.	L03358B	**ORIGINAL DESCRIPTION**	STOCK ROUTE & TOWN RESERVE R20	**ACCURACY**		**PRES EQUIPMENT**	
				GPS ACC			
GIS LAT	-27.24323889	**PARISH NAME**	1101-CLAVERTON			**ORIGINAL BORE NO**	WYANDRA TOWN BORE
GIS LNG	145.980588365	**COUNTY**	PALMER			**BORE LINE**	-
CHECKED	Y						
						POLYGON	
						RN OF BORE REPLACED	
FACILITY TYPE	Artesian - Controlled Flow	**DATE DRILLED**	21/08/1935			**DATA OWNER**	
STATUS	Existing	**DRILLERS NAME**					
ROLES		**DRILL COMPANY**					
		METHOD OF CONST.	CABLE TOOL				

CASING DETAILS

PIPE	DATE	RECORD NUMBER	MATERIAL DESCRIPTION	MAT SIZE (mm)	SIZE DESC	OUTSIDE DIAM (mm)	TOP (m)	BOTTOM (m)
A	20/08/1935	1	Steel Casing		WT	254	0.00	51.50
A	20/08/1935	2	Steel Casing		WT	203		77.20
A	20/08/1935	3	Steel Casing		WT	152		572.70
A	20/08/1935	4	Perforated or Slotted Casing		AP			568.80
A	20/08/1935	5	Grout					
A	20/08/1935	6	Grout					

STRATA LOG DETAILS

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
1	0.00	1.22	SUBSOIL
2	1.22	2.74	HARD GRAVELLY ROCK
3	2.74	8.23	BROWN CLAY

BORE REPORT

REG NUMBER 4983

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
4	8.23	13.72	GREY ROCK
5	13.72	20.12	SANDY CLAY
6	20.12	31.09	SAND & SANDY CLAY STREAKS
7	31.09	46.33	SAND WITH HARD BANDS OF IRONSTONE
8	46.33	50.60	SAND
9	50.60	67.06	SLIPPERY BLACK CLAY
10	67.06	70.71	SAND
11	70.71	78.03	LIGHT GREY CLAY OR SHALE
12	78.03	95.40	LIGHT GREY SHALE
13	95.40	117.04	FINE DRIFT SAND & WATER
14	117.04	121.92	GREY SAND
15	121.92	243.84	BLACK SHALE
16	243.84	271.28	BLACK STICKY SHALE
17	271.28	301.76	BLACK VERY STICKY SHALE
18	301.76	327.66	BLACK STICKY SHALE
19	327.66	347.17	GREY SHALE 1080 FT STRUCK WATER
20			ROSE TO SURFACE
21	347.17	381.00	WHITE SANDY CLAY OR SHALE
22	381.00	435.87	DARK GREY SHALE
23	435.87	436.17	HARD STREAK ROCK 1431 FT STRUCK WATER
24			3 IN. OVER 6 IN. CASING
25	436.17	445.93	SANDSTONE
26	445.93	451.11	FINE GRAINED SANDROCK
27	451.11	453.85	HARD SANDROCK
28	453.85	479.46	GREY SANDY CLAY
29	479.46	481.59	BROWN STICKY SHALE
30	481.59	485.55	GREY SANDSTONE
31	485.55	486.16	HARD SANDSTONE
32	486.16	512.98	BROWN SANDY SHALE WITH LAYERS OF
33			SANDSTONE
34	512.98	515.42	BROWN SANDY SHALE

BORE REPORT

REG NUMBER 4983

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
35	515.42	519.69	BROWN SHALE STICKY & HARD 1705 FT TO
36			1713 FT STRUCK WATER 12 IN. OVER
37			CASING
38	519.69	522.13	WATER BEARING SAND
39	522.13	525.79	GREY SANDY SHALE 1725 FT TO 1732 FT
40			FURTHER SUPPLY ROSE 22 IN. OVER
41			CASING NEITHER MEASURED
42	525.79	527.92	WATER BEARING SAND
43	527.92	530.97	HARD GREY SANDROCK
44	530.97	531.88	GREY SANDY SHALE
45	531.88	537.67	GREY SHALE WITH SANDSTONE STREAKS
46	537.67	540.72	GREY SANDSTONE
47	540.72	544.07	BLACK SHALE
48	544.07	550.17	GREY SANDSTONE
49	550.17	552.00	GREY HARD SHALE
50	552.00	572.42	SOFT SANDSTONE & SAND
902			20/08/1935 SWL 33.70 M TMP 046 C
903			20/08/1935 DISCH 004517.8 M3D

