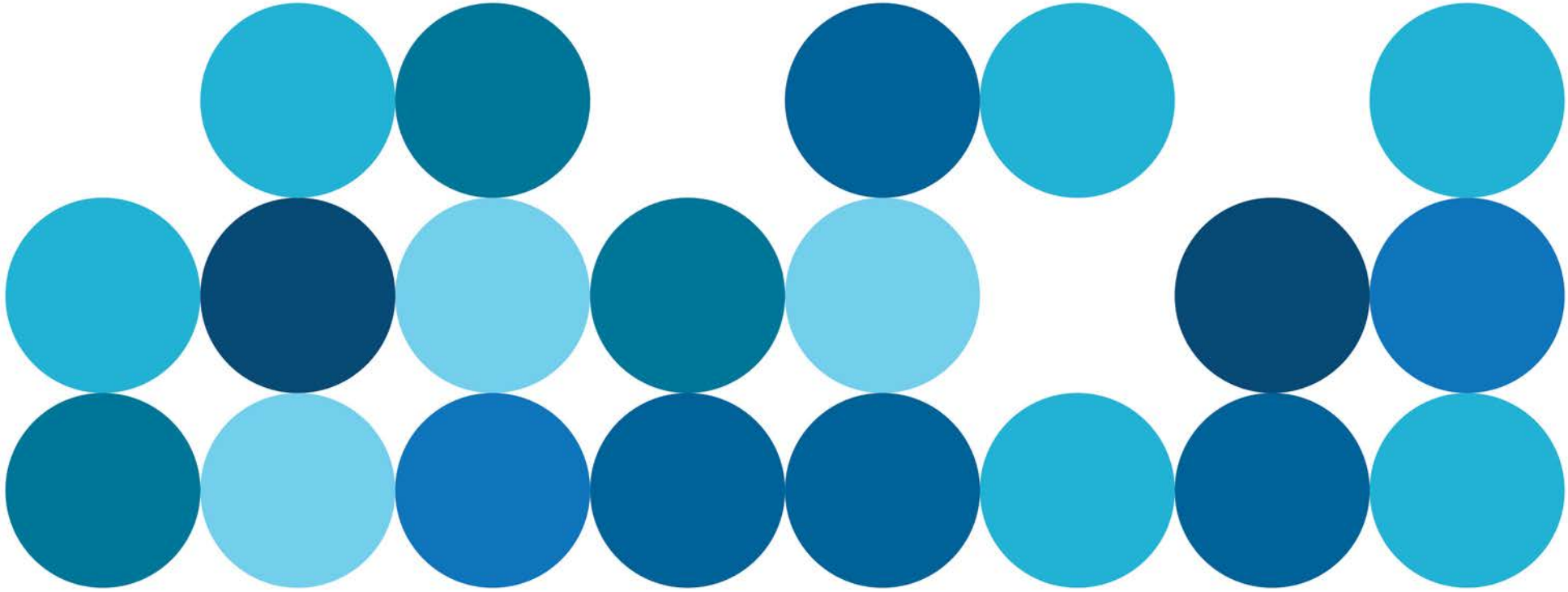
Drinking Water Quality

Annual Report 2018-19



WATER CORPORATION

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About this report

Water Corporation's 2018-19 Drinking Water Quality Annual Report is a review of our performance for the financial year ending 30 June 2019.

This report is designed to provide our customers and the Western Australian public with information on the quality of their drinking water.

Publication of this report allows us to meet the requirements of the Australian Drinking Water Guidelines, our Water Services Licence with the Economic Regulation Authority, our Memorandum of Understanding with the Department of Health and the National Performance Reporting requirements under the National Water Initiative.

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Acronyms

Acronym	Description
ADWG	Australian Drinking Water Guidelines
AWRP	Advanced Water Recycling Plant
BRA	Barrier Risk Assessment
CMS	Catchment Management Strategy
CPI	Customer Performance Index
DoH	Department of Health
EDR	Electrodialysis reversal
GAR	Goldfields and Agricultural Region
GAWS / GAWSS	Goldfields and Agricultural Water Supply / Goldfields and Agricultural Water Supply Scheme
GSR	Great Southern Region
GSTWS / GSTWSS	Great Southern Towns Water Supply / Great Southern Towns Water Supply Scheme
GWR / GWRS	Groundwater Replenishment / Groundwater Replenishment Scheme
IWSS	Integrated Water Supply Scheme
LGSTWS / LGSTWSS	Lower Great Southern Towns Water Supply / Lower Great Southern Towns Water Supply Scheme
MIEX	Magnetic Ion Exchange
mg/L	Milligrams per litre
MoU	Memorandum of Understanding
MWR	Mid-West Region
NHMRC	National Health and Medical Research Council

Acronym	Description
NTU	Nephelometric Turbidity Units
NWR	North West Region
PDWSA	Public Drinking Water Source Area
PFAS	Per- and poly-fluoroalkyl substances
PFHxS	Perfluorohexane sulfonate
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
RO	Reverse osmosis
RPZ	Reservoir protection zone
SCADA	Supervisory Control and Data Acquisition
SWR	South West Region
TCU	True Colour Units
TDS	Total Dissolved Solids
THM	Trihalomethanes
µg/L	Micrograms per litre
UF	Ultra-filtration
UV	Ultra-violet
WBRWSS	Warren Blackwood Regional Water Supply Scheme
WQMS	Water Quality Management System
WTP	Water Treatment Plant

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Summary

Ensuring supply of safe drinking water is our highest priority. In 2018-19, we achieved compliance with the health related requirements and met all health targets for drinking water quality set by the Department of Health (DoH).

Health related performance

- 100 per cent compliance with microbiological guidelines
- 100 per cent compliance with health related chemical guidelines

Non-health (aesthetic) related performance

While we strive to meet guidelines for aesthetic characteristics, this can be challenging to achieve across the diverse water sources in Western Australia.

This is especially the case in some of our small country water schemes where there may be few sources of drinking water available, and where installation of treatment can be very costly.

In 2018-19 our performance for all aesthetic analyses was 94 per cent. Although we meet all obligations under our Water Services Licence, we recognise there are always opportunities for improvement.

Customer performance index

For 2018-19, the feedback from our customers about their water quality was strong – with the end of year average of 7.17 for providing an acceptable standard of water and 7.26 for providing a consistent level of water.

This is our 17th Drinking Water Quality Annual Report and we trust it provides our customers with the information they require about their drinking water quality.

We welcome any comments and feedback by phone on 13 13 85 or by email at **report@watercorporation.com.au**

Figure 1: Mundaring Water Treatment Plant (Source Water Corporation)

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Figure 2: State-wide drinking water sources (100% compliance is in relation to requirements of Memorandum of Understanding with Department of Health)

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Our commitment to you

We are committed to providing our customers with safe, high-quality drinking water that consistently meets the requirements of the Australian Drinking Water Guidelines 2011 (ADWG), our customers and other regulatory provisions.

To achieve this, in partnership with stakeholders and relevant agencies, we will:

- Manage water quality from a 'water source to water meter' approach and promote confidence in the safe supply of drinking water.
- Incorporate the needs and expectations of our consumers and stakeholders, regulators and employees into our planning.
- Strongly advocate source protection and primacy of drinking water quality over other land uses.
- Use a risk-based approach to identify and manage potential threats and ensure appropriate barriers to water quality.
- Comply with the health-related criteria of the ADWG* and work to progressively improve compliance with aesthetic criteria.
- Use appropriate contingency planning and maintain incident response capability.
- Routinely monitor our systems and use effective reporting mechanisms to provide relevant and timely information on our performance.
- Participate in research and development activities to ensure we continually improve our understanding of drinking water quality issues and performance.
- Contribute to setting industry regulations and guidelines, and other standards relevant to public health and the water cycle.
- Continually improve our practices by assessing performance against corporate commitments and stakeholder expectations.

We will implement and maintain a drinking water quality management system consistent with the ADWG to effectively manage the risks to drinking water quality. All Water Corporation employees and alliance partners involved in the supply of drinking water are responsible for understanding their role in implementing and continuously improving the drinking water quality management system.

*We have a Memorandum of Understanding with the Department of Health that grants exemptions to the infant health guideline for 10 towns in the Mid-West and Goldfields and Agricultural regions. We are progressively working to improve the water quality in these towns.

For further information please refer to our Drinking Water Quality Policy and Drinking Water Source Protection Policy.

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Introduction

We provide drinking water to Perth, Mandurah and more than 220 regional towns and communities throughout Western Australia.

This year we delivered almost 367 billion litres of drinking water to more than 1.30 million properties through 34,779 kilometres of water mains. This water came from 45 surface water sources, 85 groundwater sources and two major desalination plants (the Perth Seawater Desalination Plant and Southern Seawater Desalination Plant).

Under our Water Services Licence, we comply with a Memorandum of Understanding (MoU) with the Department of Health (DoH). We act in accordance with the microbiological, health related chemical and radiological criteria as specified by the National Health and Medical Research Council (NHMRC) in the Australian Drinking Water Guidelines 2011 (ADWG).

Our health performance (chemical, microbiological, and radiological) has again resulted in 100 per cent of metropolitan and country localities meeting the high standards set by the DoH.

Our extensive and sophisticated drinking water quality monitoring program confirms the safety of the water we provide to our customers. Microbiological, chemical and radiological analyses are carried out by independent laboratories.

Figure 3: Carnarvon elevated and ground level tanks – image taken by drone (see Case Study - The use drones for catchment management, page 33)

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Where does your water come from?

Perth Metropolitan Region

Our largest scheme, the Integrated Water Supply Scheme (IWSS) delivered more than 287 billion litres of water to more than two million people in Perth, Mandurah, parts of the Goldfields and Agricultural, South West and Great Southern Regions. Customers receive a mix of groundwater, surface water and desalinated seawater. The percentage of each depends on seasonal factors; this year it was around 43 per cent groundwater, 26 per cent surface water and 31 per cent desalinated water.

Surface water comes from eight dams in the Darling Range: South and North Dandalup, Serpentine, Wungong, Churchman Brook, Canning, Victoria and Mundaring Weir. Water is also supplied from Stirling and Samson dams in the South West.

Groundwater is drawn from the Yarragadee, Leederville and Mirrabooka aquifers, and is treated at six groundwater treatment plants. Most of our bores are located in Perth's northern suburbs. We also have independent artesian bores which pump water directly into service reservoirs. In 2018-19, drinking water production for the IWSS was delivered on target and within overall water allocation and licence parameters. Total groundwater abstracted was 123 billion litres.

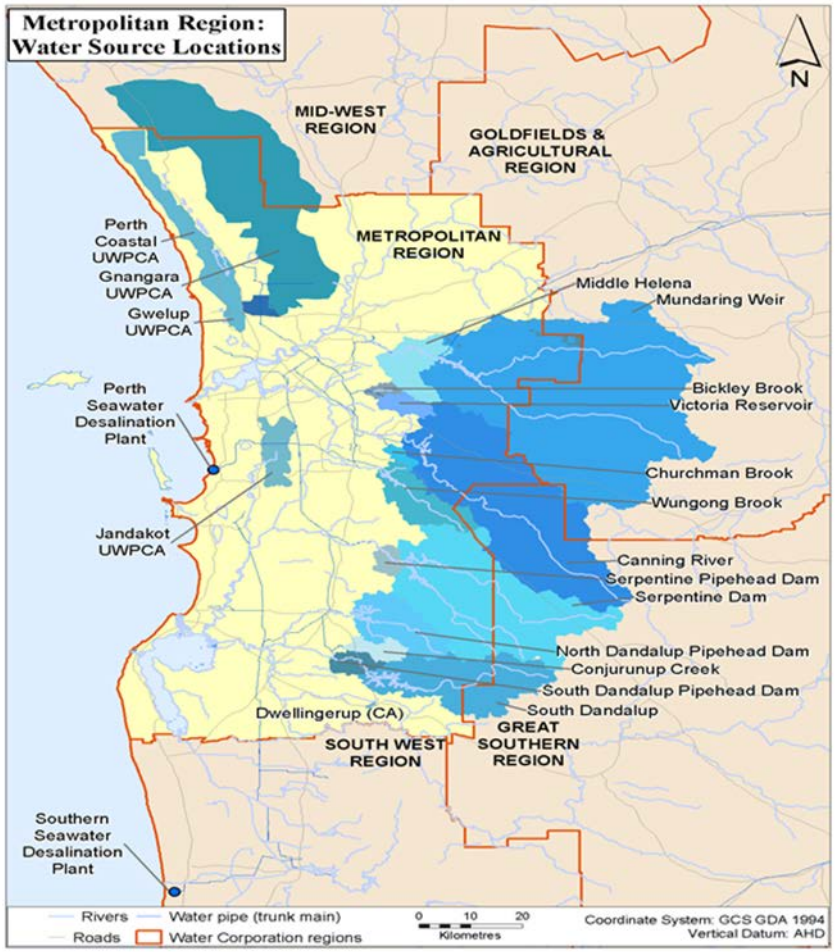

Figure 4: Overview map of the Perth Metropolitan Region

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Climate independent sources

The Perth Seawater Desalination Plant in Kwinana delivered 39 billion litres of water into the IWSS in 2018-19. The desalinated water enters the IWSS through Thomsons Reservoir where it is blended with Jandakot groundwater and surface water. A portion can be stored in Canning Dam and Wungong Dam during periods of low demand in the winter. The Southern Seawater Desalination Plant near Binningup produced 50.2 billion litres of water for the IWSS in 2018-19. For further information, refer to the Desalination section in *Diversifying our sources* (page 18).

In late 2017, the newest water source for the IWSS - the Groundwater Replenishment Scheme in Craigie - began recharging to aquifers. Groundwater Replenishment (GWR) is the process by which secondary treated wastewater undergoes advanced treatment to produce recycled water. The recycled water is recharged to an aquifer for later use as a drinking water source.

Stage 1 has the capacity to recharge up to 14 billion litres of water into groundwater supplies each year. Construction of stage 2 is well underway and is expected to be recharging to aquifers in early 2020. This project will double the scheme's capacity to recharge up to 28 billion litres of water each year, providing a climate independent water source to boost much needed drinking water supplies.

Refer to the Groundwater Replenishment section in *Diversifying our sources* (page 18) for further information.

Figure 5: Southern Seawater Desalination Plant (Source: Water Corporation)

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South West Region

Towns in the South West Region are supplied with water from a number of surface and groundwater sources. The South West Region provided more than 14,000 million litres of water to customers in 2018-19.

Margaret River and Cowaramup are supplied by groundwater and surface water via Ten Mile Brook Dam. Pemberton is supplied by surface water from Big Brook Dam via Lefroy Brook Dam.

Boyanup, Dalyellup, Dardanup, Donnybrook, Dunsborough, Capel, Peppermint Grove, Preston Beach and Augusta are supplied by locally treated groundwater. Australind, Clifton Park, Eaton, Pelican Point, Millbridge, Treendale, Kingston, Brunswick Junction, Roelands and Burekup are supplied with groundwater, via water treatment plants in Australind, Eaton and Picton.

Bridgetown, Nannup, Hester, Boyup Brook, Greenbushes, Balingup and Manjimup are connected to the Warren Blackwood Regional Water Supply Scheme (WBRWSS). Millstream and Manjimup dams and a Yarragadee bore near Nannup are the main water sources for this scheme. Tanjannerup Dam supplies most of Nannup's water requirements.

Kirup and Mullalyup are supplied from surface water (Kirup Dam) or groundwater from Donnybrook. These two schemes will be connected to the WBRWSS via a pipeline; enabling us to secure the supply to these towns and provide improved water quality.

Harvey, Waroona, Hamel, Binningup, Myalup and Yarloop are supplied from the IWSS (refer to *Where does our water come from? – Perth Metropolitan Region* - page 11). Quinninup and Northcliffe are supplied with carted water from either Manjimup or Pemberton and Logue Brook is supplied with carted water from the IWSS.

Harris Dam supplies Collie, Allanson and Darkan in the South West Region and 38 towns in the Great Southern Region via the Great Southern Towns Water Supply Scheme (GSTWSS). During 2017-18 a pump station and pipeline were completed to transfer water from Stirling Dam to Harris Water Treatment Plant, so IWSS water can now be used to supply the GSTWSS when required.

Figure 6: Overview map of the South West Region

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Goldfields and Agricultural Region

The Goldfields and Agricultural Water Supply (GAWS) scheme consists of 9,624 kilometres of water mains that provided more than 22,000 million litres of water to more than 100,000 people. Water is sourced from Mundaring Weir near Perth and undergoes treatment at Mundaring Water Treatment Plant, before it is supplied to the majority of towns in the Goldfields and Agricultural Region. Mundaring Weir is supplemented with desalinated seawater and groundwater.

Water is carted to Broad Arrow and Menzies from Kalgoorlie. The towns of Laverton, Leonora and Wiluna are supplied from local groundwater sources. Wiluna groundwater is treated using electrodialysis reversal to reduce nitrates and Leonora groundwater is treated using reverse osmosis to reduce nitrates, hardness and total dissolved solids (refer to *How is your water treated? – Desalination and electrodialysis reversal* section on page 27).

Figure 7: Wiluna Electrodialysis Reversal Plant

Chloramination is used in the GAWS to maintain a disinfectant residual across the network. (Refer to *How is your water treated? – Disinfection* on page 29). Additional disinfection facilities have largely been installed throughout the distribution system. Both of these strategies will maintain stable disinfection within the GAWS. Nevertheless, there are some communities outside the towns who receive water that, although the water has been potable, may no longer be guaranteed to meet the requirements of the ADWG due to the long mains and distance from disinfection; these are called Farmland services or Services by Agreement.

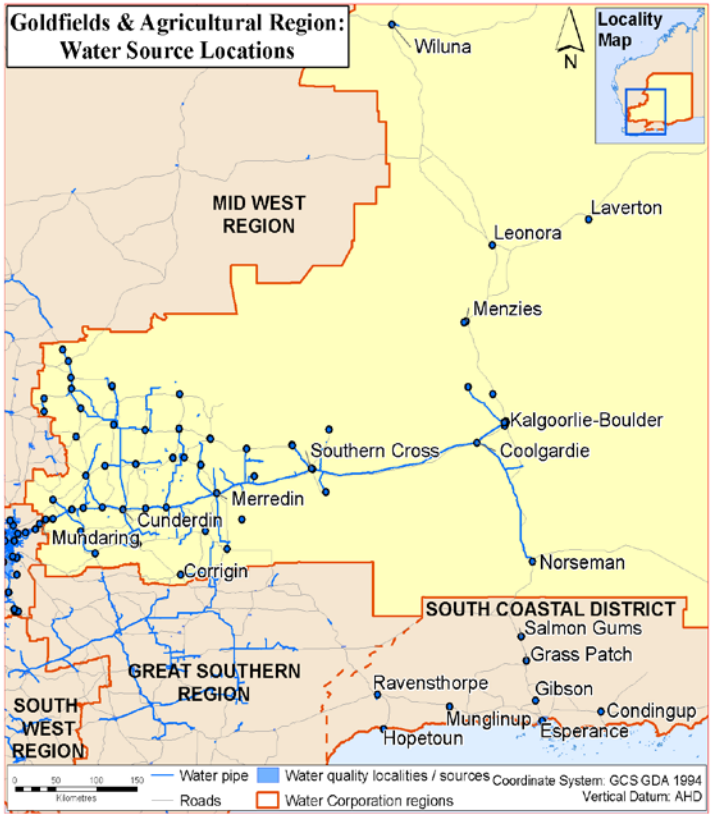

Figure 8: Overview map of the Goldfields and Agricultural Region

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Great Southern Region

In the Great Southern Region (GSR), we have two main water supply schemes - the Great Southern Towns Water Supply Scheme (GSTWSS) and the Lower Great Southern Towns Water Supply Scheme (LGSTWSS) along with a number of individual supplies. This year the region supplied more than 12,000 million litres of drinking water to more than 47,000 connected properties.

Harris Dam, near Collie, is the main source for the GSTWSS. During 2017-18, a new pump station and pipeline was completed to transfer water from Stirling Dam to Harris water treatment plant, so IWSS water can now be used to supply the GSTWSS when required, and this was operational over summer 2018-19.

Groundwater from the South Coast borefields near Albany is the main source for the LGSTWSS, although some local sources can contribute to the supply if required.

Hopetoun, Bremer Bay, Esperance, Condingup and Gibson are all supplied from local groundwater sources. Denmark, Ravensthorpe, Frankland, Ongerup, Jerramungup, Borden and Salmon Gums are supplied from local surface water sources.

Grass Patch, Lake King, Rocky Gully and Varley are supplied by carted water. There are projects progressing to install carting infrastructure at the towns of Wellstead and Munglinup, to allow the decommissioning of local sources which will improve water quality supplied to our customers at these towns. Water is carted from various treated water sources such as Albany, Lake Grace, and Esperance.

The long pipe network of the GSTWSS also has some small communities outside the towns, called Farmlands or Services by Agreement, who receive water that, although the water has been potable, may no longer be guaranteed to meet the requirements of the ADWG due to the long mains and distance from disinfection.

Figure 9: Overview map of the Great Southern Region

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North West Region

The West Pilbara Water Supply Scheme supplies customers in Karratha, Dampier and the neighbouring towns of Roebourne, Wickham, Point Samson, Cape Lambert and the Burrup Peninsula. The scheme has three sources: Harding Dam, groundwater from the Millstream Aquifer, and the Bungaroo Valley groundwater source (developed by Rio Tinto Iron Ore).

The East Pilbara Water Supply Scheme supplies customers in Port Hedland, South Hedland, Wedgefield Industrial Area and the local port operations. The scheme is supplied with groundwater from the Yule and De Grey River borefields.

In the Kimberley area, the towns of Kununurra and Broome are supplied by local groundwater sources. The remaining towns in the North West Region are supplied by local groundwater sources, with the exception of Wyndham which is supplied by Moochalabra Dam.

Figure 10: Moochalabra Dam and Water Treatment Plant

Newman is supplied with groundwater via BHP operated borefields and Water Treatment Plant.

Overall the North West Region supplied over 38,000 megalitres of drinking water to their customers.

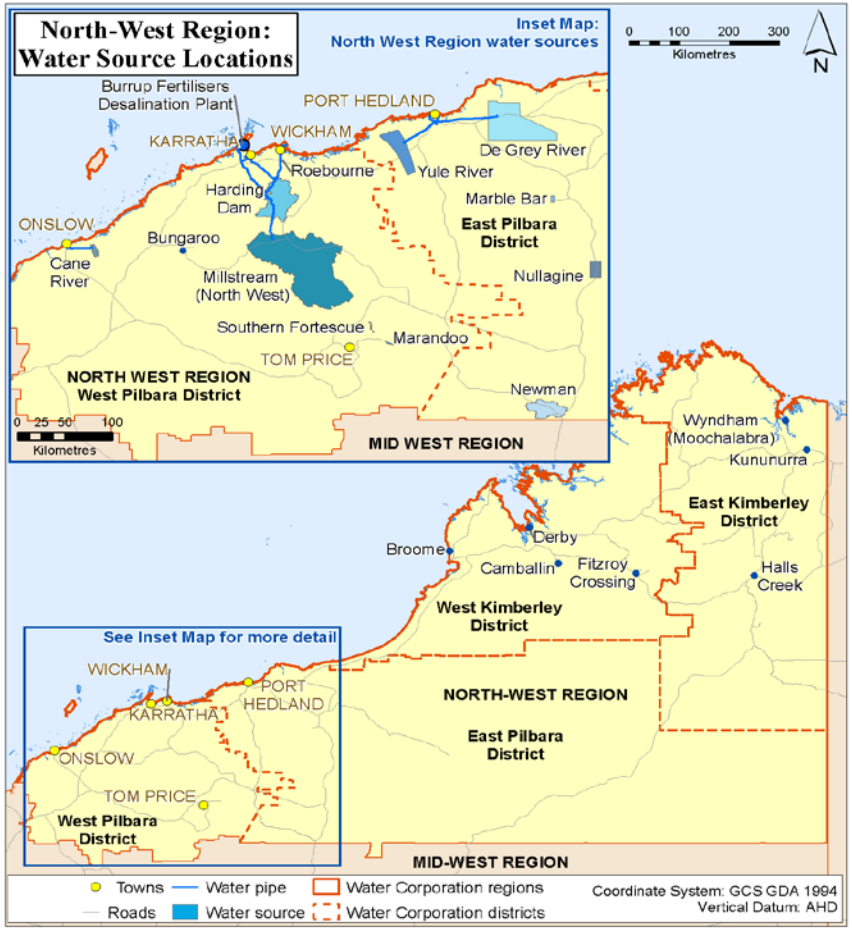

Figure 11: Overview map of the North West Region

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Mid-West Region

Drinking water throughout the Mid-West Region is supplied from local sources, with 42 independent groundwater borefields providing drinking water to 51 localities. In addition, three communities, Coomberdale, Nabawa and Yuna, receive water carted from nearby towns. The total drinking water supplied from these sources was over 16,800 million litres.

The largest borefield in the Mid-West region is Allanooka, which supplies Geraldton and the surrounding towns of Dongara, Northampton, Mullewa, Walkaway, Greenough and Narngulu.

Water for Carnarvon is sourced from bores located along the Gascoyne River, which provides water for both the town and irrigated horticulture. Bores located along the western side of the Cape Range Peninsula, are the sole supply for the town of Exmouth.

Schemes in the Coastal Midlands are mostly supplied from small local groundwater sources where a number of water treatment plants are operated to manage the natural characteristics in the groundwater.

Gascoyne Junction, Denham and Coral Bay water sources are treated using reverse osmosis and Yalgoo water treatment plant uses electrodialysis reversal to remove a number of constituents (refer to *How is your water treated? – Desalination and electrodialysis reversal* section on page 27).

Figure 12: Yalgoo - Electrodialysis Reversal Plant

The plan to build specialised water treatment plants using electrodialysis reversal is due to begin in December 2019 in the Murchison towns of Cue, Meekatharra, Sandstone and Mt Magnet. These water treatment plants will improve water quality and are expected to be operational by mid to late 2020.

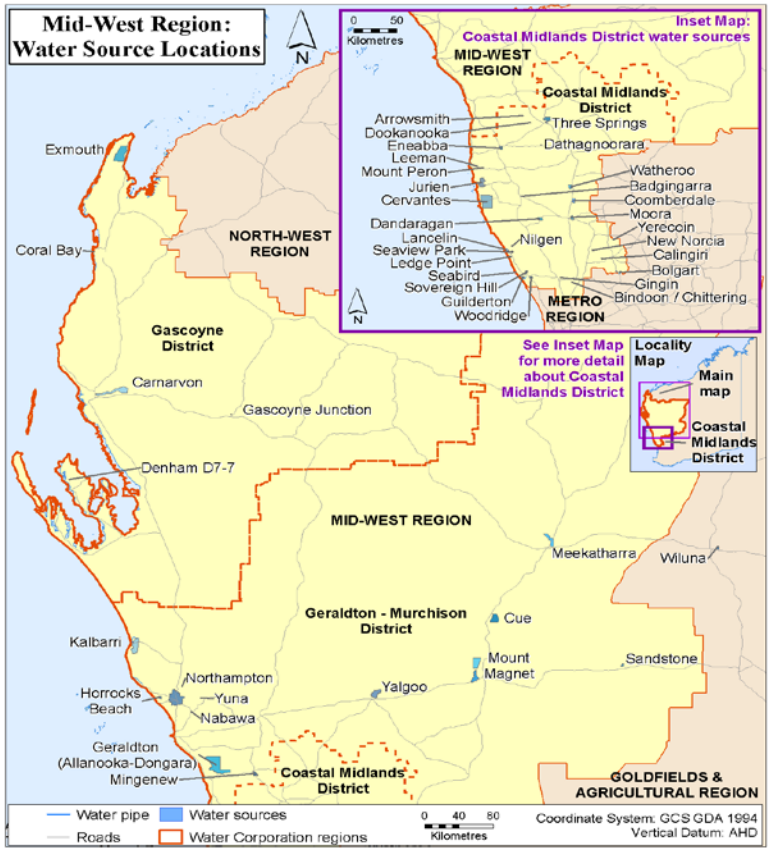

Figure 13: Overview map of the Mid-West Region

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Diversifying our sources

We have planned ahead to secure our water supplies in response to climate change, reduced runoff and expanding population, producing long-term plans under the *Water Forever* title. These plans are based on a three-pronged approach to develop new water sources, reduce water use and increase water recycling. We continue to progress towards targets set in *Water Forever* – including investment in climate independent water sources such as seawater desalination and groundwater replenishment.

