BUSSELTON WATER

ANNUAL WATER QUALTY REPORT 2014- 2015

Contents

MESSAGE FROM THE CHIEF EXECUTIVE OFFICER

I am pleased to present the 2014-15 Water Quality Report.

Busselton Water has again achieved 100 per cent compliance with the health related and non-health related water quality criteria outlined in the Australian Drinking Water Guidelines (ADWG). In addition we have continued to meet all the compliance requirements of our Memorandum of Understanding (MoU) with the Department of Health.

In 2014-15 Busselton Water implemented a Drinking Water Quality Management Plan. The plan is a requirement as part of our MoU with the Department of Health and includes strategies to address the 12 elements of the ADWG.

In addition to presenting water quality results and performance against the MoU, this report also describes the processes Busselton Water uses to collect, treat and distribute drinking water to our customers.

I wish to thank everyone who has made a contribution to these excellent results; particularly our dedicated employees, representatives from the Department of Health and consultant hydrogeologists Rockwater Pty Ltd.

Chris Elliott
Chief Executive Officer

OUR COMMITMENT

Drinking water quality policy

Busselton Water is committed to achieving compliance with the water quality criteria defined in the Australian Drinking Water Guidelines (ADWG).[1]

In pursuit of our commitments, we:

- systematically monitor and report water quality performance;
- prepare for incidents including regular testing of our response plans; and
- fulfil all the requirements of our Operating Licence and Memorandum of Understanding (MoU) with the Department of Health.

Drinking water quality management plan

Busselton Water's Drinking Water Quality Management Plan (the Plan) was implemented in 2014 and is based on the ADWG Framework for the Management of Drinking Water Quality, endorsed by the National Health and Medical Research Council. The Framework provides benchmark water quality guidelines and values for the design of a structured and systematic approach to drinking water quality management, ensuring a safe and reliable water supply.

There are 12 elements within the framework which are considered best practice. These elements are divided into four sections:

- Commitment to drinking water quality management
- System analysis and management
- Supporting requirements
- Review

The Plan includes strategies to address these 12 elements and Busselton Water will regularly assess its progress towards further alignment with the ADWG Framework.

The implementation of the Plan is a requirement of our MoU with the Department of Health. The MoU describes the Department of Health requirements for compliance with regards to microbiological, health, chemical and radiological criteria and has been recognised by our regulator, the Economic Regulation Authority. The MoU has been extended to December 2015 and a copy can be found on our website at **www.busseltonwater.wa.gov.au**

Busselton Water provides the Department of Health with a quarterly water quality report that outlines how the organisation has performed against the agreed requirements as specified in the MoU. In addition, our Water Quality Committee meets with the Department of Health quarterly during the reporting period to review water quality results and discuss relevant legislation and research.

Busselton Water supports and is an active member of the Advisory Committee for the Purity of Water.

Busselton Water provides raw water information to the Department of Water to ensure the long-term sustainability of the water supply for the Busselton region.

1 The "Australian Drinking Water Guidelines" published by the National Health and Medical Research Council, Australia's peak health research body, provides an authoritative reference on what defines safe, good quality drinking water; how it can be achieved; and how it can be assured. It is available for download from www.nhmrc.gov.au/guidelines/publications.

WATER QUALITY RESULTS AT A GLANCE

We achieved exceptional water quality results in 2014-15.

Health related characteristics	% compliance with MoU
Escherichia coli	100
Naegleria	100
Chemical	100
Pesticides	100
Radiological	100
Chlorine disinfection	100
Non-health parameters	**% compliance with MoU**
Aesthetic	100

ABOUT OUR WATER

Our licence area

Busselton Water provides safe, sustainable and affordable water supplies to approximately 26,000 people in the City of Busselton and up to 50,000 people in the peak tourist season. In addition, we provide bulk water supplies to the Water Corporation in Dunsborough.

