Quilpie Shire Council

50 Brolga Street (PO BOX 57)
Quilpie QLD 4480

Service Provider ID 108

QUILPIE DRINKING WATER QUALITY MANAGEMENT PLAN

September 2016

Action Statement

Date	Name	Position	Action required *(Review/Endorse/Approve)*
11/10/2012	Alvin Feeney/ Patrick J. Cullivan	Author	Internal review
19/11/2012	Council	Council	Endorse
19/03/2013	OWSR	Regulator	Review
01/07/2013	Alvin Feeney	Author	Final amendments
22/08/2013	Alvin Feeney	Author	Approved
27/05/16	Will Green	Author	Amendment
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Prepared by Alvin Feeney
Title Project Manager
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Contact for enquiries and proposed changes

If you have any questions regarding this document or if you have a suggestion for improvements, please contact:

Project Manager Alvin Feeney
Phone (07) 4651 2177

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1	19/11/2012	Alvin Feeney	for Council Approval
2	19/03/2013	Alvin Feeney	Issued For Review OWSR
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4	22/08/2013	Alvin Feeney	Approved
5	27/05/2016	William Green	Issue
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1 REGISTERED SERVICE DETAILS

Quilpie Shire Council (QSC) is located in South Western Queensland and comprises the towns of Quilpie, Eromanga, Adavale and Cheepie covering an area of 67,482 km^2. Figure 1.1 shows the location of the town of Quilpie relative to Brisbane, Rockhampton, Townsville and Mt. Isa.

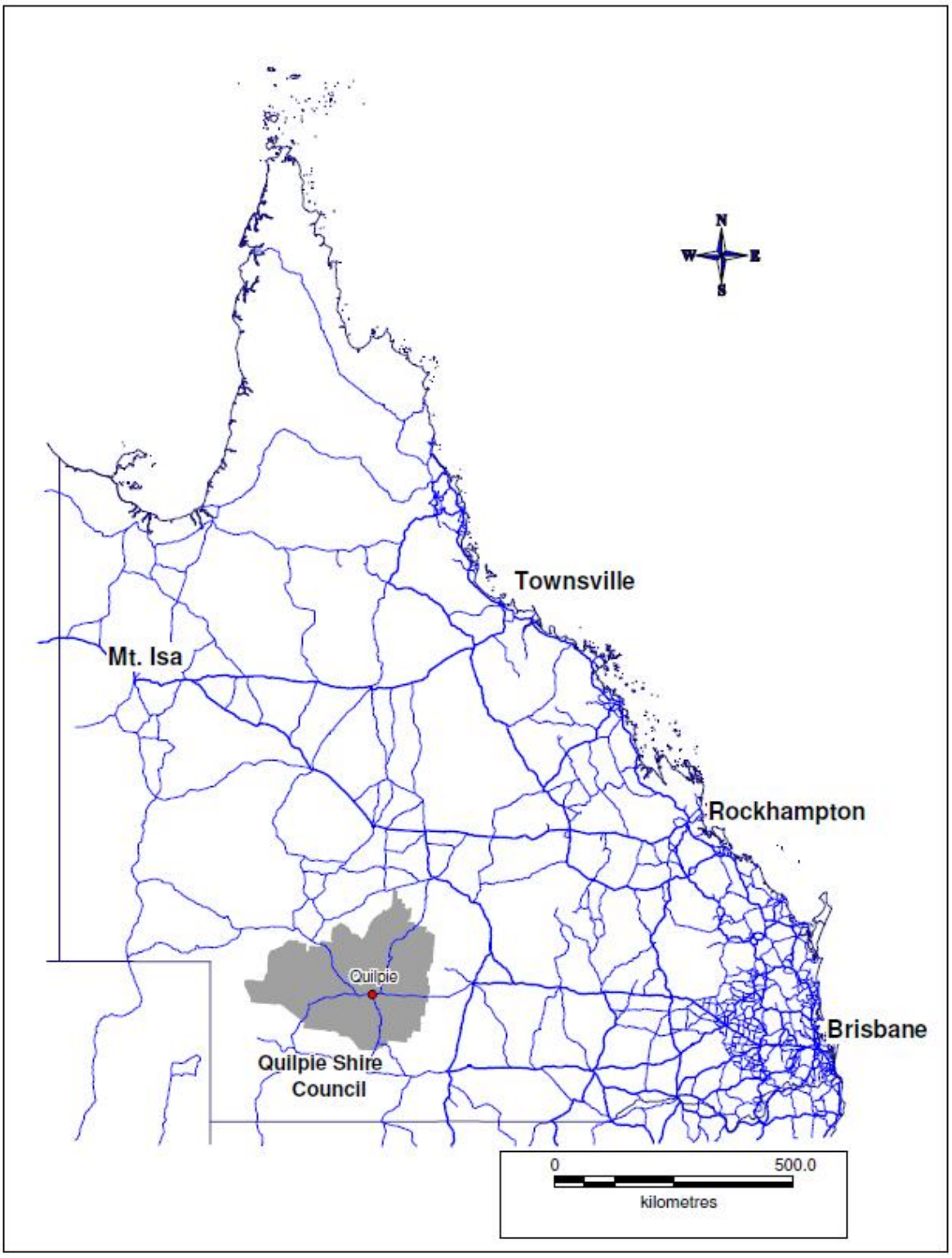


Figure 1.1 Quilpie location map

QSC is the drinking water service provider (SPID 108) for the following water supply schemes in the region; (refer to Figure 1.2):

- **Quilpie Water Supply Scheme**

Quilpie is located approximately 217km west of Charleville and 1000km west of Brisbane.

- **Eromanga Water Supply Scheme**
  Eromanga is located 100km west of Quilpie.

QSC also provide a non-potable water supply to the Adavale Water supply scheme;

- **Adavale Raw Water Supply Scheme (Non-potable)**
  Adavale is located 103km north of Quilpie.

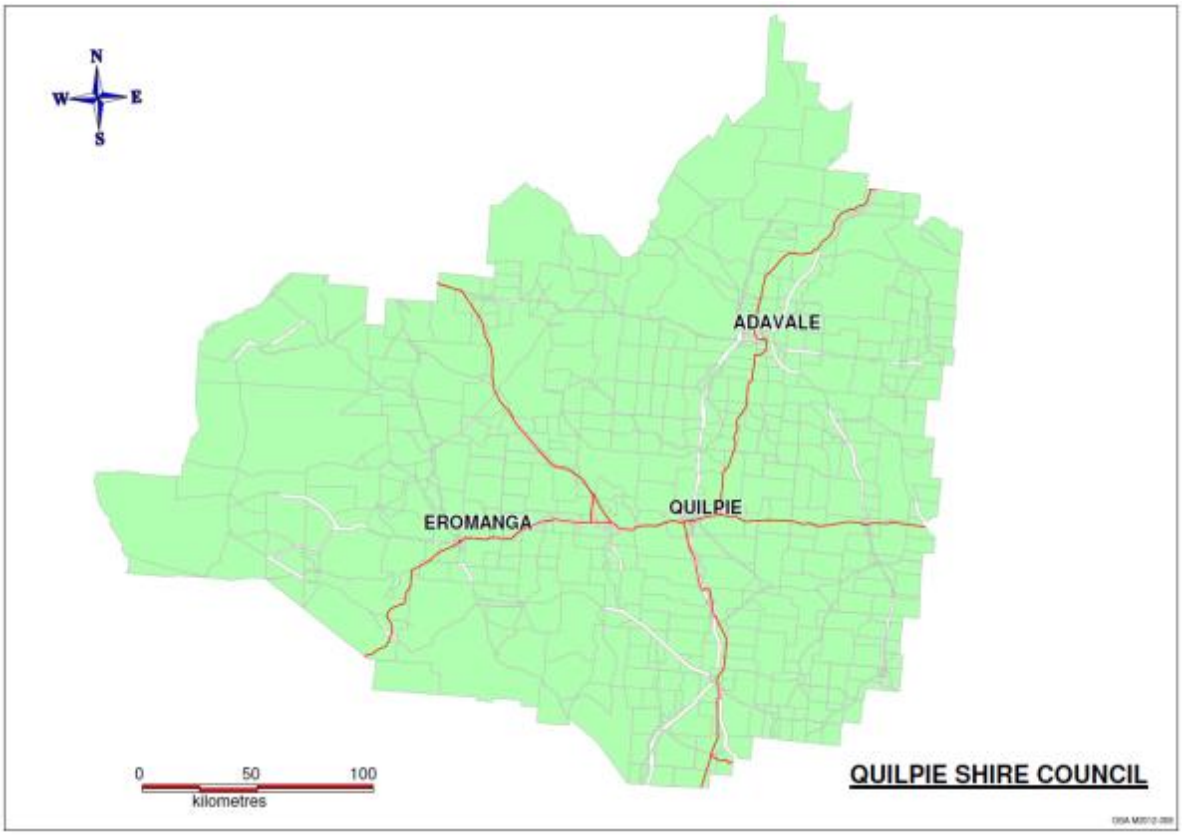


Figure 1.2 Quilpie Shire Council

QSC is a small Drinking Water Service Provider (DWSP) as defined in the Water Supply (Safety and Reliability) Act 2008 and provides drinking water for an approximate population of 665 with a total demand of approximately 1.344 ML/d. QSC may be referred to as the DWSP throughout this document.

1.1 Approval Application Form

Refer to Appendix A Drinking Water Quality Management Plan Approval Application

1.2 Further information required

Table 1.1 below lists the drinking water schemes, identifies the operational responsibilities for each scheme and details the current and future population and demand for each scheme.

Table 1.1 Listing of Water Supply Schemes

Scheme Name	Operator (organisation)	Communities Served	Current (2012)			Future (2022)[1]		
			Population Served	Connections	Demand kL/d	Population Served	Connections	Demand kL/d
Quilpie	Quilpie Shire Council	Quilpie	600	427	1200	663	472	1326
Eromanga		Eromanga	50	43	104	55	47	114
Adavale		Adavale	15	19	40	17	21	45
Total			665	489	1344	735	540	1485

[1] A population growth of 1% per annum has been applied

2 DETAILS OF INFRASTRUCTURE FOR PROVIDING THE SERVICE

QSC is the DWSP for three water supply schemes. The infrastructure for providing the service is detailed in the sections outlined below:

- 2.1 Quilpie Water Supply Scheme
- 2.2 Eromanga Water Supply Scheme
- 2.3 Adavale Water Supply Scheme (Non-potable)

For Quilpie and Adavale water supply schemes, water is untreated and artesian bore water is reticulated directly to the communities. Eromanga water supply was upgraded in 2014 with the commissioning of a reverse osmosis treatment plant and water storage facilities. Prior to the commissioning of the treatment plant, Eromanga's water supply was considered to be non-potable, this scheme now provides excellent quality drinking water.

2.1 Quilpie Water Supply Scheme

Quilpie water supply scheme is sourced from two sealed artesian bores; Town Bore 1 and Town Bore 2 the bore water is sourced from 890m and 960m respectfully the supply scheme relies on the bore pressure from the artesian supply to deliver water to customers without the use of reservoirs. Due to the high pressure of these bores Clay pressure valves are installed at each bore to reduce pressure before being supplied into reticulation. Due to the sealed nature of theses bores and the depth that the water is sourced from, subsequently reducing the likelihood of pathogenic contamination to the water supplied into reticulation does not require treatment on a daily basis. The risk of contamination from pathogens could be possible in the event of breakages to water supply infrastructure in these situations where breakages occur operations staff are required to implement maintenance procedures developed to reduce the risk of contamination of drinking water in the event of maintenance work occurring.

Town Bore No.1 is no longer supplying water to the town, however, it can be operated as a back-up bore and will be considered as the main supply for future sub-divisions to the west of the town.

2.1.1 Schematic

Figure 2.1 shows a schematic of the Quilpie's Water Supply Scheme. Refer to Appendix B for water supply layouts superimposed on aerial photos.

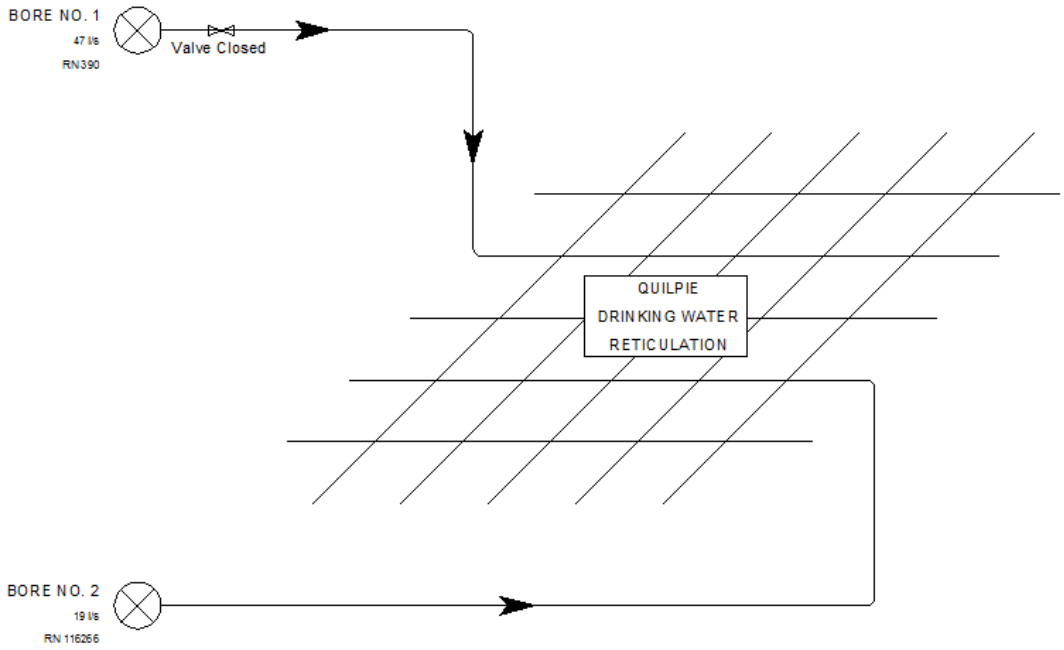


Figure 2.1 Quilpie Service Schematic LayoutSource, treatment and distribution details

Table 2.1 provides the following information for Quilpie's infrastructure:

- Source details;
- Distribution and reticulation.

Table 2.1 Quilpie Infrastructure Details

Component		Quilpie Water Supply Scheme
Sources	Name	Quilpie Town Bore No. 2
	Type	Deep Artesian Bore (RN116266)
	% of supply	100%
	Reliability	Does not run dry
	Water quality issues	Drinking water does not fully comply with the Australian Drinking Water Guidelines. Refer to 3.1.1 Water Quality Information
	Name	Quilpie Town Bore No. 1
	Type	Deep Artesian Bore (RN 390)
	% of supply	0% (back-up bore)
	Reliability	Does not run dry
	Water quality issues	Drinking water does not fully comply with the Australian Drinking Water Guidelines. Refer to 3.1.1 Water Quality Information
Sourcing	Type	Deep Artesian Bore

Component		Quilpie Water Supply Scheme
Infrastructure	Description	Town Bore No. 1 is located on the corner of Chipu and Brolga Street. Town Bore No.2 is located on the corner of Gyrica and Winchu street. Town Bore No.1 and Town Bore No. 2 are 900m and 966m deep respectively. Town Bore No. 1 is currently used as a back-up bore and has the capacity to yield 47 l/s if required. Town Bore No.2 currently yields 19l/s. Both bores are free flowing and deliver water directly into reticulation without pumping. Refer to Appendix D Bore Casing and Strata Details for bore construction details.
Are there any sources that **do not** undergo treatment prior to supply?	Yes Quilpie Town Bore No.1 and Quilpie Town Bore No. 2	
Are there any sources that **do not** undergo disinfection prior to supply?	Yes Quilpie Town Bore No.1 and Quilpie Town Bore No. 2.	
Distribution and Reticulation System	Pipe material Age range Approx. % of total length	AC 20 - 49 70.8%
	Pipe material Age range Approx. % of total length	POLY 7 - 26 17.4%
	Pipe material Age range Approx. % of total length	PVC 3 11.8%
	Areas where potential long detention periods could be expected	None
	Areas where low water pressure (e.g. < 12 m) could be expected during peak or other demand periods)	None
Water quality responsibility changes	Entire water supply scheme	Quilpie Shire Council

2.2 Eromanga Water Supply Scheme

Eromanga water supply scheme has undergone a significant upgrade in recent times. In 2014 a new supply scheme was developed sourcing water from four shallow sub artesian bores in the township of Eromanga each have an electric submersible pump which supplies water on demand to a common raw water tank as determined by automated level control system. Level switches in each bore determine the availability of water in each bore.

Bore 1 : Rear of town hall

Bore 2 : Front of town hall
Bore 3 : School oval
Bore 4 : House opposite council depot

A reverse osmosis and chlorine dosing system brings the raw water to a potable standard and transfers the treated water to the clean water tank as required to maintain the set level in the tank. The treatment plant can run automatically performing all necessary back flushing to ensure continuous water output.

Treated water is drawn from the clean water tank and pressure is maintained by the two clean water pumps and fed to the town supply on demand.

The complete system is controlled and monitored by a PLC (programmable logic controller) with an HMI (Human Machine Interface) panel in the main control building. Radio links between each of the four bores and the main control provide run signals to pumps and fault indications back to the PLC and HMI touchscreen.

2.2.1 Schematic

Figure 2.2 shows a schematic of the Eromanga water supply scheme. Refer to appendix B for water supply layouts superimposed on aerial photos.

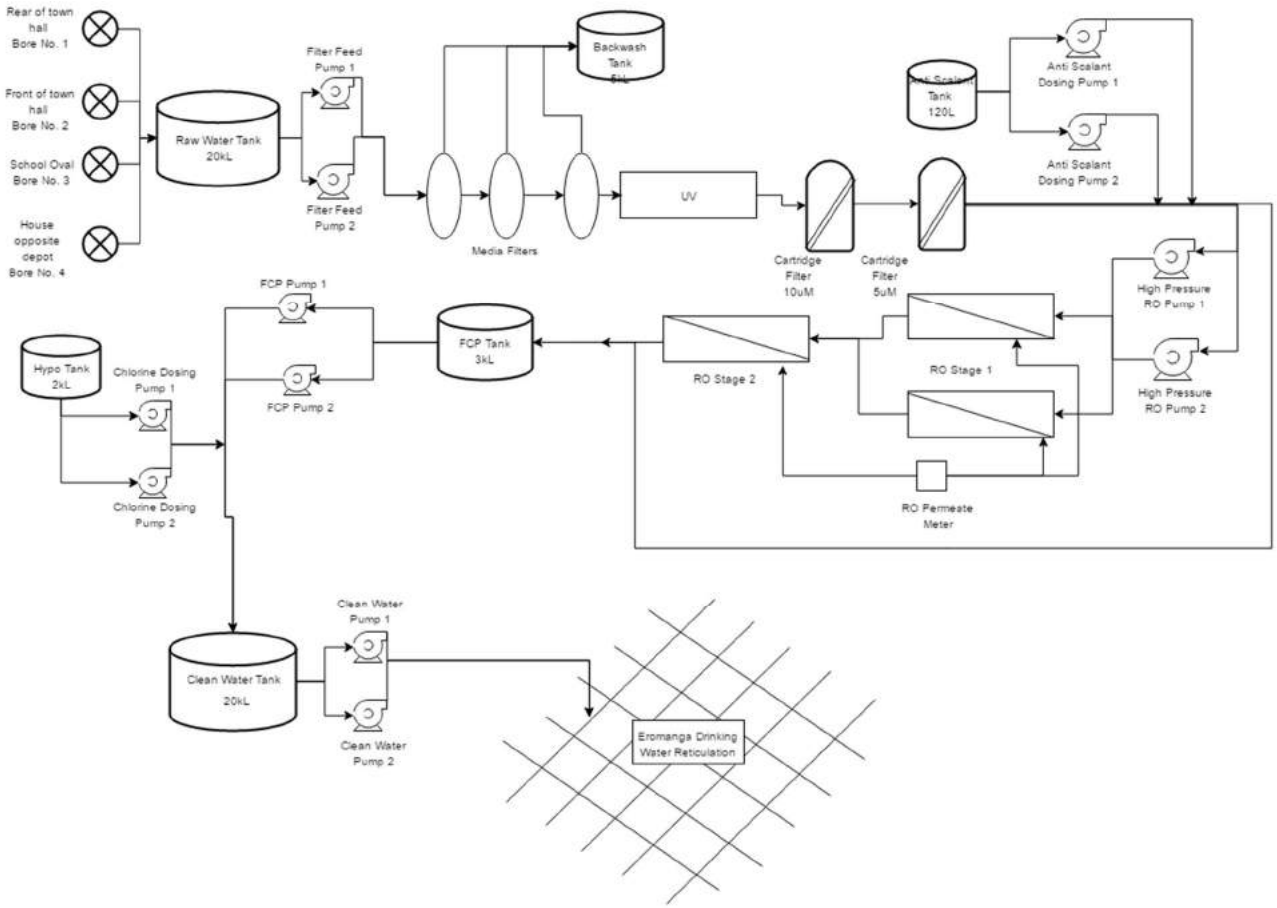


Figure 2.2 Eromanga Service Schematic Layout

2.2.2 Source, treatment and distribution details

Table 2.2 and Table 2.3 provide the following information for Eromanga's infrastructure:

- Source details;
- Distribution and reticulation.
- Plant component and descriptions (Table 2.3)

Table 2.2 Eromanga Infrastructure Details

Component		Eromanga Water Supply (Potable)
Source	Name Type % of supply Reliability Water Quality Issues	Eromanga Hall Bore (front) Sub Artesian Bore 25% Refer to 3.2.1 Water Quality Information
Sourcing Infrastructure	Type Description	Sub Artesian Bore Eromanga Hall Bore (front) is located at the Western side of town on Deacon St. The bore is 29.6m deep, yields 1.63l/s with an electric submersible pump located at top of screen at 23.60m.
Source	Name Type % of supply Reliability Water Quality Issues	Eromanga Hall Bore (Rear) Sub Artesian Bore 25% Refer to 3.2.1 Water Quality Information
Sourcing infrastructure	Type Description	Sub Artesian Bore Eromanga Hall Bore (Rear) is located on the Western side of town on Deacon St. The bore is 42m deep, yields 3.1l/s with an electric submersible pump located at top of screen at 22.5m.
Source	Name Type % of supply Reliability Water Quality Issues	Eromanga House Bore Sub Artesian Bore 25% Permanent Refer to 3.2.1 Water Quality Information
Sourcing Infrastructure	Type Description	Sub Artesian Bore Eromanga House Bore is located on the northern side of town at Lot 6 on Neal St. The bore is 29.8m deep. The bore currently yields 1.09 l/s with an electric submersible pump located at top of screen at 23.80m.
Source	Name Type % of supply Reliability Water Quality Issues	Eromanga School Bore Sub Artesian Bore 25% Permanent Refer to 3.2.1 Water Quality Information
Sourcing Infrastructure	Type Description	Sub Artesian Bore Eromanga School Bore is located on southern side of town within the school grounds on Donald St. The bore is 25m deep. The bore currently yields 2 l/s with an electric submersible pump located at top of screen at 19m.
Are there any sources that do not undergo treatment prior to supply	No	
Are there any sources that do	Yes	

not undergo disinfection prior to supply	Eromanga Artesian bore. Potentially used as an alternate water source during plant failure.	
Distribution and Reticulation System	Pipe material Age range Approx. % of total length	AC 25-27 75%
	Pipe Material Age range Approx. % of total length	DICL 24 15%
	Pipe material Age range Approx. % of total length	Poly 1 10%
	Areas where potential long detention periods could be expected	Areas of potential long detention periods may include municipal areas that are not used on a daily basis such as the town hall, other areas may include accommodation in off peak season where utilisation rates are low.
	Areas where low water pressure (e.g. <12m) could be expected during peak or other demand periods.	Treated water delivery consists of two modern delivery pumps with dedicated pressure sensors for each pump, the two pumps are set-up in a lead/lag configuration to maintain a discharge at approximately 28psi. Low water pressure in the system may occur due to mains breakages or other malfunctions. The treatment system is not designed for complete supply of all water usage and therefore the potential for overuse is possible.
Water quality responsibility changes	Entire water supply scheme	Quilpie Shire Council

Table 2.3 Eromanga Water Treatment Plant Component Description

Component	Component Description
Raw Water Tank	There are four shallow sub-artesian bores in the township of Eromanga, each have an electric submersible pump which supplies water on demand to a common Raw Water tank as determined by an automated level control system. The Raw Water tank is fitted with a pressure sensor to determine the water level; this is fed back to the Programmable Logic Controller (PLC) which communicates with the bore systems via a radio network. The four bore pumps operate simultaneously and the flow rates are monitored and recorded on the Human Machine Interface (HMI). The Raw Water tank level low setpoint starts the bore pumps and the Raw Water tank level high setpoint stops the pumps. There is also a pressure setpoint that triggers a high pressure fault and shuts the pump down. The common Raw Water tank and the Clean Water tank were constructed with the same specifications. The grounded Clean Water tank is constructed from reinforced concrete and capped with a pitched galvanised steel roof, to protect from vermin and direct stormwater run-off. The Clean Water tank was constructed with a height of 2.4, diameter of 8.6m and capacity of 120kL.
Media Filter Pumps	The Raw Water tank provides flooded suction to two pumps at the head of the water treatment plant. The two pumps provide water to the media filter pre-treatment skid and feed the entire water treatment system. They are configured as duty/standby to ensure that the water supply maintained even in the event of a fault with the one of the pumps. The pumps are controlled with individual VSDs (variable speed drives) to maintain a set discharge pressure as measured by a pressure sensor at the filter inlet. The pressure sensor also provides low pressure

	inhibits to the pumps. The pumps have a rotating duty cycle to ensure that the run hours are kept approximately equal for each pump. The pumps are integrated with the entire plant and will operate in auto with the following circumstances: • Raw water tank level above Low setpoint. • RO plant is running or backwash cycle is running
Media Filter Pre-treatment	The pre-treatment component consists of three pressurized media filters in parallel, designed and installed to prevent fouling of the RO system. The arrangement of media is intended to remove the largest particles at the top of the media bed, while smaller particles are retained deeper and deeper in the media. This allows the entire bed to act as a filter allowing much longer filter run times between backwash and more efficient particulate removal. Each media filter has two motorised valves associated with it: a normally open valve for inlet stream going into the top of the filter, and a normally closed valve for the backwash waste stream coming out the top of the filter. Filtration is the default mode in which the raw water passes through the three filters (from top to bottom) and to the RO. In this mode all filter inlet valves are open and all backwash valves are closed. The duty feed pump runs to maintain filter inlet pressure at a set-point. A filter backwash cycle is triggered intermittently to remove any solids and impurities that have accumulated on the surface of the filter media. The cycle uses the filtered water from two of the filters to pass through the third filter in the reverse direction at a high velocity.
Ultra Violet Light Disinfection System	Prior to the RO plant a UV module is installed to remove biological organisms from the filtered water to minimize the chance of fouling the RO membranes. The UV will also prevent biological growth from occurring in the water during periods of inactivity. The UV remains on all the time and will raise an alarm if there is a lamp or power failure.
Reverse Osmosis Process	The RO plant treats 60% of the filtered water from the media filters to reduce the salinity of the water to achieve Australian Drinking Water Guidelines (ADWG) requirements by passing it at a high pressure through eight semi-permeable membranes. The remaining 40% of the filtered water bypasses the RO and is blended with the pure RO water (permeate). The stream that bypasses the RO equipment from the media filters and blends with the RO permeate is controlled by a modulating valve. The valve is modulated to meet a set conductivity based upon the conductivity reading on the blended water. The RO feed pressure sensor also prevents the pumps from dry running (i.e. low suction pressure) by raising an alarm and stopping the pumps. The high pressure pumps will try to restart three times automatically after a low inlet pressure fault, if it continues to get the fault after the third try the pump will stop until the operator resets the fault. The RO has pre-membrane and post membrane pressure sensors which provide pressure indication to the HMI. Alarms are provided for high pressure readings with high differential pressure inhibitors installed to protect equipment. The output of the RO plant is regulated by the speed of the high pressure pumps and by throttling the brine water flow and recycling water flow via manual globe valves. There are two duty/standby anti-scalant dosing pumps that operate at a fixed dose rate while the RO is operating. These pumps dose an anti-scalant chemical solution into the feed water to prevent the build-up of scale.
FCP Pumps	There are two duty/standby FCP pumps that transfer blended permeate water from the FCP tank to the Clean Water tank. The pumps are started and stopped based on high and low FCP tank level setpoints. The tank level is measured by a pressure sensor mounted on the bottom of the tank. The pumps are started Direct-On-Line (DOL) and run at a fixed flow. A magnetic flow meter measures the

	discharge flow to the Clean Water tank and inhibits the pumps in the event of a no flow alarm. This no flow alarm is triggered if a pump is running and there is no flow through the flow meter.
Chlorine Dosing	The chlorine dosing treatment occurs during the transfer of blended permeate water from the FCP tank to the Clean Water tank. There are two duty/standby chlorine dosing pumps that inject Sodium Hypochlorite into the FCP pump discharge line at a rate dependant of water usage and target residual levels, with a maximum performance of 30L/hr. The required chlorine dosage is set via the dosing pump speed and is not regulated automatically. These pumps draw from the 2kL Sodium Hypochlorite tank located in the bulk storage area. The duty dosing pump can be run in auto or manual modes as selected through HMI. The switch on the control cabinet bypasses the PLC to allow the pumps to run in the event of a PLC malfunction. The chlorine storage tank has low level protection for the dosing pumps. If a low level alarm is activated the system will stop until the tank is refilled. A chlorine tank low level alarm will also inhibit the entire system from operating (excluding the bore pumps) as the chlorination process is a critical component. The Chlorine Dosing pumps are intended to operate only when the FCP Pumps are delivering water to the Clean Water tank; therefore the dosing pumps are inhibited whenever the FCP pumps are NOT running in auto.
Clean Water Tank	A reverse osmosis and chlorine dosing system brings the raw water to a potable standard, the treated water is then transferred to the Clean Water tank as required to maintain the set level in the tank. Treated water is drawn from the Clean Water tank and pressure is maintained by the two Clean Water pumps and fed to the town supply on demand. The Clean Water tank level and high/low set-point values are monitored along with the Clean Water pump operating status. As part of the monitoring, a high alarm is generated when the tank level exceeds 99% and a low alarm is generated when the tank level is below 15%, the low level alarm will inhibit the operation of the Clean Water supply pumps until the level is raised. For Clean Water tank specifications refer to Raw Water tank entry.
Clean Water Pumps	The Clean Water pump set is a stand-alone E-Boost pressure system consisting of two delivery pumps with dedicated variable speed drives and pressure sensors for each pump. Although the Clean Water pumps act as a standalone system, they are interlocked with the Clean Water tank level and will be inhibited if the Clean Water tank lo-lo level alarm is activated. The pumps are set-up in a lead/lag configuration to maintain the discharge pressure at approximately 28 psi. The control system interfaces with the pumps system for monitoring and also provides low tank level protection.

2.3 Adavale Water Supply Scheme (Non-potable)

Adavale water supply scheme is comprised of one artesian bore delivering water directly to reticulation. The water supplied into reticulation is untreated and has been deemed non-potable.

2.3.1 Schematic

Figure 2.3 shows a schematic of the Adavale's Water Supply Scheme. Refer to Appendix B for water supply layouts superimposed on aerial photos.

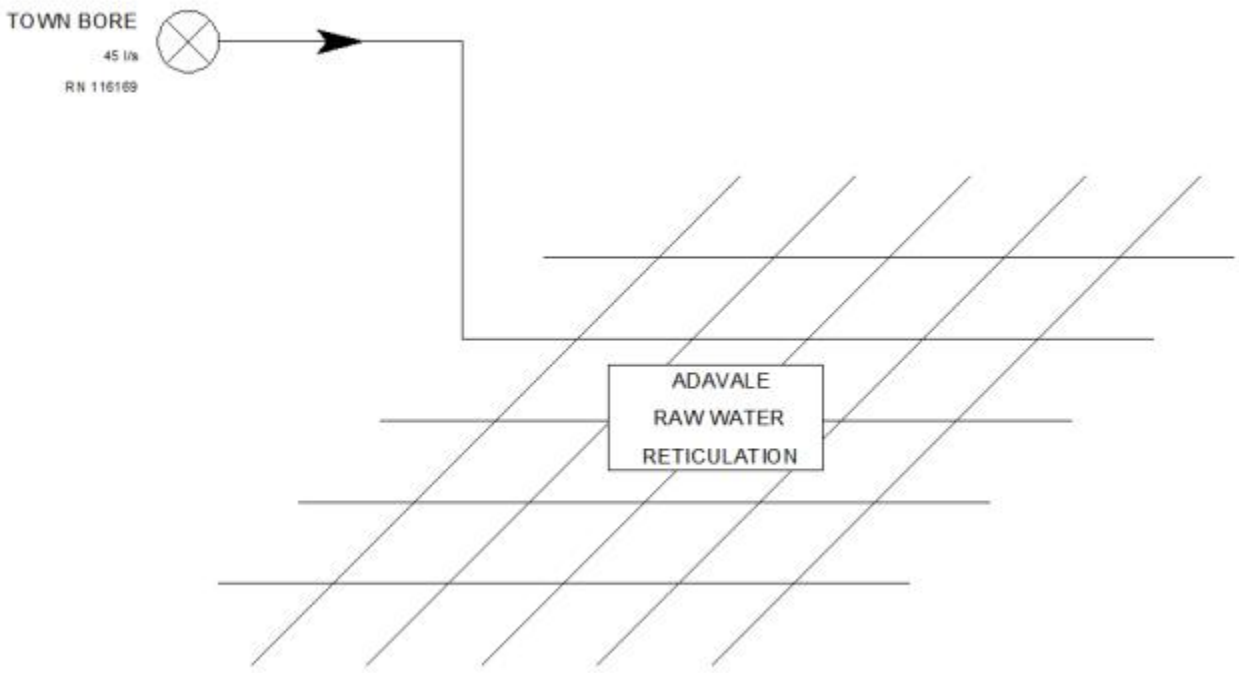


Figure 2.3 Adavale Service Schematic Layout

2.3.2 Source, treatment and distribution details

Table 2.3 provides the following information for Adavale's infrastructure:

- Source details;
- Distribution and reticulation.