Desalination

Desalination, using reverse osmosis (RO), is a membrane based treatment that was the process chosen for both the Perth Seawater Desalination Plant, which has been operational since November 2006, and the Southern Seawater Desalination Plant, that began supply in September 2011.

Desalination was the second largest source of water for the IWSS in 2018-19, supplying more than 30 per cent of the drinking water for Perth. (Refer to *How is your water treated? – Desalination* section on page 27.

Perth Seawater Desalination Plant

The Perth Seawater Desalination Plant, located in Kwinana, started operating in November 2006 and can produce up to 45 billion litres of fresh drinking water a year.

Southern Seawater Desalination Plant

The Southern Seawater Desalination Plant, located in Binningup in the South West, started producing water in 2011. It can produce up to 100 billion litres of fresh drinking water a year.

Groundwater replenishment

What is groundwater replenishment?

Groundwater replenishment is the process by which secondary treated wastewater undergoes advanced treatment to produce recycled water. The recycled water is recharged to the Leederville or Yarragadee aquifers for later use as a drinking water source. Once abstracted, the mixed groundwater will be further treated before being supplied into the Integrated Water Supply Scheme (IWSS). Figure 14 shows how groundwater replenishment fits in to Perth's water cycle.

The Groundwater Replenishment Scheme in Craigie is the first of its kind in Australia. Similar schemes have been used successfully in other parts of the world, such as Orange County California, USA, since the 1970s. Water recycling schemes are also used to supplement drinking water supplies in Singapore and in Windhoek, Namibia.

Benefits of groundwater replenishment

- Does not rely on rainfall
- Sustainable water source
- Has the potential to recycle large volumes of water
- Enables equivalent volumes of groundwater to be abstracted from the aquifer while reducing impacts to the environment or other water users.

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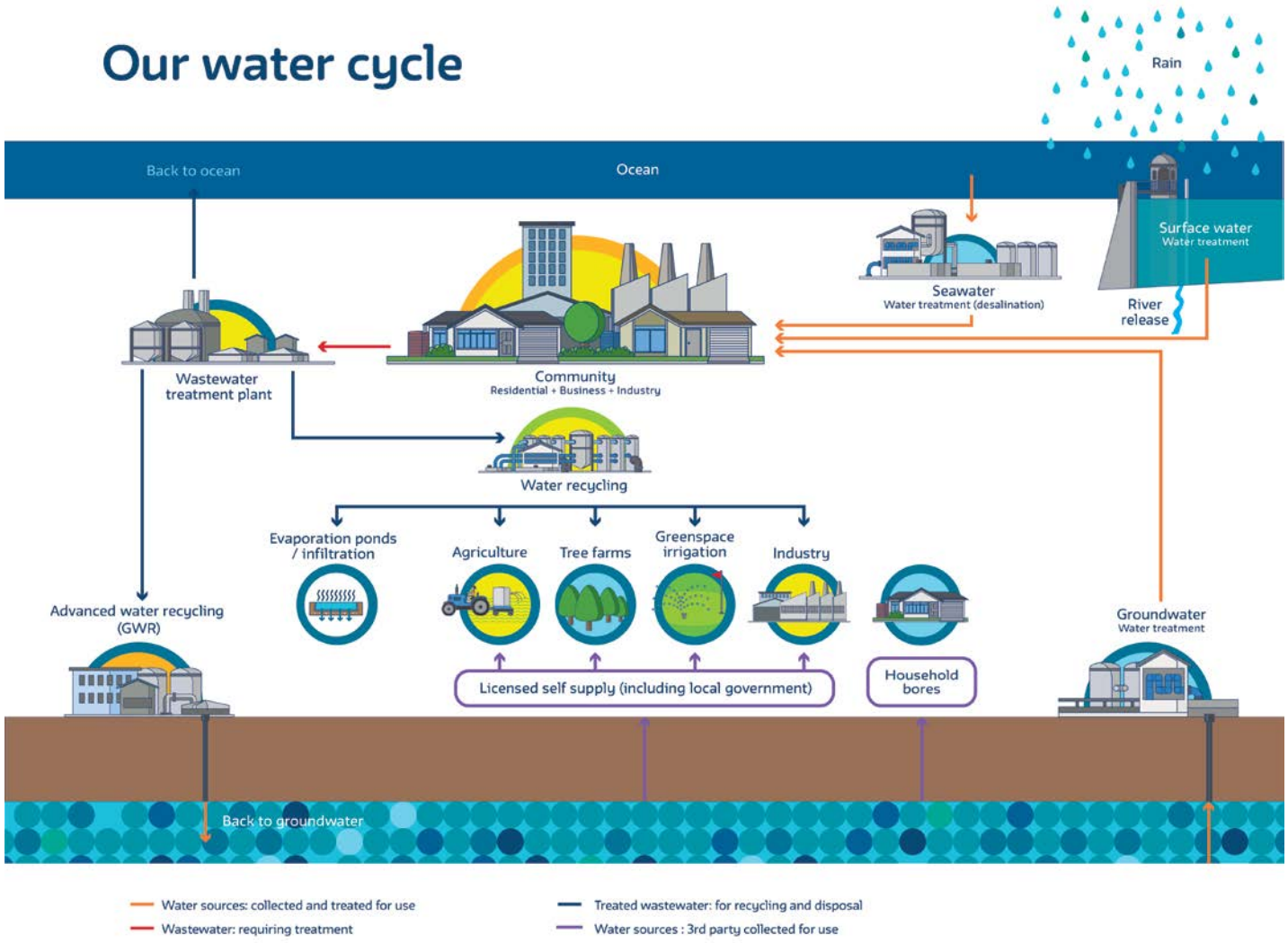

Figure 14: Groundwater replenishment in the water cycle

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Groundwater replenishment scheme update

Stage 1 of the scheme has the capacity to recharge up to 14 billion litres of water each year. Recharge from Stage 1 began in late 2017, with 3.49 billion litres recharged during 2018-19.

Work is progressing well on the Stage 2 expansion of the scheme, which will double the capacity to enable a recharge up to 28 billion litres of water each year. That is enough water to supply around 100,000 Perth homes.

The project consists of a second, independent Advanced Water Recycling Plant (AWRP) and a 13 kilometre recharge pipeline to two recharge sites in Neerabup and Wanneroo.

Stage 2 of the Groundwater Replenishment Scheme is expected to begin recharging to aquifers in 2020.

Further information can be found on the Water Corporation website.

Figure 15: Birds eye view of GWR Stage 2 under construction

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Drinking water quality risk management

The NHMRC define the requirements for safe drinking water in Australia through the Australian Drinking Water Guidelines 2011 (ADWG). These Guidelines include a 12 element framework for best practice management of drinking water supplies designed to integrate all facets of the drinking water quality management and assurance system.

Engagement with Department of Health

The Department of Health (DoH) regulates drinking water quality in Western Australia. We have a Memorandum of Understanding (MoU) with the Department of Health which requires us to work towards continual improvement in implementing the ADWG and the framework. More specifically, it requires us to comply with the microbiological, chemical health and radiological parameters as specified in the ADWG, with exemptions to adherence with the nitrate guidelines in 10 towns in the Mid-West and Goldfields and Agricultural regions (refer to *Understanding water quality test results – Nitrate* on page 36). This forms part of our Water Services Licence as issued by the Economic Regulation Authority. We, along with the DoH, recognise the practices and processes used to establish and maintain high levels of drinking water quality need to be open and transparent to the community.

For aesthetic parameters, the MoU states that we should comply as far as practical with the ADWG for non-health related characteristics. It is accepted full compliance with non-health related characteristics may take a number of years, bearing in mind the significant investment required to achieve this. For more information on our program of water quality improvements please refer *to Improving Your Water Quality* on page 45.

The MoU connects all facets of nationally and internationally recognised drinking water guidelines, standards, and quality management systems to ensure the safe and continuous supply of water to our customers. It requires us to notify them within 24 hours if monitoring results exceed a set health value or any event occurs which could pose a risk to public health.

We also provide updates to DoH throughout the year, with DoH regularly reviewing our monitoring results and corrective actions (refer to *Monitoring and incident management* on page 31).

The MoU provides for the DoH to conduct reviews of the performance of our systems and databases used to manage drinking water quality. In consultation with the Economic Regulation Authority, DoH commission audits in line with our Water Services Licence.

For more information on the last audit, please visit the drinking water quality section of our website.

Water Safety Plans

Having a Water Safety Plan for each of our schemes is a large part of implementing the Australian Drinking Water Guidelines Framework for Management of Drinking Water Quality. Our Water Safety Plans provide a comprehensive review of each water supply scheme. Using a systematic risk management approach we assess the risks to each water supply scheme from water source to water meter, ensure appropriate preventative measures, and all pertinent barriers, are in place and identify the operational controls necessary to consistently ensure the safety of our drinking water supplies.

We routinely review all Water Safety Plans to re-evaluate the schemes' risks and update any site or treatment details. During 2018-19, 48 Water Safety Plans from schemes across the State were fully reviewed. In addition, 133 Water Safety Plans were updated to include recent capital upgrades and other modifications to those schemes.

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Multiple barrier approach to drinking water quality management

Preventing contamination and minimising risk is an essential part of providing our customers with safe drinking water. The ADWG's guiding principle two states:

> *"The drinking water system must have, and continuously maintain, robust multiple barriers appropriate to the level of potential contamination facing the raw water supply."*

This approach ensures that if one barrier fails the effective operation of the other barriers will ensure safe drinking water is maintained throughout the water supply.

Barriers, applied from water source to water meter, are:

- Protected catchments and groundwater recharge areas (refer to *Source protection* on page 23);
- Large reservoirs with long water detention (storage) times;
- Water treatment (refer to *How is your water treated?* on page 26);
- Ensuring tanks and bores are sealed to prevent contamination;
- Disinfection of water (refer to *How is your water treated? – Disinfection* on page 29); and
- Sealed distribution system and maintenance of chlorine residuals throughout the system.

Some barriers, such as disinfection and management of the distribution system, are mandatory in every water supply, others are preferred, such as protected catchments and large reservoirs, however a water treatment barrier is only required if the quality of the water requires it.

We also undertake an annual Barrier Risk Assessment that drives necessary operational and capital improvements.

Source protection

Large reservoirs with long detention times

Water treatment

Sealed tanks and bores

Disinfection (chlorination)

Distribution systems protection (including chlorine residuals)

Figure 16: Multiple barriers for drinking water quality protection

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Source protection

What is source protection and why do we do it?

A drinking water catchment (also termed Public Drinking Water Source Area (PDWSA)) is an area of land where rainfall collects in rivers and streams that flow into reservoirs, or seeps into the soil to become groundwater where it is stored in underground aquifers. The captured water later becomes drinking water for the community. Protection and management of our drinking water catchments is the first barrier in a multiple barrier approach and provides a significant natural barrier to contamination.

The Australian Drinking Water Guidelines (ADWG) guiding principle one states:

> *"The greatest risks to consumers of drinking water are pathogenic microorganisms. Protection of water sources and treatment are of paramount importance and must never be compromised."*

By protecting our drinking water at the source, we minimise the risk of contamination and reduce the level of treatment required before it is supplied to the community. Source water protection is a crucial step to ensuring safe, good quality drinking water. The ADWG says "*prevention of contamination provides greater surety than removal of contaminants by treatment, so the most effective barrier is protection of source water to the maximum degree practical*".

Within Western Australia, PDWSAs are gazetted under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* or the *Country Areas Water Supply Act 1947.* Land development restrictions and by-laws may then be applied to control potentially polluting land uses and activities.

Three Priority areas are established within PDWSAs to help guide land management decisions using a risk management approach.

- Priority 1 areas use the principle of risk avoidance,
- Priority 2 areas are managed to minimise risk, and
- Priority 3 areas the objective is manage risk.

Protection areas, such as Reservoir Protection Zones (RPZ), also known as Prohibited Zones in legislation, and Wellhead Protection Zones, may also be applied around reservoirs and bores to provide added protection to those areas closest to the water supply; and thus consumer.

Figure 17: Aerial view of Serpentine dam – catchment and storage (Source: Water Corporation)

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How we do source protection

The Department of Water and Environmental Regulation (DWER) is responsible for managing and protecting the State's water resources. A Memorandum of Understanding for Drinking Water Source Protection between DWER and Water Corporation delegates the responsibility of catchment surveillance, by-law enforcement and protection planning to Water Corporation.

We manage approximately 130 drinking water sources which supply over 250 localities across the State. Our Drinking Water Source Protection Policy guides catchment operations and highlights our commitment to the primacy of drinking water quality over other catchment land uses.

Each of our catchments has a Catchment Management Strategy (CMS), which helps us to know and understand our surface water catchments and borefields, as recommended within the ADWG Framework for Management of Drinking Water Quality. Each CMS includes a comprehensive risk assessment which considers the risks to drinking water quality of land uses and activities within each catchment and preventative measures to prevent drinking water contamination. The CMS also identifies the operational and strategic requirements to ensure the source protection barrier is maintained within a catchment.

We employ several strategies to effectively undertake drinking water source protection, including catchment surveillance, electronic surveillance, the installation of physical barriers such as boom gates, fencing and signage, raw water sampling and public education.

Surveillance and by-law enforcement are key elements used to control potentially polluting activities in PDWSAs. In 2018-19, approximately 19,416 surveillance hours were undertaken state wide with 76 by-law offence prosecutions, 21 infringements and 756 warning letters issued. Further information on drinking water catchment management and protection can be found in the brochure Help keep our drinking water safe or the information sheet Drinking Water Catchment Protection both of which are available from our website.

Refer to the Case Study: The use of drones for catchment management (page 33) for an example of how new technology is being employed to complement source protection operations.

Storage Barrier

A storage barrier for a surface water source provides a potential buffer to minimise the impact of inflow variation on stored water quality. A storage barrier promotes natural processes that reduce microbiological contamination.

Groundwater taken from a confined aquifer, with no linkage to surface water, naturally has large storage and detention times.

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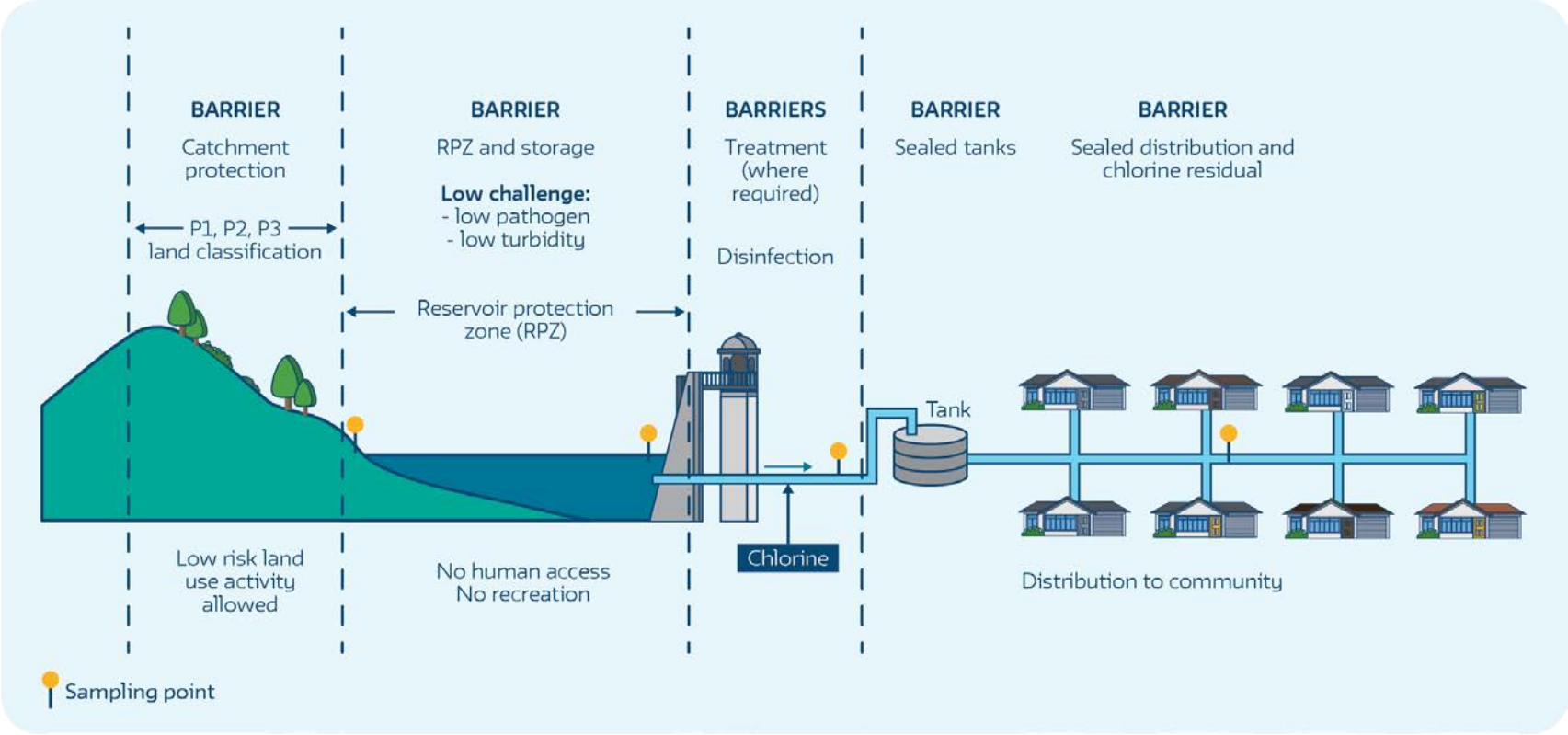

Figure 18: Surface water catchment – showing source protection and additional multiple barriers

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How is your water treated?

Water treatment

The specific water quality of each source dictates if water treatment is necessary and the type of treatment required. Where water comes from large water bodies or some groundwater supplied by fully protected catchment areas, very little treatment is required – often just disinfection (as per figure 19). In other cases, more intensive treatment processes may be required to ensure the drinking water delivered to every house is safe and aesthetically pleasing. From a water safety perspective, water treatment is one of the possible barriers in a multiple barrier approach to the management of our water supplies.

Groundwater, which is pumped from underground aquifers, can be treated to remove dissolved gases, iron, manganese, colour and turbidity using a combination of oxidation, coagulation, flocculation, filtration and clarification. In Perth, groundwater treatment plants at Jandakot, Wanneroo, Lexia, Mirrabooka and Gwelup oxidise the water (via aeration and/or chlorination) to increase the amount of dissolved oxygen and remove both carbon dioxide and hydrogen sulphide, and also to precipitate iron and manganese. A coagulant (alum) is also added which increases the settling of fine particles caused by iron and natural organic matter. Clarified water then passes through sand filters to remove any remaining particles. Similar processes occur in many country water schemes.

A crystallisation technology is used to reduce hardness (soften the water) at Neerabup Groundwater Treatment Plant.

Naturally occurring organic substances add colour to the water, which can increase taste and odour and provide precursors for disinfection by-products. Since 2001, we have used a water treatment technology known as MIEX® (magnetic ion exchange) to prevent an intermittent “swampy” odour occurring in treated groundwater supplied to Perth’s northern suburbs. Unlike conventional processes, MIEX® resin more effectively removes dissolved organic carbon, the source of potential odour and taste, from drinking water.

Ultra-filtration

Ultra-filtration (UF) treatment is a form of membrane filtration where source water is forced through a very small, semi-permeable membrane. It is designed to remove suspended solids, bacteria, viruses and other pathogens to produce water with very high purity.

UF is being used to treat water at Wyndham, Harding Dam, Pemberton, Denmark, Hyden, Walpole, Gascoyne Junction, Salmon Gums, Frankland and Kirup.

Figure 19: Example of a basic water treatment process *(see** *Fluoridation* section for those towns that have fluoride added to their water)

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Desalination and electrodialysis reversal

Seawater desalination is the removal of salt and impurities from seawater to produce fresh water. Our desalination plants use a reverse osmosis process. Seawater is pumped into the desalination plant from the ocean and passes through pre-treatment filtration to remove the majority of large and small particles.

The filtered seawater is then forced under pressure through special membranes which reverses the osmosis process as it occurs in nature. The pores in the membranes are so tiny that salt, bacteria, viruses and other impurities are separated from the seawater; in essence they act like microscopic strainers. About half of the water that enters the plant from the sea becomes fresh drinking water. The salt and other impurities removed from the seawater are then returned to the ocean via diffusers, which ensure it mixes quickly to prevent impacts to the marine environment.

The desalinated water is then further treated to meet drinking water standards before it reaches our customers.

Desalination using RO has been used in Denham for many years to treat brackish (saline) groundwater. Similar technology exists at Leonora, Gascoyne Junction, Coral Bay, and Hopetoun to improve water quality.

Another method of desalination we use is electrodialysis reversal (EDR), which is in use at Wiluna and Yalgoo. The EDR process removes salts in water by inducing ion movement using electrical currents. The groundwater that supplies Wiluna and Yalgoo is affected by salinity, hardness, nitrates and silica, which can result in that water has an undesirable taste, difficulty in forming a soap lather, or leaves a white crystalline deposit after evaporation.

Figure 20: EDR at Wiluna

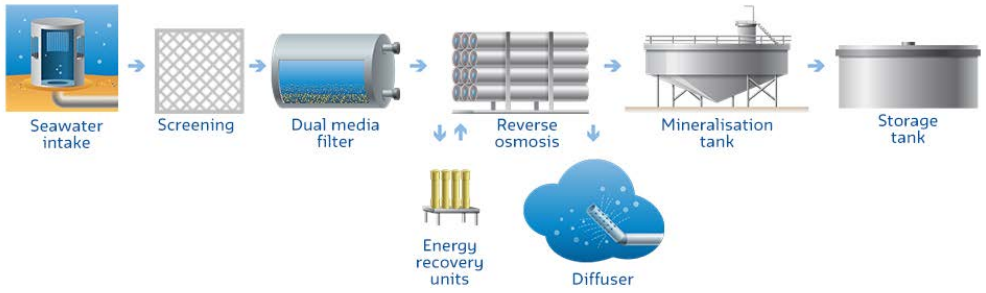

Figure 21: Typical desalination treatment process

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Water treatment for groundwater replenishment

Wastewater undergoes treatment at Beenyup Wastewater Treatment Plant before entering the Advanced Water Recycling Plant (AWRP). This treatment facilitates the removal of most chemicals and microorganisms such as nutrients, detergents, heavy metals and bacteria.

Treatment at the AWRP (as shown in Figure 22) further reduces the levels of chemicals and microorganisms so that it meets, and in many cases exceeds, drinking water standards. Throughout the treatment process, the water is monitored to ensure strict water quality guidelines are met.

The water is then recharged into an aquifer where it mixes with the existing groundwater. Further treatment then occurs when it is abstracted for drinking water use.

Water quality monitoring

We have systems, processes and regulations to ensure groundwater replenishment does not put public health or the environment at risk. These include:

- Water quality checkpoints (also known as critical control points) to ensure each stage of the plant works at an optimum level.
- If the water is not treated to a safe level when it reaches a checkpoint, the treatment process shuts down and water is diverted to the ocean outfall.
- The Department of Health (DoH) set very strict water quality guidelines that the recycled water must meet at the point of recharge and in the aquifers.
- Independent, accredited laboratories test water quality samples to ensure they meet guidelines.
- Groundwater monitoring provides long-term evaluation of water and aquifer quality, as well as providing immediate notification to any changes to the groundwater environment.
- Independent third party review of performance.

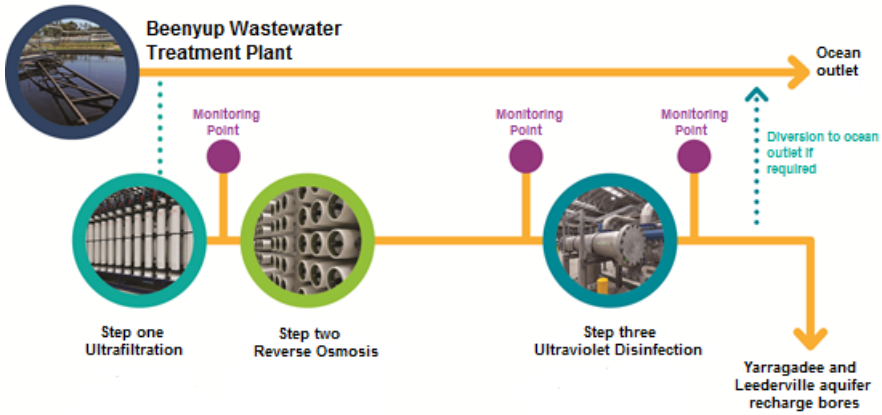

Figure 22: Advanced water treatment process

Chemicals and materials in contact with drinking water

The Memorandum of Understanding between the Department of Health and Water Corporation for Drinking Water (MoU) requires that all chemicals and materials that come into contact with drinking water are approved by the Department of Health (DoH) or are AS4020 compliant.

All chemicals and materials that are approved to be used in the provision of a drinking water supply are listed on the Department of Health website.

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Disinfection

Disinfection is undertaken to kill or inactivate pathogenic microorganisms that can cause disease. All our drinking water supply schemes are disinfected with chlorine or chloramine to protect us against waterborne pathogenic microorganisms. Chlorine or chloramine is added to our water supplies in sufficient quantity to disinfect and to ensure a residual of chlorine or chloramine is maintained, within a narrow range in the water, to ensure ongoing disinfection in the distribution system, with a minimal effect on the taste of our water.

Chloramination involves the use of chlorine and ammonia to produce a longer lasting disinfectant compared to chlorine alone. Chloramination is used in the Goldfields and Agricultural Water Supply Scheme to maintain a disinfectant residual along the length of the extensive pipe network.

Ultraviolet (UV) light is used at some water treatment plants across the State for additional disinfection, in combination with chlorination, where there are increased microbiological risks from activities in the catchment. UV does not provide a residual disinfection barrier.

Fluoridation

In Western Australia, fluoridation of community water supplies is regulated by the *Fluoridation of Public Water Supplies Act 1966* (the Act) which is administered by the Department of Health. The Fluoridation of Public Water Supplies Advisory Committee oversees fluoridation and makes recommendations to the Minister for Health who may issue or rescind directives as appropriate.

Community water fluoridation is an important, cost-effective public health measure which plays a critical role in reducing dental decay and improving oral health.

Fluoridation of community water supplies is backed by authoritative health research agencies and government bodies in Australia and worldwide, including the World Health Organization; the Australian Dental Association; the Australian Medical Association; the National Health and Medical Research Council.

Water fluoridation was introduced in Western Australia in 1968. Currently, the vast majority of the WA population is provided with fluoridated drinking water, principally in the Perth metropolitan area and most regional centres, as well as a number of smaller communities supplied from the same source or treatment plant as regional centres.

Some regional centres in WA have naturally occurring levels of fluoride in the water supply.

The water fluoridation process involves adding either fluorsilicic acid or sodium fluoride in a controlled manner to the recommended optimum concentration, where it then dissolves to release the fluoride ion. The addition of fluorsilicic acid is the more common method for adding fluoride to drinking water.

Fluoridated water supplies are monitored continuously via an online fluoride analyser at a dosing point, and sampled at least weekly to confirm acceptable fluoridation performance. Purity and quality control standards for chemicals added to drinking water are also strictly controlled by the Department of Health.

Fluoridation performance is reported quarterly to the Department of Health. Tables 1 and 2 list the localities requiring fluoridation under the Act.

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Table 1: Metropolitan localities requiring fluoridation under *Fluoridation of Public Water Supplies Act 1966*

Region / Scheme	Locality
Perth Integrated Water Supply Scheme	Armadale/Kelmscott
	Bold Park
	Buckland Hill
	Foothills
	Greenmount
	Greenmount/Darlington
	Hamilton Hill
	Harvey
	Hills Direct
	Lake Thompson
	Lexia
	Mandurah
	Melville
	Mirrabooka
	Mt. Eliza
	Mt. Hawthorn
	Mt. Yokine
	Mundaring
	Neerabup
	Pinjarra
	South Perth/Kewdale
	Tamworth Hill
	Wanneroo
	Waroona
	West Yokine
	Whitfords
	Yanchep

Table 2: Regional localities requiring fluoridation under *Fluoridation of Public Water Supplies Act 1966*

Region / Scheme	Locality
Great Southern Region	Albany
	Esperance
	Katanning (GSTWS)
	Mt Barker
	Narrogin (GSTWS)
Goldfields & Agricultural Water Supply Scheme	Kalgoorlie
	Merredin
	Northam
	York
North West Region	Broome
	Derby
	Hedland
	Karratha
	Kununurra
South West Region	Collie (GSTWS)
	Manjimup
Mid-West Region	Dongara/Port Denison
	Exmouth
	Geraldton
	Moora

Notes:

Sodium fluoride is used for water treatment plants supplying Derby, Dongara/Port Denison, Esperance, Exmouth, Kununurra, Manjimup, Moora and Yanchep all other sites use fluorsilicic acid.