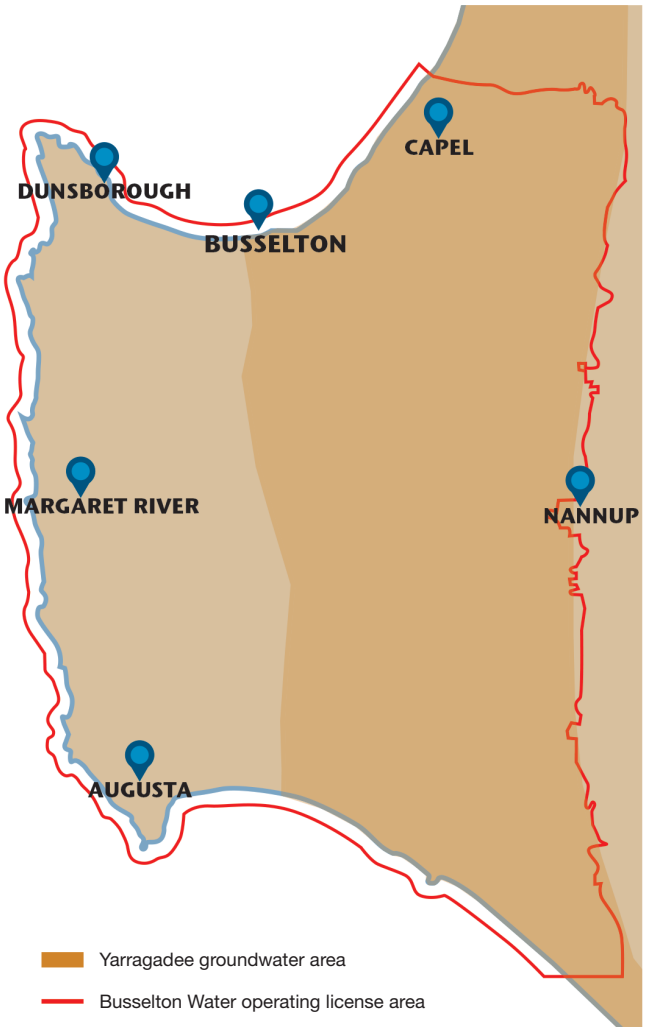
Busselton Water was formed nearly 110 years ago and became a water corporation in November 2013. Our operating licence is issued by the Economic Regulation Authority (ERA) under the *Water Services Act 2012* and is valid until 1 October 2021.

Under the provisions of the *Water Services Act 2012*, Busselton Water is poised for growth and diversification.

Busselton Water's operating licence area was increased from 81,200 to 688,700 hectares in August 2014. The larger operating licence area was granted by the ERA to facilitate Busselton Water's desire to grow and expand its water services operations and to diversify into the management of surface water drainage within the Geographe Catchment Area.

The official map of the expanded operating licence area can be viewed on the ERA's website at **www.erawa.com.au**

The new operating licence area is illustrated in the plan adjacent.



ABOUT OUR WATER

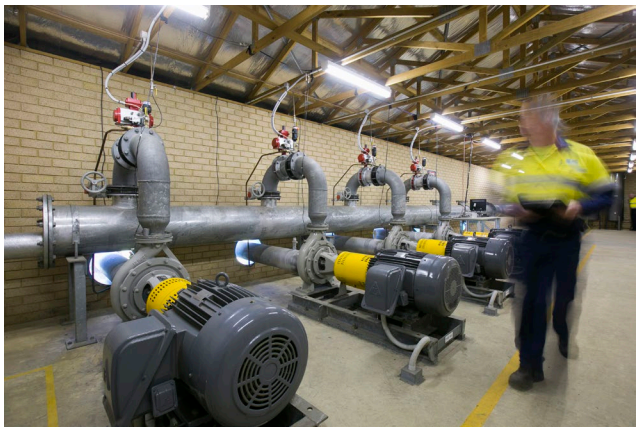
Our water source

Busselton Water sources the bulk of its raw water from the deep confined Yarragadee aquifer which extends to more than 800 metres in depth. There is some minor draw from the base of the shallower Leederville aquifer which extends from about 10 to 275 metres in depth.