Table 2.3 Adavale Infrastructure Details

Component		Adavale Water Supply Scheme (Non-potable)
Sources	Name	New Adavale Town Bore
	Type	Deep Artesian Bore (RN 116169)
	% of supply	100%
	Reliability	Does not run dry
	Water quality issues	Raw water generally does not comply with the Australian Drinking Water Guidelines Refer to Appendix E.
Sourcing	Type	Deep Artesian Bore

Component		**Adavale Water Supply Scheme (Non-potable)**
Infrastructure	Description	The Town Bore is located on Dutton Street. The bore is 1,184m deep. The bore has a yield is 45 l/s and is free flowing. Refer to Appendix D Bore Casing and Strata Details for bore construction details.
Are there any sources that **do not** undergo treatment prior to supply?	Yes Town Bore. Deep artesian bore with raw water quality that generally does not comply with the Australian Drinking Water Guidelines. Refer to Appendix E.	
Are there any sources that **do not** undergo disinfection prior to supply?	Yes Town Bore.	
	Pipe material Age range Approx. % of total length	AC 27 72.1%
	Pipe material Age range Approx. % of total length	FC 14 0.4%
	Pipe material Age range Approx. % of total length	PEX 7 8.5%
	Pipe material Age range Approx. % of total length	POLY 27 19.0%
	Areas where potential long detention periods could be expected Areas where low water pressure (e.g. < 12 m) could be expected during peak or other demand periods)	None None
Water quality responsibility changes	Entire water supply scheme	Quilpie Shire Council

2.4 Key Stakeholders

Table 2.4 below outlines the relevant stakeholders for QSC water supply schemes in Quilpie, Eromanga and Adavale.

Table 2.4 Quilpie Shire Council Stakeholders

Organisation	Contact Name and Details	Relevance to management of drinking water quality	How the stakeholder is engaged in the DWQMP
Quilpie Shire Council	Dave Burges Chief Executive Officer P: (07) 4656 0500 E: ceo@quilpie.qld.gov.au	Small Drinking Water Service Provider	Small Drinking Water Service Provider
Quilpie Hospital	30 Gyrica Street, Quilpie, QLD P: (07) 4656 0100	Sensitive User	Sensitive User
Queensland Health Forensic & Scientific Services	P: (07) 3274 9070	Water Analysis Authority	Chemical Analysis and Reporting on Water Quality
George Bourne & Associates	P: (07) 4651 2177	Consultancy Services	Preparation of DWQMP

3 IDENTIFY HAZARDS AND HAZARDOUS EVENTS

3.1 Quilpie Water Quality and Catchment Characteristics

Quilpie water supply is composed of two deep artesian bores which are not treated prior to reticulation.

3.1.1 Water Quality Information

Water quality information for Quilpie includes the following:
(a) Summary
(b) Interpolation

3.1.1 (a) Summary

Table 3.1 below summarises the available reticulated water quality for the Quilpie water supply scheme.

Figure 3.1.1 to Figure 3.1.16 below shows trends of the main characteristics contained in Table 3.1.

Analysis of Quilpie's water quality shows exceedances of ADWG Guidelines (2011) for pH, Sodium and Fluoride.
Continued monitoring of Quilpie's water supply have revealed naturally occurring Fluoride in concentrations that exceed of ADWG, with an average value of 1.75mg/l. Ongoing exposure to high fluoride levels in drinking water have the potential to cause adverse health impacts. The effects of fluoride concentrations found in Quilpie's Drinking water supply include dental fluorosis which has the potential to stain developing teeth in infants. A more serious impact on health caused by high Fluoride levels includes skeletal fluorosis which only occurs in very high levels of fluoride in drinking water, above those levels experienced in Quilpie. Ongoing monitoring of Fluoride in Quilpie's drinking water supply is one of the highest priorities relating to water quality, close monitoring of these levels will allow the detection of increased health risk in the future. Information on the management of elevated fluoride levels are discussed further in section 5 Risk Management.

The concentrations of sodium in Quilpie's Drinking water supply are consistently above ADWG aesthetic thresholds, the presence of sodium in water supplies is common in ground water due to the high solubility of sodium salts and the abundance of mineral deposits. The concentrations of sodium in Quilpie's drinking water supply do not pose a great risk to human health however may be of concern to people suffering from severe hypertension. The concentrations present in the water supply may have an effect on the taste of the water where ADWG advise that taste becomes appreciable at 180mg/l.

Slightly high pH readings are typical for Quilpie's water supply with an average value of 8.5, issues surrounding increased pH values may include increased scaling in water pipes and fittings. Elevated pH ranges are not uncommon in artesian water supplies in Western Queensland and are associated with hydrogeological processes within the artesian basin.
The responsibility for obtaining the water samples rests with the DWSP and samples are collected by the Water Officer on a quarterly basis. Samples are sent to Queensland Health Scientific Services for analysis. The DWSP also samples and analyses drinking water for E. coli on a monthly basis.

Table 3.1 Quilpie Reticulated Water

Quilpie Water Supply		Start Date	25/03/2009		End Date:	23/09/2015					
Characteristic	Units	No. of Samples	Summary of Results					Guideline Value			
			Maximum Value	Average Value	Minimum Value	Std Dev	95th Percentile	Health	Exceedances	Aesthetic	Exceedances
Conductivity	uS/cm	10	946.000	897.400	854.000	28.587	945.550				
pH		16	8.6	8.498125	8.38	0.079	8.6			≥6.5 & ≤ 8.5	10
Total Hardness	mg/L as $CaCO_3$	10	6.100	5.510	4.200	0.478	5.965				
Temporary Hardness	mg/L as $CaCo_3$	10	6.100	5.510	4.200	0.478	5.965			200	0
Alkalinity	mg/L $CaCo_3$	10	332.000	316.900	307.000	8.665	332.000				
Residual Alkalinity	meq/L	10	6.500	6.210	6.000	0.176	6.500				
Silica	mg/L	10	44.000	42.400	41.000	0.800	43.550			80	0
Total Dissolved Ions	mg/L	10	709.000	678.000	662.000	16.297	706.750				
Total Dissolved Solids	mg/L	10	553	531.2	520	11.089	551.65			600	0
True Colour	Hazen	10.000	2.000	1.100	1.000	0.300	1.550			15	0
Turbidity	NTU	16	1.000	1.000	1.000	0.000	1.000			5	0
pH (Saturation)*		10	8.700	8.620	8.600	0.040	8.700				
Saturation Index		10	-0.100	-0.270	-1.000	0.253	-0.100				
Mole Ratio		10	1.400	1.320	1.100	0.098	1.400				
Sodium Absorption Ratio		10	44.000	37.300	34.000	2.532	41.300				
Figure of Merit		10	0.000	0.000	0.000	0.000	0.000				
Sodium	mg/L	10	209	201	195	4.472136	208.1			180	10
Potassium	mg/L	10	2.700	2.340	2.200	0.143	2.565				
Calcium	mg/L	10	2.300	2.180	1.700	0.166	2.300				
Magnesium	mg/L	12	0.100	0.027	0.000	0.042	0.100				
Hydrogen	mg/L	10	0.000	0.000	0.000	0.000	0.000				
Bicarbonate	mg/L	10	393.000	372.500	356.000	11.552	390.750				
Carbonate	mg/L	10	10.000	6.690	5.000	1.515	9.190				
Hydroxide	mg/L	10	0.100	0.050	0.000	0.050	0.100				
Chloride	mg/L	10	88.000	83.400	81.000	2.200	87.550			250	0
Fluoride	mg/L	16	1.900	1.750	1.700	0.061	1.825	1.5	16		
Nitrate	mg/L	16	0.500	0.500	0.500	0.000	0.500	50	0		
Sulphate	mg/L	14	9.000	7.843	6.700	0.801	9.000	500	0	250	0
Iron	mg/L	18	0.030	0.014	0.010	0.007	0.030			0.3	0

Manganese	mg/L	16	0.010	0.009	0.000	0.002	0.010	0.5	0	0.1	0
Zinc	mg/L	18	0.020	0.010	0.003	0.003	0.012			3	0
Aluminium	mg/L	18	0.050	0.049	0.039	0.003	0.050			0.2	0
Boron	mg/L	18	0.600	0.466	0.060	0.104	0.549	4	0		
Copper	mg/L	18	0.490	0.056	0.009	0.106	0.116	2	0	1	0
E. coli		31	0.000	0.000	0.000	0.000	0.000	0	0		

Aesthetic Guideline Exceedance

Health Guideline Exceedance

* Note: Please refer to Appendix I for E.Coli Sampling Data

Table 3.2 Quilpie water quality complaints

Year	No of Water Quality Complaints	Water Quality Complaints per 1000 Connections	Scheme	Main Reasons for Complaints	Likely Sources / Causes of Problems	Resolution of Problem
2015	0	0	Quilpie	Nil		
2014	0	0	Quilpie	Nil		
2013	0	0	Quilpie	Nil		
2012	0	0	Quilpie	Nil		
2011	1	2.22	Quilpie	Data not available		
2010	0	0	Quilpie	Nil		
2009	0	0	Quilpie	Nil		