Dunsborough water undergoes de-fluoridation, as fluoride is naturally occurring, to maintain fluoride at the same level as fluoridated schemes in the South West Region. This scheme is not covered by the Fluoridation Act.

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Monitoring and incident management

Critical Control Points

A Critical Control Point (CCPs) is a point in a drinking water supply scheme where control of the process can be applied; and which is essential to prevent a hazard or reduce it to an acceptable level.

The Water Corporation has processes in a water supply system that will always have an associated critical control point, including chlorination for disinfection. Every Water Corporation drinking water scheme has at least one Critical Control Point. Water quality critical control point operational targets and limits are formally set through the Water Safety Planning process and listed in the Water Safety Plan for each scheme (refer to *Water Safety Plans* page 21).

We continuously monitor the performance of critical controls points based on set target levels. Where issues are identified we strive to improve barrier robustness and performance.

Verification Monitoring

In accordance with the ADWG, we run an extensive drinking water quality monitoring program to confirm the safety of the water we provide to our customers. In 2018-19, we took more than 68,500 water samples from water sources, treatment plants and pipe networks which supply our customers, and had in excess of 255,600 individual analyses performed by our contracted analytical laboratories.

All our water quality monitoring and reporting is coordinated through our Water Quality Management System (WQMS). This software provides many aspects of water quality management and acts as the central database for all information on drinking water quality including sampling program design, sampling analysis, monitoring and reporting.

Additionally WQMS automatically issues alerts for results outside guideline and operational limits and prompts remedial action as defined by our Water Safety Plans.

Figure 23: Water sampling in a catchment in the Perth hills

Incident response

We are committed to protecting our water sources and supply schemes with multiple barriers and have plans in place to manage any issues with minimum impacts on water quality and our customers.

We maintain a fleet of mobile ultra-filtration (UF) and chlorination plants which allow us to rapidly restore high quality drinking water supplies. Our UF plants can be mobilised quickly to provide a minimum of 500,000 litres of high quality drinking water per day. Other treatment units, including a reverse osmosis unit, are available for specialised applications.

In addition, we conduct regular incident scenarios with the Department of Health to continually improve our incident management processes.

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Case study - The use of drones for catchment management

We manage approximately 130 drinking water sources, many remote and covering vast distances, where catchment management and protection provides the first barrier in providing safe, good quality drinking water to our customers. The installation of barriers such as boom gates, fences and signage to keep activities contrary to public health out of our catchments and surveillance to alert us to issues with these barriers or show where activities may be occurring are important elements to control potentially polluting activities. In many cases, the remoteness and size of our catchments make surveillance by land vehicles difficult and in the past has been limited to easily accessible areas. The rapidly expanding use of unmanned aerial vehicles (commonly known as drones) has allowed the Water Corporation to introduce the use of drones to perform catchment surveillance and asset inspections.

Water Corporation received a Remote Operators Certificate (ReOC) from the Civil Aviation Safety Authority (CASA) in February 2018 enabling the use of drones within its operational areas. All Water Corporation drone activities must be conducted in accordance with CASA regulations and internal procedures. This means all our drone activity is planned, centrally approved and logged before being undertaken.

Figure 24: DJI Matrice 200 drone

In October 2018, the Mid-West Region began using a DJI Matrice 200 drone to monitor various catchments and conduct asset inspections. Over 140 flights have been completed with over 40 hours of flight time.

The drone has many varied uses in identifying issues in both drinking water and wastewater services including:

- The ability to identify illegal access to catchments. Figure 25 shows new off road tracks were being used to bypass security gates which had been installed to prevent access.
- Identifying stock movement though catchments or borefields, as this may increase the risk of introducing pathogens into drinking water sources.
- Monitoring the regrowth of vegetation after a bushfire or prescribed burning. Figure 26 shows Eneabba catchment following a bushfire and figure 27 shows regrowth in Exmouth Water Reserve following prescribed burns conducted several years earlier.
- Conducting mining inspections in borefields without the requirement to interrupt mining operations.
- Inspecting elevated tanks which eliminates the safety issues associated with working at heights, while giving a comprehensive view of tank roofs. Figures 3 and 28 show the roofs of elevated and ground level tanks.

Following successful trials using drones in the Mid-West Region, catchment rangers in the South West, North West and Metropolitan regions have received drone pilot accreditation. The use of drones for catchment management and source protection decision making is likely to become a strategically significant component of the water source to water meter drinking water quality process.

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Figure 25: New off road track bypassing catchment gate and sign

Figure 26: Post bushfire image of the Eneabba Borefield

Figure 27: Monitoring vegetation regrowth 3 years after prescribed burnin Exmouth Borefield

Figure 28: Denham elevated tank

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Understanding water quality test results

The following summaries are intended to assist you with interpreting the results presented in Appendix B of this report. Additional information can be obtained by referring to the Fact Sheets contained in the Australian Drinking Water Guidelines 2011 (ADWG) published by the National Health and Medical Research Council.

The tables in Appendix A show the [1]guideline values for all parameters included in the *Summary of test results* tables in Appendix B. For the purposes of this report, all data are assessed in relation to the ADWG.

Escherichia coli (*E. coli*)

Most human pathogenic microorganisms are found in the gut and faeces of humans and other warm blooded animals. The bacteria *E. coli* is found in abundance in the intestine of humans and other warm blooded animals. While most species are not pathogenic to humans, they indicate possible recent contamination by human or animal faecal waste. As it is impractical to test for the presence of all pathogenic microorganisms in water, the ADWG recommends testing for the microbial indicator bacterium *E. coli* to indicate the presence of faecal contamination or pathogenic organisms.

We employ a multiple barrier approach (refer to page 22) to prevent microbial contamination, however, if there is an *E. coli* detection it is immediately addressed to ensure the water supplied to customers is safe.

[1] ADWG defines these as the concentration or measure of a water quality characteristic that, based on present knowledge, either does not result in any significant risk to the health of the consumer (health guideline), or is associated with good quality water (aesthetic guideline value).

Thermophilic *Naegleria*

Naegleria are free living amoebae which are almost ubiquitous, being found in fresh water, soils and sediments. It is not associated with human waste. They grow more freely in waters between 27 to 46°C but may survive for long periods in cyst form in much colder waters and, under certain conditions, may proliferate in pipework and tanks. As they proliferate in warmer water they are referred to as thermophilic or *Naegleria* tolerant to 42°C. This organism is safe to drink but the species *Naegleria fowleri* can cause the disease primary amoebic meningoencephalitis if it enters the body, under pressure, through the nose. Adequate levels of chlorine or chloramine can control *Naegleria*. Any detection of thermophilic *Naegleria* is responded to immediately to ensure the potential risk to public health is managed.

Fluoride

Fluorine is one of the most abundant elements in the Earth's crust, and is typically found as the fluoride ion or as organic or inorganic fluorides. It is found naturally in groundwater supplies, and is present in most food and beverage products and toothpaste. Additional fluoride is added to a number of water supplies in Western Australia as directed by the Minister for Health (refer to *Fluoridation* on page 29). The fluoride concentration after dosing is set by the Fluoridation of Public Water Supplies Advisory Committee, and does not exceed 1 mg/L. Notwithstanding this, the ADWG health guideline for fluoride is 1.5 mg/L, applicable to both fluoridated and non-fluoridated localities.

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Nitrate

In Western Australia, elevated nitrate concentrations are usually due to the natural process of plant decay underground that has occurred over geological time. The ADWG specify a health guideline for nitrate of 50 mg/L (as nitrate) for bottle-fed infants less than three months old and a guideline of 100 mg/L (as nitrate) for adults and children over three months old. Health effects are very rare and no issues have been recorded in Western Australia.

All our water supplies meet the ADWG guideline limit for adults and children over three months. We have been granted infant nitrate exemptions by the Department of Health (DoH) for ten towns in the Mid-West and Goldfields and Agricultural Regions. The Community Health Nurse provides advice to mothers regarding the use of alternative water for the preparation of bottle feeds. We provide bottled water free of charge via the Community Health Nurse as required.

We are committed to progressively reducing nitrates in the water supply in these towns. We currently manage nitrates to below the infant health nitrate guideline at:

- Wiluna, Yalgoo and Leonora following the installation of water treatment plants;
- Laverton by blending water from low and high nitrate bores; and
- Menzies by carting water from Kalgoorlie (short term solution).

We are working on long-term solutions for the remaining towns:

- Cue, Meekatharra, Mt Magnet and Sandstone with treatment upgrades (see section *Where does our water come from? – Mid-West Region*, page 17).
- New Norcia and Menzies are undergoing planning.

Figure 29: Water testing (Source: Water Corporation)

Trihalomethanes

Trihalomethanes (THMs) may be present in drinking water, forming as a by-product of disinfection using chlorination (and chloramination to a lesser extent). We are required to comply with the ADWG health guideline of 0.25 mg/L expressed as an average long term exposure. For the purposes of this report, THM compliance is assessed comparing the guideline with the mean annual THM concentration.

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Alkalinity (as calcium carbonate)

Alkalinity is a measure of the parameters in water that have acid-neutralising ability, typically expressed in mg/L of equivalent calcium carbonate. Alkalinity can be affected by naturally occurring minerals or water treatment chemicals. There are no aesthetic or health considerations for alkalinity, and therefore the ADWG do not provide a guideline value.

Aluminium (acid-soluble)

Acid-soluble aluminium in water primarily originates from the addition of coagulants such as aluminium sulphate or poly-aluminium chloride in the water treatment process. These coagulants are added to aid the removal of colour and turbidity. Aluminium can accumulate in pipe sediments, and be re-suspended during periods of rapid changes to flow patterns. The ADWG specify an aesthetic guideline of 0.2 mg/L. No health guideline is set.

Chloride

Chloride is present in natural waters from the dissolution of salt deposits. In surface water, the concentration of chloride is typically less than 100 mg/L while groundwater can have higher concentrations, particularly if there is salt water intrusion. In Australian drinking water supplies chloride levels range up to 650 mg/L depending on local source characteristics.

Chloride is essential for humans and animals. It contributes to the osmotic activity of body fluids. Based on aesthetic considerations, the chloride concentration in drinking water should not exceed 250 mg/L (ADWG).

Hardness (as calcium carbonate)

Hardness is caused by the presence of dissolved calcium and magnesium in the water. Hard water requires more soap to obtain lather and can also cause scale to form on hot water pipes and fittings. It can also be an important issue to consider when purchasing appliances, such as dishwashers.

Hardness can be expressed in a number of units of measure. To convert the hardness values presented in this report (expressed in mg/L) to dH (German degree) units, divide by 17.8. To convert hardness to millimol (mmol) units, divide by 100 and to convert to milliequivalent (mEq) divide by 50. The ADWG specify an aesthetic hardness guideline of 200 mg/L.

Table 3: ADWG guidance – Degrees of hardness

Hardness (mg/L)	Properties
< 60	soft and possibly corrosive (depends on pH, alkalinity and dissolved oxygen concentration)
60 – 200	good quality for all domestic uses
200 – 500	will increase scale formation
> 500	will cause a high level scaling

Iron

Iron occurs naturally in water as a result of contact with soil or rock in the catchment. It can accumulate in pipe sediments, and be re-suspended during periods of rapid changes to flow patterns. Elevated concentrations cause discoloured water and can stain laundry. The ADWG specify an aesthetic guideline of 0.3 mg/L, though we aim to manage below this guideline value.

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Manganese

Manganese in water can come from contact with soil or rock in the catchment. It can accumulate in pipe sediments, and be re-suspended during periods of rapid changes to flow patterns.

Elevated manganese can make water look black and stain laundry. The ADWG specify an aesthetic guideline of 0.1 mg/L, though we aim to manage below this guideline due to customer impacts. Manganese also has a health guideline value of 0.5mg/L. For further information regarding guideline levels for other metals relevant to drinking water, refer to Appendix A, page 42.

Per- and poly-fluoroalkyl substances

Per- and poly-fluoroalkyl substances (PFAS) are manufactured chemicals that do not occur naturally in the environment. They have been used since the 1950s in a range of common household products including hydraulic fluids, firefighting foams, clothing, carpets, paper, food wrappings and cosmetic products. As a result of widespread use, PFAS have been found to be present in low levels in soils, surface water and groundwater in most urban areas around the world, including in Western Australia.

In August 2018, the Australian Drinking Water Guidelines (ADWG) were amended to incorporate two PFAS health-based guideline values. These are 0.07 micrograms per litre (µg/L) combined perfluorooctane sulfonate and perfluorohexane sulfonate (PFOS and PFHxS) and 0.56 µg/L perfluorooctanoic acid (PFOA).

Most Water Corporation drinking water source catchments are well protected and exclude activities that may introduce PFAS into the drinking water. However, we have conducted a risk assessment, in conjunction with the Department of Health, based on land uses around all drinking water catchments to determine which drinking water catchments are more likely to have the presence of PFAS. We have been undertaking a targeted sampling program at priority catchments and reporting all sampling results to the Department of Health.

Sampling so far has found drinking water supplied to customers is below the ADWG health-based guideline values. In Esperance one groundwater production bore was sampled at 90 per cent of the health based guideline value of combined PFOS and PFHxS; it was immediately removed from production and has since been decommissioned. Further information can be found on the Water Corporation website.

We are also engaging with research partners to better understand the risks associated with PFAS.

pH

pH is a measure of water acidity (pH 7 is neutral). The ADWG specify a lower and upper aesthetic value of 6.5 and 8.5 respectively. The guidelines allow for a pH of up to 9.2 for new concrete tanks and cement-lined pipes, which can significantly increase the pH for a short period of time. Elevated pH is often caused by calcium carbonate leaching from the protective cement lining of the pipes after long transit times, or may be required as part of chloramine disinfection (refer to *Disinfection* section on page 29). These conditions may be found at a number of localities in our large water supply schemes. Where low pH is experienced, this is typically a consequence of the source characteristic rather than the influence of treatment. Buffering is a treatment process that stabilises the pH of the water.

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Silica

In Australia, dissolved silica can range between 0.6 mg/L in some surface waters to 110 mg/L in ground waters. Dissolved silica can precipitate on some surfaces forming a white residue. In cases where customer complaints occur due to scale build-up, water hardness and silica concentrations are often identified as the primary cause. There is no adverse health considerations associated with silica in drinking water, but to minimise scale build up on surfaces silica should not exceed 80 mg/L (ADWG).

Sodium

Sodium is widespread in water due to the high solubility of sodium salts and the abundance of mineral deposits. In major Australian reticulated supplies, sodium concentrations range from 3 mg/L to 300 mg/L. While sodium is essential to human life, there is no agreed minimum daily intake level. Based on aesthetic consideration the concentration of sodium in drinking water should not exceed 180 mg/L (ADWG).

Total Dissolved Solids

Total Dissolved Solids (TDS) consist of inorganic (natural) salts and small amounts of organic matter dissolved in water. TDSs comprise sodium, potassium, calcium, magnesium, chloride, sulphate, bicarbonate, carbonate, silica, organic matter, fluoride, iron, manganese, nitrate and phosphate.

Water with low TDS can taste flat, while water with high TDS tastes salty and causes scaling in pipes, fittings and household appliances. The ADWG provide guidance in the palatability of drinking water according to TDS concentration, as shown in Table 4.

Table 4: ADWG guidance – TDS concentration and drinking water palatability

TDS (mg/L)	Palatability
0 – 600	Good quality
600 – 900	Fair quality
900 – 1200	Poor quality
> 1200	Unpalatable

The ADWG guideline of 600 mg/L is based on taste.

True colour

Colour in water originates mainly from natural drainage through soil and vegetation in a catchment. Corroding metal pipes can also discolour the water, with iron producing a brownish colour and copper a faint blue colour. The ADWG specify an aesthetic guideline of 15 Hazen Units. Water Corporation measures true colour in True Colour Units (TCU) which are numerically identical to Hazen Units. As a guide, 15 TCU is just noticeable in a glass.

Turbidity

Turbidity is the cloudy appearance of water caused by the presence of suspended matter. The ADWG specify an aesthetic guideline of 5 Nephelometric Turbidity Units (NTU) which is just noticeable in a glass of water.

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Sampling parameters

Appendix A contains a list of regularly sampled parameters within functional groups and their respective health and/or aesthetic guideline values.

Figure 30: Harding Dam overflowing

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Our performance

Health related performance

We again achieved excellent microbiological performance in 2018-19 with 100 per cent of schemes complying with *Escherichia coli* and thermotolerant *Naegleria* requirements. We also achieved 100 per cent for chemical health performance in accordance with Department of Health requirements (see figure 31).

For this report, the target is achieved if the yearly average concentration for each chemical is less than the guideline value (refer to *Understanding water quality test results* on page 35).

Microbiological performance requirements of our Memorandum of Understanding (MoU) with the Department of Health (DoH) were all met for the past six years (figure 32).

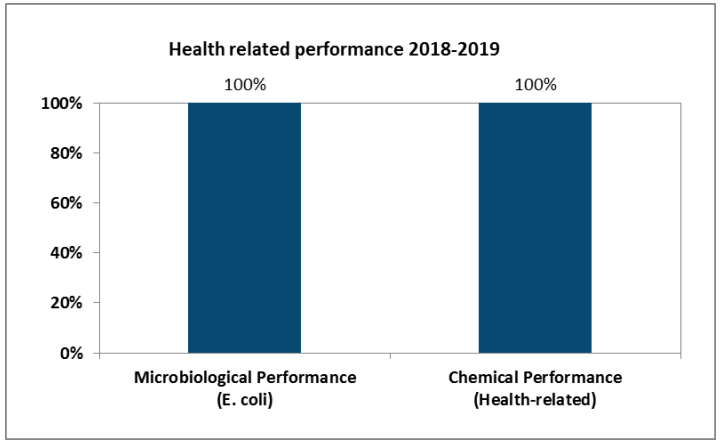

Figure 31: Microbiological and chemical health performance

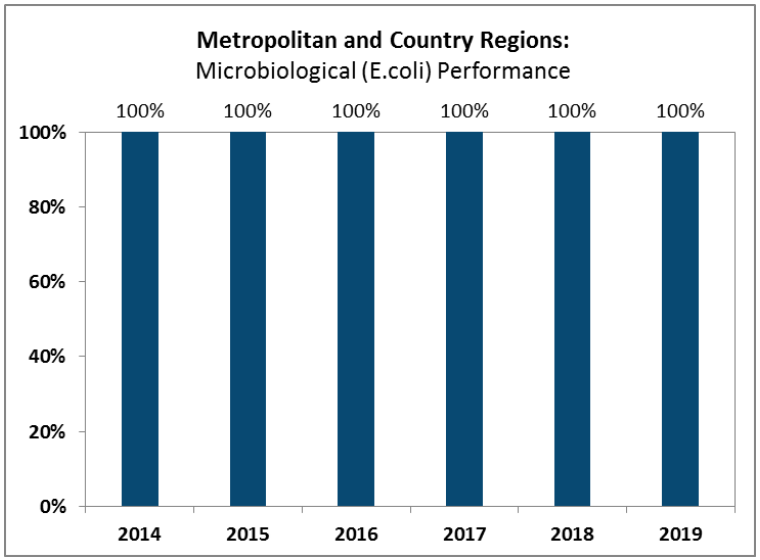

Figure 32: Six year microbiological performance

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Non-health (aesthetic) related performance

While we strive to meet the Australian Drinking Water Guidelines 2011 (ADWG) for aesthetic characteristics, this is very difficult to achieve in a state as vast as Western Australia with such diverse water sources. We are committed to improving all aspects of drinking water quality, however, improvements in aesthetic water quality can be very costly and are often hard to achieve.

Detailed performance review for 2018-19

Appendix B provides a detailed summary of test results for each scheme throughout the State. In 2018-19, there were 166 out of 250 schemes where the mean concentration for the year for all aesthetic parameters was less than the aesthetic guidelines. Our performance for all aesthetic analyses (alkalinity, aluminium, true colour, hardness, iron, manganese, pH, TDS, turbidity, sodium, chloride and silica) across our 250 schemes was 94 per cent, with 8,106 out of 8,649 analyses complying with the aesthetic guidelines.

The results in Appendix B show a small number of exceedances above the guidelines in aesthetic quality. These exceedances are caused by the unique quality of local sources, lack of alternative sources, impact of the drying climate on groundwater production and abstraction from groundwater in proximity to the coast.

For many schemes, these excursions have no, or minimal, influence on the taste of the drinking water (refer to *Understanding water quality test results* – page 35).

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Customer expectations

Customer contacts

Water quality related customer contacts (enquiries and complaints) are recorded and monitored continuously to identify any trends and areas for improvement. In 2018-19, our Operations Centre received 7,643 water quality related customer contacts (compared with 8,512 in 2017-18), of which 7,533 consisted of customer enquiries and 110 were related to complaints. Figure 33 shows the category of water quality contacts and their proportion of the total (7,643). Note: miscellaneous contacts are predominately related to water hardness).

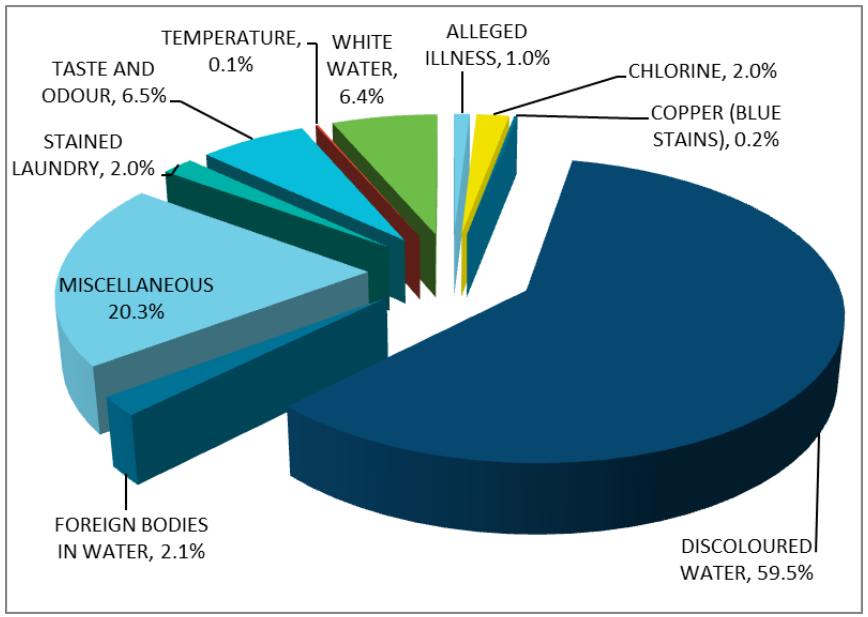

Figure 33: Water quality contacts profile 2018-19

Faults responsiveness

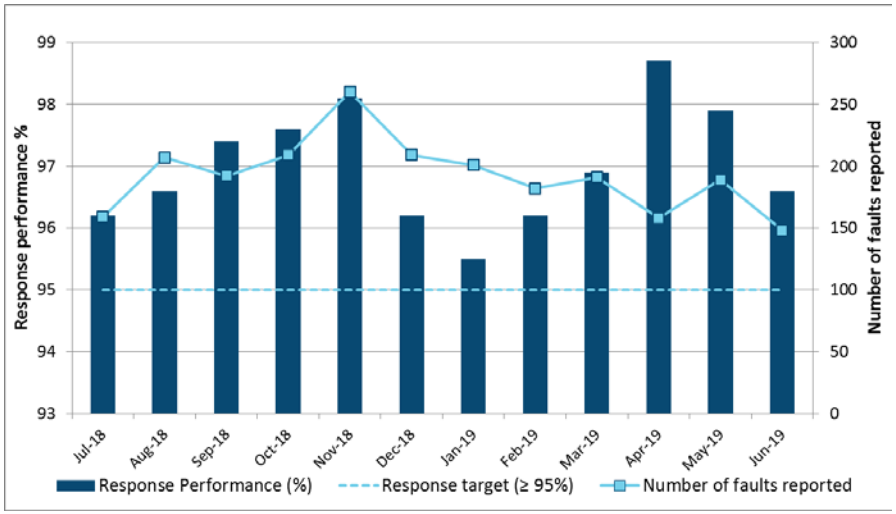

Figure 34: State-wide monthly response performance to water quality faults

For contacts related to water quality faults our Customer Charter states we will respond within two hours or at an agreed time. We have an agreed customer and business target to achieve this at least 95 per cent of the time.

In 2018-19, we exceeded this target by responding to an average of 97 per cent of recorded faults within two hours or at an agreed time (as shown in figure 34, the State-wide monthly faults responsiveness).

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Customer research

We measure community perceptions of the quality of their drinking water through our quarterly Customer Performance Index (CPI) survey.

For 2018-19, the feedback from our customers about their water quality was strong and remains one of the highest performing attributes in the Customer Performance Index (CPI) at 7.17, however the result was down from the all-time high of 7.53 experienced the previous year. This was reflective of all results within the CPI for the 2018-19 year not just water quality with the overall CPI decreasing from 7.25 in 2017-18, to 7.10 in 2018-19. A review the results for 2018-19 revealed that the CPI appeared to be impacted by general negative sentiment on pricing in relation to utilities in general.

In our CPI survey, customers are asked to indicate the degree to which they either agree or disagree with two statements in relation to water quality (where 1 is 'poor' and 10 is 'excellent'). The rating for these questions, for each quarter of the year, is reported in Table 5 and the annual average over the last 7 years is shown in Figure 35.

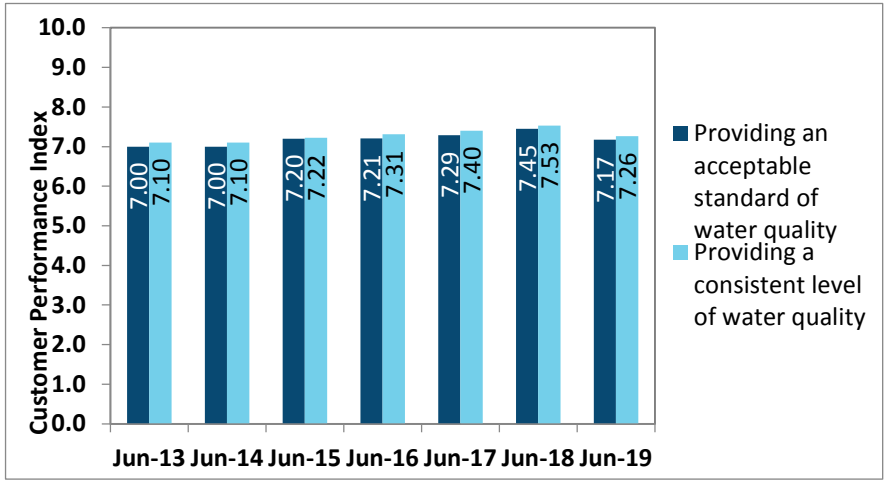

Figure 35: Customer performance index survey over the last 7 years

Table 5: Customer performance index throughout 2018-19

Survey Questions	2018-19				
	Quarter 1	Quarter 2	Quarter 3	Quarter 4	End of year average
How would you rate the Water Corporation on providing an acceptable standard of water quality?	7.09	7.13	7.13	7.16	7.17
How would you rate the Water Corporation on providing a consistent level of water quality?	7.19	7.37	7.20	7.28	7.26

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Improving your water quality

Monitoring and reporting improvements

We are continuing to strengthen the performance of our operational monitoring and critical control point compliance. These key operational and monitoring requirements are detailed within scheme Water Safety Plans which we update regularly and review in detail on a periodic basis (refer to *Water Safety Plans* on page 21). Day to day monitoring and responding to critical control points and other water quality issues is a key part of our business and we have a dedicated team in Operations Support undertaking this function (refer to *Critical Control Points* on page 31).

Quality operational information and data is critical as it informs our Barrier Risk Assessment (BRA - refer to page 22 for further information on *Multiple barrier approach*). As a part of this process we fully review drinking water quality risks annually but also update as required or when new information becomes available. The BRA details water quality risks associated with each of our drinking water schemes across the state. The data and information collected is critical as it informs how our schemes are performing from a water quality risk perspective. The BRA process assists us with identifying and understanding the need for and prioritisation of capital investments to address the identified risks.