Busselton Water extracts raw water under licences (GWLs 110850 and 110851) issued by the Department of Water from the Yarragadee and Leederville aquifers. There are eight production bores which pump raw water to the treatment plants for filtration and disinfection before it is stored in tanks and reticulated to customers. The bores are located at Plant 1 Kent Street, Plant 2 Queen Elizabeth Avenue, Plant 3 Hobson Street, and Plant 5 Queen Elizabeth Avenue.

During the 2014-15 financial year Busselton Water extracted 5.18 gigalitres of ground water; an increase on previous years and consistent with the increase in our customer base.

Financial year	Extraction (gigalitres)
2008-2009	4.49
2009-2010	4.23
2010-2011	4.30
2011-2012	4.30
2012-2013	4.59
2013-2014	5.05
2014-2015	5.18



Our distribution network

Busselton Water's distribution network delivers drinking water within the City of Busselton, including bulk water to the Water Corporation in Dunsborough. The network operates as one large interconnected system. The materials used in the reticulation network have been approved either under Australian Standard AS/NZS 4020: 2005 (testing of procedures for use in contact with drinking water) or as scheduled in our Memorandum of Understanding with the Department of Health.

Strict protocols have been established by Busselton Water in conjunction with the Department of Health to assure the safe integrity of the distributed water and the safe handling of chlorine at the treatment plants.

The distribution network has the following components:

Estimated population	Approx. 26,000
Total number of connections	12,545
Total length of pipes	315 km
Number of storage tanks	5
Chlorine residual target	0.5 mg/L
Number of distribution water quality zones	1