STRATIGRAPHY DETAILS

SOURCE	RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
DNR	1	0.00		ALLUVIUM
DNR	2			TERTIARY SEDIMENTS
DNR	3		160.00	COREENA MEMBER
DNR	4	160.00	326.10	DONCASTER MEMBER
DNR	5	326.10	331.00	WYANDRA SANDSTONE MEMBER
DNR	6	331.00	435.90	CADNA-OWIE FORMATION
DNR	7	435.90	572.40	HOORAY SANDSTONE

AQUIFER DETAILS

BORE REPORT

REG NUMBER 4983

REC	TOP BED(M)	BOTTOM BED(M)	BED LITHOLOGY	DATE	SWL (m)	FLOW	QUALITY	YIELD (l/s)	CTR	CONDIT	FORMATION NAME
1	329.20		SHLE							FR	WYANDRA SANDSTONE MEMBER
2	436.20		SDST							PS	HOORAY SANDSTONE
3	519.70	522.10	SDST							PS	HOORAY SANDSTONE
4	525.80	527.90	SDST							PS	HOORAY SANDSTONE

PUMP TEST DETAILS PART 1

PIPE	DATE	REC NO.	RN OF PUMP-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 (min)	PRES ON ARRIV (m)	Q ON ARRIV (l/s)
A	01/01/1935	20	4983	525.80	527.90	0.00	F/F	FR						13.15
A	03/12/1941	1											28.65	
A	21/02/1949	1												41.71
A	10/07/1961	1											21.13	
A	01/06/1968	20	4983	525.80	527.90	0.00	F/F	FR					19.72	
A	01/11/1975	20	4983	525.80	527.90	0.00	F/F	FR					17.98	5.80
A	18/11/1975	1	4983			0.56	ART	FR ST					18.05	5.80
A	08/09/1988	1	4983	519.70	572.40	0.10	ART	ST FR DT						
A	19/10/1999	1	4983											

PUMP TEST DETAILS PART 2

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	01/01/1935	20						13.15		13.15						
A	03/12/1941	1		30.48												
A	21/02/1949	1		25.50				41.71		41.71						
A	10/07/1961	1		22.89				40.87		43.42						
A	01/06/1968	20		22.54				37.56		37.55						

BORE REPORT

REG NUMBER 4983

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	01/11/1975	20		20.23				36.72		36.74						
A	18/11/1975	1	180	19.73			18.06	36.74	90	39.15	20.22				730	
A	08/09/1988	1	258	19.02			15.80	33.78	90						735	
A	19/10/1999	1														

BORE CONDITION

DATE	DRAIN DETAILS TOT LEN (km)	MAX RUN (km)	C D N	HEADWORKS RET LEN (km)	C D N	C T L	LEAK	FLOW IRREGULARITY	PRECIPITATE	EST USE (ML/yr)	STOCK CATTLE	STOCK SHEEP	COMMENT
19/10/1999	12.0			3.00	G	F							BORE SUPPLIES TOWN, STOCKROUTE AND SHORT DRAIN

ELEVATION DETAILS

****** NO RECORDS FOUND ******

WATER ANALYSIS PART1

PIPE	DATE	RD	ANALYST	QAN	DEPTH (m)	RMK	SRC	COND (uS/cm)	pH	Si (mg/L)	TOTAL IONS (mg/L)	TOTAL SOLIDS (mg/L)	HARD	ALK	FIG. OF MERIT	SAR	RAH
A	01/01/1968	1	GCL	39373		PU	GB	800	8.1		624.70	456.96	9	271		26.8	5.23
A	18/11/1975	1	GCL	67596		PU	GB	850	8.0		646.96	469.56	26	286		15.5	5.19
A	19/10/1999	1	GCL	187099	523.00	PU	GB	778	8.8	24	577.92	457.85	6	250	0.0	31.5	4.88