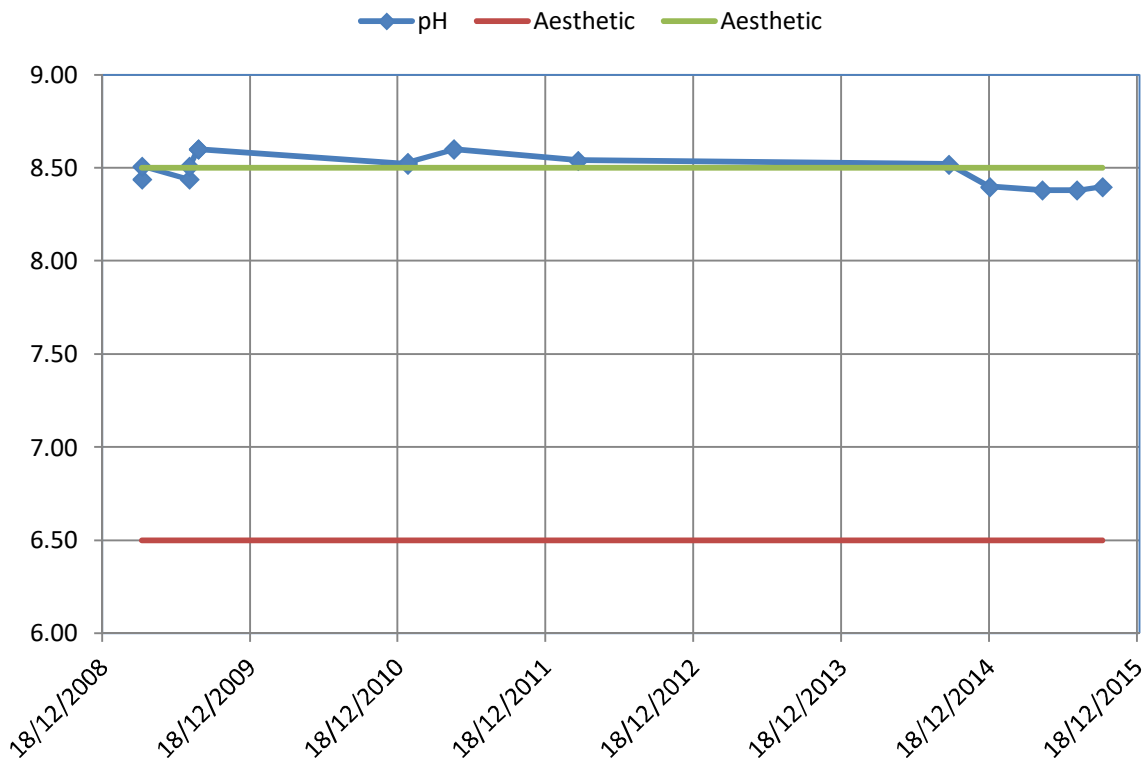


Figure 3.1 Quilpie - pH at 23°C

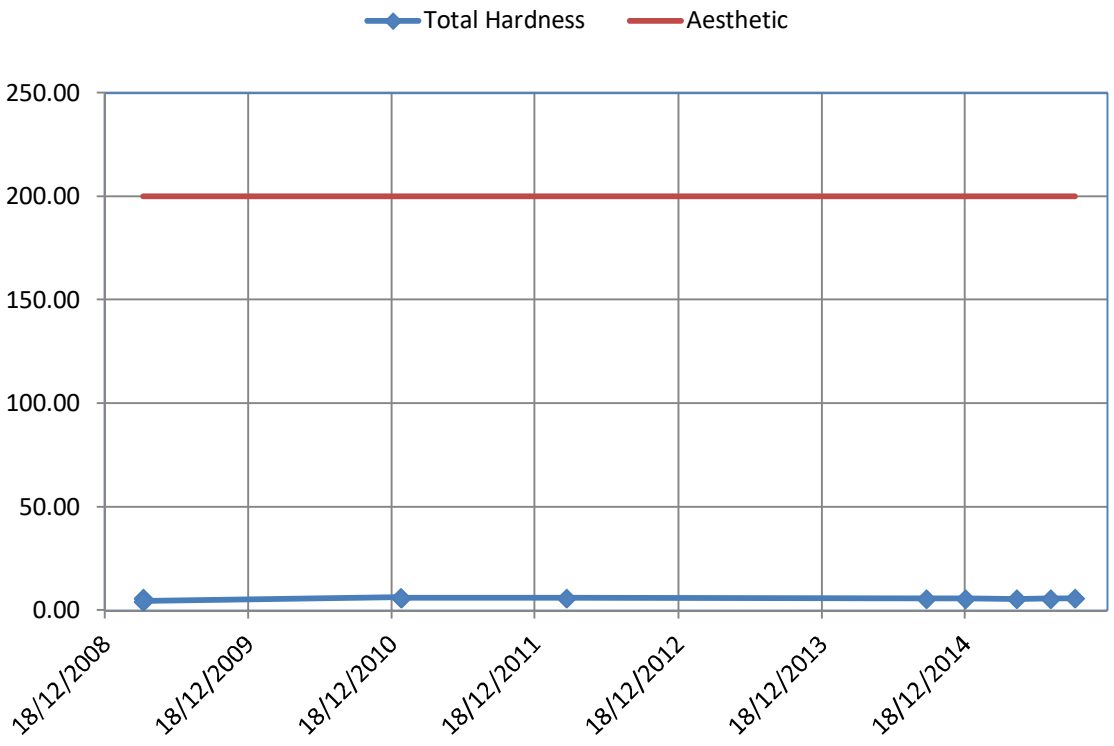


Figure 3.2 Quilpie - Total Hardness

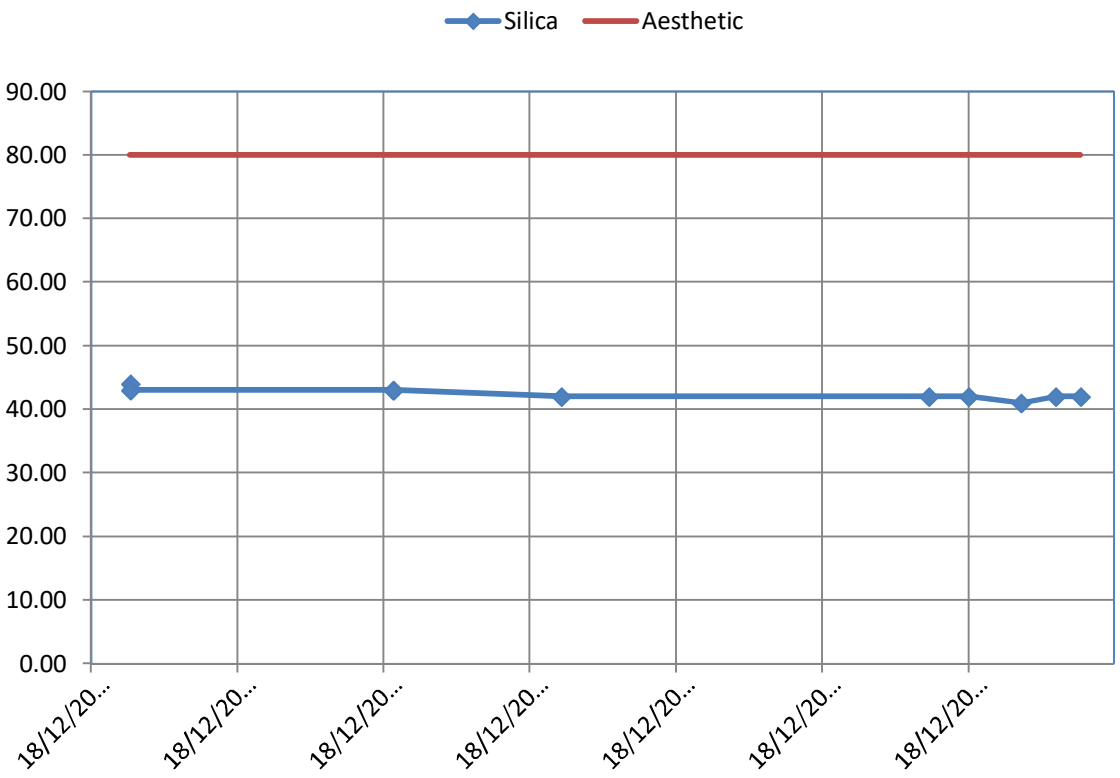


Figure 3.3 Quilpie - Silica

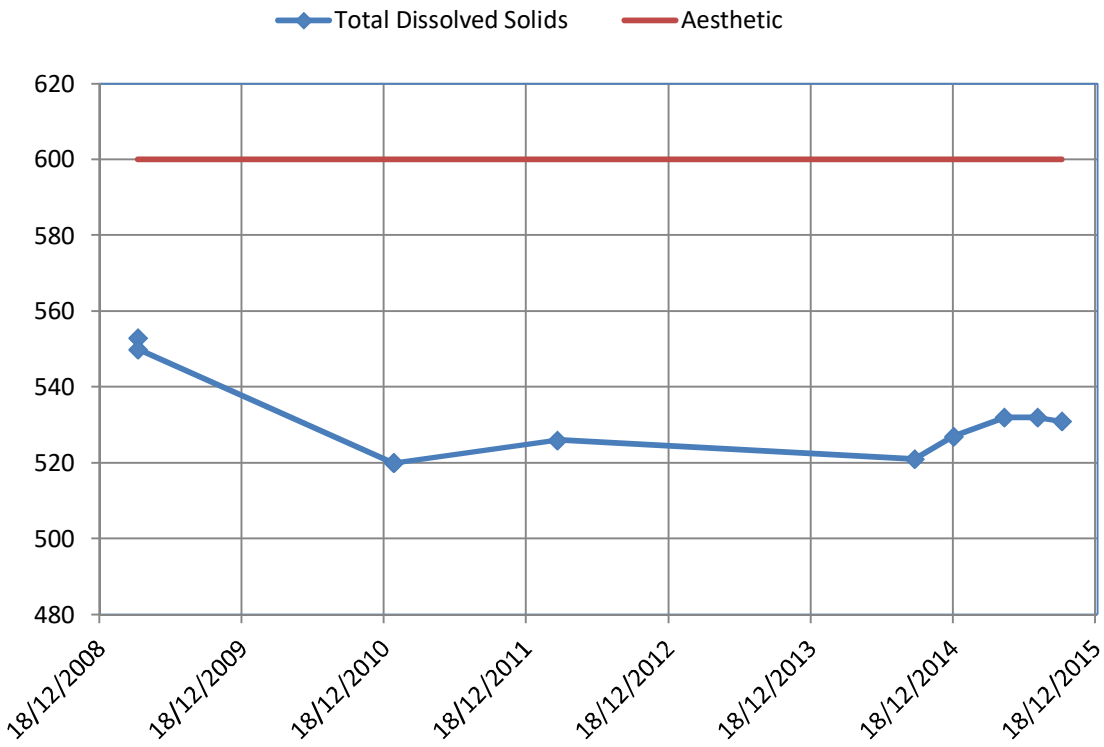


Figure 3.4 Quilpie - Total Dissolved Solids

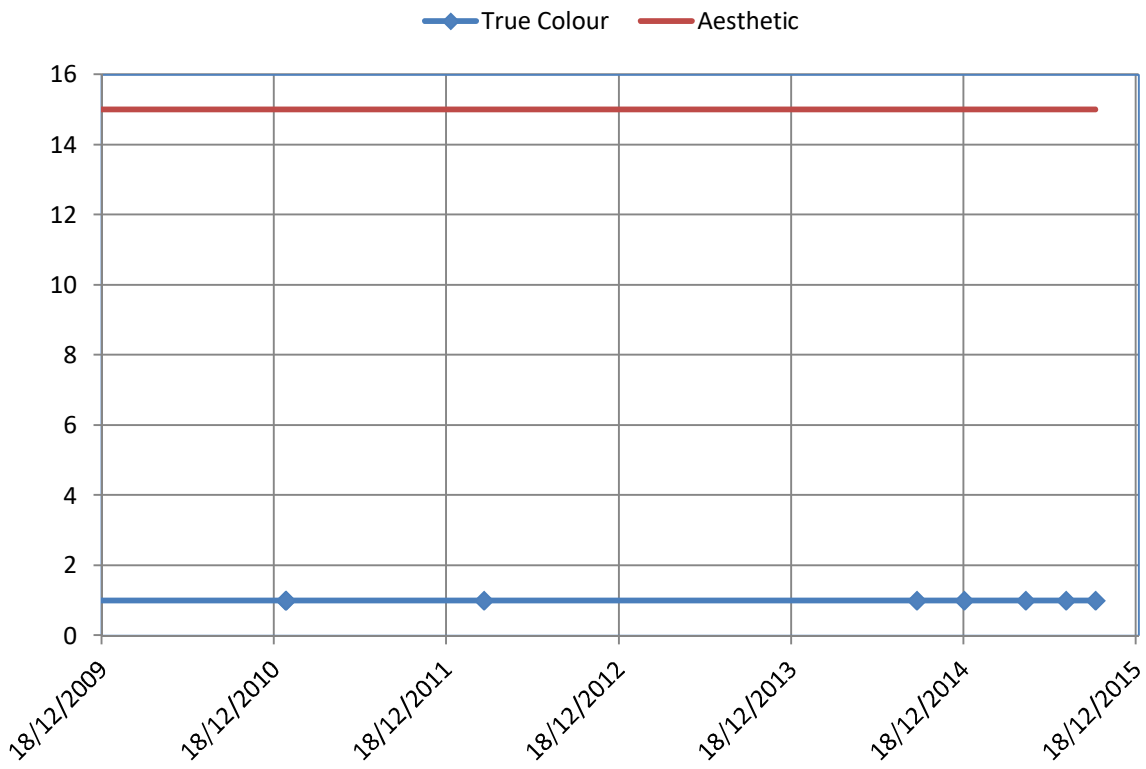


Figure 3.5 Quilpie – True Colour

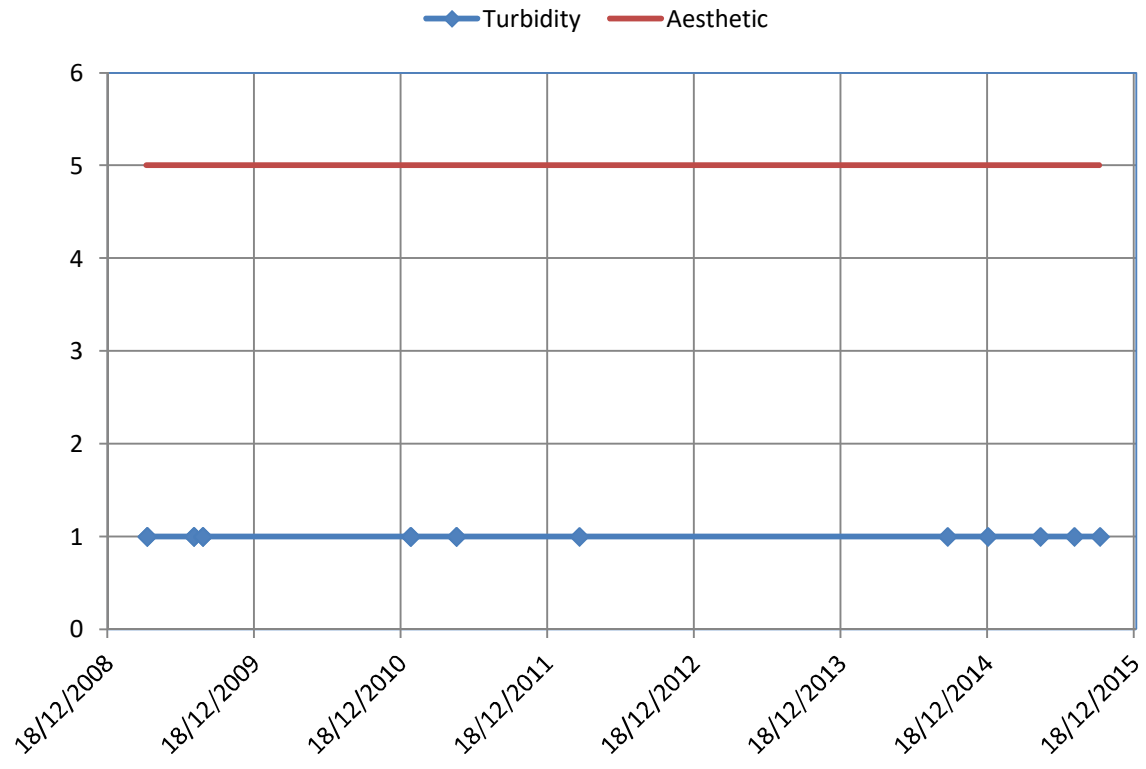


Figure 3.6 Quilpie - Turbidity

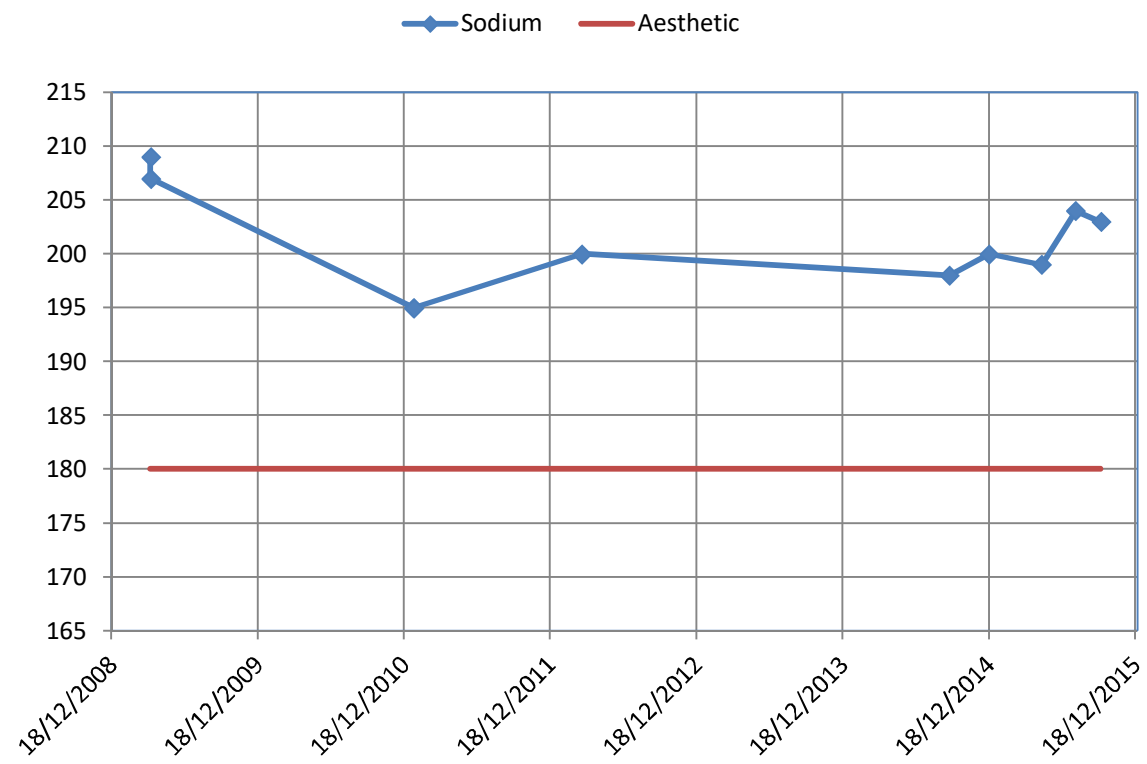


Figure 3.7 Quilpie - Sodium

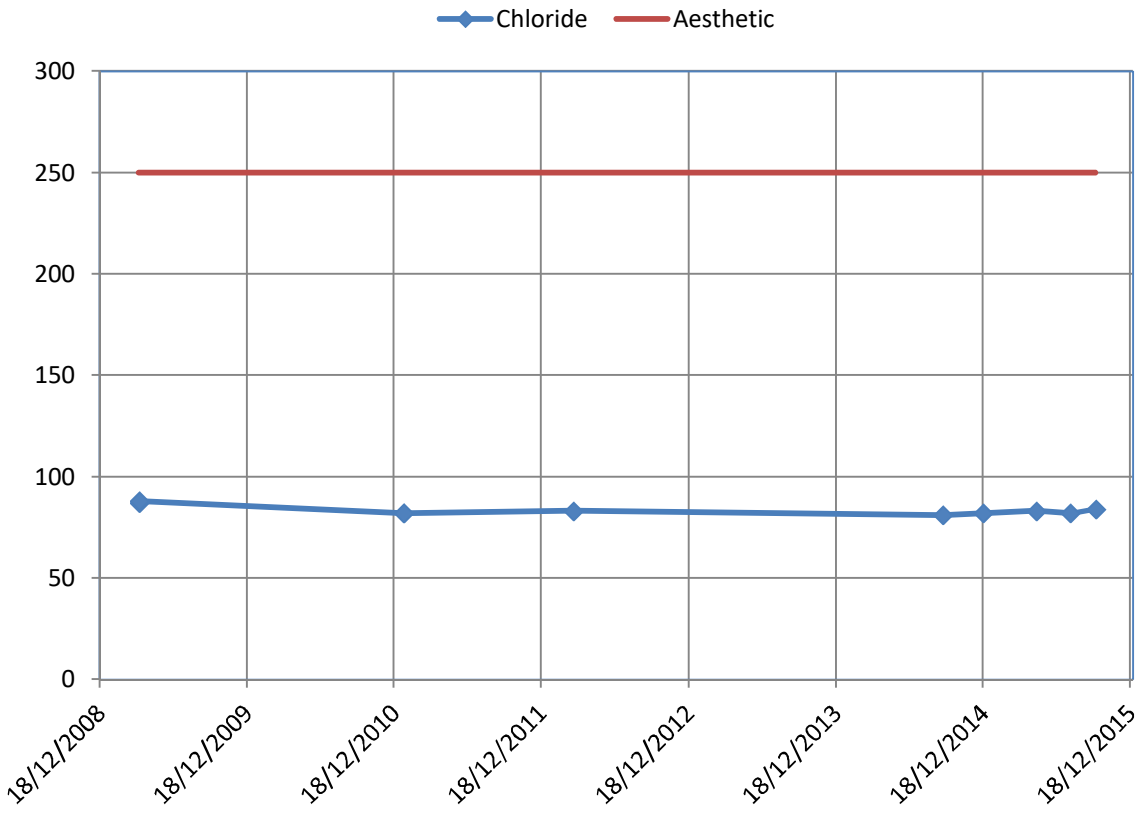


Figure 3.8 Quilpie - Chloride

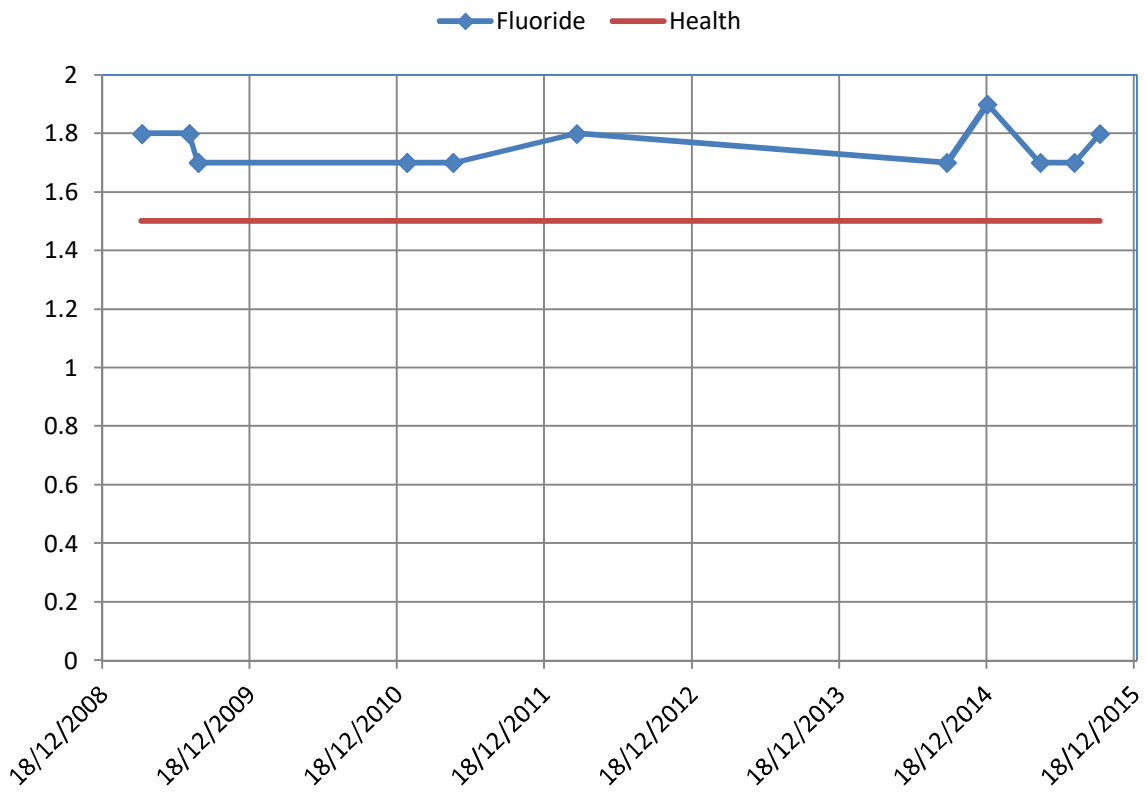


Figure 3.9 Quilpie - Fluoride

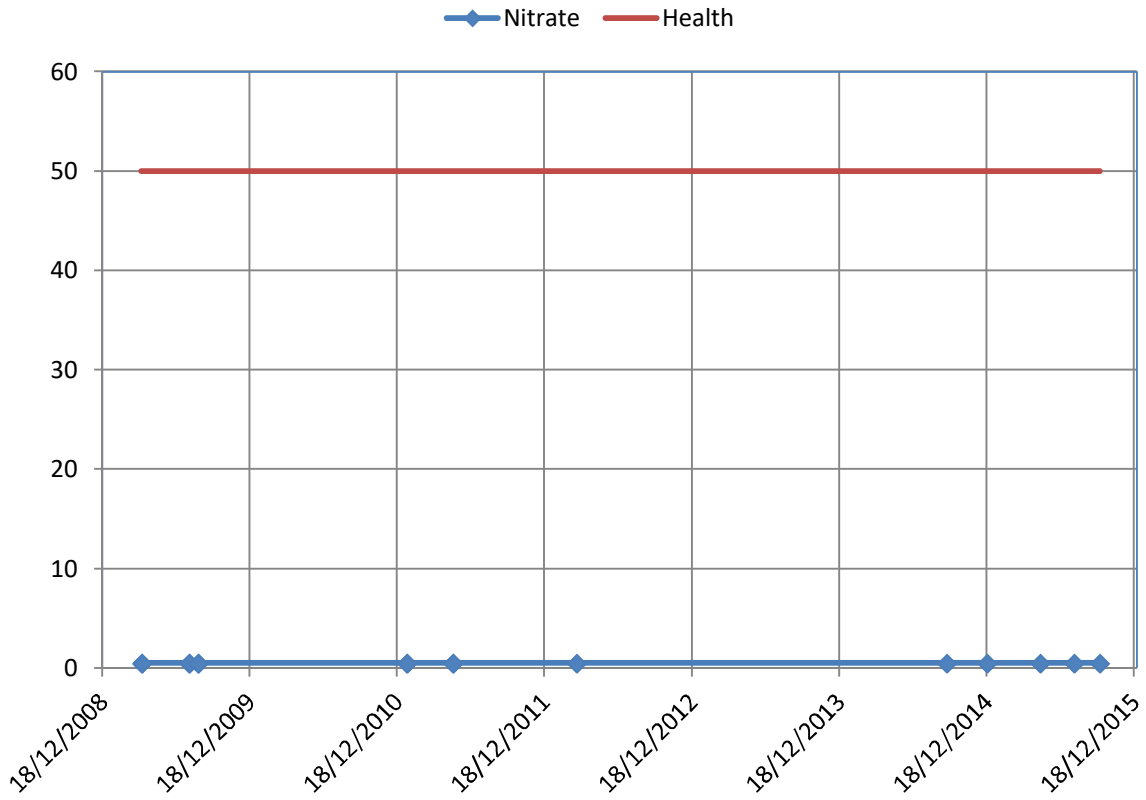


Figure 3.10 Quilpie – Nitrate

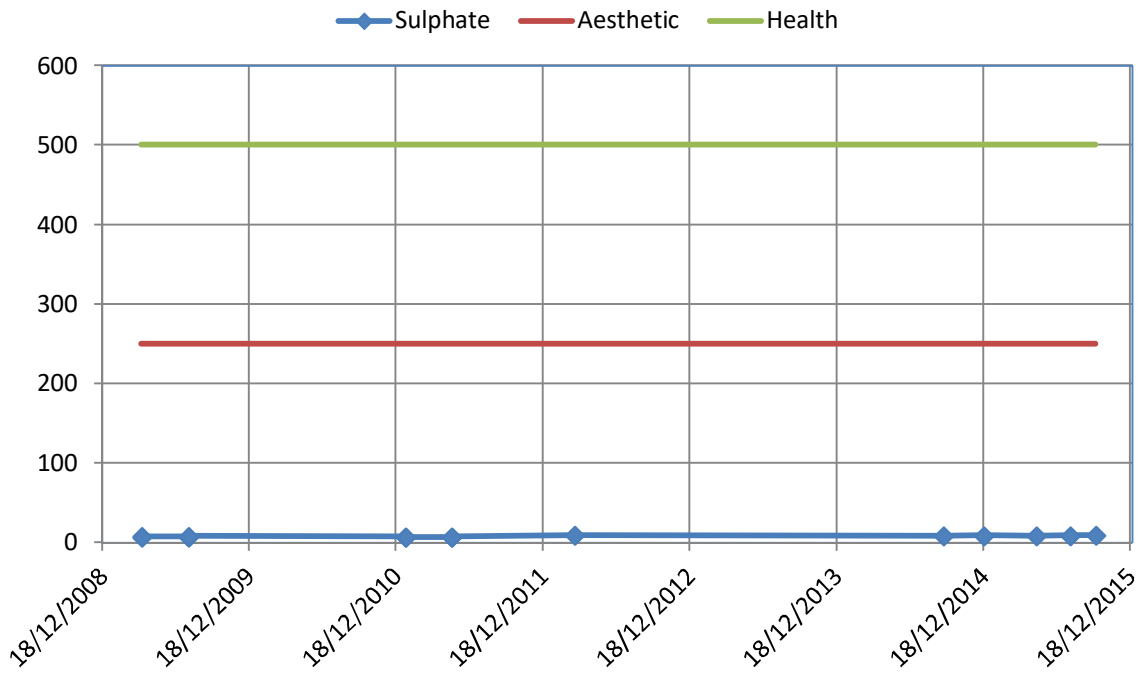


Figure 3.11 Quilpie - Sulphate

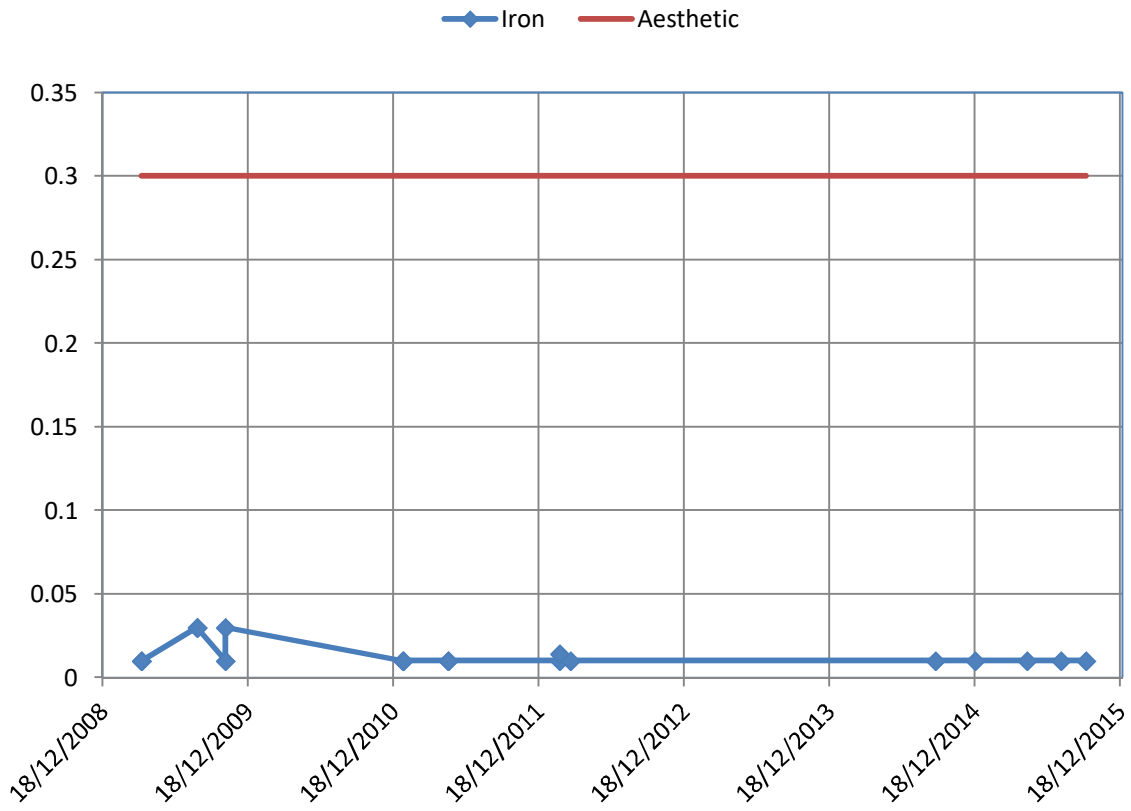


Figure 3.12 Quilpie - Iron

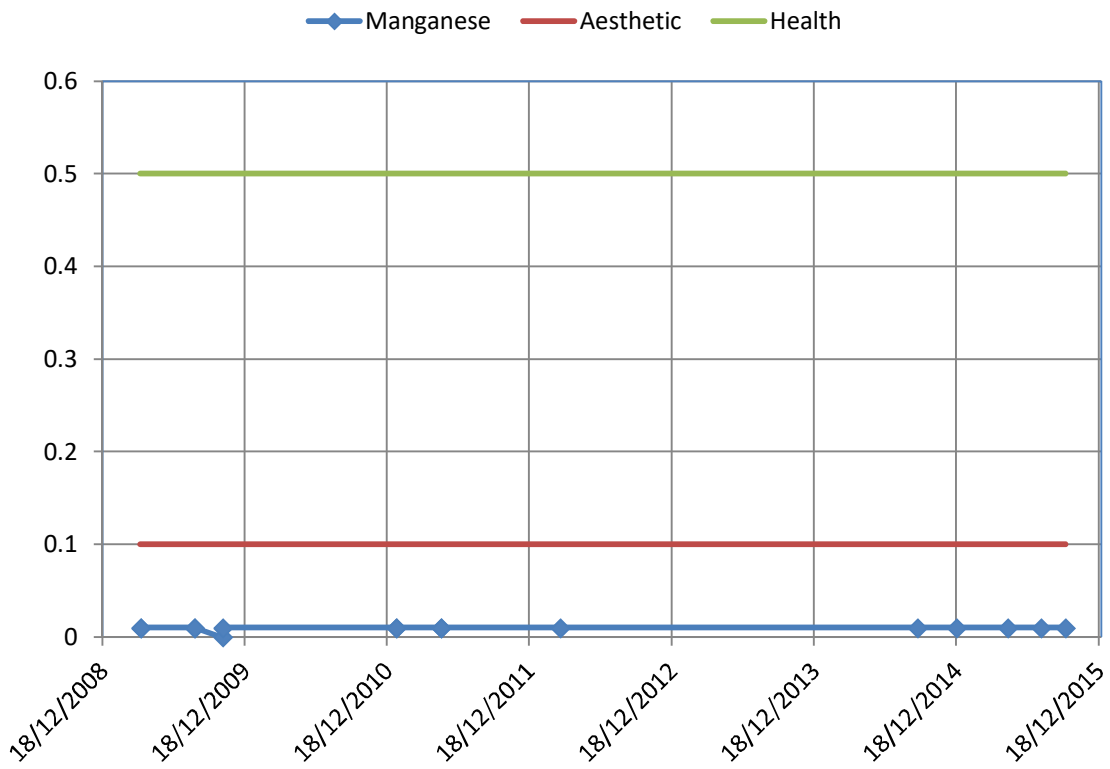


Figure 3.13 Quilpie - Manganese

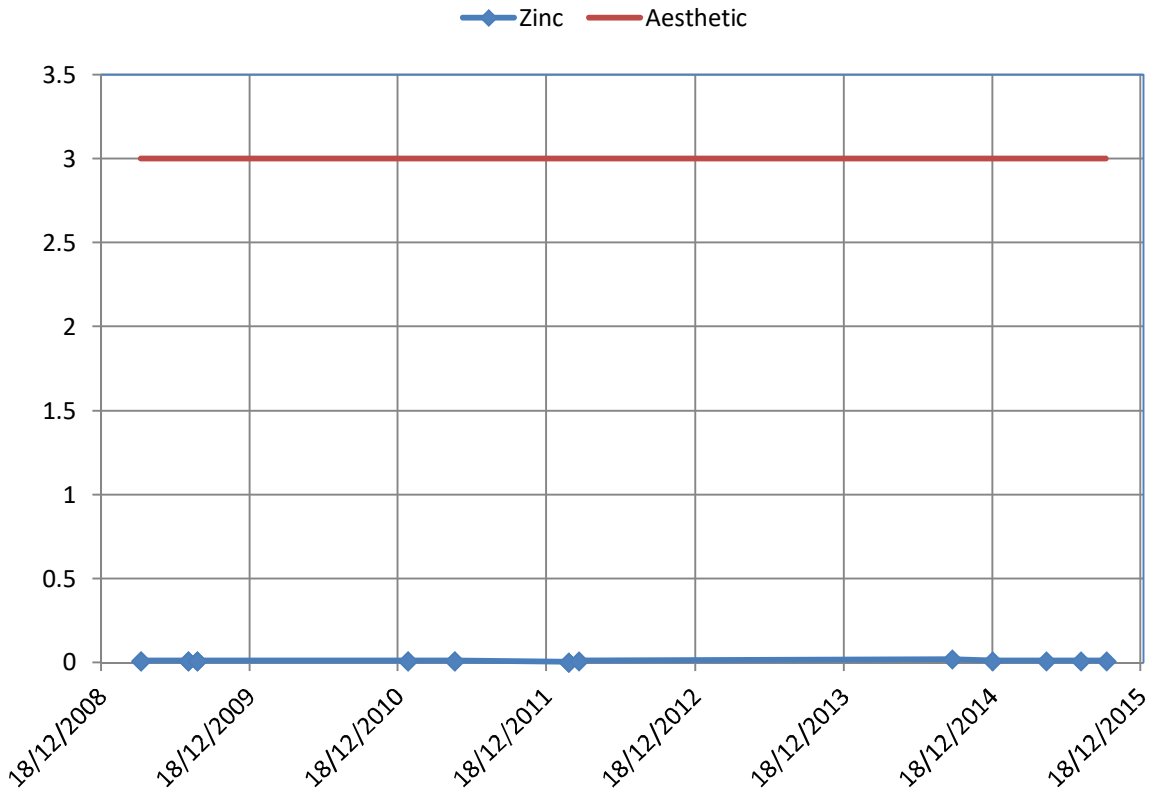


Figure 3.14 Quilpie - Zinc

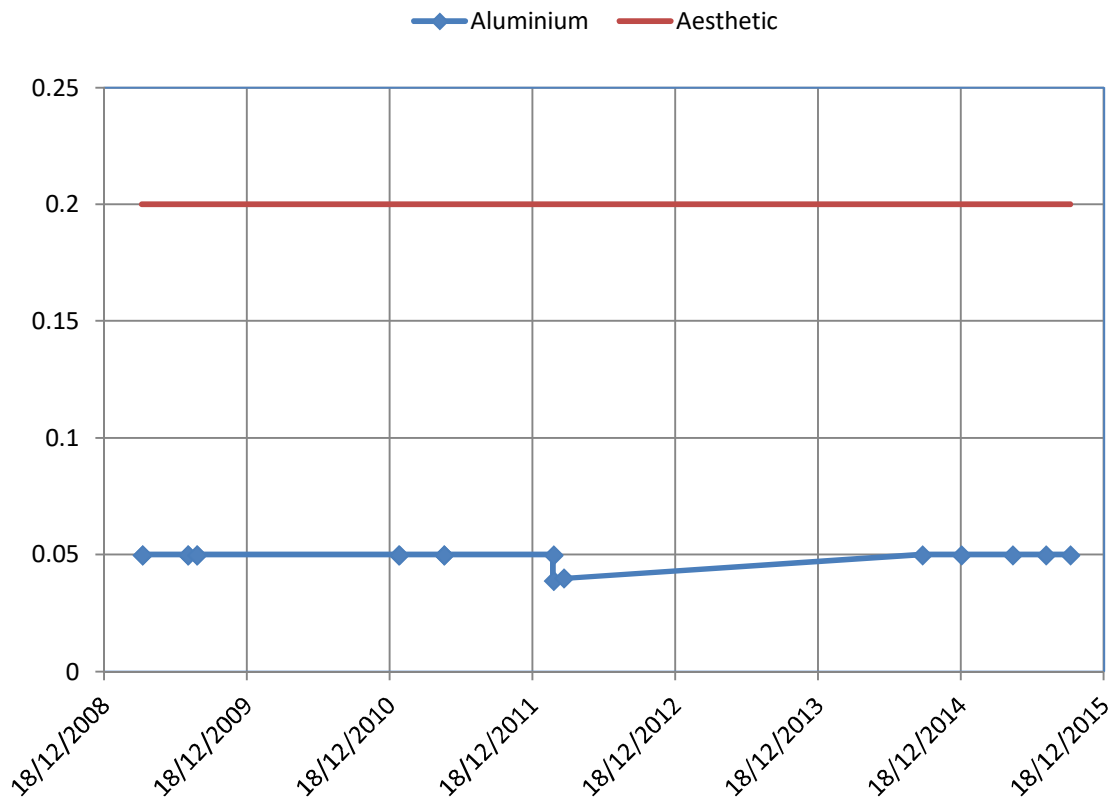


Figure 3.15 Quilpie – Aluminium

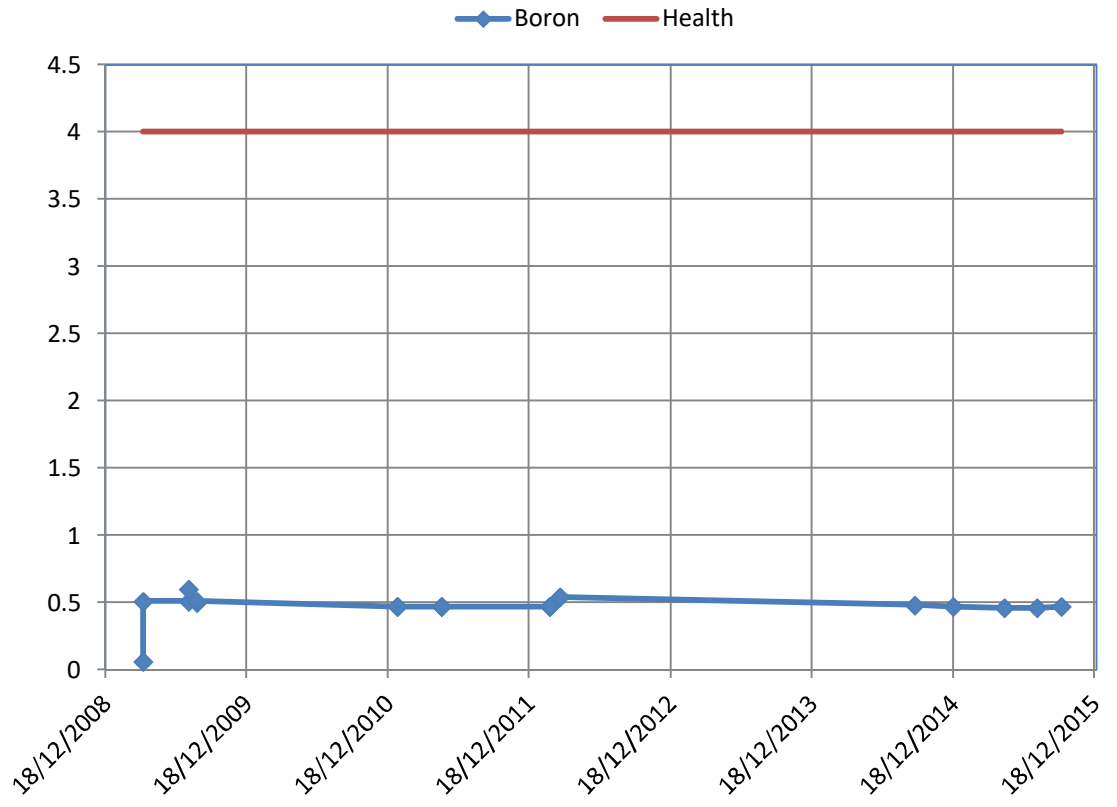


Figure 3.16 Quilpie - Boron

3.1.1 (b) Interpretation

Table 3.1 above shows aesthetic guideline value exceedances[2] for pH and Sodium, and health guideline value exceedances for Fluoride in the reticulated water.

The following aesthetic characteristics were detected (highlighted show exceedances):

- **pH**
- Silica
- Total Dissolved Solids
- Colour
- Turbidity
- **Sodium**
- Chloride
- Aluminium

The following health characteristics were detected (highlighted shows exceedances):

- **Fluoride**
- Nitrate
- Boron

Figure 3.1 provides a trend for the analysis of pH; there are nine exceedances. A maximum value of 8.6, average value of 8.5 and a 95th percentile value of 8.6 have been determined. The aesthetic guideline value is ≥6.5 & ≤ 8.5. For pH no health based guideline value is considered necessary. Only two samples have a value of ≥6.5 & ≤ 8.5 which would be regarded as a good quality drinking water. The remainder fall into increasing taste and scaling problems (>8.5).

Figure 3.7 provides a trend for the analysis of Sodium; there are six exceedances. The aesthetic guideline value is 180 mg/l. For Sodium no health based guideline is considered necessary. A maximum value of 209 mg/l, average value of 202.2 mg/l and a 95th percentile of 208.5 mg/l have been determined. Sodium values >180 mg/l cause taste issues.

Figure 3.9 provides a trend for the analysis of Fluoride; there are twelve exceedances. The health guideline value is 1.5 mg/l. A maximum value of 1.80 mg/l, average value of 1.75 mg/l and a 95th percentile of 1.8 mg/l have been determined. Fluoride values > 1.5 mg/l can cause dental fluorosis. All samples analysed measured > 1.5 mg/l.

Of all samples analysed for E. coli there have been zero E. coli colonies detected.

3.1.2 Catchment Characteristics

Quilpie is located in the Channel Country of South West Queensland and is 67,482 square kilometres in area. The main ranges in the Quilpie Shire are the Grey, McGregor and Willies Ranges. The Willies range forms the catchment boundary of the Quilpie and Paroo Rivers. The Grey Range separates the Cooper Creek catchment from the Bulloo River. Within the Cooper Creek catchment the McGregor Range divides the catchment, while ranges on the western side of the Cooper Creek at Durham Downs and in the vicinity of Nappamerrie form the boundaries of the limited catchment of Lake Pure. The Bulloo River, a major drainage system, has its source in the Gowan Ranges north of Adavale. The Bulloo River also has a well-developed flood plain.

The average annual rainfall for Quilpie is 349.2mm with the majority of the rain falling between late November and late March[3]. The mean maximum temperature is 29.2°C although temperatures have exceeded the 45°C mark during the summer months. Quilpie has a current population of 600 permanent residents and has a current demand of 1.20 Ml/day. Due to its geographical location the town of Quilpie does not flood

[2] As per the Australian Drinking Water Guidelines (2011)

Quilpie Shire economy is based on the grazing and mining industries. The region consists of one of the largest opal boulder deposits in the world along with extensive gas and oil deposits. Road infrastructure construction and maintenance also contribute significantly to provide a stable employment base for the area.

The Great Artesian Basin (GAB) covers approximately one-fifth of the Australian continent and contains 8.7 x 106 GL of groundwater in the Jurassic sandstone aquifers. It comprises the Eromanga, Surat and Carpentaria sedimentary basins and parts of the Bowen and Galilee Basins. The GAB is the largest groundwater and artesian basin in the world. The basin is located under mostly arid and semi-arid landscapes to the west of the Great Dividing Range. The GAB supports a wide array of activities such as pastoral, agriculture and mining as well as the rural communities, cultural and tourism activities. The GAB is recharged by rainfall and stream flow infiltrating into the exposed sandstone on the edges of the basin.

The Eromanga basin consists of a conformable, almost horizontal bedded sequence of Early Jurassic to Late Cretaceous sedimentary rocks. The sequence comprises continental quartz-rich sandstone, siltstone and mudstone units formed within a shallow marine setting during the Early Cretaceous. These rocks conformably overlie sandstone-dominated formations deposited in lacustrine and fluvial environments of the Late Cretaceous (Habermehl, 1980).

The most significant groundwater systems in the GAB occur in the Late Jurassic to Early Cretaceous aquifer sequence, collectively termed the Cadna-owie–Hooray Aquifer. The Cadna-owie–Hooray Aquifer extends across the entire GAB, although its thickness and hydraulic properties may vary. This important groundwater-bearing unit is a composite of several aquifers that hydraulically interconnect over basement highs, and merge in the western Eromanga Basin (Radke et al., 2000).

Currently there are two bores in Quilpie which both tap the Hooray Sandstone Aquifer, town Bore No 1 (RN 390) and Town Bore No 2 (RN 116266). Figure 3.17 shows the recharge, discharge and flow of the GAB. Town Bore No. 1 (back-up bore) is located on Chipu Street and Town Bore No. 2 is located on Gyrica Street. Bores 1 and 2 are 900m and 966m deep respectively. The bores currently yield 47 l/s and 19 l/s respectively. Both bores are free flowing with high pressures being adjusted by clay pressure valves. Bore 1 was drilled in 1933 and Bore No. 2 was drilled in 2009. All bore headworks are sealed against the possibility of deliberate contamination. Appendix B Figure GBA-2012-081 shows the bore locations and water reticulation layout on an aerial photo of the town. Appendix C contains a copy of the bore card reports obtained from Department of Environmental & Resource Management.

Quilpie sewerage collection scheme is comprised of a sewage treatment plant consisting of an Imhoff tank, baffle type clarifier, three sludge drying beds and two oxidation lagoons. Effluent is discharged to Pinkilla Creek. The sewerage reticulation system has a total pipeline length of 9,555m. New sub-divisions constructed during the last ten years have PVC mains that are in good condition.

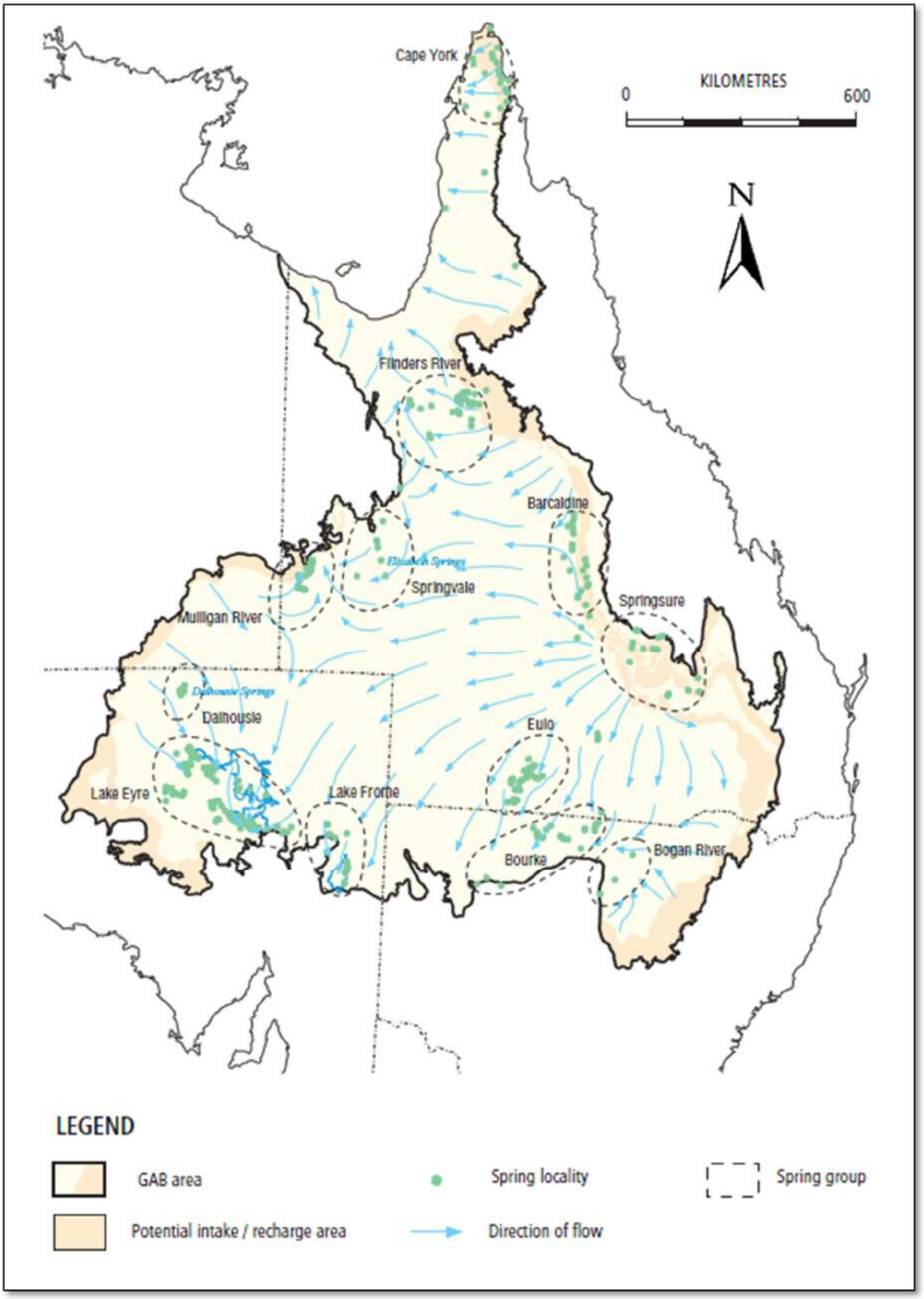


Figure 3.17 GAB recharge, discharge and flow

3.1.3 Hazard Identification

The hazards and hazardous events and their sources that adversely affect water quality are documented in Table 3.3 below and include those affecting:

- Catchment
- Sourcing infrastructure
- Distribution system

3.1.3 (a) Identifying and documenting hazards and hazardous events

The hazards and hazardous events were identified using data contained in the plan and following site visits and a risk assessment workshop which was conducted on 9th and 10th of August 2012;

- Section 2.1 Quilpie Water Supply Scheme
- Section 3.1.1 Water Quality Information
- Section 3.1.2 Catchment Characteristics

Table 3.3 Quilpie Hazard Identification, Risk Assessment and Uncertainty

Scheme Component / Sub-component	Hazardous Event	Hazard	Maximum risk			Existing Preventive Measures / Barriers.	Residual risk			Uncertainty	Comments/ Proposed Further Risk Reduction Actions
			Consequence	Likelihood	Risk level		Consequence	Likelihood	Risk level		
Bore	Sewage system discharges, agricultural run-off	Bacteria	Catastrophic	Rare	Medium (6)	Operations and Maintenance Procedure	Moderate	Rare	Low (3)	Reliable	**Q2**. Operational & Maintenance Procedure.
	Hazard that arises from the natural geological processes in the aquifer.	Sodium	Insignificant	Possible	Low (3)	Nil	Insignificant	Possible	Low (3)	Estimate	Acceptable risk, continue to monitor for exceedances
		pH	Insignificant	Possible	Low (3)	Nil	Insignificant	Possible	Low (3)	Estimate	
		Fluoride	Moderate	Almost Certain	High (15)	Fluoride Risk Facts Sheet	Moderate	Unlikely	Medium (6)	Estimate	**Q1** Distribute fact sheet to the community informing them of potential health risks.
Sourcing Infrastructure	Maintenance and repair of water main	Bacteria	Catastrophic	Possible	High (15)	Operations and Maintenance Procedure	Catastrophic	Unlikely	High (10)	Uncertain	**Q4.** Develop Safe Work Method Statement or Job Safety Analysis document for Operations staff performing maintenance and repairs.
	Accidental or intentional contamination	Harmful substances (not identified)	Catastrophic	Rare	Medium (6)	Chain-link fencing and locked gates	Moderate	Rare	Low (3)	Reliable	**Q2**. Operational & Maintenance Procedure.
	Flood Event	Loss of infrastructure	Catastrophic	Rare	Medium (6)	Town does not flood. Sealed bore headworks	Moderate	Rare	Low (3)	Uncertain	
Treatment Plant	Reticulated Water Untreated										
Disinfection Process	Reticulated Water Not Disinfected										
Distribution System	Reticulation maintenance and repair	Bacteria	Catastrophic	Possible	High (15)	Operations and Maintenance Procedure	Catastrophic	Unlikely	High (10)	Uncertain	Q4. Develop Safe Work Method Statement or Job Safety Analysis document for Operations staff performing maintenance and repairs.
Whole of System	Flights carrying water samples to be analysed delayed/cancelled	Logistics	Insignificant	Possible	Low (3)	Collect new samples and schedule testing for next available flight	Insignificant	Rare	Low (1)	Confident	**Q2**. Operational & Maintenance Procedure.
Whole of System	Poor information management	Contamination	Catastrophic	Possible	High (15)	Water quality data analysis and management, routine operations and maintenance of scheme	Catastrophic	Possible	High (15)	Uncertain	**Q3** Develop information management plan

3.1.3 (b) Hazard identification (and risk assessment) team

The personnel responsible for the hazard identification and risk assessment process, their roles and responsibilities are detailed in Table 3.4 below.

Table 3.4 Hazard Identification and Risk Assessment Team

Typical job title for key personnel	What role did each person play on the team?	What expertise and system knowledge did the person bring?
Engineer (consultant)	Management of DWQMP Process, Risk Assessment Procedure & Chairing Risk Assessment Workshop	High level knowledge, risk assessment and general engineering experience in the management of the systems
Engineer (Internal / External)	Author, Risk Assessment, Risk Assessment Workshop	Detailed knowledge of the system, water risk assessment
Water Engineer (Internal / External)	Risk Assessment Workshop	Detailed knowledge of drinking water quality management, outside perspective, risk assessment
Water Officer	Risk Assessment Workshop	Detailed knowledge of individual schemes, risk assessment

3.2 Eromanga Water Quality and Catchment Characteristics

In 2014 Eromanga's water supply system underwent significant changes, including the implementation of an alternate water source water and the installation of a reverse osmosis water treatment plant. Eromanga's water supply source was converted from artesian water supply to four shallow sub-artesian bores this decision was made due to the overall superior water quality of the sub artesian water. A water treatment plant was implemented and water storage tanks were also installed as part of the water supply upgrade, the treatment system installed included a Reverse osmosis filtration system with a capacity of 2l/second, an automated chlorine dosing system, raw water and treated water storage tanks and a pump systems to distribute clean water throughout the distribution system.

3.2.1 Water Quality Information

Water quality information for Eromanga includes the following:

a) Summary
b) Interpretation

3.2.2 (a) Summary

Recent water testing of the Eromanga water supply have indicated that the water quality of the distribution system is excellent since the implementation of the water treatment plant and the conversion from sourcing water from the Artesian bore to sub-artesian bores located in Eromanga. Water testing within the distribution system prior to the implementation of the water treatment plant and alternate water source indicated concentrations of characteristics such as Fluoride, Total dissolved Solids, E.coli and Sodium above ADWG. The improvements made to the system have resulted in all tested characteristics to fall well within the ADWG with a drastic reduction in Total Dissolved Solids and Turbidity levels consistently recording 1 NTU indicating much improved water purity.