Water quality capital improvements

We continue to progress our program of water quality capital improvements. These projects ensure robust multiple barriers are in place from water source to water meter for all our schemes. Some examples of work undertaken this year are described throughout this report.

Goldfields and Agricultural Region (GAR)

We continue to move towards fully enclosing the Goldfields and Agricultural Water Supply Scheme (GAWSS) through the construction of sealed water tanks to replace open reservoirs. Construction of the 4 million litre water tank to replace an open reservoir in Norseman is underway. Once the GAWSS is sealed, water quality will improve, helping to maintain chloramine residuals throughout the extensive pipeline network.

Construction of a 4 million litre water tank to replace the existing storages for the town of Beverley is also underway.

In addition to new tanks, improvements to our monitoring, operation and control of chemical dosing and monitoring assets are underway. Included are projects to improve operation and control at Merredin and Cunderdin and improvement of data visibility along the Goldfields pipeline and its extensions through the addition of more advanced analysers that have the capability of measuring four water quality parameters, critical for chloramination management going forward.

North West Region (NWR)

The NWR bore sealing project, to ensure that bore headworks are in good condition, has commenced. This is a large project for the NWR due to the number of schemes that are supplied from ground water. The project should be completed by 2021.

At Camballin a project to improve operations and water quality output by replacing the aging sand filter treatment plant was completed in 2018-19.

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Mid-West Region (MWR)

We have been working intensively to identify solutions for the schemes of Cue, Sandstone, Mt Magnet and Meekatharra. All these schemes have aesthetic and nitrate water quality issues, which will be addressed via water treatment. To address discoloured water issues at Horrocks, several additions and upgrades to the existing treatment will be completed in early 2020.

A treatment upgrade has been progressing at Dandaragan to improve disinfection and resulting water quality; this project is due for completion in 2019-20.

A new chlorinator was installed at Gingin in 2018-19 to improve chlorine dosing control and reduce the likelihood of discoloured water incidents.

We have built a new water treatment plant at Port Kalbarri to address aesthetic water quality issues, manganese in particular, which includes a new pressure filter and a batch electro- chlorinator.

South West Region (SWR)

The SWR critical valve project has been progressing this year with critical valve upgrades at over 18 sites. The objective of the project is to isolate or provide a suitable barrier (air gap) between raw and treated water pipes so as to eliminate the possibility of cross connection. The project will reach completion by mid-2020.

Installation of a new filter to remove high iron and manganese in the Australind ground water, therefore reducing the impact of discoloured water on our customers, was completed in 2018-19. The AMIAD Automatic Microfibre Filter, which is new to the Water Corporation, went through a thorough trial process and has proven to be an effective and cost efficient treatment system.

Great Southern Region (GSR)

Treatment is still a big part of the water quality improvement program for the GSR with a new ultrafiltration plant project commencing at Cranbrook and one nearing completion at Ravensthorpe.

We are nearing the completion of a new 2.5 million litre tank, pump station and 18.35km of water main to improve water quality in Kondinin, Karlgarin and Hyden. This work is will be completed in 2019/20.

Projects have commenced at the South Coastal borefield in Albany to assist with identification and management of iron and manganese, including a trial to test the effectiveness of an Automatic Microfibre Filter to remove iron and manganese.

State wide

We are continuing to progress our chlorination program across the State, focusing on upgrading all critical chlorinators to the latest SCADA standards. These improvements will ensure enhanced alarming, automation and reporting capability.

A State wide review of our tanks has identified that several tanks are missing water sample points, of particular interest are tanks with common inlet and outlet arrangements. These monitoring points are an important part of understanding how well tanks are functioning and maintaining water quality. New water sample points have been installed at tanks with common inlet and outlet arrangements throughout the NWR, GAR and MWR.

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Appendix A – List of sampling parameters

Table 6: Pesticide

Pesticide	Health Guideline Value (µg/L)
2,4-D ([2,4-dichlorophenoxy]acetic acid)	30 µg/L
Aldicarb	4 µg/L
Aldrin + Dieldrin	0.3 µg/L
Ametryn	70 µg/L
Amitraz	9 µg/L
Amitrole	0.9 µg/L
Asulam	70 µg/L
Atrazine	20 µg/L
Azinphos-methyl	30 µg/L
Bioresmethrin	100 µg/L
Bromacil	400 µg/L
Bromoxynil	10 µg/L
Carbaryl	30 µg/L
Carbendazim	90 µg/L
Carbofuran	10 µg/L
Chlorantraniliprole	6000 µg/L
Chlorfenvinphos	2 µg/L
Chlorothalonil	50 µg/L
Chlorpyrifos	10 µg/L
Chlorsulfuron	200 µg/L
Clopyralid	2000 µg/L
Cyfluthrin	50 µg/L
Cypermethrin	200 µg/L
Cyprodinil	90 µg/L
DDT (total isomers)	9 µg/L
Deltamethrin	40 µg/L
Diazinon	4 µg/L
Dicamba	100 µg/L
Dichlobenil	10 µg/L
Dichloroprop	100 µg/L
Dichloropropene	100 µg/L
Dichlorvos	5 µg/L
Diclofop-methyl	5 µg/L
Dieldrin	see Aldrin
Dimethoate	7 µg/L
Diquat	7 µg/L
Disulfoton	4 µg/L
Diuron	20 µg/L
2,2-DPA (2,2-Dichloropropionic acid, Dalapon)	500 µg/L
Endosulfan	20 µg/L
Ethion	4 µg/L
Etridiazole	100 µg/L
Fenamiphos	0.5 µg/L
Fenarimol	40 µg/L
Fenitrothion	7 µg/L
Fenthion	7 µg/L
Fenvalerate	60 µg/L
Fipronil	0.7 µg/L
Flamprop-methyl	4 µg/L
Fluazifop [1]	10 µg/L
Fluometuron	70 µg/L
Flupropanate	9 µg/L
Glyphosate	1000 µg/L
Heptachlor & heptachlor epoxide (total)	0.3 µg/L
Hexazinone	400 µg/L

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Pesticide	Health Guideline Value (µg/L)
Imazapyr	9000 µg/L
Maldison (Malathion)	70 µg/L
MCPA	40 µg/L
Methidathion	6 µg/L
Methiocarb	7 µg/L
Methomyl	20 µg/L
Metolachlor	300 µg/L
Metribuzin	70 µg/L
Metsulfuron-methyl	40 µg/L
Mevinphos	5 µg/L
Napropamide	400 µg/L
Nicarbazin	1000 µg/L
Norflurazon	50 µg/L
Omethoate	1 µg/L
Oryzalin	400 µg/L
Oxamyl	7 µg/L
Paraquat	20 µg/L
Parathion-ethyl	20 µg/L
Parathion-methyl	0.7 µg/L
Pendimethalin	400 µg/L
Permethrin	200 µg/L
Picloram	300 µg/L
Piperonyl butoxide	600 µg/L
Pirimicarb	7 µg/L
Pirimiphos-methyl	90 µg/L
Polihexanide	700 µg/L
Propachlor	70 µg/L
Propargite	7 µg/L
Propiconazole	100 µg/L
Propyzamid	70 µg/L
Pyrasulfotole	40 µg/L
Pyroxsulam	4000 µg/L
Simazine	20 µg/L
Temephos	400 µg/L
Terbacil	200 µg/L
Terbuthylazine	10 µg/L
Terbutryn	400 µg/L
Thiophanate	5 µg/L
Toltrazuril	4 µg/L
Triadimefon	90 µg/L
Triclopyr	20 µg/L
Trifluralin	90 µg/L
Vernolate	40 µg/L

Notes:

µg/L = micrograms per litre; 1000 µg = 1 miligram (mg)

Results should not exceed the health guideline value

[1] Guideline specific to WA and set by Department of Health (WA)

Other pesticides may be assessed as indicated

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Table 7: Organic compounds

Compound	Health Guideline Value (µg/L)	Aesthetic Guideline Value (µg/L)
Acrylamide	0.2	Not set
Benzene [1]	1	Not set
Carbon tetrachloride	3	Not set
Chloroacetic acids		
Chloroacetic acid	150	Not set
Dichloroacetic acid	100	Not set
Trichloroacetic acid	100	Not set
Chlorobenzene [1]	300	10
Chlorophenols		
2-chlorophenol	300	0.1
2,4-dichlorophenol	200	0.3
2,4,6-trichlorophenol	20	2
Dichlorobenzenes [1]		
1,2-dichlorobenzene (1,2-DCB)	1500	1
1,3-dichlorobenzene (1,3-DCB)	Not set	20
1,4-dichlorobenzene (1,4-DCB)	40	0.3
Dichloroethanes [1]		
1,1-dichloroethane	Not set	Not set
1,2-dichloroethane	3	Not set
Dichloroethenes [1]		
1,1-dichloroethene (1,1-DCE)	30	Not set
1,2-dichloroethene (1,2-DCE)	60	Not set
Dichloromethane [1]	4	Not set
Epichlorohydrin	0.5	Not set
Ethylbenzene [1]	300	3
Ethylenediamine tetraacetic acid (EDTA) [1]	250	Not set
Hexachlorobutadiene [1]	0.7	Not set
Nitrilotriacetic acid (NTA) [1]	200	Not set
Organotins [1]		
Dialkyltins	Not set	Not set
Tributyltin oxide	1	Not set
Plasticisers [1]		
Di(2-ethylhexyl) adipate	Not set	
Di(2-ethylhexyl) phthalate (DEHP)	10	Not set
Polycyclic aromatic hydrocarbons [1]		
Benzo-(a) pyrene	0.01	Not set
Styrene (vinylbenzene) [1]	30	4
Tetrachloroethene [1]	50	Not set
Toluene [1]	800	25
Total Trihalomethanes	250	Not set
Trichloroacetaldehyde (chloral hydrate)	20	Not set
Trichlorobenzenes (total) [1]	30	5
Trichloroethylene (TCE) [1]	Not set	Not set
Vinyl chloride [1]	0.3	Not set
Xylene [1]	600	20
1,1,1- Trichloroethane [1]	Not set	Not set

Notes:

µg/L = micrograms per litre; 1000 µg = 1 miligram (mg)

Results should not exceed the health guideline value

[1] These are part of the hydrocarbons suite in the sampling results tables

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Table 8: Radiological

Parameter	Health Guideline Value
Radium 226 & 228	1.0 mSv (millisieverts).
Radon 222	100 Bq/L (Becquerels per litre)

Table 9: Inorganic Chemicals

Chemical	Health Guideline Value (mg/L)	Aesthetic Guideline Value (mg/L)
Chloride	Not set	250
Cyanide [1]	0.08	Not set
Fluoride	1.5	Not set
Iodide [1]	0.5	Not set
Nitrate [2]	50	Not set
Silica	Not set	80
Sodium	Not set	180
Sulfate	Not set	250

Notes:

[1] Other health related chemicals in the summary of test results tables includes cyanide and iodide.

[2] Nitrate health guideline is for bottle-fed infants < 3 months of age. The health guideline for adults and children > 3 months is 100 mg/L.

[3] Guideline set by Department of Health (WA) - ADWG has not set a guideline value for this organism.

Results should not exceed the health guideline value

Table 10: Physical Characteristics

Characteristics	Health Guideline Value	Aesthetic Guideline Value
Hardness as $CaCO_3$	Not set	200 mg/L
pH	Not set	6.5 – 8.5
Total filterable solids (by summation)	Not set	600 mg/L
True colour	Not set	15 TCU
Turbidity	Not set	5 NTU

Notes:

NTU = Nephelometric turbidity units

Table 11: Microbiological

Organism	Health Guideline Value
Escherichia coli	0 organisms per 100 ml
Naegleria tolerant to ≤ 42°C	[3] No sample should contain *Naegleria fowleri*

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Table 12: Metals

Metal	Health Guideline Value (mg/L)	Aesthetic Guideline Value (mg/L)
Aluminium (acid soluble aluminium) [2]	Not set	0.2
Antimony [1]	0.003	Not set
Arsenic [1]	0.01	Not set
Barium [1]	2	Not set
Beryllium [1]	0.06	Not set
Boron [1]	4	Not set
Cadmium [1]	0.002	Not set
Chromium (as Cr[VI]) [1]	0.05	Not set
Copper [1]	2	1
Iron [2]	Not set	0.3
Lead [1]	0.01	Not set
Manganese [2]	0.5	0.1
Mercury [1]	0.001	Not set
Molybdenum [1]	0.05	Not set
Nickel [1]	0.02	Not set
Selenium [1]	0.01	Not set
Silver [1]	0.1	Not set
Uranium [1]	0.017	Not set
Zinc [1]	Not set	3

Notes:

[1] These are part of the metals suite in the sampling results tables

[2] Aluminium, iron and manganese are sampled as part of a general suite of samples and results are individually listed in the sampling tables

Results should not exceed the health guideline value

ISSN 2202-879X

Appendix B – Summary of test results

Perth Metropolitan Region

Health-related Tables 1 and 2

Aesthetic Tables 3, 4 and 5

Mid-West Region

Health-related Tables 6 and 7

Aesthetic Tables 8, 9 and 10

Goldfields and Agricultural Regions

Health-related Tables 11 and 12

Aesthetic Tables 13, 14 and 15

South West Region

Health-related Tables 16 and 17

Aesthetic Tables 18, 19 and 20

Great Southern Region

Health-related Tables 21 and 22

Aesthetic Tables 23, 24 and 25

North West Region

Health-related Tables 26 and 27

Aesthetic Tables 28, 29 and 30

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Drinking Water Quality Annual Report Data 01/07/2018 to 30/06/2019

Table 1 **Health related variables**

Perth Region	*E. coli*				Thermophilic *Naegleria*			Fluoride					Hydrocarbons		Metals	
Locality	Samples Taken	Samples >0 cfu/100mL	Max cfu/100mL	Requirement Met	Samples Taken	Samples with Thermophilic Naegleria	Requirement Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Guideline Met	Samples Taken	Guideline Met
									Min	Max	Mean					
Armadale/Kelmscott	262	0	0	✓	261	0	✓	52	0.75	0.95	0.86	✓	0	(1)	2	✓
Bold Park	325	0	0	✓	148	0	✓	52	0.60	0.90	0.79	✓	1	✓	2	✓
Buckland Hill	91	0	0	✓	72	0	✓	52	0.60	0.85	0.75	✓	2	✓	2	✓
Dwellingup	13	0	0	✓	6	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Foothills	139	0	0	✓	139	0	✓	52	0.75	0.95	0.84	✓	0	(1)	3	✓
Greenmount	195	0	0	✓	104	0	✓	52	0.75	0.90	0.81	✓	0	(1)	2	✓
Greenmount/Darlington	117	0	0	✓	91	0	✓	52	0.75	0.90	0.82	✓	1	✓	2	✓
Hamilton Hill	208	0	0	✓	91	0	✓	52	0.70	0.85	0.76	✓	1	✓	2	✓
Hills Direct	715	0	0	✓	286	0	✓	52	0.70	0.95	0.80	✓	0	(1)	3	✓
Lexia	143	0	0	✓	67	0	✓	52	0.70	0.85	0.75	✓	0	(1)	2	✓
Mandurah	381	0	0	✓	325	0	✓	52	0.65	0.90	0.84	✓	0	(1)	6	✓
Melville	175	0	0	✓	97	0	✓	52	0.70	0.80	0.74	✓	0	(1)	2	✓
Mirrabooka	338	0	0	✓	117	0	✓	52	0.70	0.90	0.76	✓	1	✓	2	✓
Mt. Eliza	429	0	0	✓	130	0	✓	52	0.70	0.80	0.74	✓	0	(1)	2	✓
Mt. Hawthorn	166	0	0	✓	81	0	✓	52	0.70	0.90	0.81	✓	0	(1)	2	✓
Mt. Yokine	520	0	0	✓	182	0	✓	52	0.70	0.90	0.80	✓	1	✓	2	✓
Mundaring	117	0	0	✓	117	0	✓	52	0.65	0.95	0.84	✓	0	(1)	2	✓
Neerabup	292	0	0	✓	126	0	✓	52	0.70	0.90	0.81	✓	1	✓	2	✓
North Dandalup	13	0	0	✓	6	0	✓	2	0.85	0.85	0.85	✓	0	(1)	2	✓
Pinjarra	65	0	0	✓	52	0	✓	52	0.65	0.90	0.84	✓	0	(1)	2	✓
South Perth/Kewdale	520	0	0	✓	224	0	✓	52	0.75	0.90	0.80	✓	0	(1)	2	✓
Tamworth Hill	416	0	0	✓	156	0	✓	52	0.70	0.90	0.83	✓	1	✓	2	✓
Thomsons Lake	328	0	0	✓	97	0	✓	52	0.70	0.85	0.77	✓	0	(1)	2	✓
Two Rocks	104	0	0	✓	39	0	✓	2	0.15	0.15	0.15	✓	0	(1)	5	✓
Wanneroo	487	0	0	✓	177	0	✓	52	0.65	0.85	0.76	✓	0	(1)	2	✓
West Yokine	260	0	0	✓	117	0	✓	52	0.70	0.90	0.81	✓	0	(1)	5	✓
Whitfords	143	0	0	✓	65	0	✓	52	0.70	0.85	0.76	✓	1	✓	2	✓
Yanchep	104	0	0	✓	52	0	✓	52	0.65	0.90	0.79	✓	1	✓	2	✓

(1) No samples required in this 12 month period

Drinking Water Quality Annual Report Data 01/07/2018 to 30/06/2019

Table 2 **Health related variables**

Perth Region	Nitrate					Pesticides		Radiological		Trihalomethanes					Other Health Related	
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Guideline Met	Samples Taken	Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Requirement Met
		Min	Max	Mean							Min	Max	Mean			
Armadale/Kelmscott	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	13	0.065	0.160	0.112	✓	0	(1)
Bold Park	2	0.4	2.2	1.3	✓	1	✓	2	✓	13	0.031	0.150	0.101	✓	0	(1)
Buckland Hill	4	<0.2	0.4	<0.2	✓	1	✓	2	✓	13	0.056	0.160	0.108	✓	2	✓
Dwellingup	5	<0.2	0.4	<0.2	✓	1	✓	2	✓	2	0.039	0.061	0.050	✓	0	(1)
Foothills	2	<0.2	0.4	<0.2	✓	1	✓	0	(1)	13	0.075	0.130	0.106	✓	0	(1)
Greenmount	4	0.9	2.6	1.8	✓	1	✓	2	✓	13	0.110	0.180	0.150	✓	1	✓
Greenmount/Darlington	2	0.4	0.4	0.4	✓	1	✓	0	(1)	13	0.080	0.160	0.113	✓	1	✓
Hamilton Hill	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	13	0.041	0.110	0.075	✓	1	✓
Hills Direct	4	<0.2	<0.2	<0.2	✓	2	✓	3	✓	24	0.016	0.092	0.061	✓	0	(1)
Lexia	2	0.4	8.8	4.8	✓	1	✓	1	✓	13	0.071	0.150	0.117	✓	0	(1)
Mandurah	7	<0.2	<0.2	<0.2	✓	3	✓	0	(1)	39	0.006	0.089	0.042	✓	0	(1)
Melville	5	<0.2	<0.2	<0.2	✓	1	✓	2	✓	13	0.048	0.120	0.086	✓	1	✓
Mirrabooka	5	0.4	4.0	1.8	✓	1	✓	2	✓	13	0.092	0.200	0.130	✓	2	✓
Mt. Eliza	3	<0.2	0.4	<0.2	✓	1	✓	1	✓	13	0.063	0.160	0.105	✓	0	(1)
Mt. Hawthorn	5	0.9	2.2	1.3	✓	1	✓	1	✓	13	0.090	0.160	0.127	✓	1	✓
Mt. Yokine	4	0.9	1.8	1.3	✓	1	✓	2	✓	13	0.110	0.170	0.136	✓	2	✓
Mundaring	2	0.9	1.3	0.9	✓	1	✓	2	✓	5	0.020	0.057	0.042	✓	0	(1)
Neerabup	5	1.3	13.2	7.9	✓	1	✓	2	✓	13	0.019	0.098	0.044	✓	1	✓
North Dandalup	4	<0.2	0.4	<0.2	✓	1	✓	2	✓	2	0.022	0.060	0.041	✓	0	(1)
Pinjarra	3	<0.2	<0.2	<0.2	✓	1	✓	1	✓	2	0.007	0.050	0.029	✓	0	(1)
South Perth/Kewdale	2	<0.2	2.2	0.9	✓	1	✓	2	✓	13	0.077	0.180	0.109	✓	0	(1)
Tamworth Hill	2	<0.2	0.4	<0.2	✓	1	✓	1	✓	13	0.006	0.067	0.037	✓	1	✓
Thomsons Lake	5	<0.2	<0.2	<0.2	✓	1	✓	2	✓	13	0.038	0.090	0.066	✓	0	(1)
Two Rocks	4	1.3	7.9	4.8	✓	1	✓	2	✓	13	0.009	0.019	0.011	✓	0	(1)
Wanneroo	4	2.2	4.4	3.1	✓	1	✓	0	(1)	13	0.059	0.120	0.084	✓	1	✓
West Yokine	4	0.9	2.6	1.3	✓	1	✓	1	✓	13	0.110	0.160	0.142	✓	1	✓
Whitfords	4	<0.2	4.8	3.1	✓	1	✓	2	✓	13	0.050	0.110	0.084	✓	1	✓
Yanchep	5	4.8	6.2	5.3	✓	1	✓	4	✓	13	0.003	0.085	0.033	✓	0	(1)

(1) No samples required in this 12 month period

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Table 3 **Aesthetic (Non-health related) Variables**

Perth Region	Alkalinity (as CaCO3)					Aluminium					Chloride					Hardness				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met
		Min Value	Max Value	Mean Value			Min	Max	Mean			Min Value	Max Value	Mean Value			Min	Max	Mean	
Armadale/Kelmscott	2	53	55	54	(1)	2	<0.008	0.016	<0.008	✓	2	130	130	130	✓	2	64	64	64	✓
Bold Park	2	64	120	92	(1)	2	0.014	0.016	0.015	✓	2	120	160	140	✓	2	75	88	82	✓
Buckland Hill	4	69	78	74	(1)	4	0.012	0.014	0.014	✓	4	190	200	195	✓	4	72	85	78	✓
Dwellingup	5	7	11	9	(1)	5	<0.008	0.014	0.010	✓	5	55	65	60	✓	5	27	31	29	✓
Foothills	2	53	71	62	(1)	3	0.010	0.018	0.014	✓	2	130	170	150	✓	3	63	83	70	✓
Greenmount	4	120	150	130	(1)	4	<0.008	0.016	<0.008	✓	4	150	190	173	✓	4	90	110	102	✓
Greenmount/Darlington	2	71	79	75	(1)	3	0.010	0.016	0.012	✓	2	135	170	153	✓	3	74	89	80	✓
Hamilton Hill	2	54	82	68	(1)	2	0.010	0.010	0.010	✓	2	115	180	148	✓	2	66	88	77	✓
Hills Direct	4	40	64	55	(1)	4	0.010	0.018	0.014	✓	4	60	155	121	✓	4	51	80	68	✓
Lexia	2	94	160	127	(1)	2	0.008	0.018	0.013	✓	2	85	115	100	✓	7	80	160	126	✓
Mandurah	7	43	53	49	(1)	7	0.012	0.018	0.015	✓	7	37	43	40	✓	7	52	61	57	✓
Melville	5	52	82	71	(1)	5	0.012	0.014	0.014	✓	5	100	205	174	✓	5	61	76	65	✓
Mirrabooka	5	42	110	64	(1)	5	0.014	0.025	0.019	✓	5	125	210	171	✓	5	120	130	124	✓
Mt. Eliza	3	64	77	71	(1)	3	0.016	0.025	0.019	✓	3	170	175	172	✓	3	70	84	76	✓
Mt. Hawthorn	5	120	140	132	(1)	5	<0.008	<0.008	<0.008	✓	5	170	180	176	✓	5	92	110	99	✓
Mt. Yokine	4	110	130	125	(1)	4	<0.008	0.008	<0.008	✓	4	160	185	175	✓	4	76	110	97	✓
Mundaring	2	52	61	57	(1)	2	0.012	0.018	0.015	✓	2	155	170	163	✓	2	90	91	91	✓
Neerabup	5	77	180	149	(1)	5	<0.008	0.014	<0.008	✓	5	85	130	118	✓	5	84	200	167	✓
North Dandalup	4	20	54	39	(1)	4	<0.008	0.035	0.016	✓	4	41	70	50	✓	4	39	62	53	✓
Pinjarra	3	46	49	47	(1)	3	0.014	0.025	0.021	✓	3	41	46	43	✓	3	53	59	56	✓
South Perth/Kewdale	2	57	120	89	(1)	2	<0.008	0.014	<0.008	✓	2	125	175	150	✓	2	63	97	80	✓
Tamworth Hill	2	43	46	45	(1)	2	0.018	0.025	0.022	✓	2	38	40	39	✓	2	46	49	48	✓
Thomsons Lake	5	56	92	80	(1)	5	0.008	0.018	0.012	✓	5	38	235	170	✓	5	49	120	89	✓
Two Rocks	4	190	200	195	(1)	4	<0.008	<0.008	<0.008	✓	4	105	110	106	✓	4	210	240	225	(2)
Wanneroo	4	84	110	97	(1)	4	<0.008	0.012	<0.008	✓	4	95	130	119	✓	4	85	110	104	✓
West Yokine	4	120	160	135	(1)	4	<0.008	0.012	<0.008	✓	4	165	180	173	✓	4	98	110	102	✓
Whitfords	4	59	100	83	(1)	4	<0.008	0.014	0.009	✓	4	100	135	111	✓	4	76	110	95	✓
Yanchep	5	190	210	204	(1)	4	<0.008	<0.008	<0.008	✓	5	105	115	110	✓	5	210	240	224	(2)

(1) No guideline value available as per ADWG 2011. (2) Elevated hardness is characteristic of the source supplying this locality

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Table 4 **Aesthetic (Non-health related) Variables**