WATER ANALYSIS PART 2

PIPE	DATE	RD	Na	K	Ca	Mg	Mn	HCO3	Fe	CO3	Cl	F	NO3	SO4	Zn	Al	B	Cu
A	01/01/1968	1	186.0		2.0	1.0		330.0			95.0	0.70		10.0				
A	18/11/1975	1	183.0	1.2	9.6	0.6		349.0			92.0	0.56	0.0	11.0				
A	19/10/1999	1	177.2	0.9	2.4	0.0	0.01	283.6	0.00	10.6	88.8	0.50	0.0	13.8	0.00	0.02	0.20	0.00

WATER LEVEL DETAILS

PIPE	DATE	MEASURE (m)	N/R	RMK	MEAS TYPE	PIPE	DATE	MEASURE (m)	N/R	RMK	MEAS TYPE	PIPE	DATE	MEASURE (m)	N/R	RMK	MEAS TYPE

BORE REPORT

REG NUMBER 4983

PIPE	DATE	MEASURE (m)	N/R	RMK	MEAS TYPE	PIPE	DATE	MEASURE (m)	N/R	RMK	MEAS TYPE	PIPE	DATE	MEASURE (m)	N/R	RMK	MEAS TYPE
X	20/08/1935	33.70	N		NR												

WIRE LINE LOG DETAILS

****** NO RECORDS FOUND ******

FIELD MEASUREMENTS

PIPE	DATE	DEPTH (m)	COND (uS/cm)	pH	TEMP (C)	NO3 (mg/L)	DO (mg/L)	Eh (mV)	ALK (mEq)	METH	SOURCE
A	08/09/1988				46.0					PU	GB
A	19/10/1999		784	11.0	46.0					PU	

SPECIAL WATER ANALYSIS

****** NO RECORDS FOUND ******

BORE REPORT

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GROUNDWATER DATABASE

BORE REPORT

REG NUMBER 116468

REGISTRATION DETAILS

		BASIN	4242	**LATITUDE**	27-58-17	**MAP-SCALE**	
OFFICE	Charleville	**SUB-AREA**		**LONGITUDE**	144-38-07	**MAP-SERIES**	
DATE LOG RECD		**SHIRE**	5800-PAROO	**EASTING**	267396	**MAP-NO**	
D/O FILE NO.	CHA 0321/2	**LOT**	70	**NORTHING**	6903715	**MAP NAME**	
R/O FILE NO.		**PLAN**	SP165242	**ZONE**	55	**PROG SECTION**	
H/O FILE NO.		**ORIGINAL DESCRIPTION**	DRILL LOG 2016003	**ACCURACY**		**PRES EQUIPMENT**	
				GPS ACC			
GIS LAT	-27.97138889	**PARISH NAME**	6000-NO LONGER USED			**ORIGINAL BORE NO**	
GIS LNG	144.63527778	**COUNTY**				**BORE LINE**	-
CHECKED	Y						
						POLYGON	
						RN OF BORE REPLACED	
FACILITY TYPE	Artesian - Controlled Flow	**DATE DRILLED**				**DATA OWNER**	
STATUS	Existing	**DRILLERS NAME**	HOFFMANN, SCOTT				
ROLES	WS	**DRILL COMPANY**	DALY BROS P/L				
		METHOD OF CONST.	ROTARY MUD				

CASING DETAILS

PIPE	DATE	RECORD NUMBER	MATERIAL DESCRIPTION	MAT SIZE (mm)	SIZE DESC	OUTSIDE DIAM (mm)	TOP (m)	BOTTOM (m)
A	23/03/2018	1	Steel Casing	6.350	WT	219	0.00	60.00
A	23/03/2018	2	Steel Casing	6.350	WT	168	0.00	372.00
A	23/03/2018	3	Steel Casing	4.800	WT	141	362.00	512.00
A	23/03/2018	4	Centraliser				0.00	60.00
A	23/03/2018	5	Centraliser				0.00	60.00
A	23/03/2018	6	Perforated or Slotted Casing	10.000	AP		452.00	512.00
X	23/03/2018	7	Grout			279	0.00	60.00
X	23/03/2018	8	Grout			200	0.00	372.00