Table 3.5 below summarises the available reticulated water quality for the Eromanga water supply scheme, post system upgrade.

Table 3.5 Eromanga Reticulated Water

Eromanga Water Supply Water Supply		Start Date	09/09/2014		End Date:	23/09/2015				
Characteristic	Units	No. of Samples	Summary of Results					Guideline Value		
			Maximum Value	Average Value	Minimum Value	Std Dev	95th Percentile	Health	Exceedances	Aesthetic	Exceedances
Conductivity	uS/cm	9	636.000	455.444	324.000	116.211	632.000				
pH		9	7.930	7.566	7.240	0.233	7.906			≥6.5 & ≤ 8.5	0
Total Hardness	mg/L as $CaCO_3$	9	73.000	48.111	20.000	16.326	71.000				
Temporary Hardness	mg/L as $CaCo_3$	9	53.000	37.222	20.000	9.601	50.200			200	0
Alkalinity	mg/L $CaCo_3$	9	53.000	37.556	23.000	9.032	50.200				
Residual Alkalinity	meq/L	9	0.100	0.011	0.000	0.031	0.060				
Silica	mg/L	9	24.000	19.000	12.000	4.522	24.000			80	0
Total Dissolved Ions	mg/L	9	344.000	251.889	176.000	64.115	340.800				
Total Dissolved Solids	mg/L	9	339.000	247.889	179.000	63.299	336.600			600	0
True Colour	Hazen	7	1.000	1.000	1.000	0.000	1.000			15	0
Turbidity	NTU	7	2.000	1.143	1.000	0.350	1.700			5	0
pH (Saturation)*		9	9.400	8.811	8.500	0.292	9.320				
Saturation Index		9	-0.700	-1.256	-2.100	0.497	-0.700				
Mole Ratio		9	3.600	3.167	2.600	0.306	3.560				
Sodium Absorption Ratio		9	5.400	4.267	3.100	0.759	5.280				
Figure of Merit		9	0.400	0.322	0.200	0.079	0.400				
Sodium	mg/L	9	91.000	67.000	50.000	16.931	90.600			180	0
Potassium	mg/L	9	1.500	1.100	0.700	0.279	1.420				
Calcium	mg/L	9	19.000	13.133	4.900	4.551	18.600				
Magnesium	mg/L	9	6.900	3.733	1.700	1.806	6.860				
Hydrogen	mg/L	9	0.000	0.000	0.000	0.000	0.000				
Bicarbonate	mg/L	9	64.000	45.667	28.000	10.954	60.800				
Carbonate	mg/L	9	0.300	0.122	0.000	0.103	0.300				
Hydroxide	mg/L	9	0.000	0.000	0.000	0.000	0.000				
Chloride	mg/L	9	120.000	89.222	66.000	23.389	120.000			250	0
Fluoride	mg/L	9	0.170	0.102	0.050	0.033	0.154	1.5	0		
Nitrate	mg/L	9	6.300	5.556	4.300	0.757	6.300	50	0		
Sulphate	mg/L	9	42.000	26.222	8.500	11.223	42.000	500	0	250	0
Iron	mg/L	8	0.030	0.018	0.010	0.008	0.030			0.3	0

Manganese	mg/L	8	0.020	0.011	0.010	0.003	0.017	0.5	0	0.1	0
Zinc	mg/L	9	0.080	0.039	0.010	0.019	0.068			3	0
Aluminium	mg/L	7	0.050	0.050	0.050	0.000	0.050			0.2	0
Boron	mg/L	9	0.210	0.200	0.180	0.008	0.210	4	0		
Copper	mg/L	7	0.030	0.030	0.030	0.000	0.030	2	0	1	0
E. coli		12	0.000	0.000	0.000	0.000	0.000	0	0		

Note: Please refer to Appendix I for E.Coli Sampling Data

Table 3.6 Eromanga water quality complaints

Year	No of Water Quality Complaints	Water Quality Complaints per 1000 Connections	Scheme	Main Reasons for Complaints	Likely Sources / Causes of Problems	Resolution of Problem
2015	0	0	Eromanga	Nil		
2014	0	0	Eromanga	Nil		

Figure 3.18 to Figure 3.31 below shows trends of the main characteristics contained in Table 3.1.