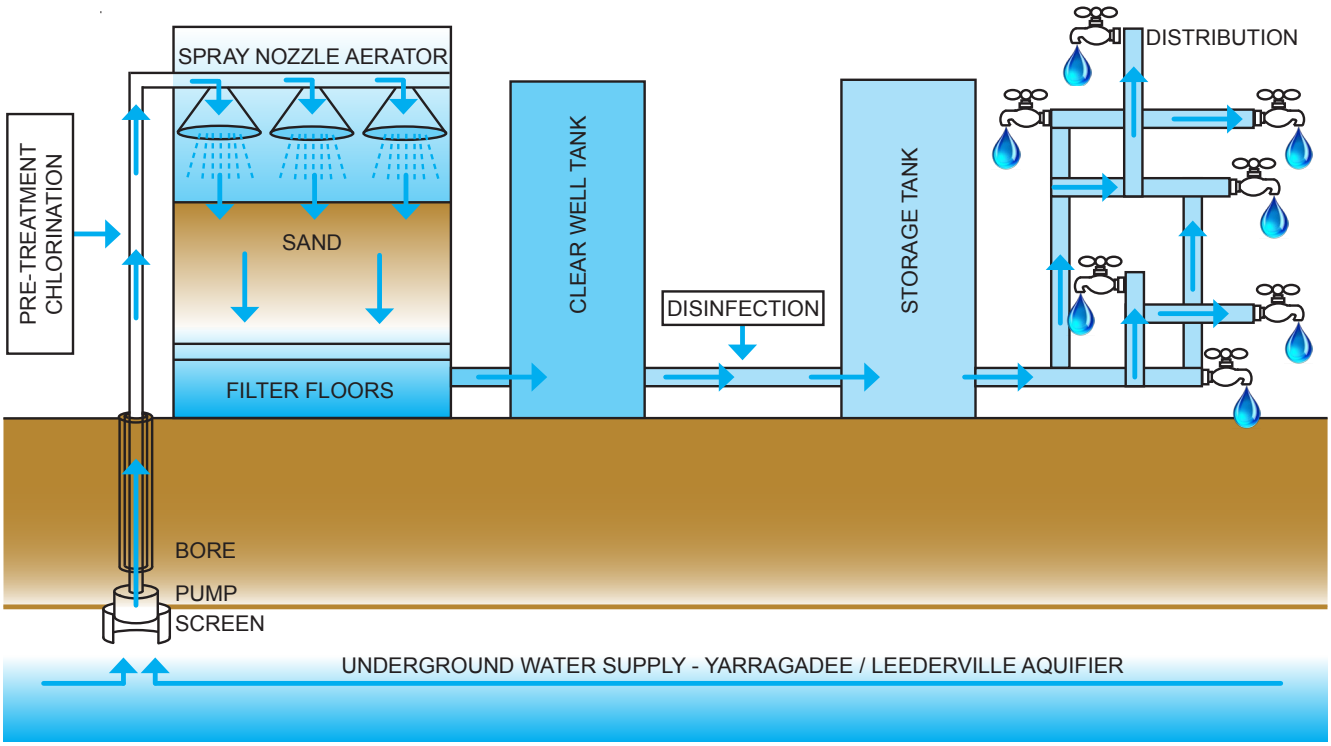
ABOUT OUR WATER

Our water treatment plants

Busselton Water has three treatment plants:

- Plant 1 – Kent Street, Busselton
- Plant 2 – Queen Elizabeth Avenue, Busselton
- Plant 3 – Hobson Street, East Busselton

WATER TREATMENT AND SUPPLY PROCESS



UNDERSTANDING WATER QUALITY

Turbidity	Turbidity is the cloudy appearance of water caused by the presence of suspended matter.	The Australian Drinking Water Guidelines specify an aesthetic guideline of 5 NTU. If disinfection is required, the turbidity of less than 1 NTU is desirable at the point of disinfection.
Colour	Colour in water originates mainly from natural drainage through soil and vegetation in a catchment.	The Australian Drinking Water Guidelines value for colour is based on the colour that is noticeable in a glass. This is generally accepted as 15 HU.
Iron	Iron occurs naturally in water as a result of contact with soil or rock in the catchment. Iron in the water does not present a health hazard.	The Australian Drinking Water Guidelines recommend that based on aesthetic consideration, the concentration of iron should not exceed 0.3 mg/L.
Manganese	Manganese in water can come from contact with soil or rock in the catchment. Manganese is not considered a health concern unless the concentration exceeds 0.5mg/L.	The Australian Drinking Water Guidelines recommend that based on aesthetic considerations, the levels of manganese should not exceed 0.1mg/L.
Total dissolved solids	Total dissolved solids (TDS) consist of inorganic (natural) salts and small amounts of organic matter dissolved in water. Total dissolved solids comprise sodium, potassium, calcium, magnesium, chloride, sulphate, bicarbonate, carbonate, silicon, organic matter, fluoride, iron, manganese, nitrate and phosphate.	Treated water quality containing TDS levels of below 500mg/L is classified good.
Microbiological pathogens and disinfection	Thermophilic *Naegleria* refers to a group of amoeba which includes *Naegleria fowleri*, the organism that causes the waterborne disease primary amoebic meningoencephalitis. *Naegleria fowleri* is an environmental pathogen which naturally lives in fresh warm water. The most common and widespread health risk associated with drinking water is contamination by microorganisms. Organisms associated with the gut of humans and mammals cause the usual waterborne diseases. Tests are undertaken for *Escherichia coli* (E. coli).	The Department of Health WA has notification protocols in place regarding *Naegleria*. The Australian Drinking Water Guidelines state that thermotolerant coliforms/E. coli should not be present in a minimum 100mL sample.
Radiological	There are natural levels of radiation within the environment, and groundwater sources such as that sourced from the Yarragadee aquifer can have higher background levels than that of surface water systems.	Testing is undertaken for gross alpha and gross beta radioactivity, where levels of Radium 226 and Radium 228 can be determined. The Australian Drinking Water Guidelines 2004 recommend that levels should not exceed 0.5 Bq/L.
pH	pH is a measure of how acidic/basic water is. The range goes from 0 - 14, with 7 being neutral. pH is the measure of free hydrogen ion concentrations in the water.	The suggested aesthetic pH target from the Australian Drinking Water Guidelines is 6.5 to 8.5.

NTU – Nephelometric turbidity units; HU – Hazen Units; mg/L – Milligrams per litre; Bq/L – Becquerel per litre

ENSURING WATER QUALITY

Source protection

Busselton Water, in conjunction with the Department of Water, developed the Busselton Water Reserves Drinking Water Source Protection Plan (Report WRP 139) (the Plan). The Plan was released by the Department of Water in August 2013. By proclaiming the water reserves, these locations are now under legislative protection.