Perth Region	Iron					Manganese					pH					Silicon				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Value (pH units)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met
		Min	Max	Mean			Min	Max	Mean			Min	Max	Mean			Min Value	Max Value	Mean Value	
Armadale/Kelmscott	2	0.025	0.045	0.035	✓	2	<0.002	0.003	<0.002	✓	2	7.29	7.34	7.32	✓	2	3.5	4.2	3.9	✓
Bold Park	2	0.020	0.050	0.035	✓	2	0.005	0.009	0.007	✓	2	7.72	8.02	7.87	✓	2	5.0	15.0	10.0	✓
Buckland Hill	4	0.050	0.070	0.055	✓	4	0.007	0.018	0.012	✓	4	7.63	8.05	7.82	✓	4	5.8	8.1	6.7	✓
Dwellingup	5	0.050	0.080	0.066	✓	5	<0.002	0.016	0.006	✓	5	6.57	6.96	6.78	✓	5	2.1	2.8	2.4	✓
Foothills	3	0.060	0.090	0.073	✓	3	0.003	0.006	0.004	✓	2	7.35	7.58	7.47	✓	2	3.6	4.4	4.0	✓
Greenmount	4	0.006	0.200	0.062	✓	4	<0.002	0.025	0.008	✓	4	7.86	8.29	8.07	✓	4	16.0	17.0	16.8	✓
Greenmount/Darlington	3	0.015	0.040	0.030	✓	3	0.003	0.004	0.004	✓	2	7.87	8.04	7.96	✓	2	6.7	7.1	6.9	✓
Hamilton Hill	2	0.008	0.030	0.019	✓	2	0.004	0.005	0.005	✓	2	7.72	8.03	7.88	✓	2	3.1	5.9	4.5	✓
Hills Direct	4	0.025	0.050	0.039	✓	4	0.003	0.016	0.008	✓	4	7.11	7.79	7.56	✓	4	2.4	4.7	3.4	✓
Lexia	2	<0.003	0.010	0.005	✓	2	<0.002	<0.002	<0.002	✓	2	7.48	7.85	7.67	✓	2	15.0	19.0	17.0	✓
Mandurah	7	<0.003	0.020	0.011	✓	7	<0.002	0.008	<0.002	✓	7	7.57	8.18	7.91	✓	7	1.1	3.7	2.7	✓
Melville	5	0.025	0.040	0.030	✓	5	0.004	0.006	0.005	✓	5	7.69	8.20	7.95	✓	5	2.8	6.9	5.6	✓
Mirrabooka	5	0.020	0.060	0.029	✓	5	<0.002	0.004	0.003	✓	5	7.08	7.85	7.41	✓	5	12.0	17.0	14.4	✓
Mt. Eliza	3	0.030	0.140	0.097	✓	3	0.006	0.025	0.019	✓	3	7.78	7.88	7.84	✓	3	5.7	7.4	6.4	✓
Mt. Hawthorn	5	0.008	0.050	0.028	✓	5	0.002	0.004	0.003	✓	5	7.86	8.05	7.97	✓	5	16.0	18.0	17.6	✓
Mt. Yokine	4	0.015	0.060	0.031	✓	4	<0.002	0.009	0.004	✓	4	7.72	8.00	7.87	✓	4	16.0	19.0	16.8	✓
Mundaring	2	<0.003	<0.003	<0.003	✓	2	<0.002	0.005	0.003	✓	6	8.35	8.52	8.45	✓	2	7.4	7.5	7.5	✓
Neerabup	5	0.010	0.030	0.018	✓	5	<0.002	0.009	0.003	✓	5	7.29	7.61	7.47	✓	5	17.0	22.0	20.2	✓
North Dandalup	4	0.004	0.035	0.019	✓	4	<0.002	0.012	0.004	✓	4	7.11	8.55	7.93	✓	4	2.7	3.5	3.1	✓
Pinjarra	3	0.006	0.010	0.008	✓	3	<0.002	<0.002	<0.002	✓	3	7.79	8.20	7.98	✓	3	1.4	2.8	2.2	✓
South Perth/Kewdale	2	0.006	0.030	0.018	✓	2	<0.002	<0.002	<0.002	✓	2	7.36	7.90	7.63	✓	2	4.2	17.0	10.6	✓
Tamworth Hill	2	0.010	0.025	0.018	✓	2	<0.002	<0.002	<0.002	✓	2	7.49	7.53	7.51	✓	2	1.2	2.6	1.9	✓
Thomsons Lake	5	<0.003	0.025	0.010	✓	5	0.003	0.010	0.005	✓	5	7.62	8.00	7.86	✓	5	2.5	6.4	5.0	✓
Two Rocks	4	<0.003	<0.003	<0.003	✓	4	<0.002	<0.002	<0.002	✓	4	7.46	7.78	7.66	✓	4	11.0	12.0	11.8	✓
Wanneroo	4	0.008	0.015	0.012	✓	4	0.003	0.005	0.004	✓	4	7.07	7.67	7.39	✓	4	17.0	19.0	18.3	✓
West Yokine	4	0.008	0.120	0.070	✓	4	<0.002	0.016	0.009	✓	4	7.66	7.99	7.87	✓	4	16.0	18.0	17.0	✓
Whitfords	4	0.004	0.006	0.006	✓	4	<0.002	0.003	<0.002	✓	4	7.68	7.91	7.84	✓	4	17.0	18.0	17.5	✓
Yanchep	5	<0.003	0.220	0.083	✓	5	<0.002	0.010	0.004	✓	5	7.30	7.92	7.59	✓	5	15.0	18.0	16.6	✓

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Table 5 **Aesthetic (Non-health related) Variables**

Perth Region	Sodium					TDS					True Colour					Turbidity				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Value (TCU)			Guideline Met	Samples Taken	Value (NTU)			Guideline Met
		Min Value	Max Value	Mean Value			Min	Max	Mean			Min	Max	Mean			Min	Max	Mean	
Armadale/Kelmscott	2	76	79	78	✓	2	318	325	322	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Bold Park	2	73	120	97	✓	2	322	502	412	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Buckland Hill	4	120	135	129	✓	4	453	493	474	✓	4	<1	<1	<1	✓	4	0.2	0.6	0.4	✓
Dwellingup	5	31	35	33	✓	5	127	144	135	✓	5	<1	<1	<1	✓	5	0.3	0.6	0.4	✓
Foothills	3	75	105	85	✓	2	319	422	371	✓	2	<1	<1	<1	✓	2	0.3	0.4	0.4	✓
Greenmount	4	120	140	128	✓	4	504	607	548	✓	4	<1	<1	<1	✓	4	0.1	0.8	0.3	✓
Greenmount/Darlington	3	86	105	96	✓	2	365	440	403	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Hamilton Hill	2	67	115	91	✓	2	296	461	379	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Hills Direct	4	32	93	73	✓	4	173	382	313	✓	4	<1	<1	<1	✓	4	0.2	0.4	0.3	✓
Lexia	2	45	71	58	✓	2	389	482	436	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Mandurah	7	22	25	23	✓	7	149	162	155	✓	7	<1	<1	<1	✓	7	<0.1	0.3	0.2	✓
Melville	5	56	140	113	✓	5	260	496	423	✓	5	<1	<1	<1	✓	5	0.2	0.6	0.3	✓
Mirrabooka	5	63	120	99	✓	5	371	516	465	✓	5	<1	<1	<1	✓	5	<0.1	0.2	<0.1	✓
Mt. Eliza	3	110	120	115	✓	3	418	452	432	✓	3	<1	<1	<1	✓	3	0.1	0.7	0.4	✓
Mt. Hawthorn	5	130	140	133	✓	5	544	579	561	✓	5	<1	<1	<1	✓	5	<0.1	0.2	<0.1	✓
Mt. Yokine	4	120	135	126	✓	4	514	575	544	✓	4	<1	<1	<1	✓	4	<0.1	0.3	0.2	✓
Mundaring	2	91	105	98	✓	2	397	427	412	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Neerabup	5	55	77	69	✓	5	312	543	482	✓	5	<1	<1	<1	✓	5	0.1	0.3	0.2	✓
North Dandalup	4	23	37	28	✓	4	149	166	156	✓	4	<1	<1	<1	✓	4	<0.1	0.4	0.2	✓
Pinjarra	3	23	27	25	✓	3	150	158	155	✓	3	<1	<1	<1	✓	3	<0.1	0.4	0.2	✓
South Perth/Kewdale	2	78	120	99	✓	2	322	532	427	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Tamworth Hill	2	21	24	23	✓	2	137	144	141	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Thomsons Lake	5	23	165	111	✓	5	158	593	438	✓	5	<1	<1	<1	✓	5	<0.1	0.3	<0.1	✓
Two Rocks	4	54	61	57	✓	4	512	532	520	✓	4	<1	<1	<1	✓	4	<0.1	0.2	<0.1	✓
Wanneroo	4	63	83	74	✓	4	381	436	399	✓	4	<1	<1	<1	✓	4	<0.1	0.2	<0.1	✓
West Yokine	4	125	135	131	✓	4	523	588	559	✓	4	<1	<1	<1	✓	4	<0.1	0.3	0.2	✓
Whitfords	4	58	82	67	✓	4	349	368	362	✓	4	<1	<1	<1	✓	4	<0.1	0.2	<0.1	✓
Yanchep	5	51	61	56	✓	5	509	550	534	✓	5	<1	<1	<1	✓	5	<0.1	0.5	0.3	✓

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Table 6 Health related variables

Mid West	*E. coli*				Thermophilic *Naegleria*			Fluoride					Hydrocarbons		Metals	
Locality	Samples Taken	Samples >0 cfu/100mL	Max cfu/100mL	Requirement Met	Samples Taken	Samples with Thermophilic Naegleria	Requirement Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Guideline Met	Samples Taken	Guideline Met
									Min	Max	Mean					
Badgingarra	13	0	0	✓	9	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Bindoon /Chittering	52	0	0	✓	27	0	✓	2	0.35	0.40	0.38	✓	0	(1)	2	✓
Bolgart	13	0	0	✓	9	0	✓	2	0.20	0.20	0.20	✓	0	(1)	2	✓
Calingiri	13	0	0	✓	9	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Carnamah	13	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Carnarvon	65	0	0	✓	39	0	✓	2	0.40	0.50	0.45	✓	0	(1)	2	✓
Cervantes	52	0	0	✓	9	0	✓	2	0.15	0.15	0.15	✓	0	(1)	2	✓
Coomberdale	13	0	0	✓	9	0	✓	2	0.20	0.85	0.53	✓	0	(1)	2	✓
Coorow	13	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	0	(2)	2	✓
Coral Bay	10	0	0	✓	10	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	2	✓
Cue	12	0	0	✓	12	0	✓	2	0.30	0.30	0.30	✓	2	✓	2	✓
Dandaragan	13	0	0	✓	9	0	✓	2	0.25	0.25	0.25	✓	0	(1)	2	✓
Denham	48	0	0	✓	26	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Dongara/Denison	65	0	0	✓	25	0	✓	48	0.20	0.90	0.79	✓	0	(1)	2	✓
Eneabba	13	0	0	✓	13	0	✓	2	0.15	0.15	0.15	✓	0	(1)	9	✓
Exmouth	64	0	0	✓	39	0	✓	52	0.65	0.80	0.72	✓	0	(1)	1	(2)
Gascoyne Junction	26	0	0	✓	26	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Geraldton	174	0	0	✓	174	0	✓	56	0.55	0.95	0.80	✓	0	(1)	4	✓
Gingin	51	0	0	✓	17	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Greenhead	52	0	0	✓	12	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	3	✓
Guilderton	51	0	0	✓	17	0	✓	2	0.15	0.25	0.20	✓	0	(1)	2	✓
Horrocks	12	0	0	✓	12	0	✓	2	0.40	0.40	0.40	✓	0	(1)	2	✓
Jurien Bay	52	0	0	✓	9	0	✓	2	0.25	0.30	0.28	✓	0	(1)	2	✓
Kalbarri	50	0	0	✓	24	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	2	✓
Lancelin	52	0	0	✓	18	0	✓	2	0.20	0.20	0.20	✓	0	(1)	2	✓
Latham	52	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Ledge Point	52	0	0	✓	9	0	✓	2	0.15	0.15	0.15	✓	0	(1)	2	✓
Leeman	52	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	5	✓
Meekatharra	52	0	0	✓	13	0	✓	2	0.55	0.60	0.58	✓	0	(1)	15	✓
Mingenew	13	0	0	✓	12	0	✓	2	0.15	0.20	0.18	✓	0	(1)	2	✓
Moora	51	0	0	✓	17	0	✓	52	0.70	0.90	0.81	✓	0	(1)	2	✓
Morawa	52	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Mt Magnet	52	0	0	✓	13	0	✓	2	0.30	0.30	0.30	✓	1	✓	2	✓
Mullewa	13	0	0	✓	13	0	✓	2	0.80	0.80	0.80	✓	2	✓	2	✓
Nabawa	13	0	0	✓	13	0	✓	2	0.80	0.95	0.88	✓	0	(1)	2	✓
New Norcia	13	0	0	✓	9	0	✓	2	0.15	0.20	0.18	✓	0	(1)	2	✓
Nilgern (Ocean Farms)	13	0	0	✓	9	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	5	✓
Northampton	51	0	0	✓	13	0	✓	2	0.80	0.85	0.83	✓	0	(1)	2	✓
Perenjori	13	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Piawaning	26	0	0	✓	8	0	✓	2	<0.1	0.55	0.28	✓	0	(1)	2	✓
Port Kalbarri	11	0	0	✓	11	0	✓	2	0.15	0.15	0.15	✓	0	(1)	2	✓
Sandstone	13	0	0	✓	13	0	✓	2	0.45	0.45	0.45	✓	0	(1)	6	✓
Seabird	13	0	0	✓	9	0	✓	2	0.30	0.30	0.30	✓	0	(1)	2	✓
Seaview Park	13	0	0	✓	9	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Sovereign Hills	25	0	0	✓	16	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	7	✓
Three Springs	13	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Watheroo	13	0	0	✓	9	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Woodridge	13	0	0	✓	9	0	✓	2	0.25	0.30	0.28	✓	0	(1)	2	✓
Yalgoo	13	0	0	✓	13	0	✓	2	0.15	0.15	0.15	✓	0	(1)	2	✓
Yerecoin	13	0	0	✓	9	0	✓	2	<0.1	0.65	0.33	✓	0	(1)	2	✓
Yuna	13	0	0	✓	13	0	✓	2	0.65	0.70	0.68	✓	0	(1)	2	✓

(1) No samples required in this 12 month period. (2) Sample due in 18/19 and scheduled for June but taken in early July - results met guidelines

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Table 7 **Health related variables**

Mid West	Nitrate					Pesticides		Radiological		Trihalomethanes					Other Health Related	
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Guideline Met	Samples Taken	Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Requirement Met
		Min	Max	Mean							Min	Max	Mean			
Badgingarra	2	0.9	0.9	0.9	✓	1	✓	2	✓	2	<0.001	0.001	<0.001	✓	0	(1)
Bindoon /Chittering	2	<0.2	<0.2	<0.2	✓	1	✓	1	✓	2	0.013	0.020	0.017	✓	0	(1)
Bolgart	2	30.4	34.3	32.6	✓	1	✓	1	✓	2	0.005	0.008	0.007	✓	0	(1)
Calingiri	4	16.7	25.5	21.1	✓	1	✓	2	✓	2	0.017	0.019	0.018	✓	0	(1)
Carnamah	2	1.3	1.3	1.3	✓	1	✓	2	✓	2	0.008	0.012	0.010	✓	0	(1)
Carnarvon	2	3.1	3.5	3.5	✓	1	✓	1	✓	2	0.004	0.005	0.005	✓	0	(1)
Cervantes	4	13.6	17.6	15.0	✓	1	✓	2	✓	2	0.015	0.019	0.017	✓	0	(1)
Coomberdale	2	<0.2	0.4	0.4	✓	1	✓	2	✓	2	0.034	0.120	0.077	✓	0	(1)
Coorow	2	0.4	1.3	0.9	✓	1	✓	4	✓	2	0.013	0.021	0.017	✓	0	(1)
Coral Bay	2	0.4	0.4	0.4	✓	1	✓	0	(1)	2	0.002	0.003	0.003	✓	2	✓
Cue	4	46.2	53.7	50.2	(3)	1	✓	2	✓	2	0.005	0.005	0.005	✓	0	(1)
Dandaragan	2	<0.2	0.4	<0.2	✓	1	✓	2	✓	2	0.007	0.009	0.008	✓	0	(1)
Denham	2	<0.2	0.4	<0.2	✓	1	✓	2	✓	2	0.005	0.005	0.005	✓	0	(1)
Dongara/Denison	5	2.2	3.5	3.1	✓	1	✓	1	✓	2	0.009	0.014	0.012	✓	1	✓
Eneabba	5	<0.2	0.4	<0.2	✓	1	✓	1	✓	2	0.009	0.009	0.009	✓	0	(1)
Exmouth	2	7.9	7.9	7.9	✓	0	(2)	0	(1)	2	<0.001	0.002	<0.001	✓	0	(1)
Gascoyne Junction	2	<0.2	0.9	0.4	✓	1	✓	0	(1)	2	0.006	0.009	0.008	✓	0	(1)
Geraldton	4	2.6	3.1	3.1	✓	2	✓	2	✓	4	0.008	0.012	0.010	✓	0	(1)
Gingin	2	<0.2	<0.2	<0.2	✓	1	✓	2	(1)	2	0.003	0.003	0.003	✓	0	(1)
Greenhead	2	3.5	3.5	3.5	✓	1	✓	1	✓	2	0.001	0.002	0.002	✓	0	(1)
Guilderton	5	33.4	42.7	38.7	✓	1	✓	0	(1)	2	0.013	0.014	0.014	✓	1	✓
Horrocks	5	<0.2	0.4	<0.2	✓	1	✓	2	✓	2	0.014	0.019	0.017	✓	0	(1)
Jurien Bay	4	15.0	15.8	15.4	✓	1	✓	2	✓	2	0.010	0.012	0.011	✓	0	(1)
Kalbarri	2	2.6	3.1	3.1	✓	1	✓	2	✓	2	0.001	0.002	0.002	✓	0	(1)
Lancelin	2	4.0	4.4	4.0	✓	1	✓	2	✓	2	0.008	0.010	0.009	✓	0	(1)
Latham	2	0.9	0.9	0.9	✓	1	✓	1	✓	2	0.012	0.063	0.038	✓	0	(1)
Ledge Point	4	18.9	21.6	20.7	✓	1	✓	1	✓	2	0.014	0.015	0.015	✓	0	(1)
Leeman	2	4.0	4.0	4.0	✓	1	✓	2	✓	2	0.004	0.004	0.004	✓	0	(1)
Meekatharra	4	56.3	65.6	61.2	(3)	1	✓	1	✓	2	0.002	0.005	0.004	✓	0	(1)
Mingenew	2	6.2	10.6	8.4	✓	1	✓	2	✓	2	0.002	0.004	0.003	✓	0	(1)
Moora	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	0.019	0.023	0.021	✓	0	(1)
Morawa	2	0.9	0.9	0.9	✓	1	✓	0	(1)	2	0.002	0.007	0.005	✓	0	(1)
Mt Magnet	6	62.9	72.2	67.3	(3)	1	✓	1	✓	2	0.002	0.005	0.004	✓	1	✓
Mullewa	2	2.2	3.1	2.6	✓	1	✓	2	✓	2	0.031	0.033	0.032	✓	0	(1)
Nabawa	2	2.6	3.1	3.1	✓	1	✓	2	✓	2	0.008	0.012	0.010	✓	1	✓
New Norcia	10	43.1	57.2	49.3	(3)	1	✓	1	✓	2	0.008	0.012	0.010	✓	0	(1)
Nilgern (Ocean Farms)	3	25.5	26.4	26.0	✓	1	✓	2	✓	2	0.005	0.005	0.005	✓	0	(1)
Northampton	2	2.2	2.6	2.6	✓	1	✓	2	✓	2	0.022	0.024	0.023	✓	0	(1)
Perenjori	2	0.9	0.9	0.9	✓	1	✓	2	✓	2	0.004	0.009	0.007	✓	0	(1)
Piawaning	2	9.2	12.3	11.0	✓	1	✓	2	✓	2	0.045	0.071	0.058	✓	0	(1)
Port Kalbarri	2	0.4	0.4	0.4	✓	1	✓	2	✓	2	0.004	0.029	0.017	✓	0	(1)
Sandstone	6	53.7	62.0	57.6	(3)	1	✓	0	(1)	2	0.002	0.002	0.002	✓	0	(1)
Seabird	2	0.4	0.4	0.4	✓	1	✓	2	✓	2	0.039	0.060	0.050	✓	0	(1)
Seaview Park	4	24.2	26.4	25.5	✓	1	✓	2	✓	2	0.002	0.002	0.002	✓	0	(1)
Sovereign Hills	7	2.6	4.0	3.5	✓	1	✓	1	✓	2	0.020	0.023	0.022	✓	0	(1)
Three Springs	2	1.8	1.8	1.8	✓	1	✓	2	✓	2	0.006	0.007	0.007	✓	0	(1)
Watheroo	4	<0.2	0.4	<0.2	✓	1	✓	0	(1)	5	0.084	0.150	0.119	✓	0	(1)
Woodridge	4	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	0.120	0.140	0.130	✓	0	(1)
Yalgoo*	2	34.3	36.5	35.6	✓	1	✓	2	✓	2	0.012	0.024	0.018	✓	0	(1)
Yerecoin	3	4.4	14.1	8.8	✓	1	✓	1	✓	2	0.090	0.100	0.095	✓	1	✓
Yuna	2	2.6	2.6	2.6	✓	0	(2)	2	✓	2	0.019	0.027	0.023	✓	0	(1)

(1) No samples required in this 12 month period. (2) Sample due in 18/19 and scheduled for June but taken in early July - results met guidelines (3) Cue, Meekatharra, Mount Magnet, New Norcia, Sandstone and Yalgoo have been granted an exemption from compliance with the infant health nitrate guideline by the Department of Health. Carers of infants younger than 3 months should seek advice from the Community Health Nurse regarding the use of alternative water sources for the preparation of bottle feeds. The Water Corporation provides bottled water free of charge for this purpose. Note: Although *Yalgoo has an exemption, due to treatment intervention, it has achieved compliance with the infant health guideline limit.The water supplied has always met the guideline for adults and children over the age of 3 months - for a full list of towns with nitrate exemptions and how we are improving water quality in these towns - please refer to *'Understanding water quality test results - Nitrate'* section of the annual report.

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Table 8 **Aesthetic (Non-health related) Variables**

Mid West	Alkalinity (as CaCO3)					Aluminium					Chloride					Hardness				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met
		Min Value	Max Value	Mean Value			Min	Max	Mean			Min Value	Max Value	Mean Value			Min	Max	Mean	
Badgingarra	2	99	140	120	(1)	2	<0.008	<0.008	<0.008	✓	2	215	225	220	✓	2	45	46	46	✓
Bindoon /Chittering	2	85	88	87	(1)	2	<0.008	<0.008	<0.008	✓	2	160	165	163	✓	2	49	53	51	✓
Bolgart	2	34	34	34	(1)	2	<0.008	<0.008	<0.008	✓	2	250	255	253	(2)	2	120	130	125	✓
Calingiri	4	24	37	30	(1)	4	<0.008	<0.008	<0.008	✓	4	360	620	473	(2)	4	140	270	195	✓
Carnamah	2	8	13	11	(1)	2	<0.008	<0.008	<0.008	✓	2	430	440	435	(2)	2	140	150	145	✓
Carnarvon	2	100	110	105	(1)	2	<0.008	<0.008	<0.008	✓	2	165	175	170	✓	2	190	200	195	✓
Cervantes	4	230	230	230	(1)	4	<0.008	<0.008	<0.008	✓	4	265	315	290	(2)	4	300	350	330	(3)
Coomberdale	2	25	190	108	(1)	2	0.014	0.035	0.025	✓	2	190	255	223	✓	2	72	240	156	✓
Coorow	2	15	21	18	(1)	2	<0.008	<0.008	<0.008	✓	2	425	440	433	(2)	2	130	150	140	✓
Coral Bay	2	72	80	76	(1)	2	<0.008	<0.008	<0.008	✓	2	43	46	45	✓	2	74	82	78	✓
Cue	2	60	62	61	(1)	2	<0.008	<0.008	<0.008	✓	2	280	290	287	(2)	2	180	200	190	✓
Dandaragan	2	120	120	120	(1)	2	<0.008	0.010	<0.008	✓	2	235	245	240	✓	2	95	100	98	✓
Denham	2	23	25	24	(1)	2	<0.008	<0.008	<0.008	✓	2	155	165	160	✓	2	58	64	61	✓
Dongara/Denison	5	62	70	66	(1)	5	<0.008	<0.008	<0.008	✓	5	350	390	375	(2)	5	110	120	118	✓
Eneabba	5	16	17	17	(1)	5	<0.008	<0.008	<0.008	✓	5	320	335	329	(2)	5	95	100	99	✓
Exmouth	2	240	240	240	(1)	2	<0.008	<0.008	<0.008	✓	2	210	250	230	✓	2	330	350	340	(3)
Gascoyne Junction	2	24	26	25	(1)	2	<0.008	<0.008	<0.008	✓	2	100	175	138	✓	2	51	83	67	✓
Geraldton	4	60	65	62	(1)	4	<0.008	<0.008	<0.008	✓	4	330	400	366	(2)	4	110	120	118	✓
Gingin	2	29	39	34	(1)	2	<0.008	<0.008	<0.008	✓	2	95	100	98	✓	2	27	28	28	✓
Greenhead	2	20	24	22	(1)	2	<0.008	<0.008	<0.008	✓	2	285	290	288	(2)	2	100	110	105	✓
Guilderton	2	190	200	195	(1)	2	<0.008	<0.008	<0.008	✓	2	310	330	320	(2)	2	310	320	315	(3)
Horrocks	5	120	160	138	(1)	5	<0.008	<0.008	<0.008	✓	5	580	620	601	(2)	5	130	140	136	✓
Jurien Bay	4	240	270	253	(1)	4	<0.008	<0.008	<0.008	✓	4	210	290	239	(2)	4	320	340	330	(3)
Kalbarri	2	7	8	8	(1)	2	<0.008	<0.008	<0.008	✓	2	190	200	195	✓	2	65	69	67	✓
Lancelin	2	200	200	200	(1)	2	<0.008	<0.008	<0.008	✓	2	215	220	218	✓	2	270	270	270	(3)
Latham	2	39	44	42	(1)	2	<0.008	<0.008	<0.008	✓	2	295	310	303	(2)	2	86	110	98	✓
Ledge Point	4	200	210	203	(1)	4	<0.008	<0.008	<0.008	✓	4	165	170	166	✓	4	250	260	255	(3)
Leeman	2	22	27	25	(1)	2	<0.008	<0.008	<0.008	✓	2	280	285	283	(2)	2	110	110	110	✓
Meekatharra	4	160	170	165	(1)	4	<0.008	<0.008	<0.008	✓	4	280	300	293	(2)	4	280	300	288	(3)
Mingenew	2	27	28	28	(1)	2	<0.008	<0.008	<0.008	✓	2	320	340	330	(2)	2	75	85	80	✓
Moora	2	21	27	24	(1)	2	<0.008	<0.008	<0.008	✓	2	250	255	253	(2)	2	69	72	71	✓
Morawa	2	21	29	25	(1)	2	<0.008	0.008	<0.008	✓	2	320	320	320	(2)	2	76	83	80	✓
Mt Magnet	2	180	200	190	(1)	2	<0.008	<0.008	<0.008	✓	2	275	285	280	(2)	2	270	270	270	(3)
Mullewa	2	75	75	75	(1)	2	<0.008	0.010	<0.008	✓	2	375	390	383	(2)	2	120	130	125	✓
Nabawa	2	62	64	63	(1)	2	0.012	0.020	0.016	✓	2	380	390	385	(2)	2	120	120	120	✓
New Norcia	6	27	31	29	(1)	2	<0.008	<0.008	<0.008	✓	6	520	620	578	(2)	6	200	260	232	(3)
Nilgern (Ocean Farms)	3	190	230	213	(1)	3	<0.008	<0.008	<0.008	✓	3	110	135	127	✓	3	210	250	233	(3)
Northampton	2	65	67	66	(1)	2	<0.008	<0.008	<0.008	✓	2	370	370	370	(2)	2	130	130	130	✓
Perenjori	2	24	26	25	(1)	2	<0.008	<0.008	<0.008	✓	2	290	310	300	(2)	2	71	91	81	✓
Piawaning	2	39	43	41	(1)	2	<0.008	<0.008	<0.008	✓	2	135	225	180	✓	2	96	140	118	✓
Port Kalbarri	2	68	80	74	(1)	2	<0.008	<0.008	<0.008	✓	2	315	335	325	(2)	2	120	120	120	✓
Sandstone	2	89	100	95	(1)	2	<0.008	<0.008	<0.008	✓	2	330	335	333	(2)	2	320	340	330	(3)
Seabird	2	93	110	102	(1)	2	<0.008	<0.008	<0.008	✓	2	210	215	213	✓	2	99	110	105	✓
Seaview Park	4	170	180	175	(1)	4	<0.008	<0.008	<0.008	✓	4	85	90	88	✓	4	190	200	198	✓
Sovereign Hills	2	200	210	205	(1)	2	<0.008	<0.008	<0.008	✓	2	185	185	185	✓	2	250	260	255	(3)
Three Springs	2	22	22	22	(1)	2	<0.008	<0.008	<0.008	✓	2	350	370	360	(2)	2	88	91	90	✓
Watheroo	4	180	200	190	(1)	4	<0.008	<0.008	<0.008	✓	4	185	190	189	✓	4	250	260	258	(3)
Woodridge	4	54	57	55	(1)	4	0.040	0.055	0.048	✓	4	185	195	189	✓	4	47	51	50	✓
Yalgoo	2	92	100	96	(1)	2	<0.008	<0.008	<0.008	✓	2	120	125	123	✓	2	87	94	91	✓
Yerecoin	3	39	57	45	(1)	3	<0.008	<0.008	<0.008	✓	3	160	220	190	✓	3	93	140	114	✓
Yuna	2	62	62	62	(1)	2	<0.008	0.055	0.028	✓	2	385	395	390	(2)	2	120	120	120	✓

(1) No guideline value available as per ADWG 2011. (2) Elevated chloride is characteristic of the source supplying this locality. (3) Elevated hardness is characteristic of the source supplying this locality.