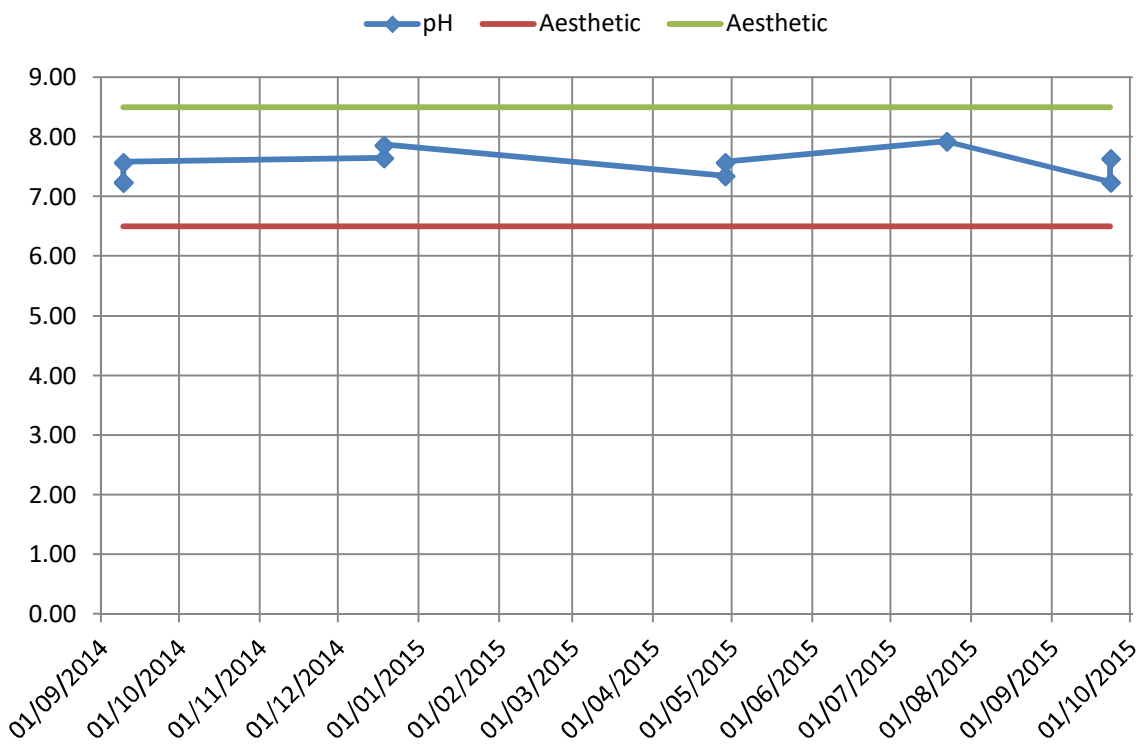


Figure 3.18 Eromanga pH at 23°C

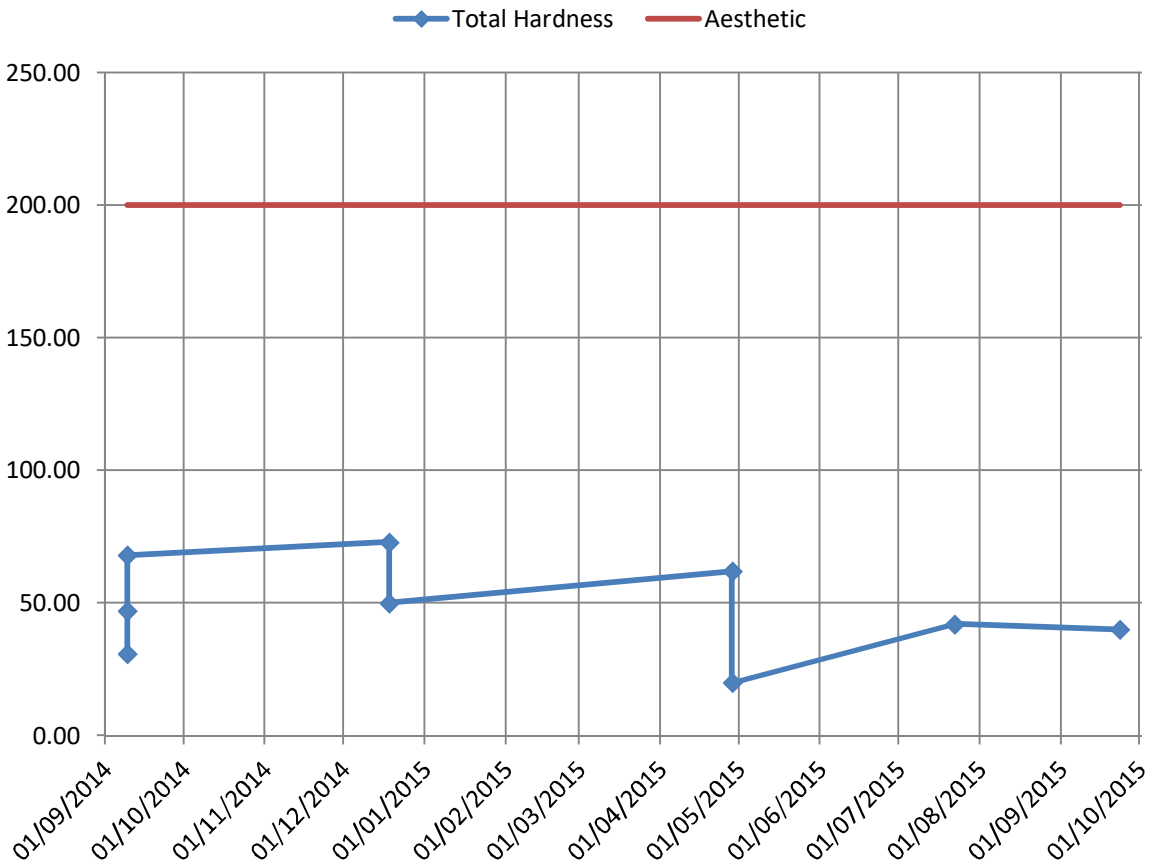


Figure 3.19 Eromanga Total Hardness

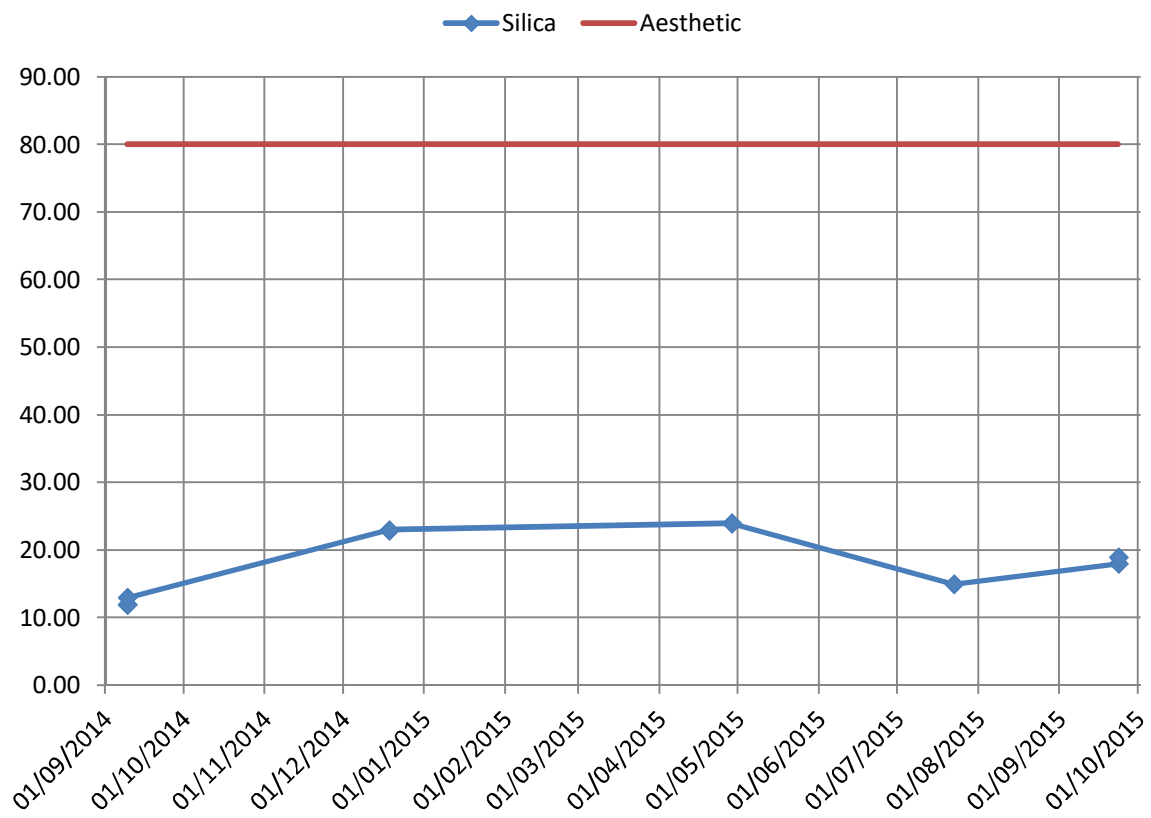


Figure 3.20 Eromanga Silica

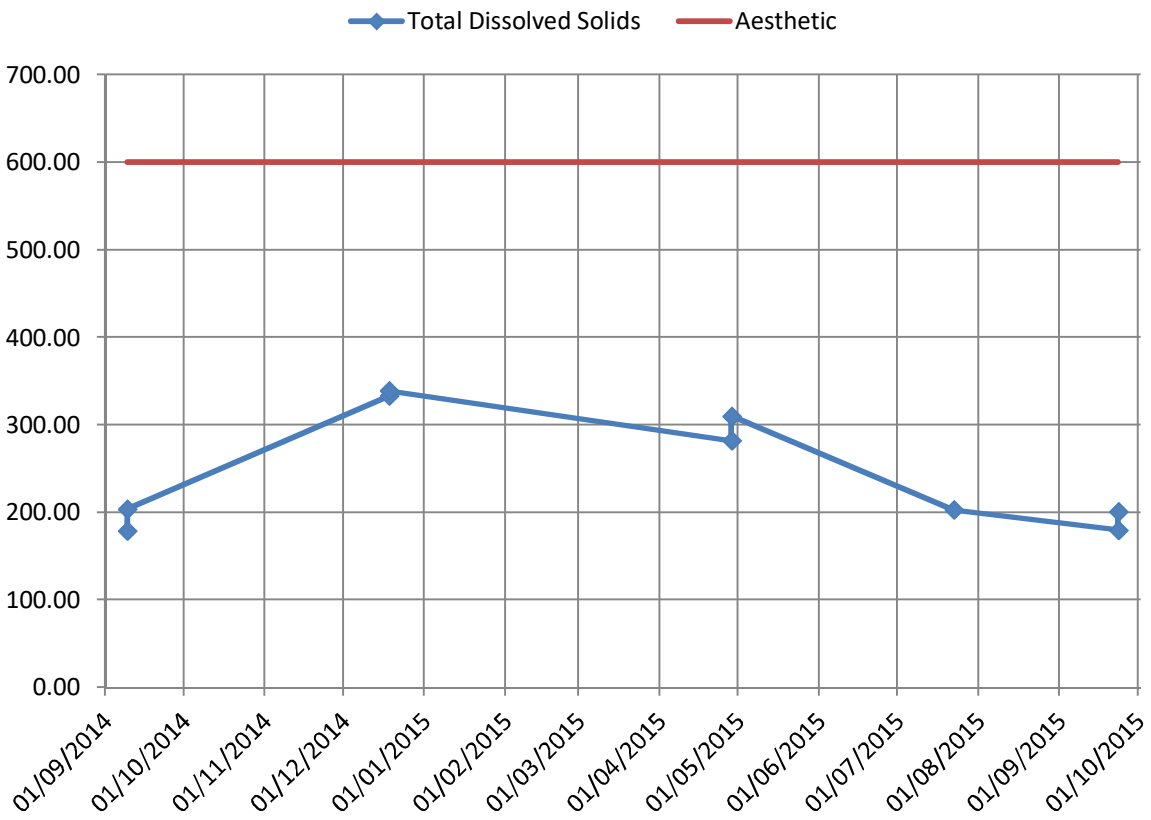


Figure 3.21 Eromanga Total Dissolved Solids

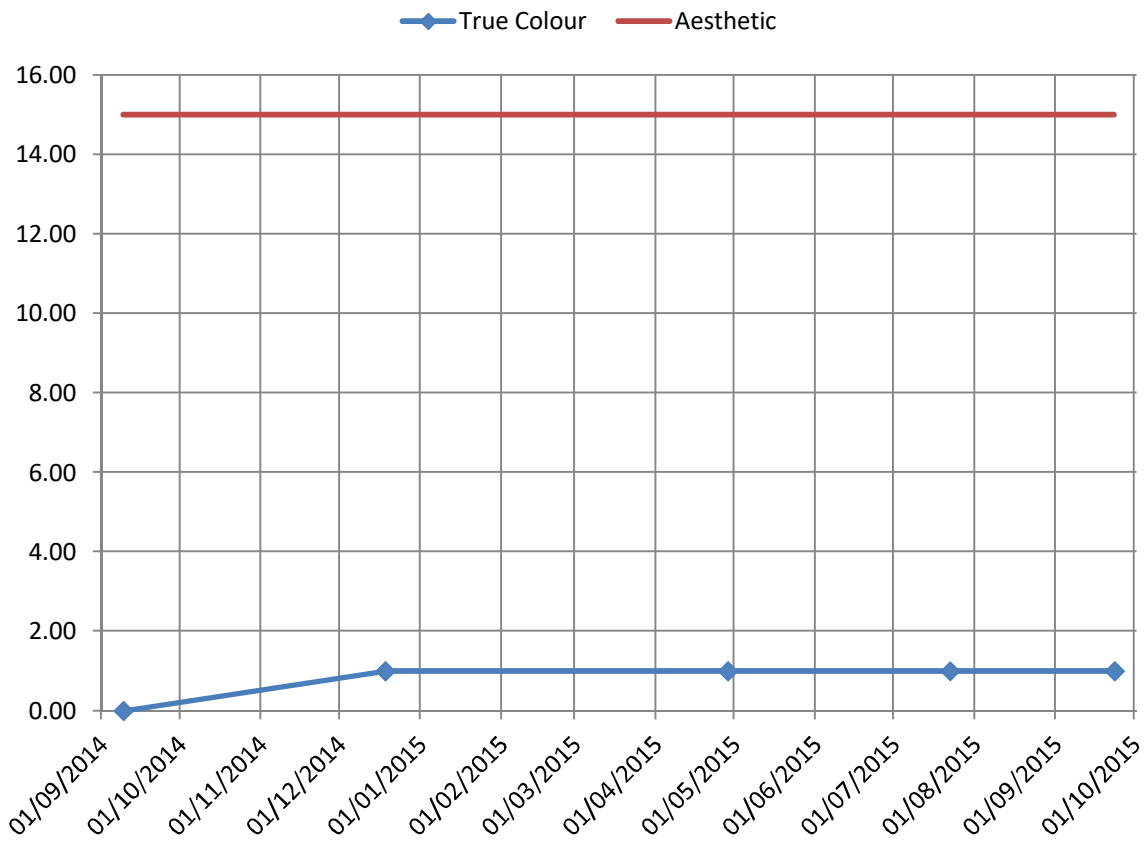


Figure 3.22 Eromanga True Colour

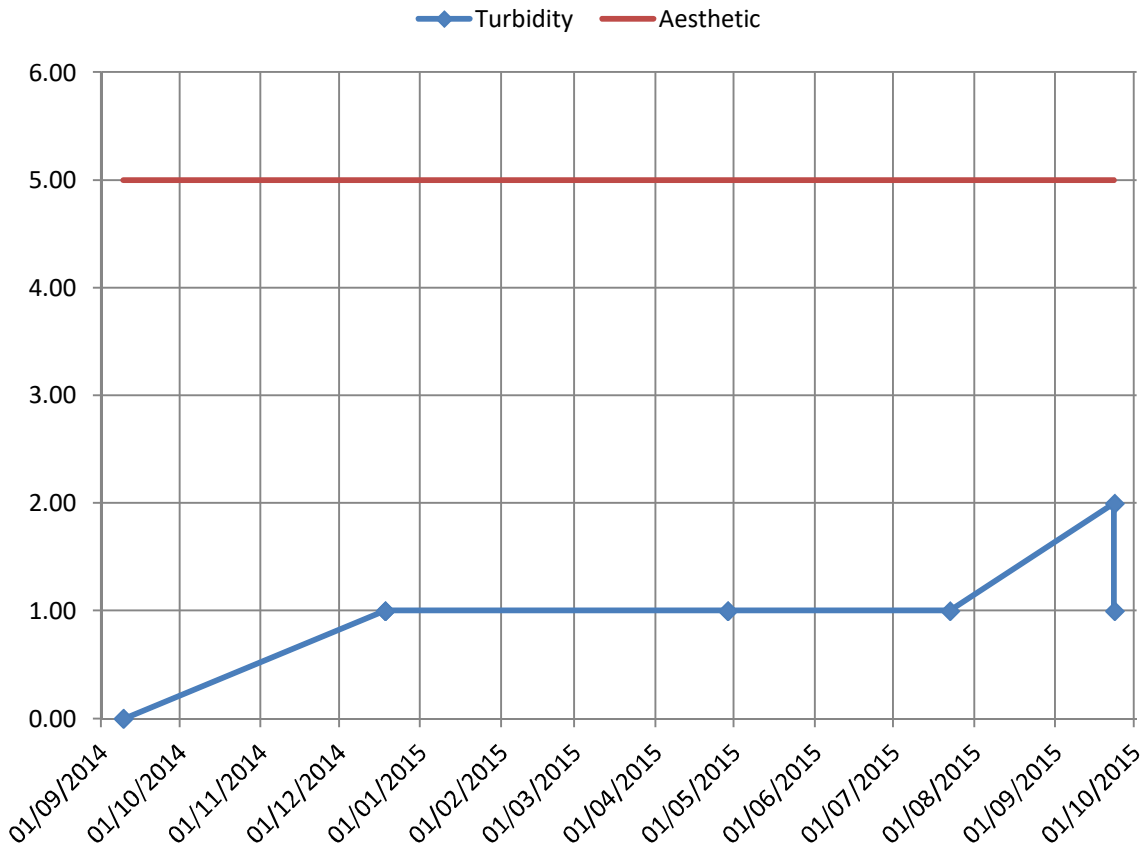


Figure 3.23 Eromanga Turbidity

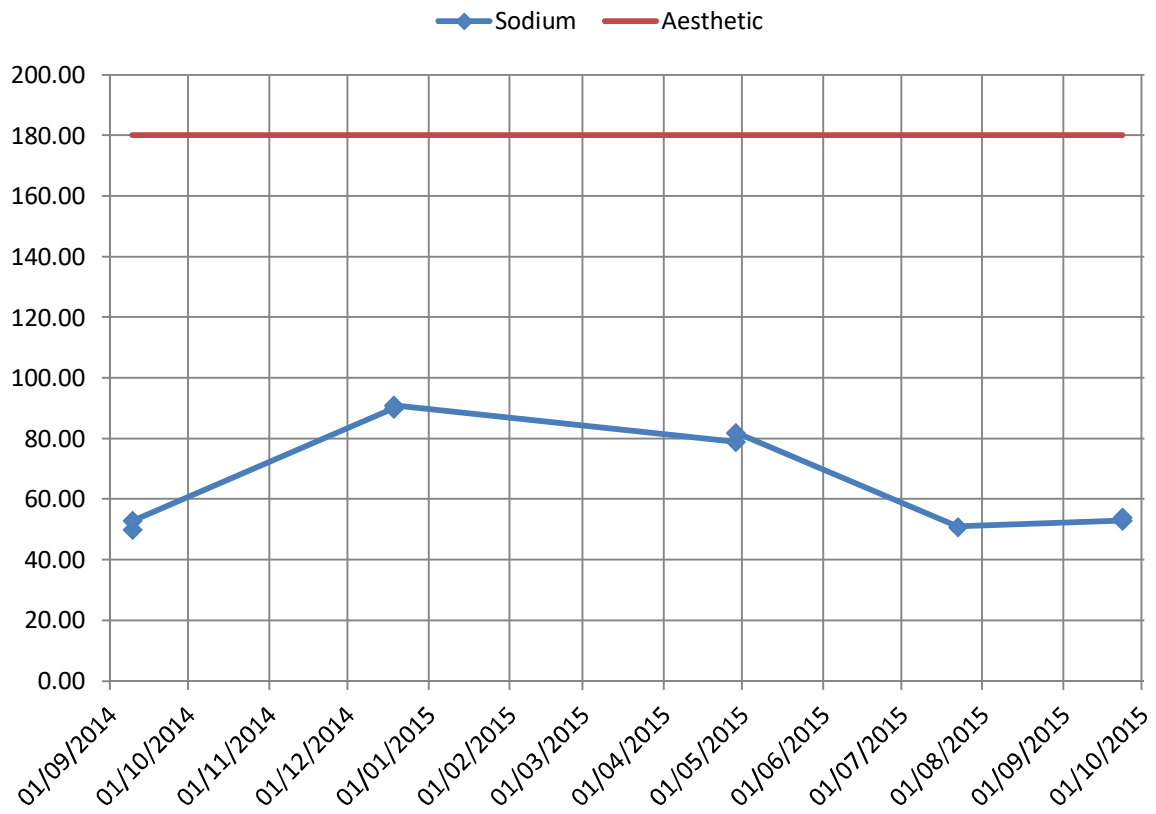


Figure 3.24 Eromanga Sodium

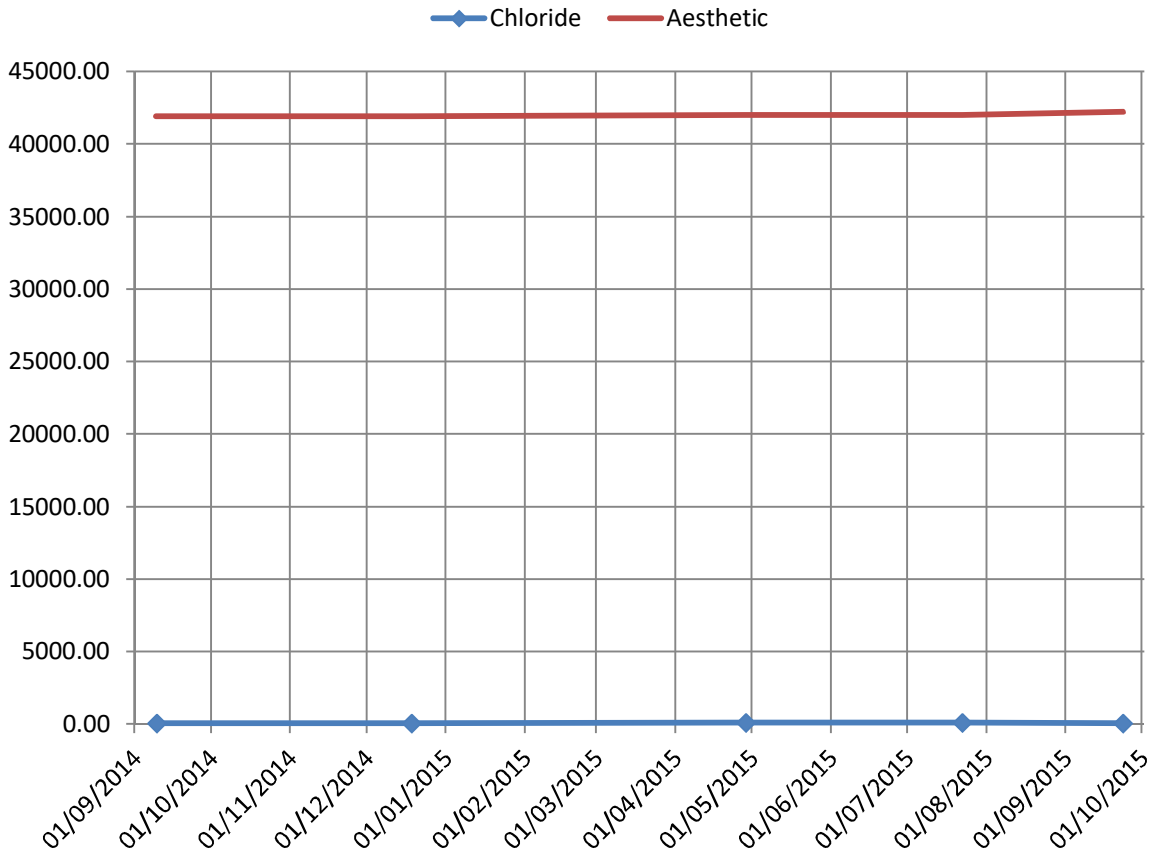


Figure 3.25 Eromanga Chloride

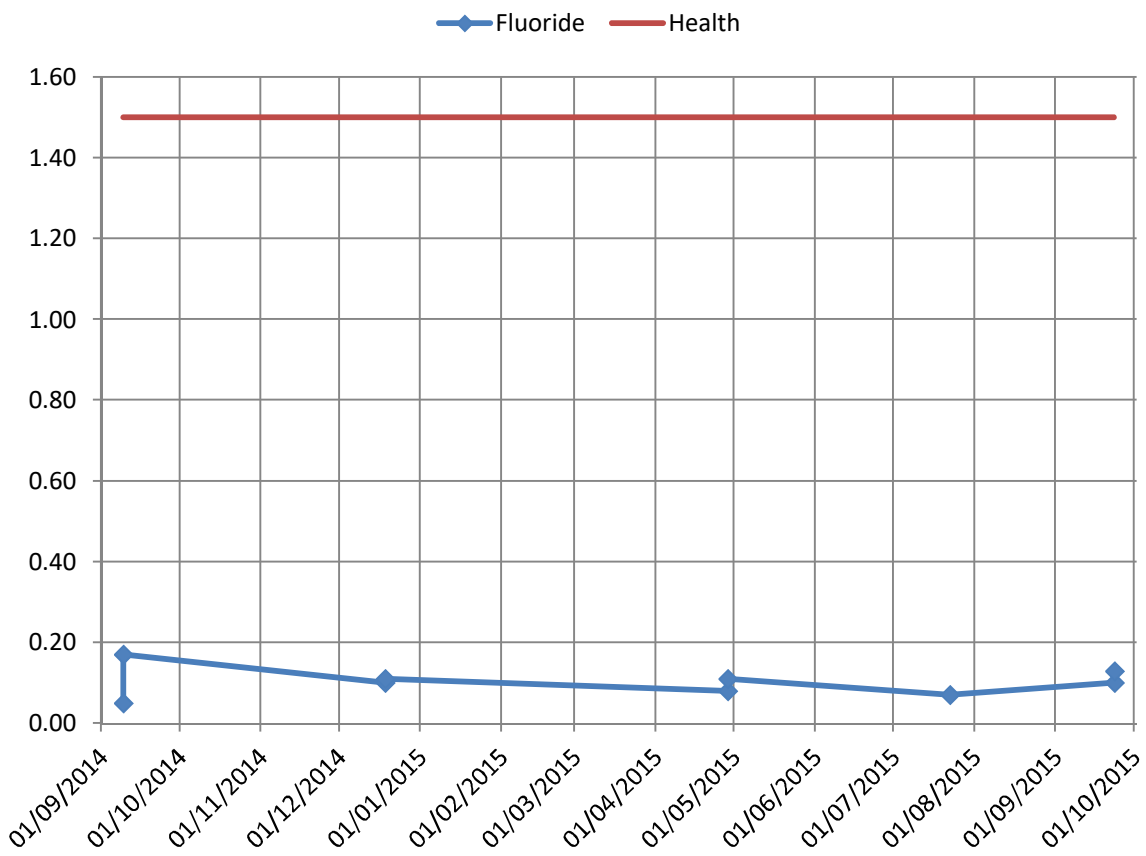


Figure 3.26 Eromanga Fluoride

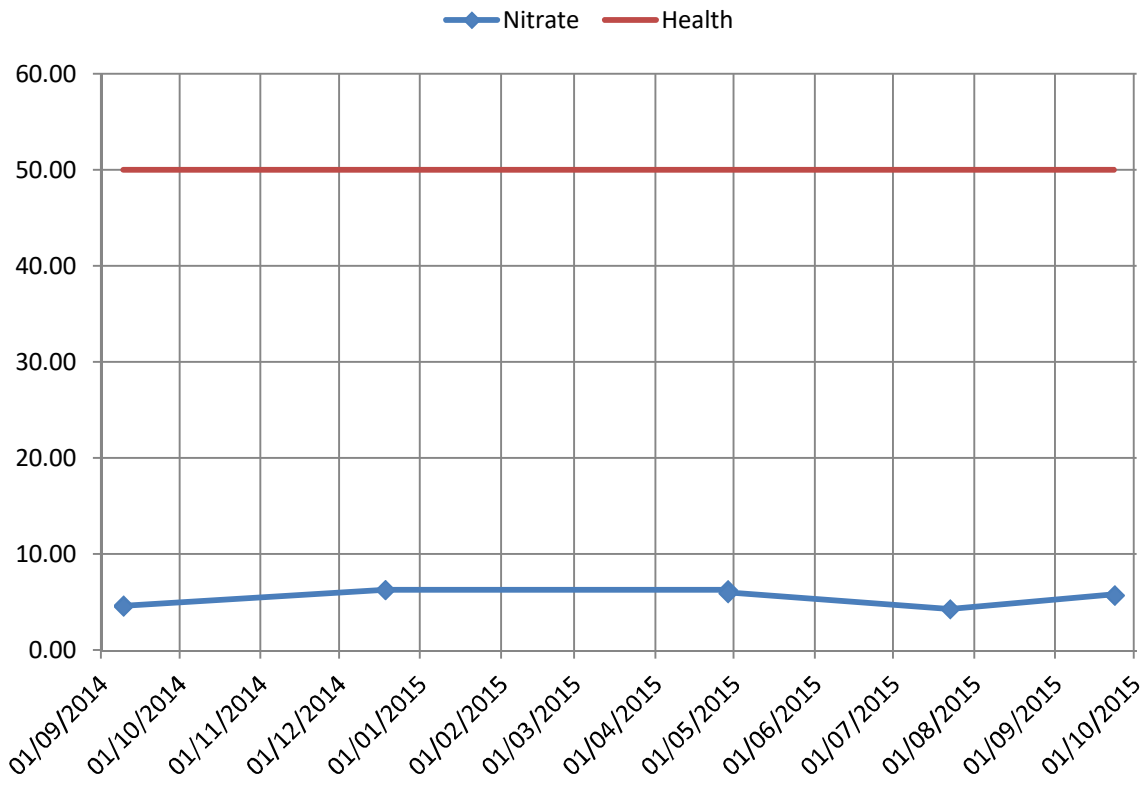


Figure 3.27 Eromanga Nitrate

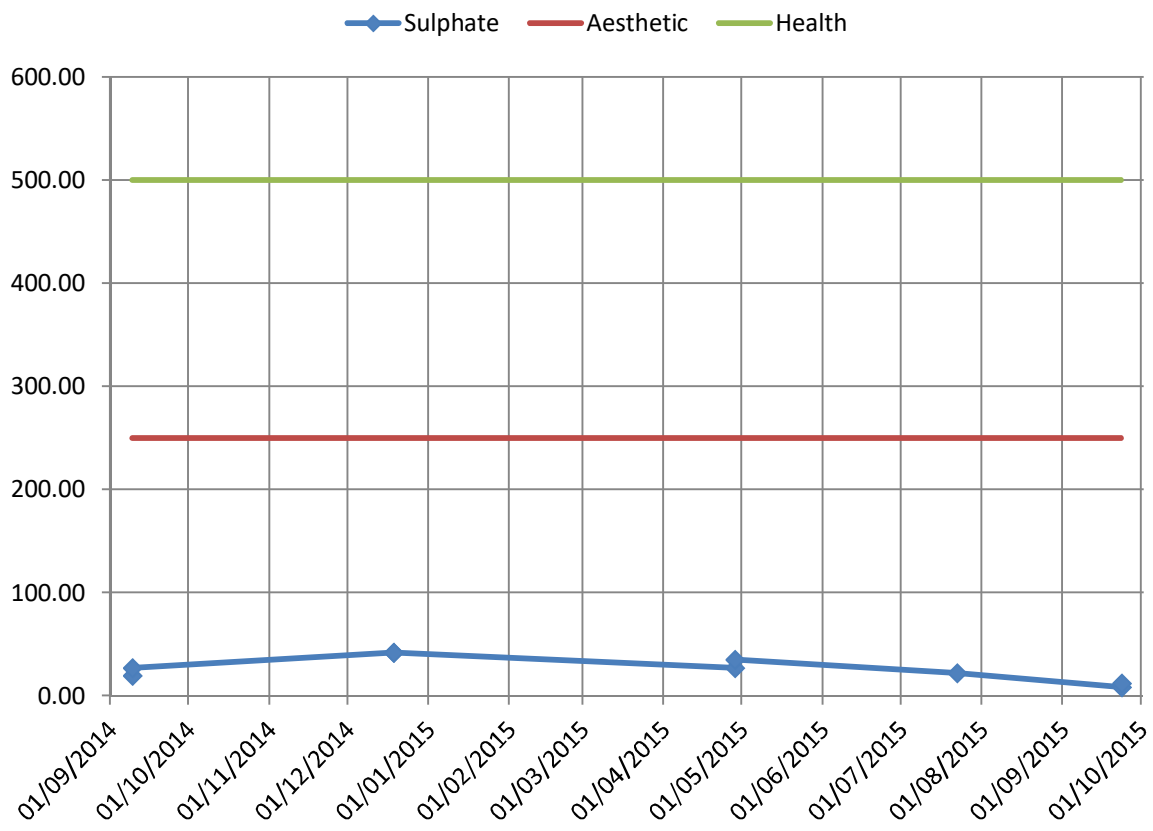


Figure 3.28 Eromanga Sulphate

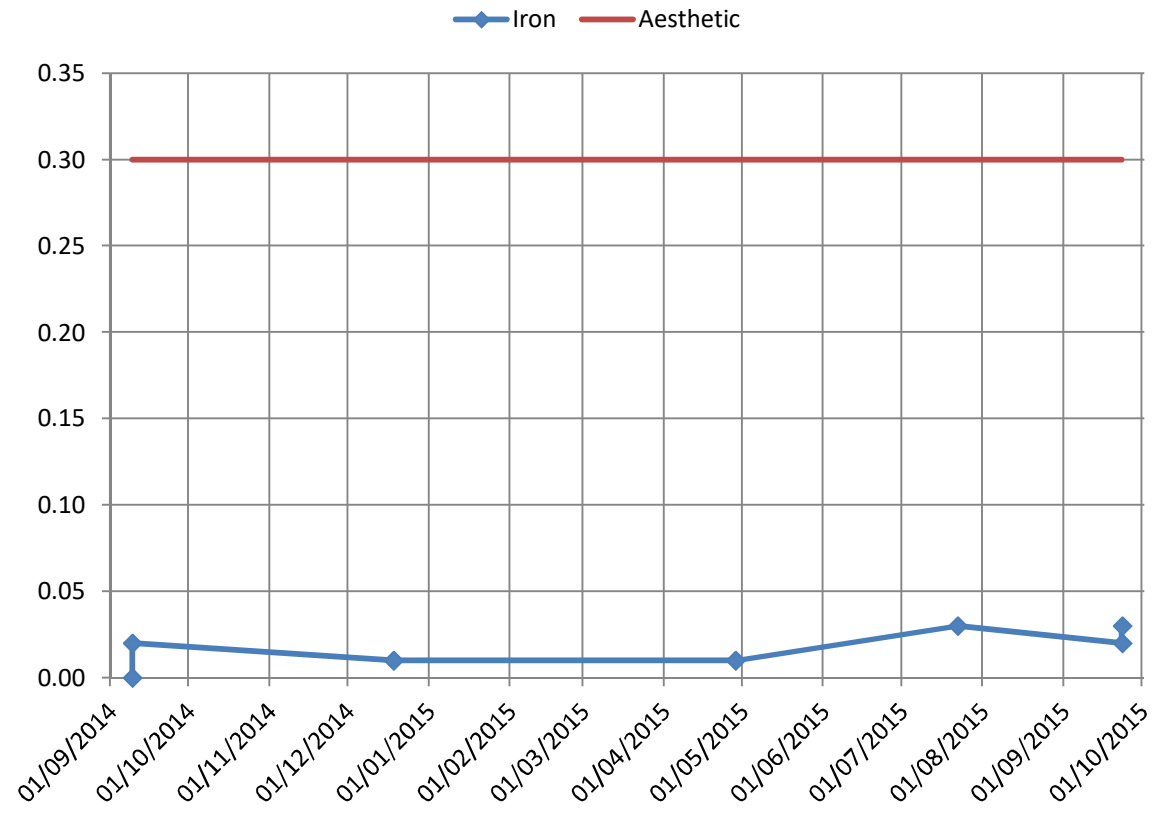


Figure 3.29 Eromanga Iron

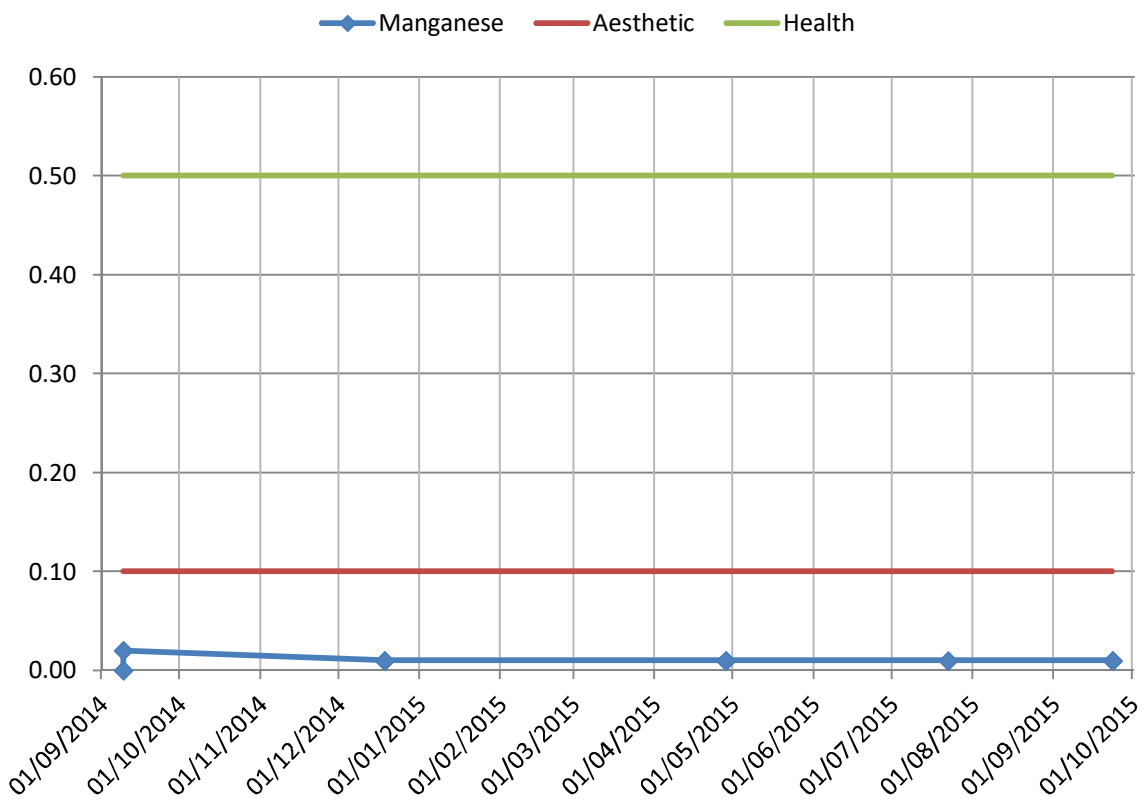


Figure 3.30 Eromanga Manganese

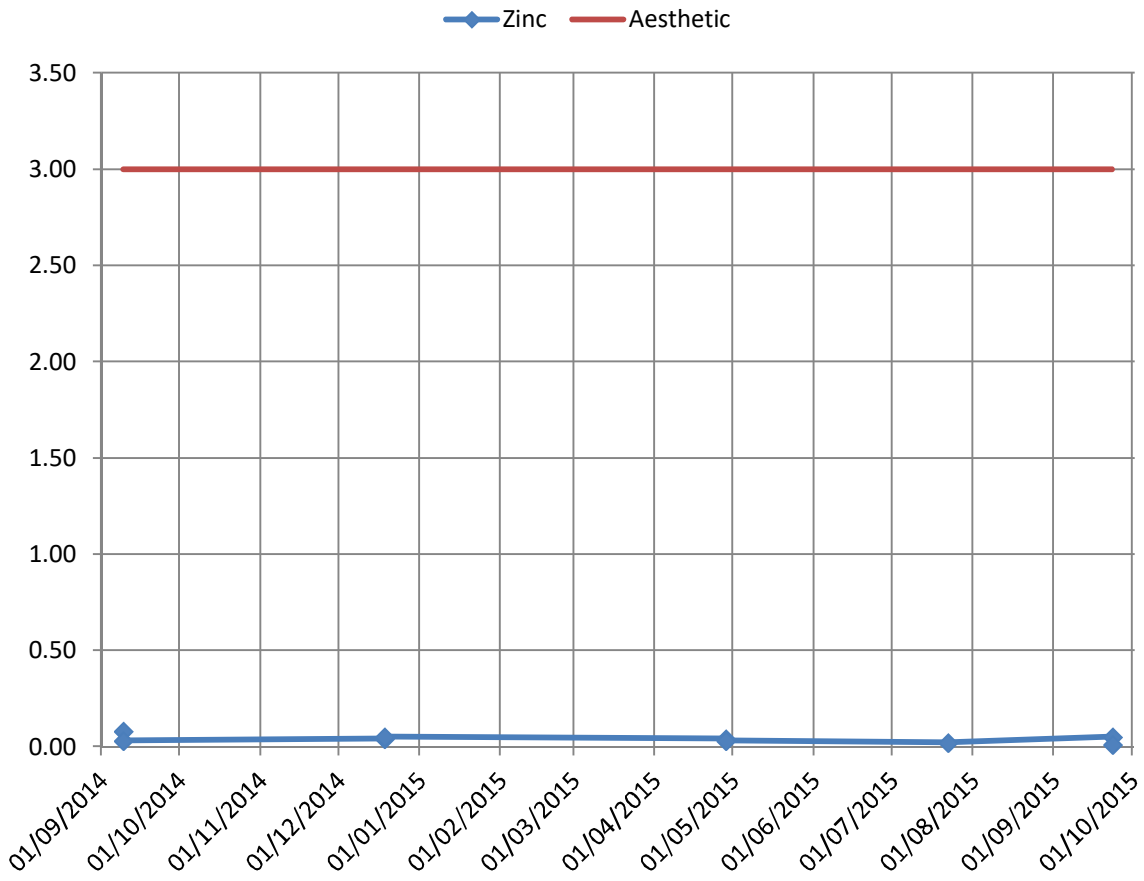


Figure 3.31 Eromanga Zinc

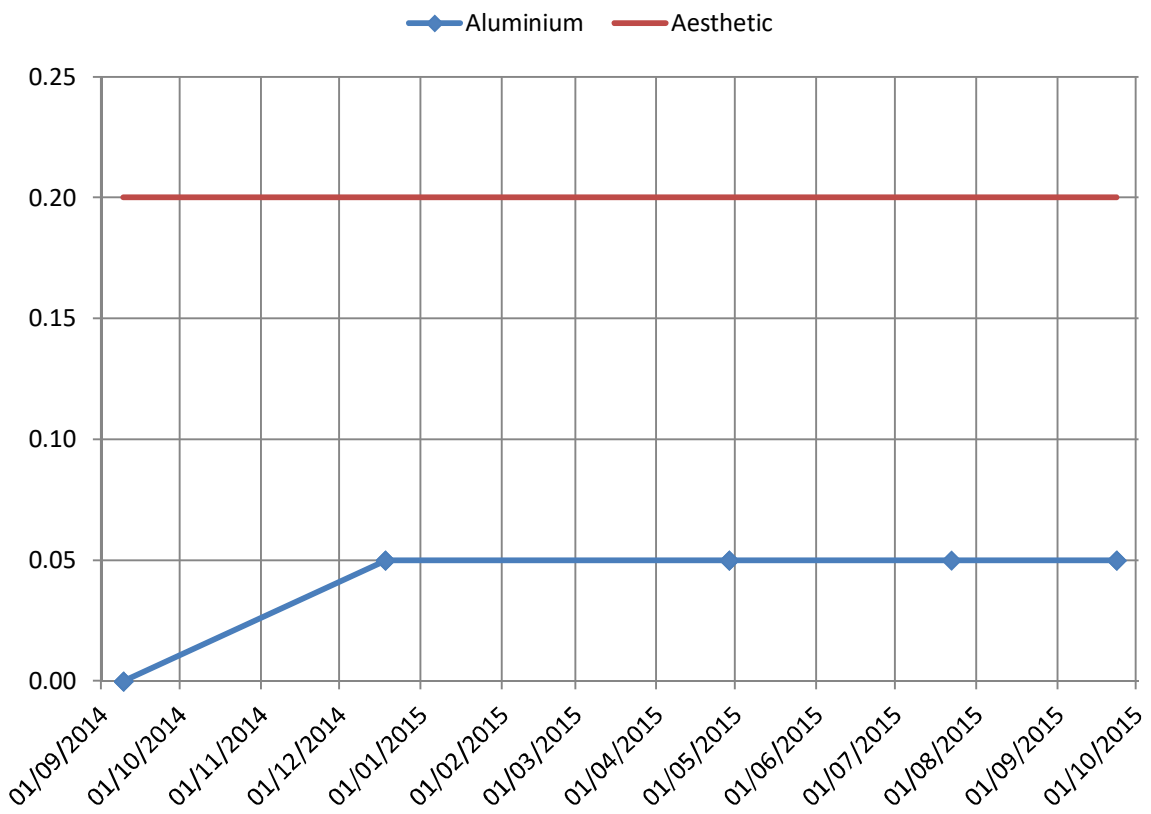


Figure 3.32 Eromanga Aluminium

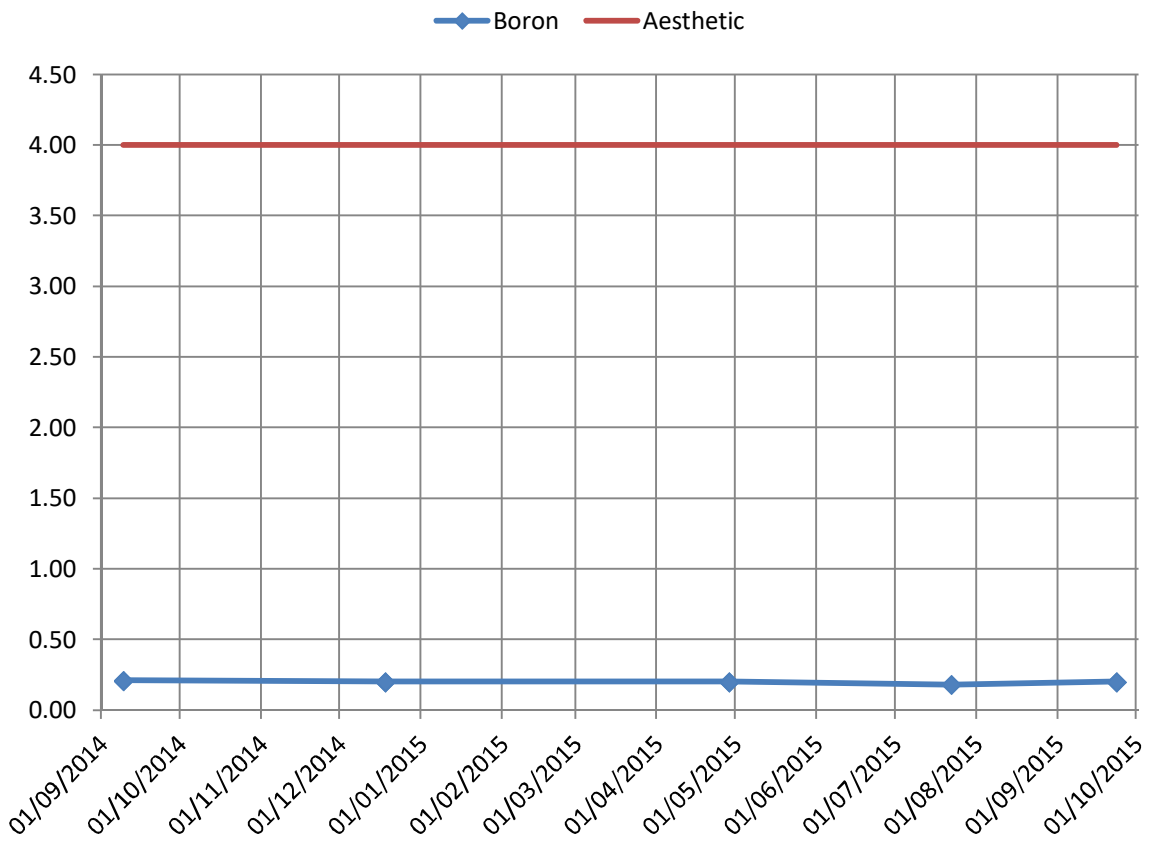


Figure 3.33 Eromanga Boron

3.2.3 (b) Interpretation

The tables above provide a visual representation of water sample data. The commencement of the water treatment plant in Eromanga has greatly improved the quality of water supplied to the residents or Eromanga. The trends above indicate that all characteristics tested fall within the ADWG guidelines.

3.2.4 Catchment Characteristics

Eromanga is located in the Channel Country of South West Queensland. The main ranges in the Quilpie Shire are the Grey, McGregor and Willies Ranges. The Willies range forms the catchment boundary of the Quilpie and Paroo Rivers. The Grey Range separates the Cooper Creek catchment from the Bulloo River. Within the Cooper Creek catchment the McGregor Range divides the catchment, while ranges on the western side of the Cooper Creek at Durham Downs and in the vicinity of Nappamerrie form the boundaries of the limited catchment of Lake Pure. The Bulloo River, a major drainage system, has its source in the Gowan Ranges north of Adavale. The Bulloo River also has a well-developed flood plain.

The average annual rainfall for Eromanga is 349.2mm[4] with the majority of the rain falling between late November and late March. The mean maximum temperature is 29.2°C although temperatures have exceeded the 45°C mark during the summer months. Eromanga has a current population of 50 permanent residents and has a current demand of .104 Ml/day.

Eromanga's economy is based on the grazing and mining industries. The region consists of one of the largest opal boulder deposits in the world along with extensive gas and oil deposits. Road infrastructure construction and maintenance also contribute significantly to provide a stable employment base for the area.

In 2014 Eromanga switched their source water supply from artesian water to sub-artesian with the establishment of a water treatment facility in Eromanga. The sub artesian supply was chosen due to the improved water quality with the main health risk associated with bacteria being eliminated by the water treatment plant. The source water supply comes from four shallow sub artesian bores, approximately forty metres depth with a positive pressure of approximately ten meters. The supply bores in the town of Eromanga flow at a rate of approximately 1-3l/s.

Quilpie shire council have maintained the artesian water supply that was used prior to the commissioning of the water treatment plant for emergency situations where the treatment plant is not working. In these situations the water treatment plant will be bypassed and the artesian supply fed directly into the mains supply. The water quality of the artesian bore water is non-potable, when this water is supplied to the customers council will issue notices the residents of Eromanga, this will be done by council staff delivering the information in person to individual houses and where personal contact cannot be made a notice dropped off at the house,

Eromanga sewerage system is a common effluent drainage scheme constructed in 2001 which contains a biological effluent treatment system comprising oxidation lagoons and an artificial wetland, one effluent pumping station, one rising main and 2600m of reticulation mains.

3.2.5 Hazard Identification

The hazards and hazardous events and their sources that adversely affect water quality are documented in Table 3.7 below and include those affecting:

- Catchment
- Sourcing infrastructure
- Distribution system

[4] Climate statistics for Quilpie Airport (nearest available climate statistics) – Bureau of Meteorology

3.2.5 (a) Identifying and documenting hazards and hazardous events

The hazards and hazardous events were identified using data contained in the plan and following site visits and a risk assessment workshop which was conducted on 9th and 10th of August 2012;

- Section 2.2 Eromanga Water Supply Scheme
- Section 3.2.1 Water Quality Information
- Section 3.2.4 Catchment Characteristics

Table 3.7 Eromanga Hazard Identification, Risk Assessment and Uncertainty

Scheme Component / Sub-component	Hazardous Event	Hazard	Maximum risk			Existing Preventive Measures / Barriers.	Residual risk			Uncertainty	Comments/ Proposed Further Risk Reduction Actions
			Consequence	Likelihood	Risk level		Consequence	Likelihood	Risk level		
Catchment	Draw down of water table	Depleted water table	**Moderate**	**Possible**	Medium (9)	Reliance on multiple bores/Continuous monitoring of water depth	Moderate	Rare	Low (3)	Reliable	Ongoing monitoring of water level. Alternate supply if necessary
Bore	Sewage system discharges, agricultural run-off	Bacteria	Catastrophic	Possible	High (15)	Treatment of shallow bore water	Moderate	Rare	Low (3)	Reliable	**E2** Operational & Maintenance Procedure.
Sourcing Infrastructure	Maintenance and repair of water main	Bacteria	Catastrophic	Possible	High (15)	Operations and Maintenance Procedure	Catastrophic	Unlikely	High (10)	Uncertain	E4. Develop Safe Work Method Statement or Job Safety Analysis document for Operations staff performing maintenance and repairs.
	Accidental or intentional contamination	Harmful substances (not identified)	Catastrophic	Rare	Medium (6)	Chain-link fencing and locked gates	Moderate	Rare	Low (3)	Uncertain	**E2** Operational & Maintenance Procedure.
	Flood Event	Loss of infrastructure	Catastrophic	Rare	Medium (6)	Town does not flood. Sealed bore headworks	Moderate	Rare	Low (3)	Uncertain	
	Power outage	Disruption to supply	**Moderate**	**Unlikely**	Medium (6)	Backup generator	**Minor**	**Rare**	Low (2)	Confident	Acceptable Risk
Treatment Plant	Equipment failure	Poor water supply or non-potable water supply	Major	Possible	High (12)	Central control system capabilities/ correct maintenance practices/ automated tank level of 90%	Major	Unlikely	Medium (8)	Uncertain	**E3** Develop information management plan
	Long term Power failure	Loss of supply	Major	Possible	High (12)	Back up generator in place for power outages	Moderate	Rare	Low (3)	Reliable	**Generator maintenance**
	Bypass treatment plant	Fluoride	**Moderate**	**Unlikely**	Medium (6)	Continual public awareness/ Emergency public notification/ Distribution of Fact Sheet	**Moderate**	**Rare**	Low (3)	Confident	**E2** Operational & Maintenance Procedure
		Bacteria	**Catastrophic**	**Unlikely**	High (10)		**Moderate**	**Rare**	Low (3)	Confident	
Disinfection Process	Overdosing of chlorine leading to high levels in finished water	Chlorine	**Moderate**	**Unlikely**	**Medium (6)**	Routine monitoring/ Ultra Violet Light Disinfection/ RO Microfiltration	**Minor**	**Unlikely**	Low (4)	Confident	**E2** Operational & Maintenance Procedure.
	Underdosing of chlorine leading to chlorine sensitive pathogen survival in finished water	Turbidity, Bacteria	**Catastrophic**	**Unlikely**	**High (10)**		**Minor**	**Unlikely**	Low (4)	Confident	**E2** Operational & Maintenance Procedure.

(Sodium Hypochlorite)	Underdosing of chlorine leading to high pH	Bacteria	**Moderate**	**Unlikely**	**Medium (6)**		**Minor**	**Unlikely**	**Low (4)**	Confident	**E2** Operational & Maintenance Procedure.
	Failure of disinfectant dosing pumps	Bacteria	**Catastrophic**	**Unlikely**	High (10)	Weekly chlorine testing/ Ultra Violet Light Disinfection/ RO Microfiltration/On-Line Monitoring and System Alarms/Set Points/Auto-Shutdown	**Minor**	**Unlikely**	**Low (4)**	Confident	**E2** Operational & Maintenance Procedure. **E4.** Develop Safe Work Method Statement or Job Safety Analysis document for Operations staff performing maintenance and repairs.
	Power outage	Disruption to supply	**Moderate**	**Unlikely**	Medium (6)	Backup generator	**Minor**	**Rare**	**Low (2)**	Confident	Acceptable Risk
Distribution System	Reticulation maintenance and repair	Bacteria	Catastrophic	Possible	High (15)	Operations and Maintenance Procedure	Catastrophic	**Unlikely**	**High (10)**	Uncertain	E4. Develop Safe Work Method Statement or Job Safety Analysis document for Operations staff performing maintenance and repairs.
Whole of System	Flights carrying water samples to be analysed delayed/cancelled	Logistics	Insignificant	Possible	Low (3)	Collect new samples and schedule testing for next available flight	Insignificant	**Rare**	**Low (1)**	Confident	**E2** Operational & Maintenance Procedure.
Whole of System	Poor information management	Contamination	Catastrophic	Possible	High (15)	Water quality data analysis and management, routine operations and maintenance of scheme	Catastrophic	**Possible**	**High (15)**	Uncertain	**E3** Develop Information Management Plan

4 ASSESSMENT OF RISKS

The plan details the risk assessment methodology used for the scheme in Section 4.1 below. Section 4.2 explains how the risks were assessed. Section 4.3 tabulates the relevant stakeholders in the risk assessment process.

4.1 Methodology

The methodology adopted for the risk assessment is described below. The methodology is based on the methodology exampled in the document “Preparing a Drinking Water Quality Management Plan Guideline Supporting Information” (September 2010).

Table 4.1 below shows the qualitative measures of likelihood that was adopted in the risk assessment.

Table 4.1 Measures of Likelihood Utilised in the Risk Assessment

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

Table 4.2 below shows the qualitative measures of consequence that was adopted in the risk assessment.

Table 4.2 Measures of Consequences Utilised in the Risk Assessment

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

Table 4.3 below shows the degrees of uncertainty adopted for the risk assessment. Some of the risks assessed for the Water Supply Schemes remain an estimate or uncertain.

Table 4.4 below shows the risk analysis matrix utilised, detailing the various levels of risk that was adopted in the risk assessment.

Table 4.3 Degrees of Uncertainty

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

Table 4.4 Risk Analysis Matrix – Level of Risk

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

Table 4.5 Defined Acceptable Risk Levels

Low risk	acceptable	manage for continuous improvement
Moderate risk	unacceptable	Implement short term measures, longer term risk reduction measures may be implemented within a reasonable timeframe
High risk	unacceptable	Implement short term measures immediately, longer term risk reduction measures need to be a priority
Extreme	unacceptable	Implement short term measures immediately, implementation of longer term risk reduction measures given top priority

Table **4.5** above details the acceptable risk levels for the water supply schemes.

4.1.1 Site Visits, Interviews and Risk Assessment Workshop

On 9 August 2012 a site visit to Quilpie Water Supply Scheme was conducted and attended by Simon Bourne – Senior Engineer, George Bourne & Associates and Alvin Feeney – Engineer, George Bourne & Associates. Alan McNal – Water Officer Quilpie gave a site tour and was interviewed in Quilpie. Alan did not attend the Risk Assessment Workshop held at the Offices of Quilpie Shire Council but gave his input to the Risk Assessment Team during the site visit.

On 10 August 2012 a site visit to Eromanga Water Supply Scheme was conducted and attended by Simon Bourne, George Bourne & Associates and Alvin Feeney – George Bourne & Associates. Alan McNal was not requested to attend the site tour due to the travel distance involved.

On the 19 may 2016 a teleconference was held, members present at the meeting included Angela Hennessy - Building and Environmental Planning Officer, Alan McNal - Water Officer, Ted Hennessey - Technical Coordinator and William Green – George Bourne and Associates. The meeting was held as part of the DWQMP amendment process, reassessing residual risks, additional hazards and preventative measures for the drinking water schemes in the Quilpie shire council.

The methodology chosen is relevant to the public health risks associated with drinking water supplies. Every effort has been made to apply the chosen methodology consistently across the three drinking water services.

4.2 Assessment of Risk

Details of the risk assessment results for each scheme's identified hazards and hazardous events include:

- maximum risk level or equivalent process (i.e. without existing barriers in place, eg: no treatment and/or disinfection);
- existing preventive measures including multiple barriers

- residual risk level (i.e. with existing barriers in place); and
- any uncertainties.

The following sections will discuss each of these dot points in further detail.

4.2.1 Assessment of Maximum Risk

For all hazards, maximum risk (e.g. the risk from an uncontrolled hazard) was first assessed. Where there was insufficient data or information to complete a reliable assessment, this was highlighted as an uncertainty and discussed further in the Risk Management Improvement Program in Section 5.4 below.

4.2.2 Existing preventative measures/barriers

All existing preventative measures are listed in the Risk Assessment. Existing preventative measures include all actions, barriers or measures currently in place to reduce the maximum risk. They include all treatment steps, active measures that protect raw water quality prior to treatment and measures to protect treated water quality.

4.2.3 Residual risk

The residual risk is determined once existing preventive measures have been applied. Residual risk is the level of risk a particular hazard is assessed as posing to the safety of the drinking water once the existing preventative measure/s have been applied.

Residual risk is determined using the same methodology (e.g. likelihood and consequence descriptors) as the initial maximum risk assessment; however changes to the assessed likelihood (or consequence) should result in a lower resultant risk level.

4.3 Key Stakeholders

Table 4.6 Stakeholders – Risk Assessment

Stakeholder	Contact Name and Details	Rationale for engagement and how engagement occurred
Quilpie Shire Council	Simon Bourne George Bourne & Associates P: (07) 4651 2177 E: SBourne@gbassoc.com.au Alan McNal Water Officer Quilpie & Eromanga Water Supplies	Contracted to Manage Engineering Services for Quilpie Shire Council[5] Site Visits & Risk Assessment Workshop Management of DWQMP Preparation Site Visits & Risk Assessment Workshop
Consultants	Alvin Feeney George Bourne & Associates P (07) 4651 2177 E afeeney@gbassoc.com.au William Green George Bourne & Associates P (07) 4651 2177 E wgreen@gbassoc.com.au	Author of Quilpie DWQMP Site Visits & Risk Assessment Workshop Amendment of Quilpie DWQMP

[5] QSC engages a civil engineering consultancy (George Bourne and Associates) to manage Engineering Services.

5 MANAGING RISKS

Quilpie source water from a relatively deep artesian bore and does not undergo any treatment processes.

Eromanga's raw water requires treatment prior to reticulation to meet acceptable drinking water quality levels. A new treatment plant was commissioned in 2014 to provide improved drinking water quality.

In the risk assessment conducted for the Quilpie and Eromanga schemes residual risk has been identified regarding the maintenance and repair of pipework in the water supply systems of both schemes. The proposed corrective action for this risk is to develop Safe Work Methods Documentation for on ground staff to have onsite when performing these tasks. This documentation will provide a resource for on ground staff to conduct repair works in a hygienic and risk adverse manner following best practice methodologies.

For Eromanga's supply scheme there is a residual risk related to plant failure or shutdown, where a backup supply system will be required to supply the scheme. The backup water would be sourced from the previous artesian water supply, where water quality is of a lower standard and does not meet the ADWG for a number of characteristics such as Fluoride, Total Dissolved Solids and Sodium. When the backup water supply is commissioned due to plant shutdown Eromanga residents will be required to be notified that an alternate water source of lesser quality has been provided. In this situation due to the small population of Eromanga notifying town residents is relatively easy, council plan on notifying residents in person by door nocking and or leaving notices at individual properties. The process however is not documented in council procedures and has been recommended to be incorporated into Councils Information Management Plan where the full process and provision of information can be documented.

Managing risks are discussed in the following sections below:

- 5.1 Risk Management Measures
- 5.2 Management of Incidents and Emergencies
- 5.3 Risk Management Improvement Program
- 5.4 Information Management

5.1 Risk Management Measures

Existing and proposed preventative risk management measures are detailed in 5.1.1 for Quilpie and 5.1.2 for Eromanga.

5.1.1 Quilpie Existing and Proposed Preventative Measures

Table 5.1 provides details of the existing and proposed preventative measures for Quilpie. Proposed measures are included in the Risk Management Improvement Program (RMIP) in Table 5.6.