STRATA LOG DETAILS

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
1	0.00	0.50	RED SILTY SOIL

BORE REPORT

REG NUMBER 116468

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
2	0.50	32.00	WHITE YELLOW CLAY
3	32.00	63.00	GREY CLAY
4	63.00	74.00	LIGHT GREY CLAYEY SILT
5	74.00	146.00	GREY SILTY CLAY
6	146.00	152.00	DARK GREY PUGGY CLAY
7	152.00	265.00	GREY SHALE
8	265.00	277.00	DARK GREY PUGGY SHALE
9	277.00	296.00	GREY SHALE
10	296.00	302.00	GREY SILTY SAND (FLUID LOSS)
11	302.00	367.00	GREY SHALE
12	367.00	382.00	LT GREY CLAYEY SILT *
13	382.00	442.00	GREY SHALE
14	442.00	471.00	GREY SILTY SANDSTONE *
15	471.00	478.00	COURSE SANDSTONE
16	478.00	483.00	LIGHT GREY CLAYEY SILTSTONE
17	483.00	489.00	COARSE SANDSTONE
18	489.00	501.00	LIGHT GREY CLAYEY SILTSTONE
19	501.00	507.00	SILTY SANDSTONE (FINE)
20	507.00	512.00	LIGHT GREY/ WHITE SILTY CLAY

STRATIGRAPHY DETAILS

****** NO RECORDS FOUND ******

AQUIFER DETAILS

****** NO RECORDS FOUND ******

PUMP TEST DETAILS PART 1

****** NO RECORDS FOUND ******

PUMP TEST DETAILS PART 2

****** NO RECORDS FOUND ******

BORE REPORT

REG NUMBER 116468

BORE CONDITION

**** NO RECORDS FOUND ****

ELEVATION DETAILS

**** NO RECORDS FOUND ****

WATER ANALYSIS PART1

**** NO RECORDS FOUND ****

WATER ANALYSIS PART 2

**** NO RECORDS FOUND ****

WATER LEVEL DETAILS

**** NO RECORDS FOUND ****

WIRE LINE LOG DETAILS

**** NO RECORDS FOUND ****

FIELD MEASUREMENTS

**** NO RECORDS FOUND ****

SPECIAL WATER ANALYSIS

**** NO RECORDS FOUND ****

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GROUNDWATER DATABASE

BORE REPORT

REG NUMBER 4976

REGISTRATION DETAILS

		BASIN	4242	**LATITUDE**	27-58-17	**MAP-SCALE**	254
OFFICE	Charleville	**SUB-AREA**		**LONGITUDE**	144-38-14	**MAP-SERIES**	M
DATE LOG RECD		**SHIRE**	5800-PAROO	**EASTING**	267603	**MAP-NO**	SG55-13
D/O FILE NO.	V17 0321	**LOT**	60	**NORTHING**	6903698	**MAP NAME**	TOOMPINE
R/O FILE NO.	554071	**PLAN**	P862923	**ZONE**	55	**PROG SECTION**	
H/O FILE NO.	L24865B	**ORIGINAL DESCRIPTION**	2	**ACCURACY**		**PRES EQUIPMENT**	
				GPS ACC			
GIS LAT	-27.971389	**PARISH NAME**	5296-YOWAH			**ORIGINAL BORE NO**	OPAL MINES
GIS LNG	144.637222	**COUNTY**	WELLINGTON			**BORE LINE**	-
CHECKED	N						
						POLYGON	
						RN OF BORE REPLACED	
FACILITY TYPE	Artesian - Controlled Flow	**DATE DRILLED**	28/08/1913			**DATA OWNER**	
STATUS	Existing	**DRILLERS NAME**					
ROLES		**DRILL COMPANY**					
		METHOD OF CONST.	CABLE TOOL				