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Table 9 **Aesthetic (Non-health related) Variables**

Mid West	Iron					Manganese					pH					Silicon				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Value (pH units)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met
		Min	Max	Mean			Min	Max	Mean			Min	Max	Mean			Min Value	Max Value	Mean Value	
Badgingarra	2	0.006	0.010	0.008	✓	2	0.002	0.003	0.003	✓	2	6.80	7.23	7.02	✓	2	42.0	42.0	42.0	✓
Bindoon /Chittering	2	0.030	0.070	0.050	✓	2	<0.002	0.005	0.003	✓	2	7.04	7.58	7.31	✓	2	35.0	35.0	35.0	✓
Bolgart	2	0.010	0.030	0.020	✓	2	<0.002	<0.002	<0.002	✓	2	6.96	7.08	7.02	✓	2	37.0	43.0	40.0	✓
Calingiri	4	0.015	0.040	0.026	✓	4	<0.002	<0.002	<0.002	✓	4	6.64	7.01	6.86	✓	4	14.0	17.0	15.5	✓
Carnamah	2	0.025	0.040	0.033	✓	2	<0.002	<0.002	<0.002	✓	2	6.84	7.04	6.94	✓	2	22.0	24.0	23.0	✓
Carnarvon	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.62	7.66	7.64	✓	2	38.0	38.0	38.0	✓
Cervantes	4	<0.003	0.006	<0.003	✓	4	<0.002	<0.002	<0.002	✓	4	7.35	7.65	7.56	✓	4	13.0	13.0	13.0	✓
Coomberdale	2	0.045	0.070	0.058	✓	2	<0.002	<0.002	<0.002	✓	2	7.77	8.19	7.98	✓	2	15.0	22.0	18.5	✓
Coorow	2	0.015	0.035	0.025	✓	2	<0.002	<0.002	<0.002	✓	2	7.03	7.05	7.04	✓	2	21.0	29.0	25.0	✓
Coral Bay	2	0.008	0.010	0.009	✓	2	<0.002	0.003	<0.002	✓	2	7.22	7.48	7.35	✓	2	0.4	0.4	0.4	✓
Cue	2	0.004	0.015	0.010	✓	2	<0.002	<0.002	<0.002	✓	2	7.41	8.02	7.76	✓	2	80.0	80.0	80.0	(2)
Dandaragan	2	0.040	0.070	0.055	✓	2	0.003	0.003	0.003	✓	2	7.16	7.28	7.22	✓	2	39.0	42.0	40.5	✓
Denham	2	0.025	0.080	0.053	✓	2	<0.002	<0.002	<0.002	✓	2	7.12	7.27	7.20	✓	2	2.3	2.7	2.5	✓
Dongara/Denison	5	0.010	0.140	0.041	✓	5	<0.002	0.012	<0.002	✓	5	7.09	7.46	7.32	✓	5	19.0	25.0	22.2	✓
Eneabba	5	0.015	0.035	0.025	✓	5	<0.002	<0.002	<0.002	✓	5	6.95	7.54	7.15	✓	5	43.0	48.0	45.0	✓
Exmouth	2	<0.003	0.004	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.59	7.69	7.64	✓	2	15.0	15.0	15.0	✓
Gascoyne Junction	2	<0.003	0.015	0.008	✓	2	<0.002	<0.002	<0.002	✓	2	6.94	7.45	7.20	✓	2	3.8	4.1	4.0	✓
Geraldton	4	0.008	0.030	0.016	✓	4	<0.002	<0.002	<0.002	✓	4	6.95	7.52	7.21	✓	4	22.0	25.0	23.0	✓
Gingin	2	0.045	0.050	0.048	✓	2	<0.002	<0.002	<0.002	✓	2	7.36	7.68	7.52	✓	2	27.0	28.0	27.5	✓
Greenhead	2	0.010	0.020	0.015	✓	2	<0.002	<0.002	<0.002	✓	2	7.13	7.41	7.27	✓	2	23.0	24.0	23.5	✓
Guilderton	2	<0.003	0.004	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.51	7.77	7.64	✓	2	8.9	9.4	9.2	✓
Horrocks	5	0.040	0.090	0.061	✓	5	0.005	0.010	0.008	✓	5	7.26	7.94	7.57	✓	5	14.0	16.0	15.0	✓
Jurien Bay	4	<0.003	<0.003	<0.003	✓	4	<0.002	<0.002	<0.002	✓	4	7.45	7.67	7.56	✓	4	14.0	16.0	14.8	✓
Kalbarri	2	0.010	0.010	0.010	✓	2	<0.002	<0.002	<0.002	✓	2	6.43	6.63	6.53	✓	2	41.0	45.0	43.0	✓
Lancelin	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.53	7.73	7.63	✓	2	15.0	16.0	15.5	✓
Latham	2	0.030	0.040	0.035	✓	2	<0.002	<0.002	<0.002	✓	2	8.95	9.08	9.02	(1)	2	40.0	48.0	44.0	✓
Ledge Point	4	<0.003	0.006	<0.003	✓	4	<0.002	<0.002	<0.002	✓	4	7.38	7.84	7.70	✓	4	14.0	16.0	14.8	✓
Leeman	2	0.030	0.035	0.033	✓	2	<0.002	<0.002	<0.002	✓	2	7.43	8.12	7.78	✓	2	22.0	25.0	23.5	✓
Meekatharra	4	<0.003	0.004	<0.003	✓	4	<0.002	<0.002	<0.002	✓	4	7.96	8.13	8.06	✓	4	75.0	80.0	77.5	✓
Mingenew	2	0.015	0.045	0.030	✓	2	<0.002	0.002	<0.002	✓	2	6.96	7.51	7.24	✓	2	50.0	55.0	52.5	✓
Moora	2	0.035	0.060	0.048	✓	2	<0.002	<0.002	<0.002	✓	2	7.03	7.19	7.11	✓	2	23.0	23.0	23.0	✓
Morawa	2	0.030	0.040	0.035	✓	2	<0.002	<0.002	<0.002	✓	2	7.05	7.08	7.07	✓	2	45.0	46.0	45.5	✓
Mt Magnet	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.87	8.01	7.94	✓	2	75.0	75.0	75.0	✓
Mullewa	2	0.035	0.050	0.043	✓	2	<0.002	<0.002	<0.002	✓	2	8.00	8.14	8.07	✓	2	19.0	23.0	21.0	✓
Nabawa	2	0.030	0.100	0.065	✓	2	<0.002	0.009	0.005	✓	2	7.72	7.84	7.78	✓	2	22.0	23.0	22.5	✓
New Norcia	6	0.015	0.040	0.027	✓	6	<0.002	<0.002	<0.002	✓	6	6.38	6.69	6.53	✓	6	43.0	49.0	44.7	✓
Nilgern (Ocean Farms)	3	<0.003	0.004	<0.003	✓	3	<0.002	<0.002	<0.002	✓	3	7.72	8.01	7.85	✓	3	18.0	19.0	18.3	✓
Northampton	2	0.015	0.035	0.025	✓	2	<0.002	0.002	<0.002	✓	2	8.37	8.49	8.43	✓	2	20.0	22.0	21.0	✓
Perenjori	2	0.006	0.015	0.011	✓	2	<0.002	<0.002	<0.002	✓	2	7.16	7.20	7.18	✓	2	44.0	48.0	46.0	✓
Piawaning	2	0.006	0.015	0.011	✓	2	<0.002	<0.002	<0.002	✓	2	7.27	7.29	7.28	✓	2	16.0	17.0	16.5	✓
Port Kalbarri	2	0.004	0.010	0.007	✓	2	<0.002	<0.002	<0.002	✓	6	6.90	7.66	7.50	✓	2	43.0	44.0	43.5	✓
Sandstone	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.36	7.39	7.38	✓	2	36.0	37.0	36.5	✓
Seabird	2	0.050	0.070	0.060	✓	2	0.016	0.020	0.018	✓	2	7.59	7.90	7.75	✓	2	16.0	18.0	17.0	✓
Seaview Park	4	<0.003	<0.003	<0.003	✓	4	<0.002	<0.002	<0.002	✓	4	7.77	7.96	7.84	✓	4	16.0	18.0	16.5	✓
Sovereign Hills	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.62	7.86	7.74	✓	2	19.0	19.0	19.0	✓
Three Springs	2	0.040	0.050	0.045	✓	2	0.006	0.008	0.007	✓	2	7.11	7.42	7.27	✓	2	46.0	47.0	46.5	✓
Watheroo	4	0.010	0.025	0.018	✓	4	<0.002	<0.002	<0.002	✓	4	7.21	7.40	7.31	✓	4	12.0	14.0	13.3	✓
Woodridge	4	0.020	0.030	0.023	✓	4	0.004	0.009	0.006	✓	4	7.04	7.46	7.29	✓	4	24.0	27.0	25.5	✓
Yalgoo	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.18	7.23	7.21	✓	2	80.0	85.0	82.5	(2)
Yerecoin	3	0.030	0.060	0.050	✓	3	<0.002	<0.002	<0.002	✓	3	7.42	7.73	7.61	✓	3	16.0	18.0	16.7	✓
Yuna	2	0.050	0.500	0.275	✓	2	<0.002	0.018	0.009	✓	2	7.71	7.78	7.75	✓	2	21.0	22.0	21.5	✓

(1) Latham - High pH due to long mains supplying this locality. (2) Elevated silica is characteristic of the souce supplying this locality.

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Table 10 **Aesthetic (Non-health related) Variables**

Mid West	Sodium					TDS					True Colour					Turbidity				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Value (TCU)			Guideline Met	Samples Taken	Value (NTU)			Guideline Met
		Min Value	Max Value	Mean Value			Min	Max	Mean			Min	Max	Mean			Min	Max	Mean	
Badgingarra	2	175	190	183	(1)	2	611	664	638	(2)	2	<1	<1	<1	✓	2	<0.1	0.2	0.1	✓
Bindoon /Chittering	2	110	115	113	✓	2	453	464	459	✓	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Bolgart	2	135	150	143	✓	2	559	591	575	✓	2	<1	<1	<1	✓	2	0.8	0.9	0.9	✓
Calingiri	4	205	355	273	(1)	4	706	1179	917	(2)	4	<1	<1	<1	✓	4	0.1	0.2	0.2	✓
Carnamah	2	245	250	248	(1)	2	819	823	821	(2)	2	<1	<1	<1	✓	2	<0.1	0.2	0.1	✓
Carnarvon	2	90	93	92	✓	2	564	574	569	✓	2	<1	<1	<1	✓	2	0.2	0.4	0.3	✓
Cervantes	4	145	180	165	✓	4	873	947	917	(2)	4	<1	<1	<1	✓	4	<0.1	<0.1	<0.1	✓
Coomberdale	2	105	140	123	✓	2	516	633	575	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Coorow	2	235	240	238	(1)	2	814	826	820	(2)	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Coral Bay	2	27	32	30	✓	2	195	216	206	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Cue	2	160	175	165	✓	2	796	820	810	(2)	2	<1	<1	<1	✓	2	0.1	0.8	0.4	✓
Dandaragan	2	170	180	175	✓	2	661	676	669	(2)	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Denham	2	89	90	90	✓	2	334	345	340	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Dongara/Denison	5	225	265	244	(1)	5	778	860	821	(2)	5	<1	<1	<1	✓	5	<0.1	1.4	0.4	✓
Eneabba	5	170	185	179	✓	5	627	642	637	(2)	5	<1	<1	<1	✓	5	0.1	0.2	0.2	✓
Exmouth	2	115	140	128	✓	2	782	857	820	(2)	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Gascoyne Junction	2	59	95	77	✓	2	237	378	308	✓	2	<1	<1	<1	✓	2	<0.1	0.2	0.1	✓
Geraldton	4	230	250	243	(1)	4	771	848	806	(2)	4	<1	<1	<1	✓	4	<0.1	0.2	0.1	✓
Gingin	2	61	62	62	✓	2	252	263	258	✓	2	<1	<1	<1	✓	2	<0.1	0.3	0.2	✓
Greenhead	2	155	165	160	✓	2	573	575	574	✓	2	<1	<1	<1	✓	2	<0.1	0.2	0.1	✓
Guilderton	2	180	195	188	(1)	2	941	961	951	(2)	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Horrocks	5	400	455	416	(1)	5	1303	1407	1347	(2)	5	<1	<1	<1	✓	5	0.2	0.5	0.4	✓
Jurien Bay	4	120	175	141	✓	4	803	965	870	(2)	4	<1	<1	<1	✓	4	<0.1	0.2	0.1	✓
Kalbarri	2	105	105	105	✓	2	386	405	396	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Lancelin	2	100	115	108	✓	2	694	721	708	(2)	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Latham	2	185	195	190	(1)	2	659	687	673	(2)	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Ledge Point	4	99	110	105	✓	4	682	699	691	(2)	4	<1	<1	<1	✓	4	<0.1	<0.1	<0.1	✓
Leeman	2	155	155	155	✓	2	571	576	574	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Meekatharra	4	195	210	201	(1)	4	1046	1078	1059	(2)	4	<1	<1	<1	✓	4	<0.1	<0.1	<0.1	✓
Mingenew	2	205	205	205	(1)	2	688	708	698	(2)	2	<1	<1	<1	✓	2	<0.1	0.4	0.2	✓
Moora	2	140	140	140	✓	2	504	509	507	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Morawa	2	190	200	195	(1)	2	670	672	671	(2)	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Mt Magnet	2	175	180	178	✓	2	977	996	987	(2)	2	<1	<1	<1	✓	2	0.2	0.5	0.4	✓
Mullewa	2	235	240	238	(1)	2	824	854	839	(2)	2	<1	<1	<1	✓	2	<0.1	0.2	0.1	✓
Nabawa	2	235	255	245	(1)	2	823	830	827	(2)	2	<1	<1	<1	✓	2	<0.1	0.9	0.5	✓
New Norcia	6	275	360	323	(1)	6	1029	1241	1145	(2)	6	<1	<1	<1	✓	6	0.2	0.5	0.3	✓
Nilgern (Ocean Farms)	3	68	89	81	✓	3	553	664	621	(2)	3	<1	<1	<1	✓	3	0.1	0.2	0.2	✓
Northampton	2	235	260	248	(1)	2	807	838	823	(2)	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Perenjori	2	180	205	193	(1)	2	612	678	645	(2)	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Piawaning	2	79	110	95	✓	2	370	511	441	✓	2	<1	<1	<1	✓	2	0.1	0.1	0.1	✓
Port Kalbarri	2	210	210	210	(1)	2	760	762	761	(2)	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Sandstone	2	185	190	188	(1)	2	959	982	971	(2)	2	<1	<1	<1	✓	2	<0.1	0.2	0.1	✓
Seabird	2	145	145	145	✓	2	565	599	582	✓	2	<1	<1	<1	✓	2	0.3	0.4	0.4	✓
Seaview Park	4	60	65	62	✓	4	496	502	499	✓	4	<1	<1	<1	✓	4	<0.1	0.2	0.1	✓
Sovereign Hills	2	105	105	105	✓	2	670	696	683	(2)	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Three Springs	2	205	215	210	(1)	2	716	726	721	(2)	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Watheroo	4	92	98	96	✓	4	628	641	635	(2)	4	<1	<1	<1	✓	4	<0.1	0.2	0.1	✓
Woodridge	4	120	135	129	✓	4	458	477	472	✓	4	<1	<1	<1	✓	4	<0.1	0.2	0.1	✓
Yalgoo	2	97	99	98	✓	2	496	516	506	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Yerecoin	3	90	115	105	✓	3	409	503	462	✓	3	<1	<1	<1	✓	3	0.1	0.2	0.1	✓
Yuna	2	230	255	243	(1)	2	808	846	827	(2)	2	<1	<1	<1	✓	2	0.3	11	5.7	(3)

(1) Elevated Sodium is characteristic of the source supplying this locality. (2) Elevated TDS is characteristic of the source supplying this locality. (3) Yuna has carted water from Geraldton which was within the ADWG aesthetic guideline value for turbidity

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Table 11 **Health related variables**

Goldfields and Agricultural Region	*E. coli*				Thermophilic *Naegleria*			Fluoride					Hydrocarbons		Metals	
Locality	Samples Taken	Samples >0 cfu/100mL	Max cfu/100mL	Requirement Met	Samples Taken	Samples with Thermophilic Naegleria	Requirement Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Guideline Met	Samples Taken	Guideline Met
									Min	Max	Mean					
Ardath	12	0	0	✓	12	0	✓	2	0.85	0.85	0.85	✓	0	(1)	2	✓
Avon Hills	60	0	0	✓	60	0	✓	2	0.80	0.90	0.85	✓	0	(1)	2	✓
Ballidu	12	0	0	✓	12	0	✓	2	0.85	0.90	0.88	✓	0	(1)	2	✓
Beacon	12	0	0	✓	12	0	✓	2	0.80	0.90	0.85	✓	1	✓	2	✓
Bencubbin	12	0	0	✓	12	0	✓	2	0.80	0.90	0.85	✓	0	(1)	2	✓
Beverley	52	0	0	✓	27	0	✓	2	0.85	0.85	0.85	✓	0	(1)	2	✓
Bind Bindi	12	0	0	✓	12	0	✓	2	0.70	0.90	0.80	✓	0	(1)	2	✓
Broad Arrow	12	0	0	✓	12	0	✓	2	0.85	0.85	0.85	✓	0	(1)	2	✓
Bruce Rock	52	0	0	✓	12	0	✓	2	0.80	0.85	0.83	✓	0	(1)	2	✓
Bullfinch	12	0	0	✓	12	0	✓	2	0.80	0.85	0.83	✓	0	(1)	2	✓
Buntine	12	0	0	✓	12	0	✓	2	0.80	0.90	0.85	✓	0	(1)	2	✓
Cadoux	12	0	0	✓	12	0	✓	2	0.85	0.85	0.85	✓	0	(1)	2	✓
Coolgardie	52	0	0	✓	26	0	✓	2	0.80	0.90	0.85	✓	0	(1)	2	✓
Corrigin	52	0	0	✓	26	0	✓	2	0.85	0.90	0.88	✓	0	(1)	2	✓
Cunderdin	52	0	0	✓	12	0	✓	2	0.75	0.80	0.78	✓	0	(1)	2	✓
Dalwallinu	52	0	0	✓	12	0	✓	2	0.80	0.90	0.85	✓	0	(1)	2	✓
Dowerin	12	0	0	✓	12	0	✓	2	0.80	0.85	0.83	✓	0	(1)	2	✓
Goomalling	52	0	0	✓	13	0	✓	2	0.80	0.85	0.83	✓	1	✓	2	✓
Greater Bodallin	12	0	0	✓	12	0	✓	2	0.80	0.80	0.80	✓	0	(1)	2	✓
Greater Burracoppin	36	0	0	✓	36	0	✓	2	0.80	0.80	0.80	✓	0	(1)	2	✓
Greater Doolakine	36	0	0	✓	36	0	✓	2	0.80	0.80	0.80	✓	0	(1)	2	✓
Greater Meckering	39	0	0	✓	38	0	✓	2	0.75	0.85	0.80	✓	0	(1)	2	✓
Greenhills	12	0	0	✓	12	0	✓	2	0.80	0.85	0.83	✓	0	(1)	2	✓
Jennacubbine	12	0	0	✓	12	0	✓	2	0.85	0.85	0.85	✓	0	(1)	2	✓
Kalannie	12	0	0	✓	12	0	✓	2	0.85	0.85	0.85	✓	0	(1)	2	✓
Kalgoorlie	156	0	0	✓	130	0	✓	54	0.80	0.90	0.86	✓	0	(1)	3	✓
Kambalda	52	0	0	✓	52	0	✓	2	0.85	0.85	0.85	✓	0	(1)	2	✓
Kellerberrin	52	0	0	✓	26	0	✓	2	0.85	0.95	0.90	✓	0	(1)	2	✓
Koolyanobbing	12	0	0	✓	12	0	✓	2	0.80	0.90	0.85	✓	0	(1)	2	✓
Koorda	12	0	0	✓	12	0	✓	2	0.85	0.90	0.88	✓	0	(1)	2	✓
Kununoppin	12	0	0	✓	12	0	✓	2	0.80	0.80	0.80	✓	0	(1)	2	✓
Laverton	12	0	0	✓	9	0	✓	4	1.10	1.20	1.18	✓	0	(1)	6	✓
Leonora	51	0	0	✓	19	0	✓	2	0.45	0.50	0.48	✓	0	(1)	2	✓
Marvel Loch	12	0	0	✓	12	0	✓	2	0.85	0.90	0.88	✓	0	(1)	2	✓
Menzies	12	0	0	✓	9	0	✓	2	0.85	0.90	0.88	✓	0	(1)	14	✓
Merredin	52	0	0	✓	52	0	✓	52	0.75	0.95	0.84	✓	0	(1)	2	✓
Miling	12	0	0	✓	12	0	✓	2	0.80	0.95	0.88	✓	0	(1)	2	✓
Mukinbudin	12	0	0	✓	12	0	✓	2	0.80	0.80	0.80	✓	0	(1)	2	✓
Muntadgin	12	0	0	✓	12	0	✓	2	0.80	0.85	0.83	✓	0	(1)	2	✓
Narembeen	12	0	0	✓	12	0	✓	2	0.80	0.90	0.85	✓	0	(1)	2	✓
Norseman	52	0	0	✓	26	0	✓	2	0.90	1.00	0.95	✓	0	(1)	2	✓
Northam	78	0	0	✓	78	0	✓	52	0.80	0.95	0.85	✓	0	(1)	2	✓
Nungarin	12	0	0	✓	12	0	✓	2	0.75	0.80	0.78	✓	0	(1)	2	✓
Ora Banda	12	0	0	✓	12	0	✓	2	0.85	0.90	0.88	✓	0	(1)	2	✓
Pithara	12	0	0	✓	12	0	✓	2	0.80	0.95	0.88	✓	0	(1)	2	✓
Quairading	52	0	0	✓	26	0	✓	2	0.85	0.85	0.85	✓	0	(1)	2	✓
Seabrook	12	0	0	✓	12	0	✓	2	0.85	0.85	0.85	✓	0	(1)	2	✓
Shackleton	12	0	0	✓	12	0	✓	2	0.80	0.85	0.83	✓	0	(1)	2	✓
Southern Cross	52	0	0	✓	39	0	✓	2	0.90	0.90	0.90	✓	0	(1)	2	✓
Spencers Brook	12	0	0	✓	12	0	✓	2	0.80	0.85	0.83	✓	0	(1)	2	✓
Tammin	24	0	0	✓	24	0	✓	2	0.80	0.85	0.83	✓	0	(1)	2	✓
Toodyay	52	0	0	✓	26	0	✓	2	0.85	0.85	0.85	✓	0	(1)	2	✓
Trayning	12	0	0	✓	12	0	✓	2	0.75	0.85	0.80	✓	0	(1)	2	✓
Warralakin	12	0	0	✓	12	0	✓	2	0.80	0.85	0.83	✓	0	(1)	2	✓
Westonia	12	0	0	✓	12	0	✓	2	0.80	0.85	0.83	✓	0	(1)	2	✓
Wiluna	13	0	0	✓	13	0	✓	2	0.20	0.20	0.20	✓	0	(1)	2	✓
Wongan Hills	52	0	0	✓	26	0	✓	2	0.85	0.90	0.88	✓	0	(1)	2	✓
Wubin	12	0	0	✓	12	0	✓	2	0.75	0.85	0.80	✓	0	(1)	2	✓
Wyalkatchem	12	0	0	✓	12	0	✓	2	0.85	0.85	0.85	✓	0	(1)	2	✓
York	78	0	0	✓	78	0	✓	52	0.80	0.95	0.84	✓	0	(1)	2	✓

(1) No samples required in this 12 month period

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Table 12 **Health related variables**

Goldfields and Agricultural Region	Nitrate					Pesticides		Radiological		Trihalomethanes					Other Health Related	
Locality	Samples Taken	Concentration (mg/L)			*Guideline Met	Samples Taken	Guideline Met	Samples Taken	Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Requirement Met
		Min	Max	Mean							Min	Max	Mean			
Ardath	2	1.3	3.5	2.2	✓	1	✓	0	(1)	2	0.015	0.018	0.017	✓	0	(1)
Avon Hills	2	0.9	1.3	0.9	✓	1	✓	0	(1)	2	0.032	0.053	0.043	✓	1	✓
Ballidu	2	1.3	1.3	1.3	✓	1	✓	2	✓	2	0.031	0.031	0.031	✓	1	✓
Beacon	2	1.8	1.8	1.8	✓	1	✓	0	(1)	2	0.023	0.024	0.024	✓	0	(1)
Bencubbin	2	3.5	4.4	4.0	✓	1	✓	0	(1)	2	0.009	0.021	0.015	✓	1	✓
Beverley	2	1.8	2.2	2.2	✓	1	✓	2	✓	2	0.045	0.046	0.046	✓	0	(1)
Bind Bindi	2	0.9	1.3	1.3	✓	1	✓	0	(1)	2	0.036	0.038	0.037	✓	1	✓
Broad Arrow	2	2.2	2.6	2.6	✓	1	✓	0	(1)	2	0.087	0.130	0.109	✓	0	(1)
Bruce Rock	2	1.3	2.2	1.8	✓	1	✓	0	(1)	2	0.019	0.026	0.023	✓	0	(1)
Bullfinch	2	5.3	5.7	5.7	✓	1	✓	0	(1)	2	0.030	0.052	0.041	✓	0	(1)
Buntine	2	2.2	3.1	2.6	✓	1	✓	2	✓	2	0.006	0.014	0.010	✓	1	✓
Cadoux	2	0.9	1.3	0.9	✓	1	✓	0	(1)	2	0.022	0.030	0.026	✓	1	✓
Coolgardie	2	1.8	3.5	2.6	✓	1	✓	0	(1)	2	0.050	0.088	0.069	✓	1	✓
Corrigin	2	1.3	1.8	1.3	✓	1	✓	0	(1)	2	0.021	0.023	0.022	✓	0	(1)
Cunderdin	2	0.9	1.3	1.3	✓	1	✓	0	(1)	2	0.020	0.044	0.032	✓	1	✓
Dalwallinu	2	1.3	1.8	1.3	✓	1	✓	0	(1)	2	0.030	0.030	0.030	✓	1	✓
Dowerin	2	1.3	1.8	1.3	✓	1	✓	0	(1)	2	0.019	0.028	0.024	✓	1	✓
Goomalling	2	0.9	1.3	0.9	✓	1	✓	0	(1)	2	0.018	0.037	0.028	✓	1	✓
Greater Bodallin	2	0.9	1.3	1.3	✓	1	✓	0	(1)	2	0.013	0.025	0.019	✓	0	(1)
Greater Burracoppin	2	1.3	1.8	1.3	✓	1	✓	0	(1)	2	0.019	0.029	0.024	✓	0	(1)
Greater Doolakine	2	0.9	1.3	0.9	✓	1	✓	0	(1)	2	0.023	0.054	0.039	✓	0	(1)
Greater Meckering	2	0.9	0.9	0.9	✓	1	✓	0	(1)	2	0.024	0.045	0.035	✓	1	✓
Greenhills	2	1.3	4.4	2.6	✓	1	✓	0	(1)	2	0.037	0.041	0.039	✓	0	(1)
Jennacubbine	2	1.8	2.2	1.8	✓	1	✓	0	(1)	2	0.029	0.053	0.041	✓	0	(1)
Kalannie	2	2.6	3.5	3.1	✓	1	✓	0	(1)	2	0.019	0.030	0.025	✓	1	✓
Kalgoorlie	4	1.8	3.5	2.6	✓	1	✓	0	(1)	3	0.043	0.120	0.071	✓	1	✓
Kambalda	2	1.8	3.1	2.6	✓	1	✓	0	(1)	2	0.095	0.150	0.123	✓	1	✓
Kellerberrin	2	0.4	0.9	0.9	✓	1	✓	2	✓	2	0.026	0.048	0.037	✓	1	✓
Koolyanobbing	2	1.8	1.8	1.8	✓	1	✓	1	✓	2	0.022	0.024	0.023	✓	1	✓
Koorda	2	0.9	1.3	0.9	✓	1	✓	0	(1)	2	0.016	0.024	0.020	✓	1	✓
Kununoppin	2	1.3	1.3	1.3	✓	1	✓	0	(1)	2	0.028	0.055	0.042	✓	1	✓
Laverton*	10	31.7	40.0	36.1	✓	1	✓	2	✓	2	0.073	0.075	0.074	✓	1	✓
Leonora*	10	17.6	31.7	27.3	✓	1	✓	2	✓	2	0.001	0.001	0.001	✓	1	✓
Marvel Loch	2	1.3	4.4	2.6	✓	1	✓	0	(1)	2	0.011	0.062	0.037	✓	1	✓
Menzies*	6	1.3	4.4	2.6	✓	1	✓	0	(1)	2	0.083	0.094	0.089	✓	1	✓
Merredin	2	0.4	1.3	0.9	✓	1	✓	2	✓	2	0.029	0.031	0.030	✓	1	✓
Miling	2	1.8	1.8	1.8	✓	1	✓	2	✓	2	0.017	0.022	0.020	✓	1	✓
Mukinbudin	2	0.9	1.8	1.3	✓	1	✓	0	(1)	2	0.024	0.033	0.029	✓	1	✓
Muntadgin	2	0.9	5.3	3.1	✓	1	✓	0	(1)	2	0.020	0.036	0.028	✓	1	✓
Narembeen	2	1.3	1.8	1.8	✓	1	✓	0	(1)	2	0.023	0.030	0.027	✓	1	✓
Norseman	2	1.3	1.8	1.8	✓	1	✓	0	(1)	2	0.062	0.094	0.078	✓	0	(1)
Northam	2	0.9	1.3	0.9	✓	1	✓	0	(1)	2	0.033	0.041	0.037	✓	1	✓
Nungarin	2	0.9	1.8	1.3	✓	1	✓	0	(1)	2	0.021	0.044	0.033	✓	1	✓
Ora Banda	2	1.8	3.5	2.6	✓	1	✓	0	(1)	2	0.058	0.099	0.079	✓	1	✓
Pithara	2	0.9	1.8	1.3	✓	1	✓	0	(1)	2	0.031	0.032	0.032	✓	1	✓
Quairading	2	0.9	1.8	1.3	✓	1	✓	2	✓	2	0.024	0.027	0.026	✓	1	✓
Seabrook	2	0.9	1.3	1.3	✓	1	✓	0	(1)	2	0.050	0.056	0.053	✓	0	(1)
Shackleton	2	1.3	2.2	1.8	✓	1	✓	0	(1)	2	0.018	0.044	0.031	✓	0	(1)
Southern Cross	2	0.9	1.8	1.3	✓	1	✓	0	(1)	2	0.022	0.023	0.023	✓	1	✓
Spencers Brook	2	0.9	1.3	0.9	✓	1	✓	0	(1)	2	0.040	0.072	0.056	✓	0	(1)
Tammin	2	0.4	1.3	0.9	✓	1	✓	0	(1)	2	0.050	0.059	0.055	✓	1	✓
Toodyay	2	0.9	0.9	0.9	✓	1	✓	0	(1)	2	0.018	0.046	0.032	✓	1	✓
Trayning	2	0.9	1.3	0.9	✓	1	✓	0	(1)	2	0.040	0.046	0.043	✓	1	✓
Warralakin	2	0.9	1.3	1.3	✓	1	✓	0	(1)	2	0.027	0.033	0.030	✓	1	✓
Westonia	2	1.3	1.3	1.3	✓	1	✓	0	(1)	2	0.028	0.032	0.030	✓	1	✓
Wiluna*	2	32.6	36.1	34.3	✓	1	✓	2	✓	2	<0.001	0.004	0.002	✓	0	(1)
Wongan Hills	2	1.3	1.3	1.3	✓	1	✓	0	(1)	2	0.024	0.026	0.025	✓	1	✓
Wubin	2	1.3	3.1	2.2	✓	1	✓	0	(1)	2	0.010	0.013	0.012	✓	1	✓
Wyalkatchem	2	0.4	1.3	0.9	✓	1	✓	0	(1)	2	0.020	0.028	0.024	✓	1	✓
York	2	0.9	1.3	1.3	✓	1	✓	0	(1)	2	0.013	0.042	0.028	✓	1	✓

(1) No samples required in this 12 month period.