Table 5.1. Quilpie Existing and Proposed Preventative Measures

Scheme Component / Sub-component	Hazard	Hazardous event/s	What is/are the existing preventative measure/s?	Which risk factor/s does the existing preventative measure/s impact on	How effective is/are the existing preventative measure/s & on what basis has this been determined?	Is the level of residual risk acceptable	Proposed measures to reach an acceptable level or residual risk	Status	Responsible Organisations
Bore	Fluoride	Hazard that arises from the natural geological processes in the aquifer	N.A.	N.A.	N.A.	No – high risk	**Q1** Distribute fact sheet to the community informing them of potential health risks. Fact Sheet is continually available on QCS website and at tourist information centre The facts sheet is distributed through local media on an annual basis including community notice board and, council Facebook page	Complete / Ongoing	Quilpie Shire Council
Sourcing Infrastructure	Harmful substances (not identified)	Accidental or intentional contamination	Chain-link fencing and locked gates.	Likelihood	Fencing excludes public	Yes	**Q4.** Develop Safe Work Method Statement or Job Safety Analysis document for Operations staff performing maintenance and repairs.	incomplete	
	Bacteria	Maintenance and repair of water main	Operational & Maintenance Procedure	Likelihood	Residual risk remains	No – high risk			
Distribution System	Bacteria	Reticulation maintenance and repair							
All of system	Contamination	Reduced water quality due to poor administrative and operational management	N/A	Water quality supply	N.A.	No- medium Risk	**Q3** Develop Information Management Plan	Incomplete	

5.1.2 Eromanga Proposed Preventative Measures

Table 5.2 provides details of the existing and proposed preventative measures for Eromanga. Proposed measures are included in the RMIP in Table 5.7.

Table 5.2 Eromanga Existing and Proposed Preventative Measures

Scheme Component / Sub-component	Hazard	Hazardous event/s	What is/are the existing preventative measure/s?	Which risk factor/s does the existing preventative measure/s impact on	How effective is/are the existing preventative measure/s & on what basis has this been determined?	Is the level of residual risk acceptable	Proposed measures to reach an acceptable level or residual risk	Status	Responsible Organisations
Sourcing Infrastructure	Harmful substances (not identified)	Accidental or intentional contamination	Chain-link fencing and locked gates.	Likelihood	Fencing excludes public	Yes	**E2** Operational & Maintenance Procedure.	Complete	Quilpie Shire Council
	Bacteria	Maintenance and repair of water main	N.A.				**E4.** Develop Safe Work Method Statement or Job Safety Analysis document for operations staff performing maintenance and repairs.	incomplete	
Distribution System	Bacteria	Reticulation maintenance and repair	N.A.	N.A.	N.A.	No – high risk			
Treatment Plant	Plant Failure	Poor water supply or non-potable water supply	Automated central control system capabilities and alarms/ correct maintenance practices/ supply residents with artesian source water	Likelihood	The risk of plant failure and subsequent supply of unpotable water resides.	No	**E3** Develop Information Management Plan	Incomplete	
All of system	Contamination	Reduced water quality due to poor administrative and operational management	N/A	Water quality supply	N.A.	No- medium Risk			

5.2 Operation and Maintenance Procedures

During the initial risk assessment it was identified that a large number of procedures were non-existent. As part of the Risk Management Improvement Program new procedures were recommended. In June 2014 the Operation and maintenance was approved for use by Quilpie shire council. This document has been developed to avoid preventable causes of potential reduced water quality to the distribution systems in Quilpie Shire Council.
The risk assessment process for the Quilpie Shire Council Schemes, identified that residual risks could be reduced by implementing administrative and operational management practices. Thus, as part of the Risk Management Improvement Program it was recommended that development of an Information Management Plan and implementation of existing Document Control Procedures were necessary. Benefits and associated risk mitigation for both these actions is discussed separately below.

5.2.1 Information Management Plan

Effective governance and mitigating prioritised risk, depends on QSCs capacity to manage information effectively. The Information Management Plan supports continual improvement in information management, administrative and operational procedures particularly in regards to data management ensuring it is accurate and assessable.

The Information Management Plan will identify procedures addressing hazards associated with water quality. Ideally this would ensure that Level 2-5 Emergencies, relating to ADWG, are eliminated.

The Information Management Plan will include information such as:

- Data management procedures
- Notification to customers relating to supply of reduced water quality
- Procedures relating to safe work methods
- Procedures identifying correct operation of water infrastructure
- Maintenance records including location of repair, times and dates, parts and materials used
- Any faults identified (pipe failure record including nature and probable cause),

Table 3.7, identifies that the Information Management Plan will reduce the residual risk currently listed in relation to maintenance and repair as well as the information management of the whole system. At a minimum, the Information Management Plan gives accountability to the service providers, identifying practices to manage hazards and risks associated with QSC's drinking water schemes.

5.2.2 Document Control Procedures

Council document control procedures require Operation and Maintenance documents to be given a document number, title, and revision date used for maintaining the documented control procedure. The principal purpose of the document control procedures is to implement routine revision of documents and maintain up-to-date records as required to all necessary parties.

The document control procedures adopted by QSC form a key component of their quality assurance system. The control procedures track documentation preparation and handling and in turn place accountability with employees. The identification of version number and subsequent version date ensures that only the most recent valid information is published and circulated.

Based on control procedures, documents are routinely reviewed on an annual basis, and amended were required to ensure employees have access to the most current information. This process is reflective of QCS's commitment to continual development.
Refer to Appendix G for a preliminary list of procedures identified.

5.3 Management of Incidents and Emergencies

Table 5.3 shows the different levels of incidents for the entire drinking water service. There are five levels of incidents and emergencies ranging from Level 5 (most severe) to Level 1 (least severe). Quilpie Shire Council has developed a Local Disaster Management Plan (current version dated 12/04/2011). Level 5 incidents and emergencies should be handled under the Quilpie Shire Council Local Disaster Management Plan and are likely to be the result or cause of other emergencies which are covered under the plan.
Table 5.4 shows how incidents and emergencies are managed relevant to drinking water quality.

The use of Eromanga Artesian bore water during plant failure or shutdown has been identified as an emergency situation.

For Eromanga's supply scheme there is a residual risk related to plant failure or shutdown, where a backup supply is sourced from the previous artesian water supply, the artesian water quality is of a lower standard than the treated water and does not meet the ADWG for a number of characteristics such as Fluoride, Total Dissolved Solids and Sodium.

When the backup water supply is commissioned due to plant shutdown Eromanga residents will be notified that an alternate water source of lesser quality has been provided. In this situation due to the small population of Eromanga notifying town residents is relatively easy, council plan on notifying residents in person by door knocking and or leaving notices at individual properties. Furthermore, Fact Sheets will be provided at motel accommodations, the Tourist Information Centre, the Museum, the Eromanga Hotel and Caravan Park to ensure distribution to all residents and visitors.

In an emergency situation, additional notification will occur through media outlets such as ABC Local Radio, the QSC website and the Council Facebook page.

Table 5.5 details the emergency contact details for and protocols to be followed when a particular emergency or incident occurs it is essential for effective incident and emergency management that these contact details are maintained by the service provider in order to effectively manage these situations. All other contact details for incident and emergency management are included in Quilpie Shire Councils Local Disaster Management Plan.

Table 5.3 Incident / Emergency levels

Incident / Emergency level	Description of level
Level 5	• Widespread outbreak of waterborne disease • Declared disaster • Supply unable to be maintained • Gross exceedances of ADWG health guideline values for a chemical parameter (> five times the ADWG health guideline limit).
Level 4	• High level of E. coli (> 5 CFU/ 100 mL) or any pathogens detected in reticulation • Failure of infrastructure (severe or emergency level supply restrictions required to ensure continuity of supply)
Level 3	• Detection of 1-5 CFU/100 mL E. coli in reticulation • Failure of infrastructure (ability to supply water compromised – short term water restrictions may be required) • Minor exceedances of ADWG health guideline value for chemical parameter (determined value is close to guideline value).
Level 2	• Failure of infrastructure or source supply (water quality or supply unlikely to be compromised) • Exceedances of ADWG aesthetic guideline (customer complaints possible)
Level 1	• Exceedances of operational limit managed through operational and maintenance procedures

Table 5.4 Management of Incidents and Emergencies

Level	Incident or emergency	Summary of actions to be taken (with documented procedure listed)	Position/s responsible for Action/s
5	Disaster levels - Implement Quilpie Shire Council Local Disaster Management Plan Report to Queensland Health by phone and written incident report to DEWS		
4	High level of E. coli (> 5 CFU/ 100 mL) or any pathogens detected in reticulation	1. Alert Technical Officer and Chief Executive Officer 2. Determine potentially affected area, isolate if possible. Issue Boil Water alert. Escalate emergency further if situation worsens. 3. Report details to Queensland Health, Drinking Water Quality Incident Hotline - phone 1300 596 709 and within 3 hours and Notify DEWS by Initial notification form within 24 hours - drinkingwater.reporting@dews.qld.gov.au 4. Resample for E. coli and disinfectant residual in potentially affected infrastructure 5. Undertake comprehensive contamination investigation 6. Undertake necessary corrective actions 7. Upon resolution, provide written report to regulator (Part 2 incident form) and Chief Executive Officer 8. Non-compliance will be raised and will require signing off by the Chief Executive Officer after corrective actions have taken place.	1. Technical Officer 2. Technical Officer 3. Technical Officer 4. Technical Officer 5. Technical Officer 6. As appropriate 7. Technical Officer 8. Technical Officer / Chief Executive Officer
4	Failure of infrastructure (severe or emergency level supply restrictions required to ensure continuity of supply)	1. Alert Technical Officer and Chief Executive Officer 2. Determine reason for failure, isolate if possible. Consider options to recommence supply. 3. Report details to Queensland Health, Drinking Water Quality Incident Hotline - phone 1300 596 709 and within 3 hours and Notify DEWS by Initial notification form within 24 hours -	1. Technical Officer 2. Technical Officer 3. Technical Officer 4. Technical Officer

Level	Incident or emergency	Summary of actions to be taken (with documented procedure listed)	Position/s responsible for Action/s
		drinkingwater.reporting@dews.qld.gov.au 4. Undertake comprehensive failure investigation 5. Undertake necessary corrective actions to recommence supply and provide an estimate of when the supply can be recommenced 6. Implement severe or emergency level supply restrictions. Consider escalating to a Level 1 incident. Notify the public. 7. Upon resolution, provide written report to regulator (Part 2 incident form). Provide written report to the Chief Executive Officer 8. Non-compliance will be raised and will require signing off by the Technical Officer and the Chief Executive Officer after corrective actions have taken place.	5. As appropriate 6. Technical Officer / Chief Executive Officer 7. Technical Officer 8. Technical Officer / Chief Executive Officer
3	Detection of 1-5 CFU/100mL E.coli in reticulation	1. Alert Technical Officer and Chief Executive Officer 2. Determine potentially affected area, isolate if possible. Consider Boil Water alert. Escalate emergency further if situation worsens. 3. Report details to Queensland Health, Drinking Water Quality Incident Hotline - phone 1300 596 709 and within 3 hours and Notify DEWS by Initial notification form within 24 hours - drinkingwater.reporting@dews.qld.gov.au 4. Resample for E. coli and disinfectant residual in potentially affected infrastructure 5. Undertake comprehensive contamination investigation 6. Undertake necessary corrective actions 7. Upon resolution, provide written report to regulator (Part 2 incident form) 8. Non-compliance will be raised and will require signing off by the Technical Officer and the Chief Executive Officer after corrective actions have taken place.	1. Technical Officer 2. Technical Officer 3. Technical Officer 4. Technical Officer 5. Technical Officer 6. As appropriate 7. Technical Officer 8. Technical Officer / Chief Executive Officer

Level	Incident or emergency	Summary of actions to be taken (with documented procedure listed)	Position/s responsible for Action/s
3 2	Failure of infrastructure (ability to supply water compromised – short term water restrictions may be required) Failure of infrastructure or source supply (water quality or supply unlikely to be compromised)	1. Alert Technical Officer and Chief Executive Officer 2. Determine reason for failure, isolate if possible. Consider options to recommence supply. 3. Undertake comprehensive failure investigation 4. Undertake necessary corrective actions to recommence supply and provide an estimate of when the supply can be recommenced 5. Implement Short Term Water restrictions if required 6. Provide written report to the Chief Executive Officer 7. Non-compliance to be raised and will require signing off by the Technical Officer and the Chief Executive Officer after corrective actions have taken place.	1. Technical Officer 2. Technical Officer 3. Technical Officer 4. As appropriate 5. Technical Officer 6. Technical Officer 7. Technical Officer / Chief Executive Officer
2	Minor exceedances of ADWG health guideline value for chemical parameter (determined value is close to guideline value).	1. Alert Technical Officer and Chief Executive Officer 2. Determine potentially affected area, isolate if possible (i.e. individual bore). Consider Water alert. Escalate emergency further if situation worsens. 3. Report details to Queensland Health, Drinking Water Quality Incident Hotline - phone 1300 596 709 and within 3 hours and Notify DEWS by Initial notification form within 24 hours - drinkingwater.reporting@dews.qld.gov.au 4. Resample for detected health parameter for all bores and combined bores (if possible) 5. Undertake comprehensive contamination investigation 6. Undertake necessary corrective actions 7. Upon resolution, provide written report to regulator (Part 2 incident form). Provide Report to Chief Executive Officer also.	1. Technical Officer 2. Technical Officer 3. Technical Officer 4. Technical Officer 5. Technical Officer 6. Technical Officer 7. Technical Officer

Level	Incident or emergency	Summary of actions to be taken (with documented procedure listed)	Position/s responsible for Action/s
		8. Non-compliance will be raised and will require signing off by the Technical Officer and the Chief Executive Officer after corrective actions have taken place.	8. Technical Officer / Chief Executive Officer
1	Exceedances of operational limit managed through operational and maintenance procedures	1. Alert Technical Officer and Chief Executive Officer 2. Review operational procedures. 3. Rectify exceedance and bring parameter within operational limits. Parameter shall be corrected same day. 4. Non-compliance to be raised and will require signing off by the Technical Officer and the Chief Executive Officer after corrective actions have taken place.	1. Technical Officer 2. Technical Officer 3. Technical Officer 4. Technical Officer / Chief Executive Officer

Table 5.5 Emergency Contact Details and Protocols

Description of Incident/ Emergency	Level	Business Unit / Organisation	Contact person(s) details	Communication protocols
All	5	Refer to Quilpie Shire Council Local Disaster Management Plan		
All	All levels	Quilpie Shire Council	Chief Executive Officer Dave Burges 50 Brolga Street, Quilpie, QLD 4480 Phone: (07) 4656 0500 Fax: (07) 4656 1441 Email: ceo@quilpie.qld.gov.au	Phone Email Written Reports
	All levels	Quilpie Shire Council	Technical Officer Ted Hennessy 50 Brolga Street, Quilpie, QLD 4480 Phone: (07) 4656 0500 Fax: (07) 4656 1441 Email: works@quilpie.qld.gov.au	Phone Email Written Reports
All in Table 5.4	5, 4, 3, 2 Where outlined in Table 5.4	DEWS Department Of Energy and Water Supply GPO Box 2454 Brisbane Q 4001 drinkingwater.reporting@dews.qld.gov.au		Phone Written Report (email and post)
All health related	5, 4, 3	Queensland Health Queensland Health Building 147-163 Charlotte Street Brisbane Queensland 4000 Firstname_Lastname@health.qld.gov.au		Phone Written Email
For all other contacts and contact numbers refer to the Quilpie Shire Council Local Disaster Management Plan including media, police, state agencies, health etc.				

5.4 Risk Management Improvement Program

Unacceptable residual risks or risks identified in the plan have been included in the Risk Management Improvement Program (RMIP) below for Quilpie in 5.4.1 and Eromanga in 5.4.2 below.

The RMIP also includes for improvements to parts of the plan where deficiencies in information or uncertainties exist. Priorities of the improvements and target dates for completion have also been included.

5.4.1 Quilpie RMIP

Table 5.6 below outlines the proposed RMIP to be implemented for Quilpie.

Improvements include implementing a Safe Work Method Statement and the implementation of an Information Management Plan.

Table 5.6 Quilpie Risk Management Improvement Program

Code	Improvement	Scheme Component / Sub-component	Hazardous event	Priority	Action(s)			Estimated Cost ($)	Target date/s	Status	Responsibility
					Interim	Short-term	Long-term				
Q1	Distribute fact sheet to the community informing them of potential health risks.	• Bore	• Hazard that arises from the natural geological processes in the aquifer	High	Draft a fact sheet on potential health risks of consuming Fluoride	Distribute fact sheet	N.A.	$5,000	Interim: July-13	Complete	Chief Executive Officer
Q2	Operational & Maintenance Procedure	• Distribution System • Sourcing Infrastructure	• Maintenance and repair of water main • Accidental or intentional contamination • Reticulation maintenance and repair	High	N.A.	Identify new procedures needed, develop and obtain approval and implement	N.A.	$10,000	Short-term: Dec-13	Complete	
Q3	Development of an information Management Plan	• Whole of system	• Reduced water quality due to poor administrative and operational management	High	N.A	Develop information Management Plan	N.A	$10,000	Short-term: Dec-16	Incomplete	
Q4	Develop Safe Work Method Statement or Job Safety Analysis document for Operations staff performing maintenance and repairs.	• Distribution System • Sourcing Infrastructure	• Maintenance and repair of water main • Accidental or intentional contamination • Reticulation maintenance and repair	High	Operations staff to draft workshop potential improvements to current procedures	Develop Safe Work Method Statement or Job Safety Analysis document	N.A	$10,000	Short-term: Dec-16	Incomplete	Chief Executive Officer

5.4.2 Eromanga RMIP

Table 5.7 below outlines the proposed RMIP to be implemented for Eromanga
Improvements include implementing a Safe Work Method Statement and the implementation of an Information Management Plan.

Table 5.7 below outlines the proposed RMIP to be implemented for Quilpie.

Table 5.7 Eromanga Risk Management Improvement Program

Code	Improvement	Scheme Component / Sub-component	Hazardous event	Priority	Action(s)			Estimated Cost	Target date/s	Status	Responsibility
					interim	short-term	long-term				
E1	Proposed upgrade of water supply to potable	• System Wide			N.A.	Prepare planning report and detailed design	Implement planning report	$1,000,000	Short-term –July 13 Long-term -Dec-13	Complete	Chief Executive Officer
E2	Operational & Maintenance Procedure revise and reissue	• Distribution System • Sourcing Infrastructure	• Maintenance and repair of water main • Accidental or intentional contamination Reticulation maintenance and repair	High	N.A.	Identify new procedures needed, develop and obtain approval and implement	N.A.	$5,000	Short-term: Dec-13	Complete	
E3	Develop Information management Plan	• Whole of system	Reduced water quality due to poor administrative and operational management	High	N.A	Develop information Management Plan	N.A	$10,000	Short-term: Dec-16	Incomplete	
E4	Develop Safe Work Method Statement or Job Safety Analysis document for Operations staff performing maintenance and repairs.	• Distribution System • Sourcing Infrastructure	• Maintenance and repair of water main • Accidental or intentional contamination Reticulation maintenance and repair	High	Operations staff to draft workshop potential improvements to current procedures	Develop Safe Work Method Statement or Job Safety Analysis document	N.A	$10,000	Short-term: Dec-16	Incomplete	Chief Executive Officer

5.5 Information Management

At present Quilpie Shire Council does not have a completed Information Management Plan developed. The Water Officer is responsible for operational issues such as monitoring bore pressures and reading water meters by completing visual inspections. The Water officer keeps a daily diary and logs all incidents, however, data management and record keeping will be integrated into the operations and management procedures to be implemented as part of the Information Management Plan
The Water Officer is responsible for organising water quality analysis to be undertaken and reviewing the results. Records are filed at the Council office. Infrastructure and asset records are contained in the Shire's Total Management Plan which is stored at the Council office. Customer complaints are logged in the Water Officer's diary, however, no investigation records are saved.

In order to monitor water quality in the Quilpie and Eromanga schemes regular water analysis is conducted in alignment with the Verification Monitoring Program outlined in Table 6.2 below. Water quality results are received by councils Building and Environmental planning officer. Water quality data is maintained in electronic format in a spreadsheet to maintain a single record of all water quality data. The spreadsheet is maintained with trends graph to provide visual guides depicting trends over time. Analytical reports received from QLD Health laboratories and inhouse test results once received are uploaded into council's information management system *Info Expert and stored* in electronic format in a chronological order to ensure information is accessible accurate and up to date.

Council has developed a number of information resources since the implementation of the DWQMP these resources include:

Document Title	Date Revised	Status
Operations and Management Procedures	25 April 2015	Issued
Customer Service Standard	18 November 2014	Adopted by Council
Reverse Osmosis Treatment Plant Instructions, Operation and Maintenance Manual	26 September 2014	Accepted for use

Development of an Information Management Plan has been recommended in the RMIP.

6 OPERATIONAL AND VERIFICATION MONITORING PROGRAMS

Details of the operational monitoring programs are tabulated below for Quilpie in Table 6.1.

Details of the verification monitoring programs for Eromanga are tabulated in Table 6.2.

6.1 Operational Monitoring

Operational monitoring for Councils water supply schemes is tabulated in Table 6.1 and 6.2 below detailing monitoring locations, parameters measured, target and critical levels and actions to be taken in the event the levels are exceeded.

The persons responsible for operational monitoring include the Chief Executive Officer, Technical Officer and the Water Officer. The Water Officer is responsible for conducting operational monitoring.

The Water Officer will be required to log all maintenance issues in an operations log and a copy of this shall be sent fortnightly to the Technical Officer. While the Water Officer will be encouraged to maintain informal lines of communication, formal communications shall also be required so as to enable a means for improved record keeping. Maintenance monitoring shall include but not limited to visual inspections to ensure that access to bore sites is restricted.

Table 6.1 Quilpie Operational Monitoring

Location in System	Parameter	Associated Hazard	Sampling		Target limit	Action if target limit exceeded	Critical limit	Action if critical limit exceeded	Positions Responsible
			Frequency	Method					
Bores, System Wide	General Maintenance	Hazards associated with maintenance bores and reticulation system	Weekly	Visual	N/A	See critical limit	N/A	The Technical / Water Officers are required to log all maintenance issues encountered on a day to day basis. Three times weekly the Water Officer is required to visually inspect the scheme for maintenance issues. A copy of the maintenance log shall be sent to the Technical Officer Monthly. Pressure reducing valves for artesian bores shall be monitored to confirm correct operational parameters. Bore heads shall be inspected to confirm contamination or any tampering has not occurred. Until such time as Improvement Item Maintenance Log is implemented, Maintenance Issues shall be recorded in the Operators Diary and any issues highlighted shall be sent to the Technical Officer fortnightly.	**Overall Responsibility** Chief Executive Officer **Implementation, review and actions:** Technical Officer **Operations:** Water Officer

Table 6.2 Eromanga Operational Monitoring

Location in System	Parameter	Associated Hazard	Sampling		Target limit	Action if target limit exceeded	Critical limit	Action if critical limit exceeded	Positions Responsible
			Frequency	Method					
Bores	General Maintenance	Reduced Water Quality	Weekly	Visual	N/A	See critical limit	N/A	- The Technical / Water Officers are required to log all maintenance issues encountered on a day to day basis. Three times weekly the Water Officer is required to visually inspect the scheme for maintenance issues. A copy of the maintenance log shall be sent to the Technical Officer Monthly. - Pressure gauges for bores shall be monitored to confirm correct operational parameters. Bore heads shall be inspected to confirm contamination or any tampering has not occurred. - Until such time as Improvement Item Maintenance Log is implemented, Maintenance Issues shall be recorded in the Operators Diary and any issues highlighted shall be sent to the Technical Officer fortnightly.	**Overall Responsibility** Chief Executive Officer **Implementation, review and actions:** Technical Officer **Operations:** Water Officer
Treatment Plant	General Maintenance	Reduced Water Quality	Weekly	Visual	N/A	N/A	N/A	- Check Summary (HMI) screen readouts for pressure readings and flow rates to ensure plant is running efficiently, pressure build up may indicate RO membranes have scaling in which case RO Clean In Place may be required. - Check all pipes valves and fittings to ensure no leaks or blockages are occurring, replace any malfunctioning pipework.	

6.2 Verification Monitoring

Table 6.2 in 6.2.1 below tabulates the parameters to be monitored, monitoring locations and frequency of monitoring for Quilpie and Eromanga schemes.

6.2.1 Quilpie and Eromanga Verification Monitoring

Quilpie have two deep artesian bores. In Quilpie bore water is supplied directly to reticulation without pumping and storage.

Eromanga's water supply comes from four sub artesian bores; source water then goes through a reverse osmosis treatment process, chlorination and storage before distributed to residents.

For Quilpie and Eromanga schemes microbial, physical and inorganics verification monitoring will be conducted at various points in the reticulation system. These points will include public buildings to facilitate access.

Data from verification monitoring shall be recorded in a master spread sheet which when each new analysis suite is added, trends will be automatically updated based on the date and each data set. The trends for each scheme and each parameter sampled are enclosed in section 3 above. The Technical Officer will be required to record in a log the weather conditions when sampling and this log shall be sent to the Technical Officer for inclusion in the spread sheet.

Currently, data on water quality complaints are limited. Generally lines of communication are informal and complaints in towns are made directly to the Technical Officer or works supervisor and currently are not logged formally. As an improvement complaints made informally to council staff will be required to be lodged formally to the Technical Officer in writing. This will be filed under Water Quality Complaints and the data from each complaint logged in a Water Quality complaint spread sheet.

Refer to Appendix B for sampling locations. Locations were chosen due to location within reticulation and ease of access to taps.

Table 6.2 Quilpie and Eromanga Verification Monitoring

Characteristic	Parameter	ADWG &/or Regulation Value	Associated Hazard	Frequency	Sampling Locations		Analysing Authority	Response to Exceedances
					Quilpie	Eromanga		
Microbial quality	*E.coli*	*Nil detect*	*Bacteria*	*Monthly*	*Quilpie Town Bore No.2. Tap located at bore.* *Quilpie Hospital.* *Quilpie Shire Office.*	*Town Bore: rotate testing location each quarter to sample each bore annually.* *Outlet of RO Plant* *Eromanga Hotel*	*QHFSS*	*Refer to incident management Plan* *Notify DEWS and complete incident reporting forms*
Physical	*pH*	*pH 6.5–8.5*	*Hazard that arises from the natural geological processes in the aquifer.*	*Quarterly*				*Acceptable risk, continue to monitor for exceedances*
	Temperature	*N/A*						
	Colour	*15 HU - Aesthetic*						
	Turbidity	*5 NTU - Aesthetic*						
	Dissolved Oxygen	*> 85% - Aesthetic*						
Inorganics	*Iron*	*0.3mg/l - Aesthetic*						*Notify DEWS and complete incident reporting forms*
	Sodium	*180mg/l - Aesthetic*						
	Manganese	*0.5mg/l - Health*						
	Fluoride	*1.5mg/l - Health*						
	Chlorine	*5mg/L - Health*	*Treatment Plant malfunction*	*Weekly/ Quarterly*	*N/A*	*Outlet of RO plant* *Eromanga Hotel*		

Appendix A Drinking Water Quality Management Plan Approval Application

Drinking Water Quality Management Plan Approval Application

Queensland Government

Water Supply (Safety and Reliability) Act 2008, section 95

Privacy Disclaimer: Collection of information provided in this approved form and any attachments is authorised under the *Water Supply (Safety and Reliability) Act 2008* and is being used for the purpose of applying to the Office of the Water Supply Regulator for approval of a drinking water quality management plan. The Department of Environment and Resource Management will endeavour to maintain any confidentiality of information relating to your form. However, consideration of your form may involve consultation and if so, details of your form may be disclosed to third parties. This information will not otherwise be disclosed outside of the department unless required or authorised by law (for example as under the *Right to Information Act 2009*).

Note: This is an approved form under the *Water Supply (Safety and Reliability) Act 2008*, to be used by the drinking water service provider, to apply to the regulator for approval of a drinking water quality management plan (DWQMP).

Before submitting this approved form, please be fully aware of your rights and obligations under the *Water Supply (Safety and Reliability) Act 2008*.

1. Drinking Water Service Provider Details

Drinking water service provider	SPID
Quilpie Shire Council	108

2. Contact Details

Principal Contact

Family name	Given name(s)	Position
Burges	Dave	CEO

Postal address

PO Box 57

Quilpie Postcode 4480

Telephone number	Fax number	Mobile number
(07)4656 0500	(07)4656 1441	

Email address

admin@quilpie.qld.gov.au

3. Drinking Water Scheme Details

Please **list** the drinking water scheme(s) to which this plan applies

Quilpie
Eromanga
Adavale

(If space provided is insufficient, additional information may be attached)

Form WSR505 V01 Jan 2010 *SSA Multimedia Services* Page 1 of 2

Drinking Water Quality Management Plan Approval Application continued... page 2 of 2

4. Relevant Documents

List below all supporting documentation attached to this application that form part of the DWQMP. Where a document applies to a specific scheme or schemes please state this (e.g. scheme name).

	Document Name(s)
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	

(If space provided is insufficient, additional information may be attached)

5. Declaration

I/we declare and warrant that I/we have all the necessary and appropriate authority on behalf of the drinking water service provider to declare the information in this approved form, including any attachments or supporting information provided, are true and accurate to the best of my/our knowledge.

Family name	Given name(s)	
Burges	Dave	
Position	**Signature**	**Date (dd/mm/yyyy)**
CEO	DGB	27/8/2012
Family name	**Given name(s)**	
Position	**Signature**	**Date (dd/mm/yyyy)**
		/ /

6. Submission

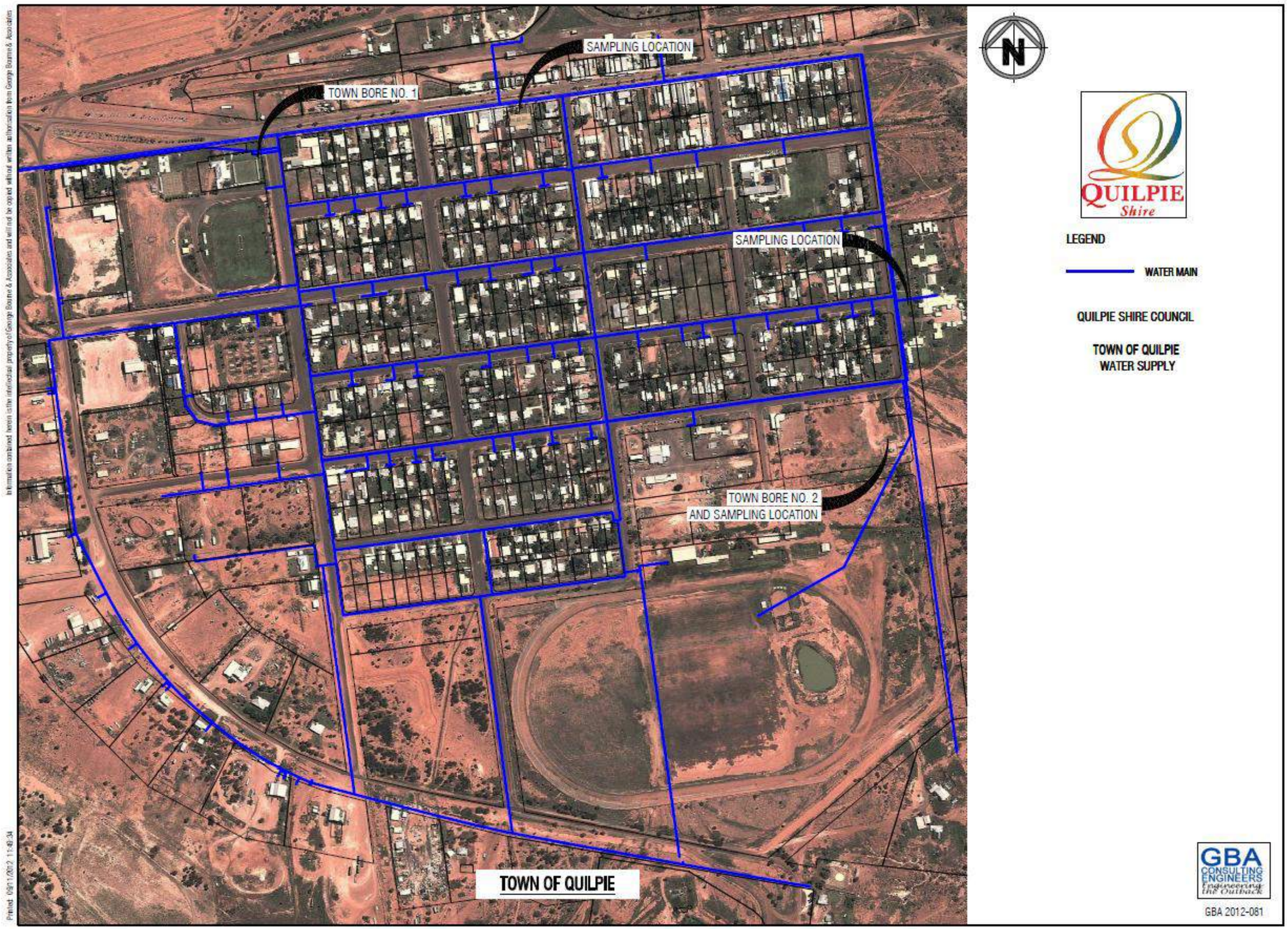
Please complete and sign the form and send one (1) printed copy of all relevant materials, along with all materials saved on to CD (or equivalent electronic device) to:

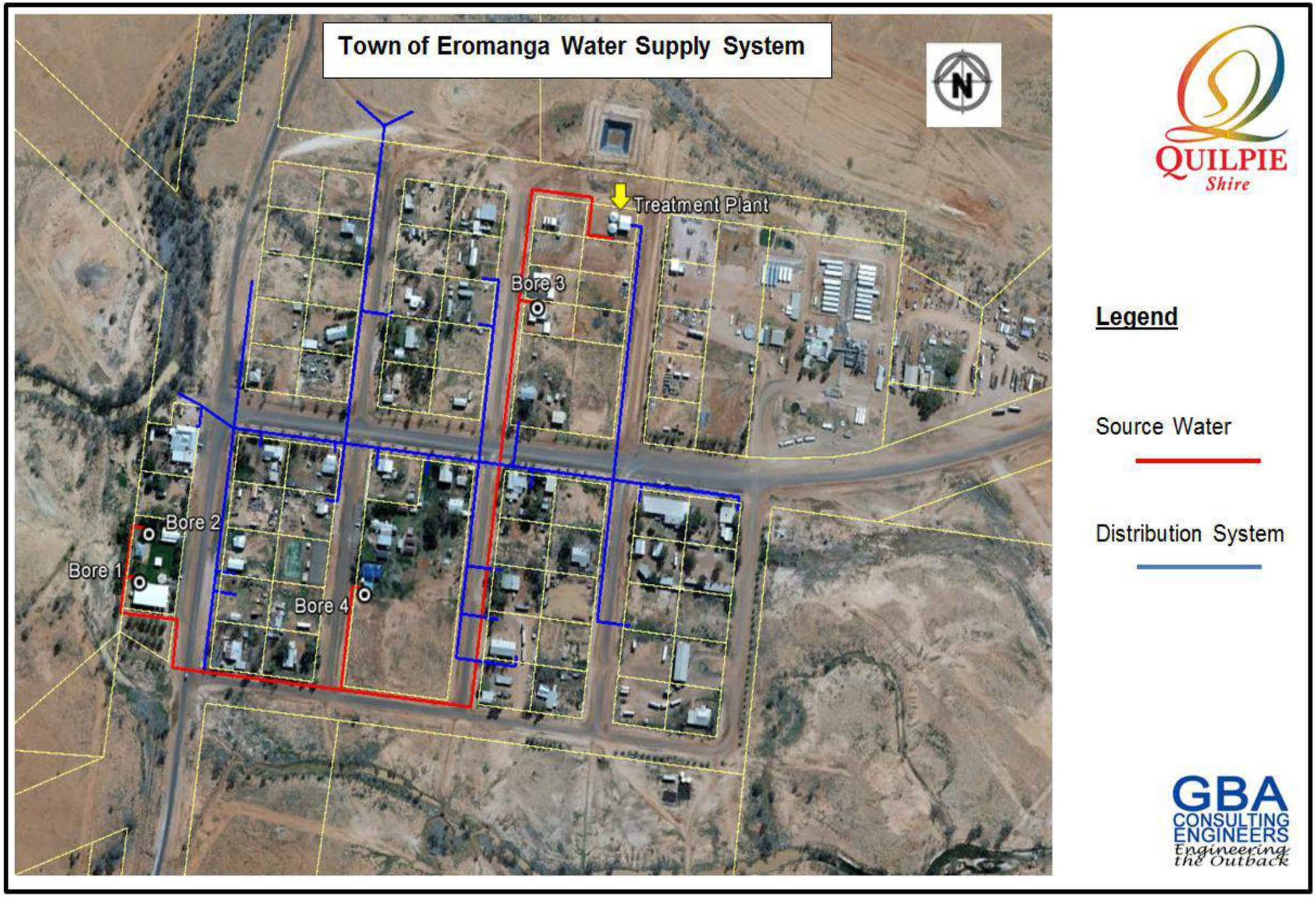
Director
Water Industry Asset Management and Standards
Office of the Water Supply Regulator
Department of Environment and Resource Management
GPO Box 2454
Brisbane Qld 4001

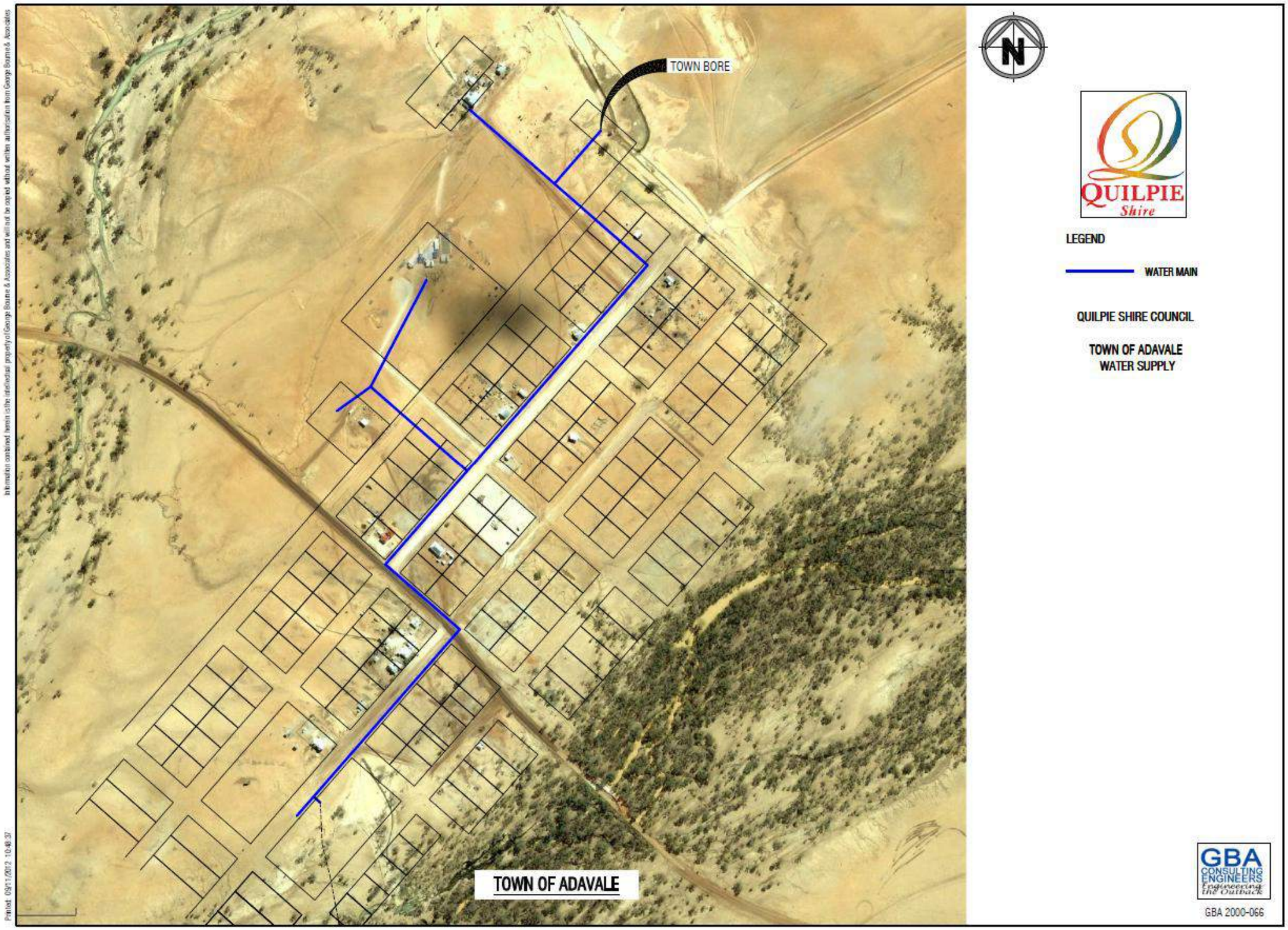
Form WSR505 V01 Jan 2010 *SSA Multimedia Services* Page 2 of 2

Appendix B Water Supply Layouts Superimposed on Aerial Photos

GBA-2012-081 Quilpie Water Supply Scheme
GBA-2000-109 Eromanga Water Supply Scheme
GBA-2000-066 Adavale Water Supply Scheme


SAMPLING LOCATION
TOWN BORE NO. 1
SAMPLING LOCATION
TOWN BORE NO. 2
AND SAMPLING LOCATION
TOWN OF QUILPIE
N
QUILPIE
Shire
LEGEND
WATER MAIN
QUILPIE SHIRE COUNCIL
TOWN OF QUILPIE
WATER SUPPLY
GBA
CONSULTING
ENGINEERS
Engineering the Outback
GBA 2012-081


Town of Eromanga Water Supply System
N
Treatment Plant
Bore 3
Bore 2
Bore 1
Bore 4
QUILPIE
Shire
Legend
Source Water
Distribution System
GBA
CONSULTING
ENGINEERS
Engineering
the Outback


TOWN BORE
TOWN OF ADAVALE
N
QUILPIE Shire
LEGEND
WATER MAIN
QUILPIE SHIRE COUNCIL
TOWN OF ADAVALE
WATER SUPPLY
GBA CONSULTING ENGINEERS Engineering the Outback
GBA 2000-066

Appendix C Bore Water Report Card

DATE 22/08/2012

GROUNDWATER DATABASE

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 390

REGISTRATION DETAILS

		BASIN	0112	LATITUDE	26-37-05	MAP-SCALE	254
OFFICE	Charleville	SUB-AREA		LONGITUDE	144-15-44	MAP-SERIES	M
DATE LOG RECD		SHIRE	6150-QUILPIE	EASTING	227403	MAP-NO	SG55-9
D/O FILE NO.	V17 0274	LOT		NORTHING	7052931	MAP NAME	QUILPIE
R/O FILE NO.	561333	PLAN		ZONE	55	PROG SECTION	
H/O FILE NO.	L04841B	ORIGINAL DESCRIPTION	BORE RESERVE 20	ACCURACY		PRES EQUIPMENT	
				GPS ACC			
GIS LAT	-26.618182012	PARISH NAME	5162-WOORBIL			ORIGINAL BORE NO	QUILPIE TOWN BORE
GIS LNG	144.26229913	COUNTY	NICKAVILLA			BORE LINE	-
CHECKED	N	PROPERTY NAME					
		FIELD LOCATION				POLYGON	
						RN OF BORE REPLACED	
FACILITY TYPE	AF	DATE DRILLED	07/10/1933			DATA OWNER	
STATUS	EX	DRILLERS NAME				CONFIDENTIAL	
ROLES		DRILL COMPANY					
		METHOD OF CONST.	CABLE TOOL				

CASING DETAILS

PIPE	DATE	RECORD NUMBER	MATERIAL DESCRIPTION	MAT SIZE (mm)	SIZE DESC	OUTSIDE DIAM	TOP (m)	BOTTOM (m)
A	07/10/1933	1	Steel Casing (unspecified)		WT	254	0.00	66.40
A	07/10/1933	2	Steel Casing (unspecified)		WT	203	0.00	177.10
A	07/10/1933	3	Steel Casing (unspecified)		WT	152	0.00	899.80
A	07/10/1933	4	Perforated or Slotted Casing		AP		878.50	900.00

STRATA LOG DETAILS

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
1	0.00	1.22	RED SOIL
2	1.22	38.10	ROCK
3	38.10	80.16	CLAY
4	80.16	96.93	SHALE
5	96.93	118.26	CLAY

DATE 22/08/2012

GROUNDWATER DATABASE

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 390

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
6	118.26	166.12	SHALE
7	166.12	289.56	CLAY WITH HARD STREAKS
8	289.56	449.58	SHALE WITH HARD STREAKS
9	449.58	452.63	SANDSTONE SAND
10	452.63	480.06	CLAY
11	480.06	601.37	SHALE
12	601.37	614.78	LIMESTONE SHALE
13	614.78	731.22	SHALE
14	731.22	734.57	SANDSTONE SAND
15	734.57	798.58	CLAY
16	798.58	801.62	SANDSTONE QUARTZ
17	801.62	841.25	CLAY AND SAND
18	841.25	852.53	SANDROCK
19	852.53	858.01	CLAY
20	858.01	873.25	SANDROCK
21	873.25	882.40	CLAY
22	882.40	899.77	SANDROCK, SANDSTONE

STRATIGRAPHY DETAILS

SOURCE	RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
DNR	1	0.00		ALLUVIUM
DNR	2		30.50	TERTIARY SEDIMENTS
DNR	3	30.50		WINTON FORMATION
DNR	4			MACKUNDA FORMATION
DNR	5		440.10	ALLARU MUDSTONE
DNR	6	440.10	449.60	TOOLEBUC FORMATION
DNR	7	449.60		COREENA MEMBER
DNR	8		731.20	DONCASTER MEMBER
DNR	9	731.20	749.80	WYANDRA SANDSTONE MEMBER
DNR	10	749.80	823.00	CADNA-OWIE FORMATION

GROUNDWATER DATABASE

DATE 22/08/2012

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 390

SOURCE	RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
DNR	11	823.00	899.80	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	27.40		SDST							PS	TERTIARY SEDIMEFORM
2	64.00		SHLE							FR	WINTON FORMATION
3	94.50		SHLE							FR	WINTON FORMATION
4	143.30		SHLE							FR	WINTON FORMATION
5	213.40		SHLE							FR	WINTON FORMATION
6	449.60		SDST							PS	COREENA MEMBER
7	731.50		SDST							PS	WYANDRA SANDSTONE MEMBER
8	824.50	826.60	SDST							PS	HOORAY SANDSTONE
9	843.10	852.50	SDST							PS	HOORAY SANDSTONE
10	861.10	873.30	SDST							PS	HOORAY SANDSTONE
11	885.40	886.90	SDST							PS	HOORAY SANDSTONE
12	890.00		SDST							PS	HOORAY SANDSTONE
13	893.10		SDST							PS	HOORAY SANDSTONE

PUMP TEST DETAILS PART 1

**** NO RECORDS FOUND ****

PUMP TEST DETAILS PART 2

**** NO RECORDS FOUND ****

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	SHEEP	COMMENT

DATE 22/08/2012

GROUNDWATER DATABASE

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REG NUMBER 390

14/11/1985			water distribution through town mains for domestic supply. Mains open ended and partial bore blow runs 2 drains to Paroo River on town common, requirements - remove and fit new headworks to eliminate lead packer, threaded gun metal flange and casing joint, rotted casing inside 254mm casing shroud. Cement 152.4mm to 203.2mm casing annulus. Incorporate in new headworks provision for connecting testing apparatus without disturbing town reticulation connecting gear.
08/10/1975			
30/08/1960			Report on generator etc. on File 65.
29/08/1960	G	P	Bore has only 4" discharge.

ELEVATION DETAILS

PIPE	DATE	ELEVATION	PRECISION	DATUM	MEASUREMENT POINT	SURVEY SOURCE
X	13/SEP/74	197.00	SVY	STD	N	

WATER ANALYSIS PART1

PIPE	DATE	RD	ANALYST	QAN	DEPTH (m)	RMK	SRC	COND (uS/cm)	pH	Si (mg/L)	TOTAL IONS	TOTAL SOLIDS	HARD	ALK	FIG. OF MERIT	SAR	RAH
A	03/03/1976	1	GCL	066622		PU	GB	950	8.2		724.20	0.00	12	339	0.0	27.5	6.54
A	24/04/1981	1	GCL	089759		MA	GR	925	8.6	43	705.70	549.95	7	336	0.0	34.6	6.58
A	14/11/1985	1	GCL	112346	900.00	PU	GB	900	8.7	36	679.32	529.80	5	321	0.0	38.0	6.31
X	01/09/1986	1	GCL	115676	900.00	PU	GB	900	8.1	37	737.12	563.18	7	346	0.0	35.8	6.79
X	01/09/1986	2	GCL	115677	900.00	PU	GB	880	8.2	36	723.82	553.96	6	339	0.0	39.0	6.67

WATER ANALYSIS PART 2

PIPE	DATE	RD	Na	K	Ca	Mg	Mn	HCO3	Fe	CO3	Cl	F	NO3	SO4	Zn	Al	B	Cu
A	03/03/1976	1	216.0	2.2	4.0	0.4		405.0		4.1	88.0	1.30		3.2				
A	24/04/1981	1	205.0	2.0	2.5	0.1		391.0		9.3	85.0	1.80	0.0	9.0				
A	14/11/1985	1	200.0	2.2	2.1	0.0	0.01	365.0	0.01	13.0	87.0	1.70	0.5	7.8				

DATE 22/08/2012

GROUNDWATER DATABASE

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 390

PIPE	DATE	RD	Na	K	Ca	Mg	Mn	HCO3	Fe	CO3	Cl	F	NO3	SO4	Zn	Al	B	Cu
X	01/09/1986	1	210.0	2.5	2.6	0.0	0.01	415.0	0.01	3.5	93.0	1.60	0.5	8.4				
X	01/09/1986	2	210.0	2.4	2.2	0.0	0.01	405.0	0.01	4.4	88.0	1.60	0.5	9.7				

WATER LEVEL DETAILS

PIPE	DATE	MEASURE (m)	N/R	RMK	LOG	PIPE	DATE	MEASURE (m)	N/R	RMK	LOG	PIPE	DATE	MEASURE (m)	N/R	RMK	LOG
X	13/09/1974	85.80	N			X	20/11/1985	85.08	N								

WIRE LINE LOG DETAILS

DATE	RUN	OPERATOR	TYPE	SOURCE	TOP	BOTTOM	COMMENTS
03/08/2000	1	B ISBISTER	CALU	QUILPIE	249.91	253.61	
03/08/2000	2	B ISBISTER	CALU	QUILPIE	-1.47	901.43	
03/08/2000	1	B ISBISTER	GR	QUILPIE	49.02	901.52	
03/08/2000	2	B ISBISTER	GR	QUILPIE	-1.52	901.38	

FIELD MEASUREMENTS

PIPE	DATE	DEPTH (m)	COND (uS/cm)	pH	TEMP (C)	NO3 (mg/L)	DO (mg/L)	Eh (mV)	ALK	METH	SOURCE
A	07/10/1933				75.0					PU	GB
A	14/11/1938				75.0					PU	GB
A	29/10/1941				75.0					PU	GB
A	13/09/1948				75.0					PU	GB
A	29/08/1960				75.0					PU	GB
A	30/03/1965				73.0					PU	GB
A	08/10/1975				73.5						
A	12/05/1981				73.0					PU	GB
A	20/11/1985				75.0					PU	GB

SPECIAL WATER ANALYSIS

**** NO RECORDS FOUND ****

DATE 22/08/2012

GROUNDWATER DATABASE

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 390

VALIDATION LOG - PART 1

REGDET	CASING	STRLOG	AQUIFR	PUMTES	ELVDET	WLVDET	FIELDQ
Y 26/11/1990	Y 26/11/1990	Y 20/11/2000	Y 26/11/1990	Y 26/11/1990	Y 26/11/1990	Y 26/11/1990	Y 26/11/1990

VALIDATION LOG - PART 2

WATANL	SAMPLE	STRTIG	WIRLOG	MULCND	BRCOND	FPREAD	GNOTES
Y 26/11/1990		Y 26/11/1990		Y 26/11/1990			

GENERAL NOTES

**** NO RECORDS FOUND ****

GROUNDWATER DATABASE

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DATE 18/07/2012

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 116266

REGISTRATION DETAILS

		BASIN	0112	LATITUDE	26-37-05	MAP-SCALE	254
OFFICE	Charleville	SUB-AREA		LONGITUDE	144-16-26	MAP-SERIES	N
DATE LOG RECD	19/MAR/09	SHIRE	6150-QUILPIE	EASTING	228555	MAP-NO	SG55-9
D/O FILE NO.	V17 0274	LOT	3	NORTHING	7052981	MAP NAME	QUILPIE
R/O FILE NO.		PLAN	SP204518	ZONE	55	PROG SECTION	
H/O FILE NO.		ORIGINAL DESCRIPTION		ACCURACY	GPS	PRES EQUIPMENT	HW
				GPS ACC	3		
GIS LAT	-26.61809	PARISH NAME	5162-WOORBIL			ORIGINAL BORE NO	
GIS LNG	144.2737307	COUNTY	NICKAVILLA			BORE LINE	-
CHECKED	Y	PROPERTY NAME					
		FIELD LOCATION				POLYGON	
						RN OF BORE REPLACED	
FACILITY TYPE	AF	DATE DRILLED	07/03/2009			DATA OWNER	
STATUS	EX	DRILLERS NAME	TAYLER, STEPHEN CHARLES			CONFIDENTIAL	N
ROLES	WS	DRILL COMPANY	DALY BROS				
		METHOD OF CONST.	MUD ROTARY				

CASING DETAILS

PIPE	DATE	RECORD NUMBER	MATERIAL DESCRIPTION	MAT SIZE (mm)	SIZE DESC	OUTSIDE DIAM	TOP (m)	BOTTOM (m)
A	21/02/2009	1	Steel Casing (unspecified)	6.400	WT	219	0.00	156.00
A	21/02/2009	2	Grout			279	0.00	156.00
A	04/03/2009	3	Steel Casing (unspecified)	6.400	WT	168	0.00	817.00
A	05/03/2009	4	Grout			200	0.00	817.00
A	07/03/2009	5	Steel Casing (unspecified)	6.000	WT	141	809.30	966.30
A	07/03/2009	6	Perforated or Slotted Casing	3.000	AP	141	858.30	966.30

STRATA LOG DETAILS

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
1	0.00	1.00	TOP SOIL
2	1.00	20.00	WHITE ROCK
3	20.00	61.00	GREY CLAY

DATE 18/07/2012

GROUNDWATER DATABASE

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 116266

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
4	61.00	73.00	SDST
5	73.00	85.00	GREY CLAY
6	85.00	93.00	SDST
7	93.00	111.00	GREY SHALE
8	111.00	136.00	SHALE & SILTSTONE
9	136.00	143.00	GREY SHALE
10	143.00	870.00	SILTSTONE WITH SHALE LAYERS
11	870.00	904.00	WHITE MUDSTONE
12	904.00	914.00	SHALE & SDST LAYERS ****
13	914.00	930.00	SDST **** 45 L/SEC
14	930.00	960.00	SILTSTONE AND SDST LAYERS
15	960.00	966.30	SHALE WITH SILTSTONE

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	914.00	960.00	SDST	07/03/2009	79.70	Y	POTABLE		Y	PS	HOORAY SANDSTONE

PUMP TEST DETAILS PART 1

**** NO RECORDS FOUND ****

PUMP TEST DETAILS PART 2

**** NO RECORDS FOUND ****

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	SHEEP	COMMENT

GROUNDWATER DATABASE

DATE 18/07/2012

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 116266

26/03/2008 G F Town supply not hooked up when tested.

ELEVATION DETAILS

PIPE	DATE	ELEVATION	PRECISION	DATUM	MEASUREMENT POINT	SURVEY SOURCE
X	26/MAR/09	188.00	GPS	AHD	N	JOHN YOUNG

WATER ANALYSIS PART1

PIPE	DATE	RD	ANALYST	QAN	DEPTH (m)	RMK	SRC	COND (uS/cm)	pH	Si (mg/L)	TOTAL IONS	TOTAL SOLIDS	HARD	ALK	FIG. OF MERIT	SAR	RAH
A	26/03/2009	1	GCL	195495	914.00	PU	GB	778	8.6	43	621.00	488.00	6	296	0.0	32.0	5.80

WATER ANALYSIS PART 2

PIPE	DATE	RD	Na	K	Ca	Mg	Mn	HCO3	Fe	CO3	Cl	F	NO3	SO4	Zn	Al	B	Cu
A	26/03/2009	1	184.0	2.9	2.4	0.1	< 0.01	345.0	< 0.01	7.9	72.0	1.90	< 0.5	4.6	< 0.01	< 0.05	0.27	< 0.03

WATER LEVEL DETAILS

**** NO RECORDS FOUND ****

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	METH	SOURCE
A	26/03/2009	914.00	794	9.2	78.0					PU	GB

SPECIAL WATER ANALYSIS

**** NO RECORDS FOUND ****

VALIDATION LOG - PART 1

REGDET	CASING	STRLOG	AQUIFR	PUMTES	ELVDET	WLVDET	FIELDQ
Y 27/03/2009							

DATE 18/07/2012

GROUNDWATER DATABASE

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BORE CARD REPORT - PUBLISHABLE

REG NUMBER 116266

VALIDATION LOG - PART 2

WATANL	SAMPLE	STRTIG	WIRLOG	MULCND	BRCOND	FPREAD	GNOTES

GENERAL NOTES

**** NO RECORDS FOUND ****

DATE 10/02/2012

GROUNDWATER DATABASE

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 358

REGISTRATION DETAILS

		BASIN	0031	LATITUDE	26-40-10	MAP-SCALE	254
OFFICE	Charleville	SUB-AREA		LONGITUDE	143-16-22	MAP-SERIES	M
DATE LOG RECD		SHIRE	6150-QUILPIE	EASTING	726185	MAP-NO	SG54-12
D/O FILE NO.	V17 0465	LOT	8	NORTHING	7048162	MAP NAME	EROMANGA
R/O FILE NO.	561133	PLAN	GO23	ZONE	54	PROG SECTION	
H/O FILE NO.	L04841B	ORIGINAL DESCRIPTION	EROMANGA TOWN	ACCURACY	GPS	PRES EQUIPMENT	
				GPS ACC	4		
GIS LAT	-26.66938894	PARISH NAME	1782-EROUNGHOOLA			ORIGINAL BORE NO	EROMANGA NO 2 BORE
GIS LNG	143.2727374	COUNTY	GORDON			BORE LINE	-
CHECKED	Y	PROPERTY NAME					
		FIELD LOCATION				POLYGON	
						RN OF BORE REPLACED	
FACILITY TYPE	AF	DATE DRILLED	03/03/1909			DATA OWNER	
STATUS	EX	DRILLERS NAME				CONFIDENTIAL	
ROLES		DRILL COMPANY					
		METHOD OF CONST.	CABLE TOOL				

CASING DETAILS

PIPE	DATE	RECORD NUMBER	MATERIAL DESCRIPTION	MAT SIZE (mm)	SIZE DESC	OUTSIDE DIAM	TOP (m)	BOTTOM (m)
A	03/03/1909	1	Steel Casing (unspecified)		WT	203	0.00	89.30
A	03/03/1909	2	Steel Casing (unspecified)		WT	152	0.00	915.60
A	03/03/1909	3	Steel Casing (unspecified)		WT	127	0.00	1303.63
A	03/03/1909	4	Steel Casing (unspecified)		WT	254	0.00	13.10
A	03/03/1909	5	Perforated or Slotted Casing		AP		1276.20	1303.63
X	17/10/1985	1	Grout			190	1.50	7.80
X	22/11/1985	1	Grout			142	1.50	95.00
X	28/11/1985	1	Grout			304	0.00	1.50

STRATA LOG DETAILS

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
1	0.00	13.11	CLAY AND COPIE

DATE 10/02/2012

GROUNDWATER DATABASE

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RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
2	13.11	51.82	GRAVEL AND ROCK
3	51.82	65.53	CLAY
4	65.53	480.36	SHALE WITH HARD STREAKS OF LIMESTONE
5	480.36	587.65	SANDROCK SEAMS OF CLAY
6	587.65	932.69	SHALE AND LIMESTONE
7	932.69	1089.66	SHALE SAND SEAMS
8	1089.66	1149.10	SHALE WITH BANDS OF SANDROCK
9	1149.10	1207.01	SHALE
10	1207.01	1220.11	SHALE SANDROCK
11	1220.11	1275.89	SANDSTONE AND SHALE
12	1275.89	1286.26	SHALE WITH BARS SANDROCK
13	1286.26	1303.63	SANDROCK

STRATIGRAPHY DETAILS

SOURCE	RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
DNR	1	0.00		QUATERNARY ALLUVIUM
DNR	2			WINTON FORMATION
DNR	3			MACKUNDA FORMATION
DNR	4			ALLARU MUDSTONE
DNR	5			TOOLEBUC FORMATION
DNR	6			WALLUMBILLA FORMATION
DNR	7		1207.00	CADNA-OWIE FORMATION
DNR	8	1207.00	1303.63	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	13.70		GRAV						N	UC	WINTON FORMATION
2	499.90		SDST						N	PS	MACKUNDA FORMATION
3	1213.10		SDST						N	PS	HOORAY SANDSTONE

GROUNDWATER DATABASE

DATE 10/02/2012

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 358

REC	TOP BED(M)	BOTTOM BED(M)	BED LITHOLOGY	DATE	SWL (m)	FLOW	QUALITY	YIELD (l/s)	CTR	CONDIT	FORMATION NAME
4	1234.40		SDST						N	PS	HOORAY SANDSTONE
5	1260.30		SDST						N	PS	HOORAY SANDSTONE
6	1286.30		SDST						Y	PS	HOORAY SANDSTONE
7	1297.20		SDST						Y	PS	HOORAY SANDSTONE

PUMP TEST DETAILS PART 1

**** NO RECORDS FOUND ****

PUMP TEST DETAILS PART 2

**** NO RECORDS FOUND ****

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
16/11/1998					G	F		GAS					BORE SUPPLIES TOWN & 4KMOF DRAIN,1TROUGH, 1 TANK
08/10/2001	1.0		F	5.00	G	F				21.6	100		Bore supplies approximately 50 houses 10 businesses tw o stock route tanks and 1 earth tank. Headw orks - 127mm riser fitted w ith 1x4hole flanges: 2x80 and 1x12mm couplings. Valves 1x100; 2x80mm gate valves and 1x12mm ball valve. 2x 20000gal tanks, 1km drains, stock 100 sheep & cattle. 80mm valve to tow n leaking w hen shut dow n.
29/09/2004	4.0				G	F				4	100		Bore supplies the tow n of Eromanga.

ELEVATION DETAILS

PIPE	DATE	ELEVATION	PRECISION	DATUM	MEASUREMENT POINT	SURVEY SOURCE
X	03/MAR/09	158.20	EST	STD	N	
X	10/MAR/08	147.00	GPS	AHD	N	JOHN YOUNG

DATE 10/02/2012

GROUNDWATER DATABASE

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 358

WATER ANALYSIS PART1

PIPE	DATE	RD	ANALYST	QAN	DEPTH (m)	RMK	SRC	COND (uS/cm)	pH	Si (mg/L)	TOTAL IONS	TOTAL SOLIDS	HARD	ALK	FIG. OF MERIT	SAR	RAH
A	04/02/1972		1 GCL	051587		PU	GB	2850	8.1		2686.30	1787.12	15	1451			28.69
A	16/11/1998		1 GCL	187012	1289.30	PU	GB	2720	8.7	58	2586.23	1812.24	14	1444	0.0	84.9	28.58
A	10/03/2008		1 GCL	195483	1286.00	PU	GB	2820	8.7	61	2620.00	1820.00	14	1470	0.0	84.0	29.00

WATER ANALYSIS PART 2

PIPE	DATE	RD	Na	K	Ca	Mg	Mn	HCO3	Fe	CO3	Cl	F	NO3	SO4	Zn	Al	B	Cu
A	04/02/1972	1	754.0		6.0			1769.0			122.0	4.30		31.0				
A	16/11/1998	1	731.3	12.6	5.3	0.2	0.01	1636.6	0.01	61.4	107.8	3.55	0.0	27.4	0.16	0.04	3.70	0.01
A	10/03/2008	1	724.0	12.0	5.1	0.3	0.01	1680.0	0.01	55.0	108.0	3.70	< 2.5	30.0	< 0.01	< 0.05	3.60	< 0.03

WATER LEVEL DETAILS

**** NO RECORDS FOUND ****

WIRE LINE LOG DETAILS

DATE	RUN	OPERATOR	TYPE	SOURCE	TOP	BOTTOM	COMMENTS
30/07/2000	1	B ISBISTER	CALU	EROMANGA	941.73	950.93	
30/07/2000	2	B ISBISTER	CALU	EROMANGA	1298.5	1302	
31/07/2000	1	B ISBISTER	CALU	EROMANGA	1277.38	1296.28	
31/07/2000	2	B ISBISTER	CALU	EROMANGA	1194.65	1277.5	
31/07/2000	3	B ISBISTER	CALU	EROMANGA	595.8	601	
31/07/2000	1	B ISBISTER	GR	EROMANGA	.14	1301.84	
31/07/2000	2	B ISBISTER	GR	EROMANGA	-.13	1301.67	
01/08/2000	1	B ISBISTER	CALU	EROMANGA	999.16	1004.06	
01/08/2000	2	B ISBISTER	CALU	EROMANGA	.16	1301.91	

FIELD MEASUREMENTS

PIPE	DATE	DEPTH (m)	COND (uS/cm)	pH	TEMP (C)	NO3 (mg/L)	DO (mg/L)	Eh (mV)	ALK	METH	SOURCE
A	01/03/1909				92.0					PU	GB

DATE 10/02/2012

GROUNDWATER DATABASE

BORE CARD REPORT - PUBLISHABLE

REG NUMBER 358

PIPE	DATE	DEPTH (m)	COND (uS/cm)	pH	TEMP (C)	NO3 (mg/L)	DO (mg/L)	Eh (mV)	ALK	METH	SOURCE
A	08/09/1929				91.0					PU	GB
A	12/04/1955				74.0					PU	GB
A	07/02/1964				86.0					PU	GB
A	04/02/1972				86.0					PU	GB
A	25/01/1977				46.0					PU	GB
A	16/11/1998		2800	7.4	91.0					PU	
A	08/10/2001	1303.60	3006	7.8	89.9					PU	GB
A	29/09/2004		3150	8.2	97.0					PU	GB
A	10/03/2008		2860	7.7	99.0					PU	GB

SPECIAL WATER ANALYSIS

**** NO RECORDS FOUND ****

VALIDATION LOG - PART 1

REGDET	CASING	STRLOG	AQUIFR	PUMTES	ELVDET	WLVDET	FIELDQ
Y 27/01/2005	Y 26/11/1990	Y 20/11/2000	Y 26/11/1990	Y 26/11/1990	Y 26/11/1990	Y 26/11/1990	Y 26/11/1990

VALIDATION LOG - PART 2

WATANL	SAMPLE	STRTIG	WIRLOG	MULCND	BRCOND	FPREAD	GNOTES
Y 26/11/1990		Y 26/11/1990		Y 26/11/1990			

GENERAL NOTES

PIPE	DATE	REC	NOTES
A	01/11/2001	1	Phone 46561133 Quilpie Shire Engineer w ho w ill arrange to advertise shut dow n of bore. 1 w eeks notice required. Plumber Al McNeil 04 2756 1198

DATE 23/11/2005

GROUNDWATER DATABASE

BORE CARD REPORT

REG NUMBER 116169

REGISTRATION DETAILS

		BASIN	0112	LATITUDE	25-54-41	MAP-SCALE	254
OFFICE	Charleville	SUB-AREA		LONGITUDE	144-36-12	MAP-SERIES	N
DATE LOG RECD	18/OCT/05	SHIRE	6150-QUILPIE	EASTING	259909	MAP-NO	SG55-5
D/O FILE NO.	V17 0166	LOT	36	NORTHING	7133071	MAP NAME	ADAVALE
R/O FILE NO.		PLAN	MCK5320	ZONE	55	PROG SECTION	
H/O FILE NO.		ORIGINAL DESCRIPTION		ACCURACY	GPS	PRES EQUIPMENT	HW
				GPS ACC	3		
GIS LAT	-25.9012315	PARISH NAME	23-ADAVALE			ORIGINAL BORE NO	ADAVALE TOWN BORE
GIS LNG	144.6035239	COUNTY	MCKINLAY			BORE LINE	-
CHECKED	Y	PROPERTY NAME	ADAVALE TOWN				
		FIELD LOCATION				POLYGON	
						RN OF BORE REPLACE	305
FACILITY TYPE	AF	DATE DRILLED	08/OCT/05			DATA OWNER	
STATUS	EX	DRILLERS NAME	DALY, KENNETH PATRICK			CONFIDENTIAL	N
ROLES	WS	DRILL COMPANY	DALY BROS. PTY. LTD.				
		METHOD OF CONST.	MUD ROTARY				