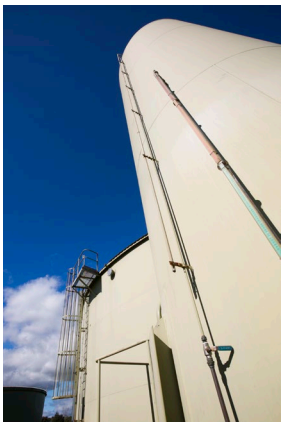
The Plan defines the boundaries of Busselton Water's Water Reserve. These water reserve boundary areas are assigned 'Priority 1' around the bore locations. The Reserve has been proclaimed and serves to identify the location for referral of land use development proposals which may pose a risk, including petroleum exploration or other proposed bores in close proximity. It is noted within the Plan that due to the confined nature of this drinking water source, there is no risk of contamination from overlying land uses.

Busselton Water is also bound by the Department of Water's Groundwater Licence Operating Strategy (GLOS). The GLOS was issued by the Department of Water in March 2014 and stipulates the annual extraction entitlement limits, licence conditions and requirements with which Busselton Water must comply. Busselton Water's consultant hydrogeologists (Rockwater Pty Ltd) regularly review the GLOS. In addition, they also implement, monitor and report on the borefield construction and maintenance plan to ensure sustainable operating strategies.

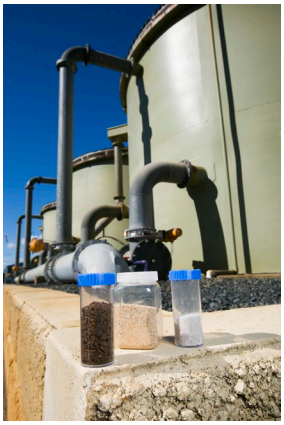
Water treatment

Busselton Water uses a three step process to treat the raw water from the deep groundwater aquifers to produce safe drinking water to its customers.

Pre-treatment and aeration
Raw water is dosed with a small amount of chlorine then aerated via spray aerators. This oxidises naturally occurring iron and manganese turning it from its soluble form into small solids.



Filtration
The pre-chlorinated and aerated water is then filtered through sand filters to remove the iron, manganese, turbidity and other impurities. The filtered water is then collected in a clear well.



Disinfection
A further dose of chlorine is then added to water pumped from the clear well to maintain the disinfection level required to preserve microbiological safety before it is stored in tanks and pumped into the distribution system.

ENSURING WATER QUALITY

Multi barrier approach

Preventing contamination and minimising potential hazards are essential in providing our customers with safe drinking water. The Australian Drinking Water Guidelines (ADWG) state that a multi barrier approach is the most effective way to ensure the safety of drinking water.

Busselton Water's barriers include:

- Protection of groundwater
- Treatment
- Chlorine disinfection
- Backflow prevention

Busselton Water maintains and operates these multiple barriers, ensuring they are robust and that high quality water is delivered to its customers.

Incident responses

Busselton Water has stringent controls in place to ensure that water quality is maintained.

Busselton Water has response plans in place to manage any water quality incidents that occur; whether due to equipment failure, human error, extreme weather conditions or unforeseen events. Where incidents do occur, our incident response team is geared to act immediately to ensure minimal disruption and impact on water quality.

In the event of a water quality incident, Busselton Water activates its Water Quality Incident Response Plan, which is a comprehensive plan to manage water quality incidents and links to the binding protocols of the Memorandum of Understanding (MoU) between Busselton Water and the Department of Health.

In order to maintain our preparedness to deal with any water quality incidents and as part of our compliance with the MoU with the Department of Health, two mock events simulating a failure of our systems are conducted annually. This year the events were held in August 2014 and June 2015. The first tested our response to an *Escherichia coli* incursion and involved representatives from the Department of Health. The second was an internal mock event that tested the response to a *Naegleria fowleri* incursion.

In June 2015 a water quality incident occurred when high chlorine water was released into the distribution network at Dawson Estate, Vasse. This was reported to the Department of Health. The event was managed and quickly controlled using our incident response procedures. Learnings from this event have resulted in improvements to the commissioning process for new distribution pipework.