*Wiluna, Laverton, Leonora and Menzies have been granted an exemption from compliance with the child health nitrate guideline by the Department of Health, however, following treatment or operational intervention these towns have achieved compliance wiht the infant health limit. Carers of infants younger than 3 months should seek advice from the Community Health Nurse regarding the use of alternative water sources for the preparation of bottle feeds. The Water Corporation provides bottled water free of charge for this purpose. Note: The water supplied has always met the guideline for adults and children over the age of 3 months and these towns currently meet the child health nitrate guideline - for a full list of towns with nitrate exemptions and how we are improving water quality in these towns - please refer to *'Understanding water quality test results - Nitrate'* section of the annual report.

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Table 13 **Aesthetic (Non-health related) Variables**

Goldfields and Agricultural Region	Alkalinity (as CaCO3)					Aluminium					Chloride					Hardness				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met
		Min Value	Max Value	Mean Value			Min	Max	Mean			Min Value	Max Value	Mean Value			Min	Max	Mean	
Ardath	2	70	72	71	(1)	2	0.016	0.040	0.028	✓	2	160	160	160	✓	2	92	94	93	✓
Avon Hills	2	54	63	59	(1)	2	0.018	0.020	0.019	✓	2	150	175	163	✓	2	87	95	91	✓
Ballidu	2	69	77	73	(1)	2	0.014	0.055	0.035	✓	2	155	170	163	✓	2	92	100	96	✓
Beacon	2	50	68	59	(1)	2	0.018	0.025	0.022	✓	2	160	175	168	✓	2	92	110	101	✓
Bencubbin	2	72	77	75	(1)	2	0.014	0.030	0.022	✓	2	155	170	163	✓	2	98	100	99	✓
Beverley	2	46	63	55	(1)	2	0.020	0.040	0.030	✓	2	150	170	160	✓	2	93	95	94	✓
Bind Bindi	2	74	82	78	(1)	2	0.016	0.060	0.038	✓	2	155	160	158	✓	2	100	100	100	✓
Broad Arrow	2	49	57	53	(1)	2	0.030	0.030	0.030	✓	2	170	200	185	✓	2	100	110	105	✓
Bruce Rock	2	50	68	59	(1)	2	0.020	0.040	0.030	✓	2	155	185	170	✓	2	88	110	99	✓
Bullfinch	2	52	66	59	(1)	2	0.018	0.020	0.019	✓	2	160	195	178	✓	2	95	100	98	✓
Buntine	2	69	80	75	(1)	2	0.020	0.040	0.030	✓	2	165	170	168	✓	2	110	110	110	✓
Cadoux	2	63	78	71	(1)	2	0.014	0.050	0.032	✓	2	155	160	158	✓	2	91	100	96	✓
Coolgardie	2	35	55	45	(1)	2	0.016	0.030	0.023	✓	2	160	175	168	✓	2	94	100	97	✓
Corrigin	2	71	77	74	(1)	2	0.014	0.045	0.030	✓	2	160	165	163	✓	2	91	98	95	✓
Cunderdin	2	62	74	68	(1)	2	0.020	0.030	0.025	✓	2	155	155	155	✓	2	89	95	92	✓
Dalwallinu	2	49	70	60	(1)	2	0.030	0.035	0.033	✓	2	160	175	168	✓	2	95	100	98	✓
Dowerin	2	57	65	61	(1)	2	0.020	0.030	0.025	✓	2	155	175	165	✓	2	89	94	92	✓
Goomalling	2	60	66	63	(1)	2	0.020	0.025	0.023	✓	2	160	170	165	✓	2	91	95	93	✓
Greater Bodallin	2	73	74	74	(1)	2	0.025	0.030	0.028	✓	2	155	155	155	✓	2	90	93	92	✓
Greater Burracoppin	2	61	69	65	(1)	2	0.020	0.035	0.028	✓	2	160	160	160	✓	2	93	100	97	✓
Greater Doolakine	2	45	66	56	(1)	2	0.020	0.025	0.023	✓	2	150	165	158	✓	2	97	97	97	✓
Greater Meckering	2	64	76	70	(1)	2	0.018	0.030	0.024	✓	2	150	155	153	✓	2	84	95	90	✓
Greenhills	2	56	59	58	(1)	2	0.025	0.040	0.033	✓	2	155	165	160	✓	2	96	99	98	✓
Jennacubbine	2	65	71	68	(1)	2	0.025	0.035	0.030	✓	2	155	160	158	✓	2	94	110	102	✓
Kalannie	2	62	63	63	(1)	2	0.014	0.040	0.027	✓	2	155	180	168	✓	2	97	100	99	✓
Kalgoorlie	2	41	55	48	(1)	2	0.016	0.025	0.021	✓	2	160	180	170	✓	2	96	100	98	✓
Kambalda	2	43	59	51	(1)	2	0.012	0.014	0.013	✓	2	155	185	170	✓	2	100	110	105	✓
Kellerberrin	2	59	70	65	(1)	2	0.012	0.025	0.019	✓	2	155	170	163	✓	2	88	90	89	✓
Koolyanobbing	2	52	67	60	(1)	2	0.030	0.035	0.033	✓	2	155	175	165	✓	2	93	97	95	✓
Koorda	2	66	79	73	(1)	2	0.020	0.040	0.030	✓	2	150	165	158	✓	2	93	98	96	✓
Kununoppin	2	57	66	62	(1)	2	0.018	0.020	0.019	✓	2	160	180	170	✓	2	90	100	95	✓
Laverton	6	110	130	118	(1)	2	<0.008	<0.008	<0.008	✓	6	135	160	146	✓	6	120	130	123	✓
Leonora	5	110	120	112	(1)	2	<0.008	<0.008	<0.008	✓	5	160	165	162	✓	5	140	150	148	✓
Marvel Loch	2	61	71	66	(1)	2	0.025	0.030	0.028	✓	2	160	165	163	✓	2	91	95	93	✓
Menzies	6	48	69	58	(1)	2	0.035	0.035	0.035	✓	6	170	185	176	✓	6	100	110	105	✓
Merredin	2	72	74	73	(1)	2	0.025	0.035	0.030	✓	2	155	155	155	✓	2	89	94	92	✓
Miling	2	52	69	61	(1)	2	0.030	0.035	0.033	✓	2	160	175	168	✓	2	96	110	103	✓
Mukinbudin	2	49	66	58	(1)	2	0.018	0.025	0.022	✓	2	160	175	168	✓	2	84	100	92	✓
Muntadgin	2	63	74	69	(1)	2	0.020	0.030	0.025	✓	2	155	155	155	✓	2	88	95	92	✓
Narembeen	2	68	69	69	(1)	2	0.020	0.035	0.028	✓	2	165	170	168	✓	2	93	95	94	✓
Norseman	2	51	61	56	(1)	2	0.020	0.030	0.025	✓	2	185	200	193	✓	2	110	120	115	✓
Northam	2	59	65	62	(1)	2	0.014	0.020	0.017	✓	2	145	175	160	✓	2	89	95	92	✓
Nungarin	2	64	66	65	(1)	2	0.020	0.040	0.030	✓	2	160	180	170	✓	2	96	100	98	✓
Ora Banda	2	67	67	67	(1)	2	0.012	0.012	0.012	✓	2	180	185	183	✓	2	120	120	120	✓
Pithara	2	68	79	74	(1)	2	0.025	0.045	0.035	✓	2	160	160	160	✓	2	91	100	96	✓
Quairading	2	55	65	60	(1)	2	0.016	0.030	0.023	✓	2	160	190	175	✓	2	97	100	99	✓
Seabrook	2	34	67	51	(1)	2	0.025	0.035	0.030	✓	2	145	165	155	✓	2	91	95	93	✓
Shackleton	2	66	72	69	(1)	2	0.014	0.030	0.022	✓	2	150	155	153	✓	2	89	92	91	✓
Southern Cross	2	55	65	60	(1)	2	0.020	0.025	0.023	✓	2	155	175	165	✓	2	90	97	94	✓
Spencers Brook	2	38	64	51	(1)	2	0.018	0.025	0.022	✓	2	145	160	153	✓	2	89	93	91	✓
Tammin	2	46	68	57	(1)	2	0.020	0.025	0.023	✓	2	155	175	165	✓	2	85	100	93	✓
Toodyay	2	51	65	58	(1)	2	0.016	0.035	0.026	✓	2	155	160	158	✓	2	92	93	93	✓
Trayning	2	56	64	60	(1)	2	0.012	0.020	0.016	✓	2	160	170	165	✓	2	92	100	96	✓
Warralakin	2	48	65	57	(1)	2	0.014	0.025	0.020	✓	2	160	185	173	✓	2	89	100	95	✓
Westonia	2	48	66	57	(1)	2	0.016	0.030	0.023	✓	2	160	175	168	✓	2	88	99	94	✓
Wiluna	2	71	79	75	(1)	2	<0.008	<0.008	<0.008	✓	2	60	70	65	✓	2	100	100	100	✓
Wongan Hills	2	73	79	76	(1)	2	0.025	0.045	0.035	✓	2	150	150	150	✓	2	93	98	96	✓
Wubin	2	77	80	79	(1)	2	0.018	0.035	0.027	✓	2	155	170	163	✓	2	100	110	105	✓
Wyalkatchem	2	62	77	70	(1)	2	0.010	0.035	0.023	✓	2	150	165	158	✓	2	88	97	93	✓
York	2	37	63	50	(1)	2	0.020	0.030	0.025	✓	2	145	165	155	✓	2	92	97	95	✓

(1) No guideline value available as per ADWG 2011.

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Table 14 **Aesthetic (Non-health related) Variables**

Goldfields and Agricultural Region	Iron					Manganese					pH					Silica				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Value (pH units)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met
		Min	Max	Mean			Min	Max	Mean			Min	Max	Mean			Min Value	Max Value	Mean Value	
Ardath	2	<0.003	0.010	0.005	✓	2	<0.002	<0.002	<0.002	✓	2	8.64	8.74	8.69	✓	2	6.0	7.7	6.9	✓
Avon Hills	2	<0.003	0.008	0.004	✓	2	<0.002	0.003	<0.002	✓	2	8.07	8.38	8.23	✓	2	6.7	7.6	7.2	✓
Ballidu	2	0.006	0.008	0.007	✓	2	<0.002	<0.002	<0.002	✓	2	8.58	8.85	8.72	✓	2	6.3	7.0	6.7	✓
Beacon	2	<0.003	0.004	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.70	8.95	8.83	✓	2	6.0	7.6	6.8	✓
Bencubbin	2	0.010	0.020	0.015	✓	2	<0.002	<0.002	<0.002	✓	2	8.40	8.47	8.44	✓	2	5.2	6.8	6.0	✓
Beverley	2	0.006	0.010	0.008	✓	2	<0.002	0.004	<0.002	✓	2	8.64	8.81	8.73	(1)	2	6.6	7.5	7.1	✓
Bind Bindi	2	<0.003	0.008	0.004	✓	2	<0.002	<0.002	<0.002	✓	2	8.81	8.84	8.83	(1)	2	6.2	7.4	6.8	✓
Broad Arrow	2	0.060	0.070	0.065	✓	2	<0.002	0.003	<0.002	✓	2	7.85	7.96	7.91	✓	2	6.5	6.9	6.7	✓
Bruce Rock	2	0.008	0.020	0.014	✓	2	<0.002	<0.002	<0.002	✓	2	8.31	8.35	8.33	✓	2	6.3	7.6	7.0	✓
Bullfinch	2	0.004	0.004	0.004	✓	2	<0.002	<0.002	<0.002	✓	2	8.78	8.81	8.80	✓	2	5.4	6.8	6.1	✓
Buntine	2	0.010	0.030	0.020	✓	2	<0.002	<0.002	<0.002	✓	2	8.63	8.81	8.72	(1)	2	5.8	7.3	6.6	✓
Cadoux	2	<0.003	0.004	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.71	8.75	8.73	✓	2	3.5	6.1	4.8	✓
Coolgardie	2	0.015	0.020	0.018	✓	2	<0.002	0.004	<0.002	✓	2	7.41	7.43	7.42	✓	2	7.4	7.6	7.5	✓
Corrigin	2	0.010	0.015	0.013	✓	2	<0.002	<0.002	<0.002	✓	2	8.66	8.74	8.70	(1)	2	5.8	7.2	6.5	✓
Cunderdin	2	<0.003	0.006	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.24	8.24	8.24	✓	2	6.8	7.2	7.0	✓
Dalwallinu	2	0.015	0.020	0.018	✓	2	<0.002	<0.002	<0.002	✓	2	8.95	9.00	8.98	(1)	2	6.6	7.2	6.9	✓
Dowerin	2	0.006	0.010	0.008	✓	2	<0.002	<0.002	<0.002	✓	2	8.44	8.54	8.49	(1)	2	6.3	7.3	6.8	✓
Goomalling	2	0.008	0.020	0.014	✓	2	<0.002	0.004	<0.002	✓	2	8.48	8.71	8.60	(1)	2	6.6	7.5	7.1	✓
Greater Bodallin	2	0.004	0.006	0.005	✓	2	<0.002	<0.002	<0.002	✓	2	8.58	8.66	8.62	(1)	2	6.3	7.3	6.8	✓
Greater Burracoppin	2	0.008	0.010	0.009	✓	2	<0.002	<0.002	<0.002	✓	2	8.56	8.68	8.62	✓	2	6.9	8.2	7.6	✓
Greater Doolakine	2	0.004	0.004	0.004	✓	2	<0.002	0.009	0.005	✓	2	8.58	8.87	8.73	(1)	2	6.9	7.5	7.2	✓
Greater Meckering	2	<0.003	0.004	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.46	8.46	8.46	✓	2	6.9	7.1	7.0	✓
Greenhills	2	0.015	0.015	0.015	✓	2	<0.002	0.007	0.004	✓	2	7.72	8.63	8.18	✓	2	6.4	7.8	7.1	✓
Jennacubbine	2	0.008	0.040	0.024	✓	2	<0.002	0.009	0.005	✓	2	8.81	8.84	8.83	(1)	2	6.8	7.5	7.2	✓
Kalannie	2	0.004	0.015	0.010	✓	2	<0.002	<0.002	<0.002	✓	2	8.15	8.24	8.20	✓	2	1.6	7.7	4.7	✓
Kalgoorlie	2	0.008	0.015	0.012	✓	2	<0.002	0.003	<0.002	✓	2	7.57	7.61	7.59	✓	2	6.9	7.6	7.3	✓
Kambalda	2	0.015	0.025	0.020	✓	2	<0.002	0.003	<0.002	✓	2	7.74	7.82	7.78	✓	2	6.9	7.5	7.2	✓
Kellerberrin	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.17	8.35	8.26	✓	2	5.8	6.7	6.3	✓
Koolyanobbing	2	0.008	0.015	0.012	✓	2	<0.002	0.003	<0.002	✓	2	8.61	8.88	8.75	✓	2	6.7	7.3	7.0	✓
Koorda	2	0.006	0.006	0.006	✓	2	<0.002	<0.002	<0.002	✓	2	8.74	8.8	8.77	(1)	2	6.2	6.7	6.5	✓
Kununoppin	2	<0.003	0.004	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.67	8.94	8.81	(1)	2	6.6	7.1	6.9	✓
Laverton	6	0.010	0.050	0.025	✓	6	<0.002	<0.002	<0.002	✓	6	7.77	8.08	7.94	✓	6	38.0	44.0	40.3	✓
Leonora	5	<0.003	0.004	<0.003	✓	5	<0.002	<0.002	<0.002	✓	5	7.51	7.85	7.61	✓	5	21.0	26.0	24.0	✓
Marvel Loch	2	0.008	0.010	0.009	✓	2	<0.002	<0.002	<0.002	✓	2	7.52	8.60	8.06	✓	2	5.9	7.6	6.8	✓
Menzies	6	0.020	0.080	0.047	✓	6	<0.002	0.004	<0.002	✓	6	7.76	8.04	7.90	✓	6	6.1	7.4	6.8	✓
Merredin	2	0.006	0.015	0.011	✓	2	<0.002	<0.002	<0.002	✓	2	8.6	8.73	8.67	(1)	2	6.5	7.2	6.9	✓
Miling	2	0.004	0.006	0.005	✓	2	<0.002	<0.002	<0.002	✓	2	8.92	8.93	8.93	(1)	2	6.7	7.4	7.1	✓
Mukinbudin	2	0.006	0.008	0.007	✓	2	<0.002	<0.002	<0.002	✓	2	8.66	8.76	8.71	✓	2	6.1	7.7	6.9	✓
Muntadgin	2	0.004	0.008	0.006	✓	2	<0.002	<0.002	<0.002	✓	2	7.64	8.64	8.14	✓	2	6.1	7.8	7.0	✓
Narembeen	2	0.008	0.020	0.014	✓	2	<0.002	0.003	<0.002	✓	2	8.27	8.49	8.38	✓	2	6.4	8.2	7.3	✓
Norseman	2	0.010	0.010	0.010	✓	2	<0.002	<0.002	<0.002	✓	2	7.91	7.91	7.91	✓	2	5.4	6.0	5.7	✓
Northam	2	<0.003	0.025	0.013	✓	2	<0.002	<0.002	<0.002	✓	2	7.61	8.32	7.97	✓	2	6.0	7.0	6.5	✓
Nungarin	2	0.010	0.010	0.010	✓	2	<0.002	0.007	0.004	✓	2	8.74	8.84	8.79	(1)	2	7.0	8.1	7.6	✓
Ora Banda	2	<0.003	0.015	0.008	✓	2	<0.002	<0.002	<0.002	✓	2	8.09	8.58	8.34	✓	2	6.2	6.9	6.6	✓
Pithara	2	0.010	0.030	0.020	✓	2	<0.002	<0.002	<0.002	✓	2	8.89	8.89	8.89	(1)	2	6.3	7.0	6.7	✓
Quairading	2	0.010	0.025	0.018	✓	2	<0.002	<0.002	<0.002	✓	2	7.86	8.65	8.26	✓	2	5.7	7.4	6.6	✓
Seabrook	2	<0.003	0.008	0.004	✓	2	<0.002	0.009	0.005	✓	2	8.8	9.02	8.91	(1)	2	6.3	7.4	6.9	✓
Shackleton	2	<0.003	0.006	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.54	8.75	8.65	(1)	2	5.7	7.0	6.4	✓
Southern Cross	2	0.004	0.010	0.007	✓	2	<0.002	0.003	<0.002	✓	2	8.44	8.49	8.47	✓	2	6.5	7.6	7.1	✓
Spencers Brook	2	<0.003	0.015	0.008	✓	2	<0.002	0.010	0.005	✓	2	8.35	8.45	8.40	✓	2	7.2	7.2	7.2	✓
Tammin	2	0.008	0.010	0.009	✓	2	<0.002	<0.002	<0.002	✓	2	8.39	8.64	8.52	✓	2	6.4	7.4	6.9	✓
Toodyay	2	<0.003	0.004	<0.003	✓	2	<0.002	0.009	0.005	✓	2	7.78	8.50	8.14	(1)	2	7.3	7.5	7.4	✓
Trayning	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.76	8.92	8.84	(1)	2	5.9	7.2	6.6	✓
Warralakin	2	0.004	0.006	0.005	✓	2	<0.002	<0.002	<0.002	✓	2	8.35	8.82	8.59	✓	2	6.1	7.5	6.8	✓
Westonia	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.51	8.78	8.65	✓	2	6.0	7.5	6.8	✓
Wiluna	2	0.006	0.008	0.007	✓	2	<0.002	<0.002	<0.002	✓	2	7.88	8.05	7.97	✓	2	85.0	85.0	85.0	(2)
Wongan Hills	2	<0.003	0.010	0.005	✓	2	<0.002	<0.002	<0.002	✓	2	8.64	8.71	8.68	(1)	2	6.6	7.9	7.3	✓
Wubin	2	0.010	0.015	0.013	✓	2	<0.002	<0.002	<0.002	✓	2	8.97	8.97	8.97	(1)	2	6.3	7.9	7.1	✓
Wyalkatchem	2	0.004	0.004	0.004	✓	2	<0.002	<0.002	<0.002	✓	2	8.67	8.68	8.68	✓	2	6.2	6.7	6.5	✓
York	2	0.006	0.008	0.007	✓	2	<0.002	0.010	0.005	✓	2	8.42	8.53	8.48	✓	2	7.0	7.7	7.4	✓

(1) Elevated pH is a result of the pH adjustment as part of Chloramination process. Experience shows that pH at this level is not objectionable to our customers. (2) Elevated Silica is a natural characteristic of the source supplying this locality.

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Table 15 **Aesthetic (Non-health related) Variables**

Goldfields and Agricultural Region	Sodium					TDS					True Colour					Turbidity				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Value (TCU)			Guideline Met	Samples Taken	Value (NTU)			Guideline Met
		Min Value	Max Value	Mean Value			Min	Max	Mean			Min	Max	Mean			Min	Max	Mean	
Ardath	2	100	105	103	✓	2	419	423	421	✓	2	<1	<1	<1	✓	2	0.1	0.4	0.3	✓
Avon Hills	2	94	99	97	✓	2	385	425	405	✓	2	<1	<1	<1	✓	2	0.1	0.5	0.3	✓
Ballidu	2	100	105	103	✓	2	410	446	428	✓	2	<1	<1	<1	✓	2	0.3	0.4	0.4	✓
Beacon	2	93	105	99	✓	2	394	441	418	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Bencubbin	2	99	99	99	✓	2	422	441	432	✓	2	<1	2	1	✓	2	<0.1	<0.1	<0.1	✓
Beverley	2	89	98	94	✓	2	387	421	404	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Bind Bindi	2	97	105	101	✓	2	430	436	433	✓	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Broad Arrow	2	105	105	105	✓	2	424	457	441	✓	2	<1	<1	<1	✓	2	0.3	0.4	0.4	✓
Bruce Rock	2	93	105	99	✓	2	388	458	423	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Bullfinch	2	100	115	108	✓	2	414	470	442	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Buntine	2	100	105	103	✓	2	434	458	446	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Cadoux	2	98	100	99	✓	2	402	432	417	✓	2	<1	2	1	✓	2	0.2	0.2	0.2	✓
Coolgardie	2	92	105	99	✓	2	388	434	411	✓	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Corrigin	2	100	100	100	✓	2	418	435	427	✓	2	<1	<1	<1	✓	2	0.1	0.1	0.1	✓
Cunderdin	2	98	100	99	✓	2	404	417	411	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Dalwallinu	2	94	99	97	✓	2	402	433	418	✓	2	<1	<1	<1	✓	2	0.2	0.4	0.3	✓
Dowerin	2	92	98	95	✓	2	393	429	411	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Goomalling	2	100	100	100	✓	2	412	428	420	✓	2	<1	<1	<1	✓	2	0.2	0.7	0.5	✓
Greater Bodallin	2	97	99	98	✓	2	419	422	421	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Greater Burracoppin	2	100	105	103	✓	2	424	425	425	✓	2	<1	<1	<1	✓	2	<0.1	0.3	0.2	✓
Greater Doolakine	2	92	110	101	✓	2	392	432	412	✓	2	<1	<1	<1	✓	2	<0.1	0.2	1.0	✓
Greater Meckering	2	96	98	97	✓	2	396	421	409	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Greenhills	2	97	110	104	✓	2	407	429	418	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Jennacubbine	2	96	105	101	✓	2	418	420	419	✓	2	<1	<1	<1	✓	2	0.3	0.5	0.4	✓
Kalannie	2	98	100	99	✓	2	407	440	424	✓	2	<1	<1	<1	✓	2	0.3	0.3	0.3	✓
Kalgoorlie	2	93	99	96	✓	2	391	430	411	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Kambalda	2	94	97	96	✓	2	395	435	415	✓	2	<1	<1	<1	✓	2	0.2	0.6	0.4	✓
Kellerberrin	2	91	97	94	✓	2	393	422	408	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Koolyanobbing	2	96	99	98	✓	2	402	431	417	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Koorda	2	99	100	100	✓	2	407	434	421	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Kununoppin	2	92	100	96	✓	2	398	443	421	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Laverton	6	120	150	129	✓	6	587	648	607	(1)	6	<1	<1	<1	✓	6	<0.1	1.3	0.5	✓
Leonora	5	110	130	121	✓	5	576	619	598	✓	5	<1	<1	<1	✓	5	0.2	0.3	0.3	✓
Marvel Loch	2	100	105	103	✓	2	415	425	420	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Menzies	6	95	105	100	✓	6	417	445	430	✓	6	<1	<1	<1	✓	6	0.4	0.6	0.5	✓
Merredin	2	94	98	96	✓	2	410	418	414	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Miling	2	96	100	98	✓	2	407	437	422	✓	2	<1	<1	<1	✓	2	0.3	0.4	0.4	✓
Mukinbudin	2	94	105	100	✓	2	391	436	414	✓	2	<1	<1	<1	✓	2	0.1	0.5	0.3	✓
Muntadgin	2	94	100	97	✓	2	413	418	416	✓	2	<1	<1	<1	✓	2	<0.1	0.2	1.0	✓
Narembeen	2	100	105	103	✓	2	429	437	433	✓	2	<1	<1	<1	✓	2	<0.1	0.3	0.2	✓
Norseman	2	105	110	108	✓	2	441	478	460	✓	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Northam	2	90	105	98	✓	2	385	432	409	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Nungarin	2	99	110	105	✓	2	429	445	437	✓	2	<1	<1	<1	✓	2	<0.1	0.2	1.0	✓
Ora Banda	2	97	105	101	✓	2	451	460	456	✓	2	<1	<1	<1	✓	2	0.2	0.4	0.3	✓
Pithara	2	96	100	98	✓	2	413	432	423	✓	2	<1	<1	<1	✓	2	<0.1	0.3	0.2	✓
Quairading	2	98	105	102	✓	2	402	452	427	✓	2	<1	<1	<1	✓	2	0.2	0.4	0.3	✓
Seabrook	2	90	100	95	✓	2	371	419	395	✓	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Shackleton	2	94	95	95	✓	2	403	403	403	✓	2	<1	<1	<1	✓	2	0.1	0.1	0.1	✓
Southern Cross	2	99	100	100	✓	2	403	433	418	✓	2	<1	<1	<1	✓	2	0.4	0.5	0.5	✓
Spencers Brook	2	89	100	95	✓	2	373	416	395	✓	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Tammin	2	87	105	96	✓	2	376	444	410	✓	2	<1	1	<1	✓	2	0.1	0.2	0.2	✓
Toodyay	2	90	100	95	✓	2	397	416	407	✓	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Trayning	2	95	100	98	✓	2	401	429	415	✓	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Warralakin	2	92	105	99	✓	2	390	448	419	✓	2	<1	<1	<1	✓	2	0.1	0.5	0.3	✓
Westonia	2	91	105	98	✓	2	390	443	417	✓	2	<1	2	1	✓	2	0.2	0.4	0.3	✓
Wiluna	2	51	52	52	✓	2	390	405	398	✓	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Wongan Hills	2	96	100	98	✓	2	414	419	417	✓	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Wubin	2	99	100	100	✓	2	429	446	438	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Wyalkatchem	2	98	100	99	✓	2	397	435	416	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
York	2	90	110	100	✓	2	374	429	402	✓	2	<1	<1	<1	✓	2	<0.1	0.2	1	✓