CASING DETAILS

PIPE	DATE	RECORD NUMBER	MATERIAL DESCRIPTION	MAT SIZE (mm)	SIZE DESC	OUTSIDE DIAM (mm)	TOP (m)	BOTTOM (m)
A	28/08/1913	1	Steel Casing		WT	203	0.00	46.00
A	28/08/1913	2	Steel Casing		WT	152		377.20
A	28/08/1913	3	Grout					
A	28/08/1913	4	Grout					

STRATA LOG DETAILS

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
1	0.00	27.73	CLAY OPAL MINES
2	27.73	159.41	BLUE SHALE WITH FEW HD STREAKS
3	159.41	166.72	BLUE ROCK
4	166.72	201.17	BLUE SHALE
5	201.17	262.13	DARK GREY SHALE

BORE REPORT

REG NUMBER 4976

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
6	262.13	262.43	HD STREAK
7	262.43	289.56	STICKY & SANDY GREY SHALE
8	289.56	295.65	DARK SAND
9	295.65	304.80	GREY SHALE
10	304.80	305.41	HD STREAK
11	305.41	367.59	STICKY GREY SHALE
12	367.59	372.16	SAND ROCK
13	372.16	373.99	HD STREAK
14	373.99	379.78	GREY SHALE
15	379.78	386.18	SAND ROCK
16	386.18	411.18	STICKY GREY SHALE
17	411.18	447.45	SANDSTONE
902			00/08/1913 SWL " M TMP 53 C
903			00/08/1913 DISCH 2896.2 M3D
910	153.00		QUALITY DESCRIP/CONDUCT: BRACKISH
911	439.50		QUALITY DESCRIP/CONDUCT: 890

STRATIGRAPHY DETAILS

SOURCE	RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
DNR	1	0.00		WINTON FORMATION
DNR	2			ALLARU MUDSTONE
DNR	3		289.60	WALLUMBILLA FORMATION
DNR	4	289.60		WYANDRA SANDSTONE MEMBER
DNR	5		365.80	CADNA-OWIE FORMATION
DNR	6	365.80	447.40	HOORAY SANDSTONE

AQUIFER DETAILS

REC	TOP BED(M)	BOTTOM BED(M)	BED LITHOLOGY	DATE	SWL (m)	FLOW	QUALITY	YIELD (l/s)	CTR	CONDIT	FORMATION NAME
1	153.00		SHLE							FR	WALLUMBILLA FORMATION

BORE REPORT

REG NUMBER 4976

REC	TOP BED(M)	BOTTOM BED(M)	BED LITHOLOGY	DATE	SWL (m)	FLOW	QUALITY	YIELD (l/s)	CTR	CONDIT	FORMATION NAME
2	289.60		SDST							PS	WYANDRA SANDSTONE MEMBER
3	365.80		SHLE							FR	HOORAY SANDSTONE
4	374.90	376.70	SHLE							FR	HOORAY SANDSTONE
5	439.50		SDST							PS	HOORAY SANDSTONE

PUMP TEST DETAILS PART 1

PIPE	DATE	REC NO.	RN OF PUMP-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 (min)	PRES ON ARRIV (m)	Q ON ARRIV (l/s)
A	01/01/1912	20	4976	439.50		0.00	F/F	FR						
A	28/08/1913	1												33.52
A	27/10/1919	1												31.19
A	02/03/1929	1												23.27
A	29/11/1948	1												15.83
A	23/11/1949	1												15.83
A	18/06/1955	1												14.72
A	28/02/1962	1												
A	27/01/1967	1												
A	27/01/1971	1												
A	01/10/1975	20	4976	439.50		0.00	F/F	FR						
A	10/11/1991	21	4976	439.50		0.20	ART	DT						
A	10/10/2001	1	4976	439.50	447.40	0.30	ART	FR ST					16.75	3.36

PUMP TEST DETAILS PART 2

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	01/01/1912	20						52.60		52.60						