ENSURING WATER QUALITY

Water quality monitoring and testing

Busselton Water has a comprehensive monitoring program which has been reviewed and endorsed by the Department of Health.

Key parameters monitored by Busselton Water include:

- **Microbiological** – this includes thermophilic *Naegleria* and *Escherichia coli*
- **Chemical health** – this includes a large range of parameters with health related guide line values in the ADWG
- **Chemical non-health (aesthetic)** – this includes a large range of parameters with the non-health guideline values in the ADWG
- **Radiological health** – monitoring and testing carried out on an annual basis

Development, training and innovation

Busselton Water employees undergo regular training in water quality management policies and procedures.

Staff also attend relevant industry seminars and conferences.

Managing complaints

We strive to deliver excellence in customer service and continue to improve our existing levels of customer satisfaction. We operate a robust complaints process to help ensure we are meeting expectations and addressing issues as and when they arise.

In 2014-15, 22 water quality complaints were received. Twenty complaints related to taste and odour, one to discoloured water and one was a general complaint. This represents a 31 per cent reduction compared to the 32 water quality complaints received in 2013-14.

WATER QUALITY RESULTS

Summary

Microbiological and disinfection health results

Busselton Water collected a total of 364 samples from the reticulation system during the reporting period and 100 per cent of these results were compliant with no detections of either *Escherichia coli* or thermophilic *Naegleria*. A further 1,686 samples were taken for chlorine levels.

Chemical health results

There are a large number of chemical parameters which have health related guideline values in the Australian Drinking Water Guidelines (ADWG). The report on page 15 gives more detail on the individual parameters. Busselton Water achieved 100 per cent compliance with all the health-related requirements set out in the ADWG for chemical parameters.

Radiological health results

Groundwater radiological testing is carried out in accordance with parameters and frequencies based on the ADWG and in consultation with the Department of Health.

Graduates radiological testing is only required periodically. Radium 228 and Radium 226 are tested annually in April and results from these samples were 100 per cent compliant.

Non-health (aesthetic) results

There are a large number of parameters with aesthetic guideline value in the ADWG parameters. The detailed report in the next section gives more detail on the individual parameters. Busselton Water achieved 100 per cent compliance except for chlorine in the distribution system.

Free chlorine concentrations exceeded aesthetic limits in some locations; however, the ADWG state that “In some supplies it may be necessary to exceed the aesthetic guideline in order to maintain an effective residual throughout the system.” Free chlorine concentrations in the distribution system have been optimised so that the target residual at the end of the network is achieved.

WATER QUALITY RESULTS

CHEMICAL HEALTH – 1 JULY 2014 TO 30 JUNE 2015

CHARACTERISTIC	UNIT	ADWG limit (health)	No. of samples		Total no. of samples (raw + distribution)	Maximum value		Number of non-compliance with ADWG limit		Compliance % distribution water
			Raw water	Distribution water		Raw water	Distribution water	Raw water	Distribution water	
Antimony	mg/L	0.003	0	4	4	-	ND	-	0	100
Arsenic	mg/L	0.007	30	0	30	ND	-	0	-	
Barium	mg/L	0.7	30	0	30	0.39	-	0	-	
Boron	mg/L	4	30	0	30	0.31	-	0	-	
Cadmium	mg/L	0.002	0	4	4	-	ND	-	0	100
Carbon Tetrachloride	mg/L	0.003	8	0	8	ND	-	0	-	
Chlorine (total)	mg/L	5	0	843	843	-	1.97	-	0	100
Chromium	mg/L	0.05	0	4	4	-	ND	-	0	100
Copper	mg/L	2	0	84	84	-	0.017	-	0	100
Fluoride	mg/L	1.5	90	84	174	1	0.7	0	0	100
Lead	mg/L	0.01	0	4	4	-	ND	-	0	100
Manganese (total)	mg/L	0.5	90	84	174	0.19	0.013	0	0	100
Mercury	mg/L	0.001	30	0	30	ND	-	0	-	
Molybdenum	mg/L	0.05	30	0	30	ND	-	0	-	
Nickel	mg/L	0.02	30	4	34	0.009	ND	0	0	100
Nitrate	mg/L	50	30	0	30	0.09	-	0	-	
Nitrite	mg/L	3	30	0	30	0.17	-	0	-	
Selenium	mg/L	0.01	30	0	30	ND	-	0	-	
Sulphate	mg/L	500	30	0	30	19	-	0	-	
Total Trihalomethanes	mg/L	0.25	0	48	48	-	0.006	-	0	100
Uranium	mg/L	0.02	30	0	30	ND	-	0	-	