LICENSE DETAILS

**** NO RECORDS FOUND ****

CASING DETAILS

PIPE	DATE	RECORD NUMBER	MATERIAL DESCRIPTION	MAT SIZE (mm)	SIZE DESC	OUTSIDE DIAM (mm)	TOP (m)	BOTTOM (m)
A	12/09/2005	1	Steel Casing (unspecified)	6.400	WT	219	0.00	192.50
A	12/09/2005	2	Grout			279	0.00	192.50
A	27/09/2005	3	Steel Casing (unspecified)	6.400	WT	168	0.00	1000.00
A	27/09/2005	4	Grout			200	0.00	1000.00
A	03/10/2005	5	Steel Casing (unspecified)	6.400	WT	141	992.00	1184.00
A	03/10/2005	6	Perforated or Slotted Casing	8.000	AP	141	1100.00	1184.00

STRATA LOG DETAILS

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

DATE 23/11/2005

GROUNDWATER DATABASE

BORE CARD REPORT

REG NUMBER 116169

RECORD NUMBER	STRATA TOP (m)	STRATA BOT (m)	STRATA DESCRIPTION
2	1.00	3.50	RED/YELLOW CLAY
3	3.50	10.60	YELLOW/GREY CLAY
4	10.60	13.60	GRAVEL
5	13.60	20.60	WHITE ROCK
6	20.60	22.60	YELLOW/WHITE & GREY CLAY
7	22.60	42.00	GREY CLAY
8	42.00	55.00	WHITE/GREY CLAY
9	55.00	57.00	LIGHT GREY CLAY
10	57.00	60.00	COAL
11	60.00	63.00	LIGHT GREY CLAY
12	63.00	109.00	GREY CLAY
13	109.00	372.00	GREY SHALE
14	372.00	373.00	WHITE ROCK
15	373.00	800.00	GREY SHALE
16	800.00	806.00	PUGGY SHALE
17	806.00	944.00	GREY SHALE
18	944.00	1037.00	DARK GREY SHALE WITH HARD & SOFT BAND
19	1037.00	1053.00	SANDSTONE
20	1053.00	1067.00	MUDSTONE WITH SHALE LAYERS
21	1067.00	1070.50	VERY HARD GREY SHALE
22	1070.00	1094.50	LIGHT GREY SILTSTONE
23	1094.50	1112.00	PUGGY GREY SHALE
24	1112.00	1184.00	SANDSTONE ***** 35L/SEC 675KPA

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	0.00	373.00	CLAY						N	PS	WINTON FORMATION

GROUNDWATER DATABASE

DATE 23/11/2005

BORE CARD REPORT

REG NUMBER 116169

REC	TOP BED(M)	BOTTOM BED(M)	BED LITHOLOGY	DATE	SWL (m)	FLOW	QUALITY	YIELD (l/s)	CTR	CONDIT	FORMATION NAME
2	373.00	800.00	SHLE						N	PS	ALLARU MUDSTONE
3	800.00	1037.00	SHLE						N	PS	WALLUMBILLA FORMATION
4	1037.00	1053.00							N	SC	WYANDRA SANDSTONE MEMBER
5	1053.00	1112.00							N	SC	CADNA-OWIE FORMATION
6	1112.00	1184.00	SDST						Y	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	18/10/2005	1	116169	1100.00	1184.00	0.70	ART	AC ST FR ST DT			0.00	10	70.51	3.00

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	18/10/2005	1	380	73.06	120		61.82	45.54	120	45.54	73.24				287	

BORE CONDITION

**** NO RECORDS FOUND ****

ELEVATION DETAILS

PIPE	DATE	ELEVATION	PRECISION	DATUM	MEASUREMENT POINT	SURVEY SOURCE
X	18/OCT/05	229.00	GPS	AHD	N	JOHN YOUNG

WATER ANALYSIS PART1

**** NO RECORDS FOUND ****

WATER ANALYSIS PART 2

**** NO RECORDS FOUND ****

DATE 23/11/2005

GROUNDWATER DATABASE

Page 4 of 4

BORE CARD REPORT

REG NUMBER 116169

WATER LEVEL DETAILS
**** NO RECORDS FOUND ****

WIRE LINE LOG DETAILS
**** NO RECORDS FOUND ****

FIELD MEASUREMENTS
**** NO RECORDS FOUND ****

SPECIAL WATER ANALYSIS
**** NO RECORDS FOUND ****

VALIDATION LOG - PART 1

REGDET	CASING	STRLOG	AQUIFR	PUMTES	ELVDET	WLVDET	FIELDQ
N 02/11/2005							

VALIDATION LOG - PART 2

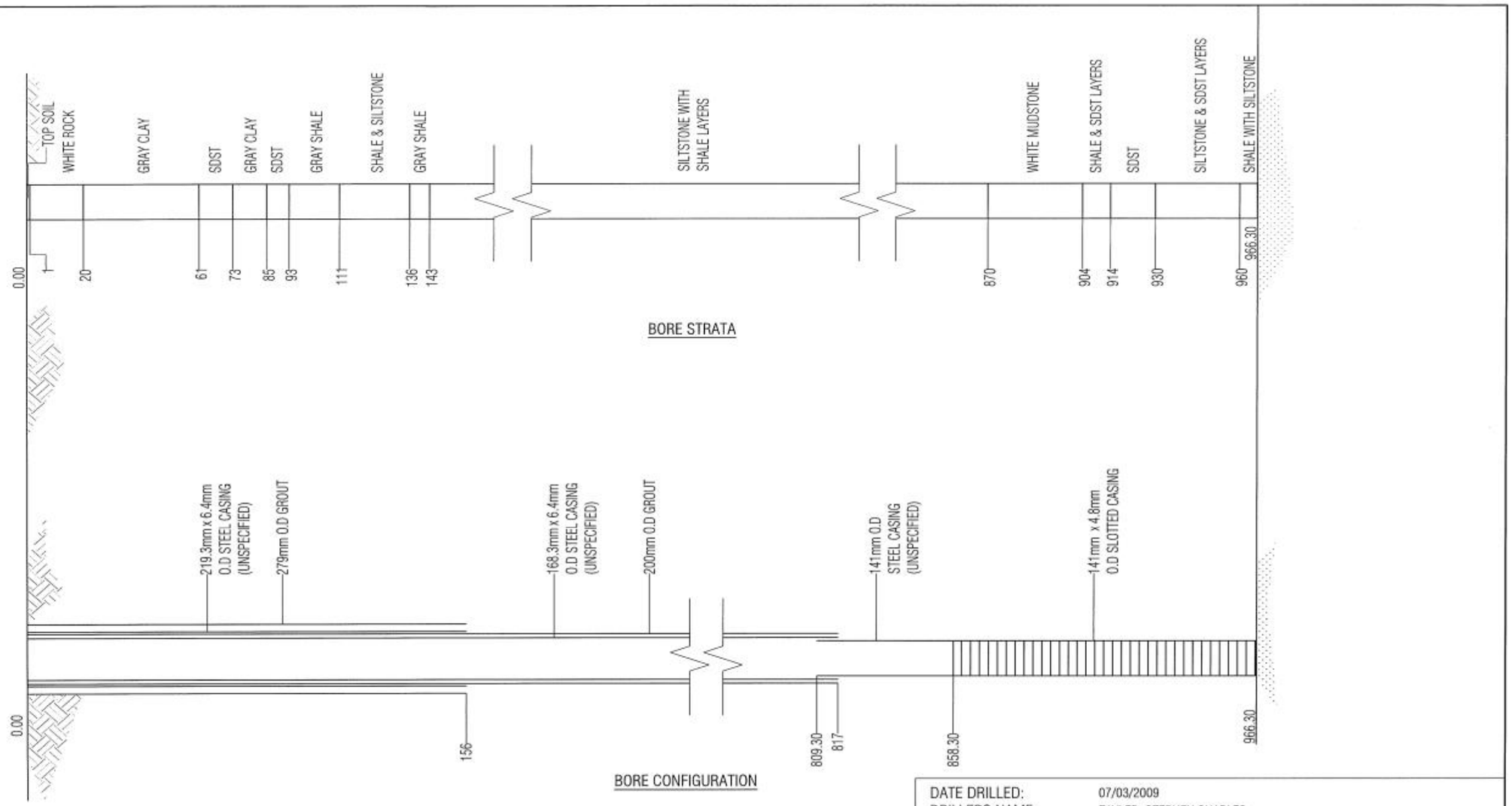
WATANL	SAMPLE	STRTIG	WIRLOG	MULCND	BRCOND	FPREAD	GNOTES

GENERAL NOTES
**** NO RECORDS FOUND ****

METERED USE
**** NO RECORDS FOUND ****

** End of Report **

Appendix D Bore Casing and Strata Details



DATE DRILLED:	07/03/2009
DRILLERS NAME:	TAYLER, STEPHEN CHARLES
DRILL COMPANY:	DALY BROS
METHOD OF CONST.:	MUD ROTARY
LOCATION - EASTING:	228555
NORTHING:	7052981

No.	Revision Description	By	Date
A	ORIGINAL ISSUE	JC	27/08/2012

Survey:

Drawn: JC

Check: AF

CONSULT AUSTRALIA Member Firm

GEORGE BOURNE & ASSOCIATES
Consulting Civil Engineers

Scale: AS SHOWN

Approved:

SLJ Bourne 1513 RPEQ

QUILPIE SHIRE COUNCIL

TOWN OF QUILPIE
QUILPIE NEW BORE
RN. 116266 DRILLED 2009
PLAN LAYOUT

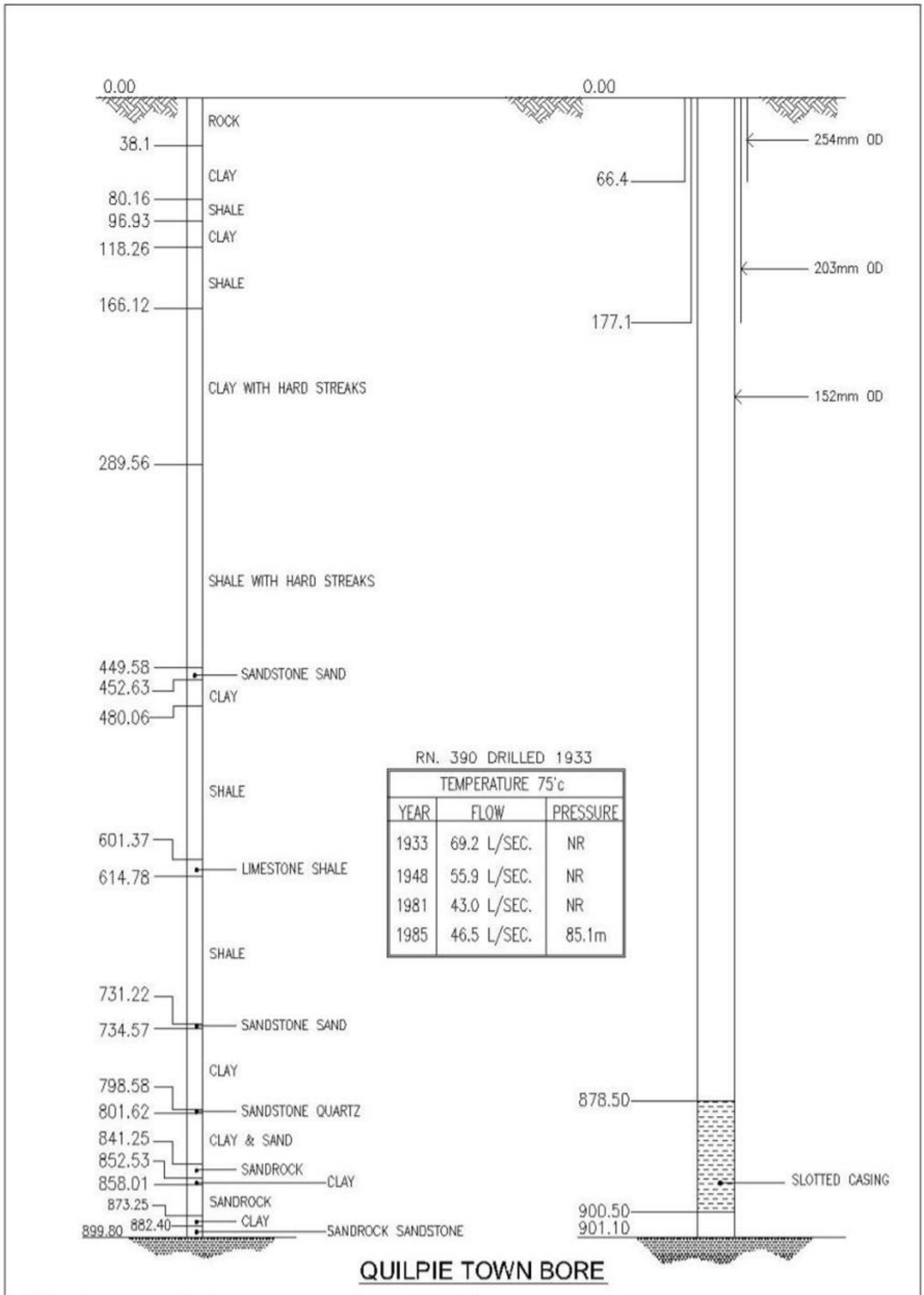
Job No. 11/16A Rev.

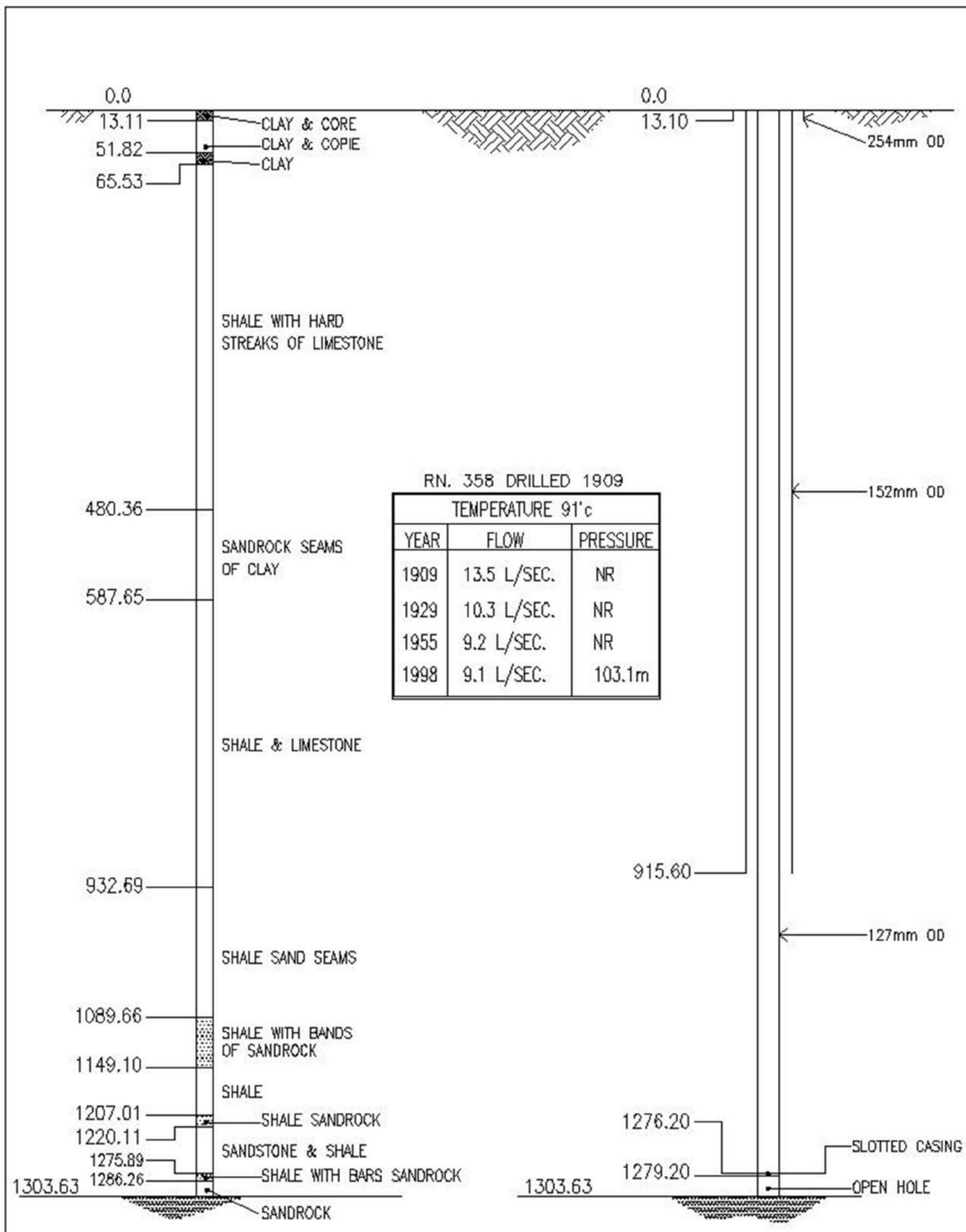
Drawing No. 2012-064/01 A

Category: WATER A3

ORIGINAL

Printed: 27/08/2012 11:21:22


0.00
ROCK
38.1
CLAY
80.16
SHALE
96.93
CLAY
118.26
SHALE
166.12
CLAY WITH HARD STREAKS
289.56
SHALE WITH HARD STREAKS
449.58
SANDSTONE SAND
452.63
CLAY
480.06
SHALE
601.37
LIMESTONE SHALE
614.78
SHALE
731.22
SANDSTONE SAND
734.57
CLAY
798.58
SANDSTONE QUARTZ
801.62
CLAY & SAND
841.25
SANDROCK
852.53
CLAY
858.01
SANDROCK
873.25
CLAY
882.40
899.80
SANDROCK SANDSTONE
0.00
66.4
177.1
254mm OD
203mm OD
152mm OD
878.50
SLOTTED CASING
900.50
901.10
RN. 390 DRILLED 1933
TEMPERATURE 75'c
YEAR
FLOW
PRESSURE
1933
69.2 L/SEC.
NR
1948
55.9 L/SEC.
NR
1981
43.0 L/SEC.
NR
1985
46.5 L/SEC.
85.1m
QUILPIE TOWN BORE
A
SLOTTED CASSING DEPTH CHANGED
LI.I
05/10/06
Rev.
By
Date
Sur.
Des.
Draw.
Chk.
GEORGE BOURNE & ASSOCIATES
Consulting Civil Engineers
Scale:
Approved:
S.Bourne
REPO
05/10/06
QUILPIE SHIRE COUNCIL
Quilpie Town Bore
RN. 390 Drilled 1933
Plan Layout
Job No.
Dwg. No.
Rev.
87-00/1
A
Cad. Name
A4



EROMANGA TOWN BORE

GEORGE BOURNE & ASSOCIATES CONSULTING CIVIL ENGINEERS			Assoc. Dwgs:	Size: A4
Surv.	Approved:	ACEA	QUILPIE SHIRE COUNCIL	Dwg No.
Des.			EROMANGA TOWN BORE	86-00
Drw. H.A 04/00	Scale:		RN. 358 DRILLED 1909	No. 1 of 1
Chk.				

Appendix E Acknowledgement of Non-potable Water Supplies (Eromanga and Adavale)

File/Ref DWR/515/104(0400)

QUILPIE SHIRE COUNCIL
2 4 FEB 2010
ACTION
Angie - something in newsletter, plus website maybe?
FYI

Queensland Government

Department of Environment and Resource Management

23 February 2010

Mr Carl Ninine
Chief Executive Officer
Quilpie Shire Council
P O Box 57
Quilpie QLD 4480

Dear Mr Ninine

Thank you for your letter to our Toowoomba office dated 25 September 2009 regarding Eromanga and Adavale water supplies and I apologise for the delay in responding.

The department acknowledges Council's advice that the above water supply schemes do not provide a drinking water service. On this basis, Council is not required to provide monitoring reports and to report drinking water quality parameter exceedences for Eromanga and Adavale water supply schemes as outlined in the *Drinking Water Service Provider Monitoring and Reporting Requirement Notice* and covering letter of 3 December 2008.

However you are advised that, as Council is providing a non-drinking water supply service, it has a duty of care to ensure action is taken to inform all residents and visitors of the public health limitations of the water supply.

To assist service providers, the department is preparing – in consultation with Queensland Health – information outlining the appropriate uses for non-drinking water and the measures that should be employed to establish and maintain an adequate level of community awareness regarding public safety when using such supplies.

Community awareness measures generally involve appropriate signage on publically accessible taps as well as periodic reminders to all households through mechanisms such as rate notices.

Once the information has been finalised, a copy will be forwarded to you. Should you have any further enquiries, please do not hesitate to contact Mr Ian Ryan, Principal Engineer - Western Queensland of the department on telephone 4688 1014.

Yours sincerely

Russell Cuerel
Manager
Infrastructure Management
Water Industry Asset Management & Standards
Office of the Water Supply Regulator

Level 3, 41 George Street
GPO Box 2454, Brisbane
Queensland 4001 Australia
Telephone + 61 7 3247 0369
Facsimile + 61 7 3224 7999
Website www.derm.qld.gov.au

Appendix F Water Licences

Client Ref: 159339
File Ref: CHA/515/001(0274)2

QUILPIE SHIRE COUNCIL
7 MAR 2011
ACTION

Queensland Government

Department of
Environment and Resource Management

3 March 2011

QUILPIE SHIRE COUNCIL
Attention to: CHIEF EXECUTIVE OFFICER
PO BOX 57
QUILPIE QLD 4480

YI
Angie - always thought it was 630 mgd, but is 600

Dear Sir/Madam

Application for Renewal of Water Licence: reference 00390E, application reference 529540

Attached is a Water Licence granted in accordance with the provisions of the *Water Act 2000*.

Please note that this Water Licence does not negate the requirement to obtain any other approvals or to enter into other statutory arrangements, such as those relating to Aboriginal cultural heritage, which may be required. In particular, the *Aboriginal Cultural Heritage Act 2003*, places a duty of care on anyone undertaking an activity to protect Aboriginal Cultural Heritage. Please refer to the attached information sheet for further information on this legislation.

If you have any further enquiries please call (07) 46881000.

Yours Sincerely

J McClymont

Margaret McClymont
Administration Officer

DEEDI / DERM Complex
203 Tor Street TOOWOOMBA
PO BOX 318
TOOWOOMBA 4350
Telephone +61 7 46881000
Facsimile +61 7 746881188

WATER LICENCE
Water Act 2000

Queensland Government

Reference	00390E	**Expiry Date**	31/03/2021
Licensee	QUILPIE SHIRE COUNCIL		
Authorised Activity	The taking of underground water from the Warrego West 3 Management Unit (Great Artesian Basin) with the point of take under Lot 1 on Q68045 and Lot 1 on Q68042.		
Authorised Purpose	Urban		
Nominal Entitlement	600 Megalitres		

This water licence is subject to the conditions endorsed hereon or attached hereto.

Under the *Sustainable Planning Act 2009* a development permit may be required for operational works to take or interfere with the water described in this licence. The licensee must ensure that the relevant development approvals have been obtained prior to installing or constructing new or additional operational works.

Given at Charleville this THIRD day of MARCH 2011.

John Bradley
Director-General
Department of Environment and Resource Management

Client Ref: 159339 File Ref: CHA/515/001(0274)2
Location: DEEDI / DERM Complex, 203 Tor Street, QLD
Postal: PO BOX 318, TOOWOOMBA 4350

Water Licence: 00390E
Expiry Date: 31/03/2021

Queensland Government

Conditions: Schedule A

6.31
The water taken under this water licence must be reticulated by pipeline to tanks and troughs. The use of a bore drain or a system of bore drains to distribute any of the water taken is not permitted.

Client Ref: 159339 File Ref: CHA/515/001(0274)2
Location: DEEDI / DERM Complex, 203 Tor Street, QLD

Water Licence: 00390E
Expiry Date: 31/03/2021

Queensland Government

Conditions: Schedule B

Spec 1
The supply of water from this bore shall be controlled to the satisfaction of the chief executive, by valves and piping to the town reticulation system and shall not be permitted to flow outside that system.

Client Ref: 159339 File Ref: CHA/515/001(0274)2
Location: DEEDI / DERM Complex, 203 Tor Street, QLD
Postal: PO BOX 318, TOOWOOMBA 4350

Client Ref: 159339
File Ref: CHA/515/001(0465)2

Queensland Government

9 September 2011

Department of
Environment and Resource Management

QUILPIE SHIRE COUNCIL
Attention to: CHIEF EXECUTIVE OFFICER
PO BOX 57
QUILPIE QLD 4480

Dear Sir/Madam

Application for Renewal of Water Licence: reference 00358E, application reference 537003

Attached is a Water Licence granted in accordance with the provisions of the *Water Act 2000*.

Please note that this Water Licence does not negate the requirement to obtain any other approvals or to enter into other statutory arrangements, such as those relating to Aboriginal and Torres Strait Islander cultural heritage, which may be required. In particular, the *Aboriginal Cultural Heritage Act 2003* and the *Torres Strait Islander Cultural Heritage Act 2003*, places a duty of care on anyone undertaking an activity to protect Aboriginal and Torres Strait Islander Cultural Heritage. Please refer to the attached information sheet for further information on this legislation.

If you have any further enquiries please call (07) 46881000.

Yours Sincerely

V J Marsh

Vanessa Marsh
Administration Officer

QUILPIE SHIRE COUNCIL
14 SEP 2011
ACTION
ANGIE
FYI

DEEDI / DERM Complex
203 Tor Street TOOWOOMBA
PO BOX 318
TOOWOOMBA 4350
Telephone +61 7 46881000
Facsimile +61 7 746881188
Website http://www.derm.qld.gov.au/

WATER LICENCE
Water Act 2000

Queensland Government

Reference	00358E	**Expiry Date**	30/09/2021
Licensee	QUILPIE SHIRE COUNCIL		
Authorised Activity	The taking of underground water from the Warrego West 3 Management Unit (Great Artesian Basin) with the point of take under Lot 8 on GO23.		
Authorised Purpose	Stock and Urban		
Description of Land	Attached to the land described as Lot 8 on GO23.		
Nominal Entitlement	70 Megalitres		

This water licence is subject to the conditions endorsed hereon or attached hereto.

Under the *Sustainable Planning Act 2009* a development permit may be required for operational works to take or interfere with the water described in this licence. The licensee must ensure that the relevant development approvals have been obtained prior to installing or constructing new or additional operational works.

Given at Charleville this NINTH day of SEPTEMBER 2011.

Jim Reeves
Director-General
Department of Environment and Resource Management

Client Ref: 159339 File Ref: CHA/515/001(0465)2
Location: DEEDI / DERM Complex, 203 Tor Street, QLD

Water Licence: 00358E
Expiry Date: 30/09/2021

Queensland Government

Conditions: Schedule B

SPEC 01 The supply of water from this bore shall be controlled to the satisfaction of the chief executive, by valves and piping to the town reticulation system and shall not be permitted to flow outside that system.

Client Ref: 159339 File Ref: CHA/515/001(0465)2
Location: DEEDI / DERM Complex, 203 Tor Street, QLD

Client Ref: 159339
File Ref: CHA/515/001(0166)

Queensland Government

18 November 2010

Department of
Environment and Resource Management

QUILPIE SHIRE COUNCIL
Attention to: CHIEF EXECUTIVE OFFICER
PO BOX 57
QUILPIE QLD 4480

Dear Sir/Madam

Grant of a water licence to replace an authority : reference 603804

Attached is an information notice which is advice of the decision and the reasons for the decision for the abovementioned granting of a water licence under a plan or declaration process in accordance with section 1037 of the *Water Act 2000*, which replaces a continuing authority under this Act.

If you have any further enquiries please call (07) 46881000.

Yours Sincerely

Teresa Lever
Technical Officer

QUILPIE SHIRE COUNCIL
23 NOV 2010
ACTION
FYI
Angie

DEEDI / DERM Complex
203 Tor Street TOOWOOMBA
PO BOX 318
TOOWOOMBA QLD 4350
Telephone +61 7 46881000
Facsimile +61 7 746881188
Website http://www.derm.qld.gov.au/

WATER LICENCE
Water Act 2000

Queensland Government

Reference	603804	**Expiry Date**	31/10/2020
Licensee	QUILPIE SHIRE COUNCIL		
Authorised Activity	The taking of underground water from the Warrego West 3 Management Unit (Great Artesian Basin) with the point of take under Lot 33 on A2455 and Lot 36 on MCK5320. Township of ADAVALE.		
Authorised Purpose	Town Water Supply		
Nominal Entitlement	200 Megalitres		

This water licence is subject to the conditions endorsed hereon or attached hereto.

Under the *Sustainable Planning Act 2009* a development permit may be required for operational works to take or interfere with the water described in this licence. The licensee must ensure that the relevant development approvals have been obtained prior to installing or constructing new or additional operational works.

Given at Charleville this EIGHTEENTH day of NOVEMBER 2010.

John Bradley
Director-General
Department of Environment and Resource Management

Client Ref: 159339 File Ref: CHA/515/001(0156)
Location: DEEDI / DERM Complex, 203 Tor Street, QLD
Postal: PO BOX 318, TOOWOOMBA, QLD, 4350

Water Licence: 603804
Expiry Date: 31/10/2020

Conditions: Schedule A

6.31
The water taken under this water licence must be reticulated by pipeline to tanks and troughs. The use of a bore drain or a system of bore drains to distribute any of the water taken is not permitted.

Client Ref: 159339 File Ref: CHA/515/001(0166)
Location: DEEDI / DERM Complex, 203 Tor Street, QLD
Postal: PO BOX 318, TOOWOOMBA, QLD, 4350

Appendix G Preliminary[6] List of Operational & Maintenance Procedures

• Operation and maintenance of bores	
• Maintenance log	
• Outline water supply contamination contingency plan	
• Customer complaints –water & sewerage	
• Information Management Plan	
• Hydrant maintenance	
• Hydrant Flow and Pressure Tests	
• Super-chlorination of water mains	Short-Term
• Trunk main shut down – Planned maintenance	
• Trunk main shut down – Unplanned maintenance	
• Valve maintenance	
• Notification of water supply interruptions – programmed works	
• Notification of water supply interruptions – unplanned works	
• Water main flushing	
• Water main repair – Reactive maintenance	

[6] This is a non-exhaustive list.

Appendix H Local Disaster Management Group Contact Details

Position Title	Organisation Name	Contact Details
QSC Mayor	Quilpie Shire Council	mayor@quilpie.qld.gov.au
QSC CEO	Quilpie Shire Council	ceo@quilpie.qld.gov.au
QSC Works Manager	Quilpie Shire Council	works@quilpie.qld.gov.au
QPS – Officer in Charge – Quilpie	Queensland Police Service	Buln Buln St, Quilpie QLD 4480
Area Director Scott Walsh	Emergency Management Qld	Scott.Walsh@dcs.qld.gov.au
Mike Castles	SES Local Controller QSC	whs@quilpie.qld.gov.au
Michael Thompson	SES Deputy Local Controller QSC	59 Jabiru St, Quilpie QLD 4480
Officer in Charge Chris Seng	Queensland Police Service -Adavale	Klugh St, Adavale QLD 4474
Robert Walker	SES Group Leaders QSC – Eromanga	Cranstoun, Eromanga QLD 4480
CAPTAIN	QFRS – Quilpie Fire Brigade	PO Box 108, Quilpie QLD 4480
	QAS – Quilpie	PO Box 27, Quilpie QLD 4480
Guy McPherson	Ergon Energy	Winchu St, Quilpie QLD 4480
DON	Queensland Health DON – Quilpie Hospital	PO Box 27, Quilpie QLD 4480
CEO	Murweh Shire Council	95-101 Alfred St, Charleville QLD 4470
CEO	Paroo Shire Council	49 Stockyard St, Cunnamulla QLD 4490s
CEO	Bulloo Shire Council	53 Dowling St, Thargomindah QLD 4492
CEO	Blackall-Tambo Regional Council	PO Box 21 *Blackall* QLD 4472.
District Disaster Coordinator	Charleville District Disaster Management Group	56 Alfred St, Charleville QLD 4470
Lyn Baxter	Quilpie Shire Council Library (Abridged version)	N/A
Station Master	QRail	Quilpie Rail Depot, Quilpie QLD 4480
Ralph Walker	SES Member – Eromanga	eromangacontracting@harboursat.com.au
Owen Cecil	SES Member - Eromanga	osweldingworks@yahoo.com.au
Mitch Field	Telstra Account Manager	Mitch.Field@team.telstra.com

Appendix I E.Coli Sampling Data

	17-Dec-15	27-Nov-15	22-Oct-15	30-Sep-15	20-Aug-05	30-Jun-15	19-May-15	29-Apr-15	27-Mar-15	26-Feb-15	29-Jan-15	21-Jan-15	24-Nov-14	24-Oct-14	21-Mar-13	29-Feb-2013	31-Jan-13	21-Dec-12	30-Nov-12	26-Oct-12	28-Sep-12	28-Aug-12	26-Jul-12	28-Jun-12	25-May-12	23-Feb-12	25-Jan-12	05-Jan-12	30-Dec-11	30-Nov-11	28-Oct-11	23-Sep-11	30-Aug-11	26-Jul-11	30-Jun-11	25-May-11	29-Apr-11	01-Mar-11	11-Feb-11	30-Dec-10	26-Nov-10	26-Oct-10	24-Sep-10	30-Jul-10	30-Jun-10	29-Apr-10	26-Mar-10	18-Feb-10	20-Jan-10	16-Dec-09	08-Oct-09	24-Sep-09	09-Jul-09	26-Mar-09	22-Sep-05	12-Jul-05	21-Jul-04
Bore No. 1								✓							✓			✓		✓	✓	✓		✓	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓					
Bore No. 2															✓		✓	✓	✓	✓	✓		✓	✓					✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓					
Quilpie Hospital	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓		✓																																						✓	✓	✓
Quilpie Shire Depot							✓									✓	✓		✓			✓	✓		✓	✓	✓	✓		✓		✓				✓										✓	✓	✓	✓			✓	✓	✓			
Football Field																										✓		✓																													
Quilpie Shire Office	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓																																						✓			✓	✓	✓
Eromanga Pub	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓																																											
Eromanga Plant	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓																																										
Eromanga Hall													✓	✓																																												

E.Coli Nil Detection	✓
E.Coli Detection	✗