BORE REPORT

REG NUMBER 4976

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	28/08/1913	1		67.06				33.52		33.52						
A	27/10/1919	1						31.19		31.19						
A	02/03/1929	1						23.27		23.27						
A	29/11/1948	1						15.83		15.83						
A	23/11/1949	1						15.83		15.83						
A	18/06/1955	1						14.72		14.72						
A	28/02/1962	1						15.09		15.09						
A	27/01/1967	1						14.00		14.00						
A	27/01/1971	1						13.28		13.28						
A	01/10/1975	20						13.96		13.96						
A	10/11/1991	21	50400	31.25			29.21	13.43	120							
A	10/10/2001	1	38	30.34						16.65	30.87				26	

BORE CONDITION

DATE	DRAIN DETAILS TOT LEN (km)	MAX RUN (km)	CDN	HEADWORKS RET LEN (km)	CDN	CTL	LEAK	FLOW IRREGULARITY	PRECIPITATE	EST USE (ML/yr)	STOCK CATTLE	STOCK SHEEP	COMMENT
10/10/2001	2.0		F	10.00	G	F				40	0	0	Bore supplies approximatly 100 houses and 20 businesses.

ELEVATION DETAILS

PIPE	DATE	ELEVATION	PRECISION	DATUM	MEASUREMENT POINT	SURVEY SOURCE
X	28/08/1913	206.10	SVY	STD	N	

WATER ANALYSIS PART1

PIPE	DATE	RD	ANALYST	QAN	DEPTH (m)	RMK	SRC	COND (uS/cm)	pH	Si (mg/L)	TOTAL IONS (mg/L)	TOTAL SOLIDS (mg/L)	HARD	ALK	FIG. OF MERIT	SAR	RAH
A	27/01/1971	1	GCL	47786		PU	GB	910	8.0		613.50	442.20	35	276		12.6	4.83
A	12/10/1975	1	GCL	066617	440.00	PU	GB	890	8.2		707.70	0.00	12	343	0.0	26.0	6.62
A	03/03/1985	1	GCL	108087	447.00		GB	870	8.2	25	715.82	529.88	9	347	0.0	28.8	6.75

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PIPE	DATE	RD	ANALYST	QAN	DEPTH (m)	RMK	SRC	COND (uS/cm)	pH	Si (mg/L)	TOTAL IONS (mg/L)	TOTAL SOLIDS (mg/L)	HARD	ALK	FIG. OF MERIT	SAR	RAH
A	10/11/1991		1 GCL	141164		PU	GB	863	8.2	23	690.98	514.87	8	328	0.0	31.3	6.39

WATER ANALYSIS PART 2

PIPE	DATE	RD	Na	K	Ca	Mg	Mn	HCO3	Fe	CO3	Cl	F	NO3	SO4	Zn	Al	B	Cu
A	27/01/1971	1	171.0		9.0	3.0		337.0			92.0	1.50	0.0	0.0				
A	12/10/1975	1	204.0	2.8	4.0	0.4		410.0		4.0	80.0	1.30		1.2				
A	03/03/1985	1	200.0	2.6	3.5	0.1	0.01	415.0	0.01	4.1	81.0	1.20	0.5	7.8				
A	10/11/1991	1	207.0	2.9	3.1	0.1	0.00	391.9	0.00	4.0	80.7	1.20	0.0	0.0				

WATER LEVEL DETAILS

PIPE	DATE	MEASURE (m)	N/R	RMK	MEAS TYPE	PIPE	DATE	MEASURE (m)	N/R	RMK	MEAS TYPE	PIPE	DATE	MEASURE (m)	N/R	RMK	MEAS TYPE
X	28/08/1913	77.70	N		NR												

WIRE LINE LOG DETAILS

****** NO RECORDS FOUND ******

FIELD MEASUREMENTS

PIPE	DATE	DEPTH (m)	COND (uS/cm)	pH	TEMP (C)	NO3 (mg/L)	DO (mg/L)	Eh (mV)	ALK (mEq)	METH	SOURCE
A	10/11/1991				55.0					PU	GB
A	10/10/2001	447.40	979	7.9	53.0					PU	GB

SPECIAL WATER ANALYSIS

****** NO RECORDS FOUND ******

BORE REPORT

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**** End of Report. Produced:** 07/08/2018 02:44:03 PM ******