WATER QUALITY RESULTS

RADIOLOGICAL SAMPLES – 1 JULY 2014 TO 30 JUNE 2015

CHARACTERISTIC	UNIT	ADWG (health)	Non-compliance (health)	No. of samples	% Compliance (health)	Maximum value
Radium 226	Bq/L	0.5	0	8	100	0.156 +- 0.025
Radium 228	Bq/L	0.5	0	8	100	0.150 +- 0.039

Busselton Water collected 1,686 free chlorine and total chlorine samples in the distribution network during 2014-15. The minimum, average and maximum levels were:

TYPE	Minimum mg/L	Average mg/L	Maximum mg/L
Distributed chlorine (free)	0.35	0.61	1.81
Distributed chlorine (total)	0.31	0.65	1.97

MICROBIOLOGICAL SAMPLES – 1 JULY 2014 TO 30 JUNE 2015

CHARACTERISTIC	UNIT	ADWG limit	No. of samples		Total no. of samples (treated + distribution)	Maximum value		Number of non-compliance with ADWG limit		Compliance % distribution water
			Treated water (non-assessable)	Distribution water (assessable)		Treated water (non-assessable)	Distribution water (assessable)	Treated water (non-assessable)	Distribution water (assessable)	
Escherichia coli	CFU/100mL	0	260	364	624	0	0	0	0	100
Thermophilic *Naegleria*	org/250mL	ND	260	364	624	ND	ND	0	0	100
Naegleria fowleri	org/250mL	ND	0	0	0	-	-	0	0	100

WATER QUALITY RESULTS

CHEMICAL NON-HEALTH (AESTHETIC) SAMPLES – 1 JULY 2014 TO 30 JUNE 2015

CHARACTERISTIC	UNIT	ADWG limit (health)	No. of samples		Total no. of samples (raw + distribution)	Maximum value		Number of non-compliance with ADWG limit		Compliance % distribution water
			Raw water	Distribution water		Raw water	Distribution water	Raw water	Distribution water	
Ammonia	mg/L	0.5	0	84	84	-	0.005	-	0	100
Chloride	mg/L	250	30	0	30	120	-	0	-	
Colour true	HU	15	90	84	174	26	ND	2	0	100
Colour app	HU	15	90	84	174	520	3	59	0	100
Copper	mg/L	1	0	84	84	-	0.017	-	0	100
Hardness	mg/L	200	90	84	174	130	130	0	0	100
Hydrogen Sulphide	mg/L	0.05	0	4	4	-	ND	-	0	100
Iron (soluble)	mg/L	0.3	90	84	174	21	0.035	69	0	100
Iron (total)	mg/L	0.3	90	84	174	21	0.13	75	0	100
Manganese (soluble)	mg/L	0.1	90	84	174	0.13	0.01	2	0	100
Manganese (total)	mg/L	0.1	90	84	174	0.19	0.013	2	0	100
pH	pH	6.5- 8.5	90	843	933	8.1	8.5	0	0	100
Sodium	mg/L	180	30	0	30	89	-	0	-	
Sulphate	mg/L	250	30	0	30	19	-	0	-	
Salinity (as Total Dissolved Solids)	mg/L	500	90	0	90	470	-	0	-	
Turbidity	NTU	5	90	843	933	2.47	0.66	0	0	100
Zinc	mg/L	3	0	4	4	-	0.009	-	0	100

mg/L – Milligrams per litre
Bq/L – Becquerel per litre
NTU – Nephelometric turbidity units
ND – Not Detected
HU – Hazen Units

For further information please contact Busselton Water at the address below:

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