(1) Elevated TDS is a natural characteristic of the source supplying this locality

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Table 16 **Health related variables**

South West Region	*E. coli*				Thermophilic *Naegleria*			Fluoride					Hydrocarbons		Metals	
Locality	Samples Taken	Samples >0 cfu/100mL	Max cfu/100mL	Requirement Met	Samples Taken	Samples with Thermophilic Naegleria	Requirement Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Guideline Met	Samples Taken	Guideline Met
									Min	Max	Mean					
Allanson	13	0	0	✓	6	0	✓	4	0.75	0.85	0.80	✓	1	✓	2	✓
Augusta	65	0	0	✓	32	0	✓	2	0.20	0.20	0.20	✓	0	(1)	2	✓
Australind	117	0	0	✓	117	0	✓	4	0.20	0.25	0.23	✓	0	(1)	4	✓
Balingup	13	0	0	✓	7	0	✓	2	0.10	0.10	0.10	✓	0	(1)	2	✓
Binningup	52	0	0	✓	24	0	✓	4	0.70	0.85	0.80	✓	1	✓	2	✓
Boyanup	52	0	0	✓	13	0	✓	2	0.15	0.15	0.15	✓	0	(1)	2	✓
Boyup Brook	52	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Bridgetown	65	0	0	✓	33	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Brunswick Junction	52	0	0	✓	16	0	✓	2	0.20	0.20	0.20	✓	0	(1)	2	✓
Capel	52	0	0	✓	39	0	✓	2	0.20	0.20	0.20	✓	0	(1)	2	✓
Collie	78	0	0	✓	32	0	✓	52	0.15	0.95	0.78	✓	0	(1)	4	✓
Cowaramup	52	0	0	✓	6	0	✓	2	0.20	0.20	0.20	✓	0	(1)	2	✓
Dalyellup	65	0	0	✓	39	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Dardanup	26	0	0	✓	26	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Darkan	13	0	0	✓	6	0	✓	4	0.75	0.85	0.79	✓	0	(1)	2	✓
Donnybrook	52	0	0	✓	26	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	5	✓
Dunsborough	91	0	0	✓	91	0	✓	56	0.75	1.00	0.87	✓	1	✓	2	✓
Eaton	78	0	0	✓	78	0	✓	2	0.15	0.20	0.18	✓	1	✓	2	✓
Greenbushes	26	0	0	✓	13	0	✓	2	0.10	0.10	0.10	✓	1	✓	2	✓
Harvey	52	0	0	✓	52	0	✓	52	0.75	0.90	0.82	✓	2	✓	2	✓
Hester TWS	13	0	0	✓	7	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Kirup	13	0	0	✓	7	0	✓	2	<0.1	0.15	<0.1	✓	0	(1)	2	✓
Logue Brook	13	0	0	✓	7	0	✓	2	0.50	0.55	0.53	✓	0	(1)	2	✓
Manjimup	65	0	0	✓	33	0	✓	54	0.75	0.90	0.84	✓	0	(1)	2	✓
Margaret River	87	0	0	✓	50	0	✓	2	0.15	0.20	0.18	✓	0	(1)	2	✓
Mullalyup	13	0	0	✓	6	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Myalup	13	0	0	✓	13	0	✓	2	0.80	0.80	0.80	✓	2	✓	2	✓
Nannup	52	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Northcliffe	13	0	0	✓	7	0	✓	2	0.55	0.85	0.70	✓	0	(1)	2	✓
Pemberton	52	0	0	✓	12	0	✓	2	<0.1	<0.1	<0.1	✓	1	✓	2	✓
Peppermint Grove	52	0	0	✓	7	0	✓	2	0.25	0.25	0.25	✓	0	(1)	2	✓
Preston Beach	52	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Quinninup	12	0	0	✓	6	0	✓	2	0.55	0.85	0.70	✓	0	(1)	2	✓
Waroona	52	0	0	✓	52	0	✓	54	0.75	0.90	0.84	✓	1	✓	2	✓
Yarloop	13	0	0	✓	6	0	✓	2	0.80	0.90	0.85	✓	0	(1)	2	✓

(1) No samples required in this 12 month period.

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Table 17 **Health related variables**

South West Region	Nitrate					Pesticides		Radiological		Trihalomethanes					Other Health Related	
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Guideline Met	Samples Taken	Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Requirement Met
		Min	Max	Mean							Min	Max	Mean			
Allanson	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	0.055	0.095	0.075	✓	1	✓
Augusta	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	0.014	0.029	0.022	✓	0	(1)
Australind	8	<0.2	<0.2	<0.2	✓	2	✓	4	✓	4	0.008	0.069	0.035	✓	0	(1)
Balingup	2	0.4	0.9	0.4	✓	1	✓	0	(1)	2	0.087	0.087	0.087	✓	0	(1)
Binningup	2	<0.2	0.4	<0.2	✓	1	✓	2	✓	2	0.003	0.100	0.052	✓	2	✓
Boyanup	2	<0.2	0.4	0.4	✓	1	✓	0	(1)	2	<0.001	0.003	0.002	✓	0	(1)
Boyup Brook	2	0.4	0.9	0.4	✓	1	✓	2	✓	2	0.100	0.100	0.100	✓	0	(1)
Bridgetown	2	0.4	0.4	0.4	✓	1	✓	0	(1)	2	0.063	0.067	0.065	✓	0	(1)
Brunswick Junction	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	0.015	0.016	0.016	✓	0	(1)
Capel	4	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	<0.001	<0.001	<0.001	✓	0	(1)
Collie	8	<0.2	0.9	0.4	✓	2	✓	0	(1)	4	0.062	0.150	0.097	✓	0	(1)
Cowaramup	4	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	4	0.160	0.190	0.168	✓	1	✓
Dalyellup	2	<0.2	0.4	<0.2	✓	1	✓	2	✓	2	0.043	0.075	0.059	✓	0	(1)
Dardanup	2	<0.2	0.4	<0.2	✓	1	✓	0	(1)	2	<0.001	0.001	<0.001	✓	0	(1)
Darkan	2	<0.2	0.4	<0.2	✓	1	✓	2	✓	10	0.100	0.240	0.162	✓	0	(1)
Donnybrook	2	13.6	15.8	15.0	✓	1	✓	1	✓	2	0.004	0.010	0.007	✓	1	✓
Dunsborough	4	<0.2	0.4	<0.2	✓	1	✓	1	✓	2	0.026	0.028	0.027	✓	1	✓
Eaton	2	<0.2	0.4	<0.2	✓	1	✓	0	(1)	2	0.003	0.011	0.007	✓	1	✓
Greenbushes	2	0.4	0.4	0.4	✓	1	✓	2	✓	2	0.041	0.059	0.050	✓	0	(1)
Harvey	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	0.055	0.070	0.063	✓	2	✓
Hester TWS	4	<0.2	0.4	0.4	✓	1	✓	2	✓	2	0.082	0.100	0.091	✓	0	(1)
Kirup	4	<0.2	16.7	7.5	✓	1	✓	0	(1)	2	0.007	0.082	0.045	✓	0	(1)
Logue Brook	2	4.4	6.2	5.3	✓	1	✓	2	✓	2	0.012	0.040	0.026	✓	0	(1)
Manjimup	2	<0.2	<0.2	<0.2	✓	4	✓	0	(1)	2	0.075	0.082	0.079	✓	1	✓
Margaret River	4	<0.2	0.4	<0.2	✓	1	✓	1	✓	2	0.150	0.190	0.170	✓	0	(1)
Mullalyup	4	<0.2	17.6	4.4	✓	1	✓	2	✓	2	0.013	0.075	0.044	✓	0	(1)
Myalup	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	0.003	0.064	0.034	✓	2	✓
Nannup	2	<0.2	0.4	0.4	✓	1	✓	0	(1)	2	0.078	0.080	0.079	✓	0	(1)
Northcliffe	2	<0.2	0.9	0.4	✓	1	✓	0	(1)	2	0.058	0.073	0.066	✓	0	(1)
Pemberton	2	1.3	2.2	1.8	✓	4	✓	0	(1)	2	0.074	0.099	0.087	✓	0	(1)
Peppermint Grove	4	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	<0.001	<0.001	<0.001	✓	0	(1)
Preston Beach	4	4.4	5.7	5.3	✓	1	✓	2	✓	4	0.096	0.160	0.122	✓	0	(1)
Quinninup	4	<0.2	1.3	0.4	✓	1	✓	0	(1)	2	0.100	0.140	0.120	✓	0	(1)
Waroona	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	3	0.020	0.089	0.049	✓	1	✓
Yarloop	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	0.005	0.081	0.043	✓	0	(1)

(1) No samples required in this 12 month period.

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Table 18 **Aesthetic (Non-health related) Variables**

South West Region	Alkalinity (as CaCO3)					Aluminium					Chloride					Hardness				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met
		Min Value	Max Value	Mean Value			Min	Max	Mean			Min Value	Max Value	Mean Value			Min	Max	Mean	
Allanson	2	4	6	5	(1)	2	0.025	0.030	0.028	✓	2	50	60	55	✓	2	22	24	23	✓
Augusta	2	51	61	56	(1)	2	<0.008	<0.008	<0.008	✓	2	125	140	133	✓	2	76	92	84	✓
Australind	8	130	150	135	(1)	8	<0.008	<0.008	<0.008	✓	8	145	170	159	✓	8	74	120	96	✓
Balingup	2	78	110	94	(1)	2	0.014	0.030	0.022	✓	2	85	100	93	✓	2	110	130	120	✓
Binningup	2	29	54	42	(1)	2	0.016	0.035	0.026	✓	2	38	55	47	✓	2	48	55	52	✓
Boyanup	2	110	120	115	(1)	2	<0.008	<0.008	<0.008	✓	2	100	100	100	✓	2	110	110	110	✓
Boyup Brook	2	87	99	93	(1)	2	0.014	0.018	0.016	✓	2	90	100	95	✓	2	110	120	115	✓
Bridgetown	2	79	83	81	(1)	2	0.020	0.045	0.033	✓	2	90	105	98	✓	2	92	110	101	✓
Brunswick Junction	2	130	140	135	(1)	2	<0.008	<0.008	<0.008	✓	2	170	170	170	✓	2	80	84	82	✓
Capel	4	75	79	77	(1)	4	<0.008	<0.008	<0.008	✓	4	55	60	58	✓	4	47	49	48	✓
Collie	8	2	16	11	(1)	8	0.010	0.040	0.022	✓	8	55	85	74	✓	8	22	44	36	✓
Cowaramup	4	23	36	29	(1)	4	0.014	0.030	0.024	✓	4	80	95	88	✓	4	34	41	37	✓
Dalyellup	2	140	140	140	(1)	2	<0.008	<0.008	<0.008	✓	2	95	100	98	✓	2	78	83	81	✓
Dardanup	2	70	73	72	(1)	2	<0.008	<0.008	<0.008	✓	2	85	85	85	✓	2	27	27	27	✓
Darkan	2	11	25	18	(1)	2	0.014	0.016	0.015	✓	2	55	95	75	✓	2	35	57	46	✓
Donnybrook	2	66	76	71	(1)	2	0.060	0.070	0.065	✓	2	160	165	163	✓	2	59	64	62	✓
Dunsborough	4	130	150	140	(1)	4	<0.008	0.012	<0.008	✓	4	130	150	141	✓	4	64	73	69	✓
Eaton	2	96	110	103	(1)	2	<0.008	<0.008	<0.008	✓	2	125	130	128	✓	2	110	120	115	✓
Greenbushes	2	82	98	90	(1)	2	0.010	0.040	0.025	✓	2	95	95	95	✓	2	110	120	115	✓
Harvey	2	30	54	42	(1)	2	0.012	0.030	0.021	✓	2	38	55	47	✓	2	49	56	53	✓
Hester TWS	4	69	100	84	(1)	4	0.012	0.065	0.033	✓	4	80	105	95	✓	4	82	120	101	✓
Kirup	4	5	78	39	(1)	4	0.008	0.095	0.049	✓	4	45	200	123	✓	4	18	92	49	✓
Logue Brook	2	57	62	60	(1)	2	0.030	0.140	0.085	✓	2	75	135	105	✓	2	54	74	64	✓
Manjimup	2	35	44	40	(1)	2	0.016	0.025	0.021	✓	2	75	85	80	✓	2	76	82	79	✓
Margaret River	4	23	34	29	(1)	4	0.012	0.030	0.024	✓	4	80	95	89	✓	4	34	40	38	✓
Mullalyup	4	4	110	46	(1)	4	<0.008	0.120	0.042	✓	4	46	155	95	✓	4	18	100	50	✓
Myalup	2	32	57	45	(1)	2	0.010	0.030	0.020	✓	2	35	55	45	✓	2	53	58	56	✓
Nannup	2	6	6	6	(1)	2	0.020	0.020	0.020	✓	2	42	60	51	✓	2	29	41	35	✓
Northcliffe	2	20	34	27	(1)	2	0.030	0.040	0.035	✓	2	75	90	83	✓	2	61	69	65	✓
Pemberton	2	23	26	25	(1)	2	0.014	0.025	0.020	✓	2	65	70	68	✓	2	45	47	46	✓
Peppermint Grove	4	84	90	87	(1)	4	<0.008	<0.008	<0.008	✓	4	55	65	61	✓	4	57	58	57	✓
Preston Beach	4	270	280	278	(1)	4	<0.008	<0.008	<0.008	✓	4	180	200	193	✓	4	320	330	325	(2)
Quinninup	4	26	46	35	(1)	4	0.030	0.050	0.036	✓	4	70	100	84	✓	4	63	86	70	✓
Waroona	2	46	54	50	(1)	2	0.012	0.025	0.019	✓	2	42	45	44	✓	2	57	61	59	✓
Yarloop	2	42	51	47	(1)	2	<0.008	0.035	0.018	✓	2	34	38	36	✓	2	52	58	55	✓

(1) No guideline value available as per ADWG 2011. (2) Elevated hardness is characteristic of the source supplying this locality.

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Table 19 **Aesthetic (Non-health related) Variables**

South West Region	Iron					Manganese					pH					Silicon				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Value (pH units)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met
		Min	Max	Mean			Min	Max	Mean			Min	Max	Mean			Min Value	Max Value	Mean Value	
Allanson	2	0.025	0.050	0.038	✓	2	0.002	0.004	0.003	✓	2	6.68	6.86	6.77	✓	2	5.1	5.8	5.5	✓
Augusta	2	0.070	0.080	0.075	✓	2	0.002	0.002	0.002	✓	2	7.19	7.41	7.30	✓	2	14.0	16.0	15.0	✓
Australind	8	0.035	0.140	0.076	✓	8	<0.002	0.007	0.003	✓	8	7.23	8.06	7.68	✓	8	22.0	55.0	38.1	✓
Balingup	2	0.008	0.040	0.024	✓	2	<0.002	0.003	<0.002	✓	2	7.97	8.43	8.20	✓	2	5.1	5.5	5.3	✓
Binningup	2	0.004	0.020	0.012	✓	2	<0.002	0.005	0.003	✓	2	7.59	8.23	7.91	✓	2	1.0	5.7	3.4	✓
Boyanup	2	0.006	0.020	0.013	✓	2	<0.002	<0.002	<0.002	✓	2	7.96	8.08	8.02	✓	2	18.0	19.0	18.5	✓
Boyup Brook	2	0.015	0.020	0.018	✓	2	<0.002	0.004	<0.002	✓	2	7.90	8.20	8.05	✓	2	5.2	5.4	5.3	✓
Bridgetown	2	0.020	0.020	0.020	✓	2	0.002	0.003	0.003	✓	2	7.73	7.93	7.83	✓	2	0.7	5.5	3.1	✓
Brunswick Junction	2	0.030	0.060	0.045	✓	2	0.003	0.006	0.005	✓	2	7.64	7.99	7.82	✓	2	50.0	50.0	50.0	✓
Capel	4	0.050	0.060	0.053	✓	4	<0.002	<0.002	<0.002	✓	4	6.60	6.95	6.74	✓	4	14.0	14.0	14.0	✓
Collie	8	0.025	0.120	0.072	✓	8	0.003	0.02	0.012	✓	8	6.34	6.80	6.61	✓	8	1.5	5.9	2.9	✓
Cowaramup	4	0.090	0.280	0.213	✓	4	0.006	0.02	0.011	✓	4	6.92	7.33	7.09	✓	4	4.9	8.2	6.3	✓
Dalyellup	2	0.045	0.060	0.053	✓	2	0.006	0.01	0.008	✓	2	7.79	8.00	7.90	✓	2	16.0	16.0	16.0	✓
Dardanup	2	0.006	0.010	0.008	✓	2	<0.002	<0.002	<0.002	✓	2	7.56	7.77	7.67	✓	2	19.0	19.0	19.0	✓
Darkan	2	0.040	0.080	0.060	✓	2	0.002	0.004	0.003	✓	2	7.29	8.20	7.75	✓	2	2.7	6.3	4.5	✓
Donnybrook	2	0.004	0.050	0.027	✓	2	0.002	0.003	0.003	✓	2	7.30	7.73	7.52	✓	2	10.0	14.0	12.0	✓
Dunsborough	4	0.006	0.020	0.013	✓	4	<0.002	<0.002	<0.002	✓	4	8.03	8.14	8.10	✓	4	16.0	17.0	16.5	✓
Eaton	2	0.080	0.090	0.085	✓	2	0.002	0.002	0.002	✓	2	7.14	7.21	7.18	✓	2	27.0	27.0	27.0	✓
Greenbushes	2	0.020	0.025	0.023	✓	2	<0.002	0.004	<0.002	✓	2	7.86	8.01	7.94	✓	2	5.1	5.9	5.5	✓
Harvey	2	<0.003	0.030	0.015	✓	2	<0.002	0.007	0.004	✓	2	7.40	8.53	7.97	✓	2	0.9	6.0	3.5	✓
Hester TWS	4	0.010	0.035	0.021	✓	4	<0.002	0.014	0.004	✓	4	8.15	8.97	8.47	✓	4	0.9	5.1	3.2	✓
Kirup	4	0.008	0.015	0.010	✓	4	<0.002	<0.002	<0.002	✓	4	6.86	7.97	7.56	✓	4	4.2	9.5	6.7	✓
Logue Brook	2	0.020	0.025	0.023	✓	2	<0.002	0.003	<0.002	✓	2	7.78	7.86	7.82	✓	2	4.7	6.2	5.5	✓
Manjimup	2	0.035	0.050	0.043	✓	2	0.005	0.009	0.007	✓	2	6.63	7.67	7.15	✓	2	4.8	6.9	5.9	✓
Margaret River	4	0.100	0.340	0.235	✓	4	0.006	0.018	0.010	✓	4	7.17	7.50	7.32	✓	4	4.8	7.5	6.2	✓
Mullalyup	4	0.004	0.020	0.009	✓	4	<0.002	<0.002	<0.002	✓	4	6.15	8.14	7.26	✓	4	4.0	9.3	6.2	✓
Myalup	2	<0.003	0.035	0.018	✓	2	<0.002	0.005	0.003	✓	2	7.57	8.25	7.91	✓	2	1.0	5.5	3.3	✓
Nannup	2	0.060	0.080	0.070	✓	2	<0.002	<0.002	<0.002	✓	2	7.19	7.21	7.20	✓	2	5.2	6.6	5.9	✓
Northcliffe	2	0.040	0.060	0.050	✓	2	0.005	0.012	0.009	✓	2	7.43	7.53	7.48	✓	2	5.1	5.3	5.2	✓
Pemberton	2	0.015	0.020	0.018	✓	2	<0.002	<0.002	<0.002	✓	2	7.59	7.70	7.65	✓	2	4.7	6.0	5.4	✓
Peppermint Grove	4	0.030	0.060	0.041	✓	4	<0.002	<0.002	<0.002	✓	4	7.08	7.34	7.19	✓	4	15.0	15.0	15.0	✓
Preston Beach	4	0.004	0.010	0.008	✓	4	<0.002	<0.002	<0.002	✓	4	7.99	8.44	8.24	✓	4	16.0	17.0	16.3	✓
Quinninup	4	0.050	0.080	0.063	✓	4	0.003	0.014	0.007	✓	4	7.29	8.30	7.82	✓	4	3.9	6.2	5.1	✓
Waroona	2	0.010	0.020	0.015	✓	2	<0.002	0.005	0.003	✓	2	7.70	7.72	7.71	✓	2	3.0	4.4	3.7	✓
Yarloop	2	0.004	0.010	0.007	✓	2	<0.002	<0.002	<0.002	✓	2	7.54	7.61	7.58	✓	2	1.0	2.6	1.8	✓

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Table 20 **Aesthetic (Non-health related) Variables**

South West Region	Sodium					TDS					True Colour					Turbidity				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Value (TCU)			Guideline Met	Samples Taken	Value (NTU)			Guideline Met
		Min Value	Max Value	Mean Value			Min	Max	Mean			Min	Max	Mean			Min	Max	Mean	
Allanson	2	28	31	30	✓	2	113	120	117	✓	2	<1	1	<1	✓	2	0.3	0.4	0.4	✓
Augusta	2	63	72	68	✓	2	313	352	333	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Australind	8	96	130	111	✓	8	507	552	533	✓	8	<1	3	2	✓	8	0.2	0.3	0.2	✓
Balingup	2	44	53	49	✓	2	302	365	334	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Binningup	2	24	28	26	✓	2	152	153	153	✓	2	<1	<1	<1	✓	2	0.2	0.4	0.3	✓
Boyanup	2	62	63	63	✓	2	382	398	390	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Boyup Brook	2	45	53	49	✓	2	315	353	334	✓	2	<1	<1	<1	✓	2	0.2	0.4	0.3	✓
Bridgetown	2	51	53	52	✓	2	311	319	315	✓	2	<1	<1	<1	✓	2	0.2	0.4	0.3	✓
Brunswick Junction	2	120	130	125	✓	2	553	560	557	✓	2	<1	<1	<1	✓	2	0.2	0.5	0.4	✓
Capel	4	45	47	46	✓	4	257	268	262	✓	4	<1	<1	<1	✓	4	0.1	0.2	0.2	✓
Collie	8	30	47	40	✓	8	112	190	162	✓	8	<1	4	2	✓	8	0.2	0.9	0.6	✓
Cowaramup	4	43	52	48	✓	4	205	231	220	✓	4	1	9	5	✓	4	0.4	1.1	0.8	✓
Dalyellup	2	76	87	82	✓	2	423	429	426	✓	2	<1	<1	<1	✓	2	0.3	0.4	0.4	✓
Dardanup	2	70	72	71	✓	2	282	284	283	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Darkan	2	31	46	39	✓	2	132	210	171	✓	2	<1	1	<1	✓	2	0.2	0.4	0.3	✓
Donnybrook	2	115	120	118	✓	2	420	435	428	✓	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Dunsborough	4	120	150	134	✓	4	530	589	551	✓	4	<1	<1	<1	✓	4	<0.1	0.4	0.2	✓
Eaton	2	64	66	65	✓	2	394	419	407	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Greenbushes	2	47	50	49	✓	2	315	339	327	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Harvey	2	24	30	27	✓	2	153	156	155	✓	2	<1	<1	<1	✓	2	0.2	0.4	0.3	✓
Hester TWS	4	43	54	50	✓	4	286	348	314	✓	4	<1	2	<1	✓	4	0.1	0.4	0.3	✓
Kirup	4	32	120	78	✓	4	121	477	302	✓	4	<1	<1	<1	✓	4	<0.1	0.2	1.0	✓
Logue Brook	2	51	81	66	✓	2	236	332	284	✓	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Manjimup	2	37	44	41	✓	2	232	262	247	✓	2	<1	<1	<1	✓	2	0.3	0.3	0.3	✓
Margaret River	4	43	54	48	✓	4	203	232	221	✓	4	1	8	6	✓	4	0.5	1.1	0.9	✓
Mullalyup	4	32	140	84	✓	4	121	436	289	✓	4	<1	<1	<1	✓	4	<0.1	0.2	1.0	✓
Myalup	2	20	30	25	✓	2	151	164	158	✓	2	<1	<1	<1	✓	2	0.1	0.4	0.3	✓
Nannup	2	45	53	49	✓	2	176	216	196	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Northcliffe	2	44	49	47	✓	2	217	251	234	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Pemberton	2	48	56	52	✓	2	211	226	219	✓	2	<1	<1	<1	✓	2	<0.1	0.2	0.1	✓
Peppermint Grove	4	45	48	46	✓	4	279	289	282	✓	4	<1	<1	<1	✓	4	<0.1	0.2	1.0	✓
Preston Beach	4	95	110	104	✓	4	773	818	802	(1)	4	<1	1	<1	✓	4	0.1	0.3	0.2	✓
Quinninup	4	43	51	47	✓	4	232	266	246	✓	4	<1	<1	<1	✓	4	0.2	0.3	0.3	✓
Waroona	2	25	25	25	✓	2	157	169	163	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Yarloop	2	22	23	23	✓	2	141	145	143	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓

(1) Elevated TDS is characteristic of the source supplying this locality.

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Table 21 Health related variables

Great Southern Region	*E. coli*				Thermophilic *Naegleria*			Fluoride					Hydrocarbons		Metals	
Locality	Samples Taken	Samples >0 cfu/100mL	Max cfu/100mL	Requirement Met	Samples Taken	Samples with Thermophilic Naegleria	Requirement Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Guideline Met	Samples Taken	Guideline Met
									Min	Max	Mean					
Albany	169	0	0	✓	85	0	✓	52	0.65	0.85	0.78	✓	2	✓	8	✓
Boddington	52	0	0	✓	52	0	✓	4	0.75	0.85	0.81	✓	0	(1)	2	✓
Borden	12	0	0	✓	6	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	2	✓
Bremer Bay	51	0	0	✓	26	0	✓	4	0.50	0.60	0.55	✓	0	(1)	2	✓
Brookton	52	0	0	✓	52	0	✓	5	0.75	0.85	0.80	✓	0	(1)	2	✓
Broomehill	12	0	0	✓	12	0	✓	4	0.80	0.95	0.86	✓	0	(1)	2	✓
Bullaring	12	0	0	✓	12	0	✓	4	0.75	0.85	0.81	✓	0	(1)	2	✓
Condingup	12	0	0	✓	8	0	✓	2	0.30	0.30	0.30	✓	0	(1)	2	✓
Cranbrook	12	0	0	✓	6	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	2	✓
Cuballing	12	0	0	✓	12	0	✓	4	0.70	0.80	0.78	✓	0	(1)	2	✓
Denmark	65	0	0	✓	32	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Dudinin TWS	12	0	0	✓	12	0	✓	4	0.60	0.90	0.79	✓	0	(1)	2	✓
Dumbleyung	12	0	0	✓	12	0	✓	4	0.70	0.85	0.79	✓	0	(1)	2	✓
Esperance	91	0	0	✓	61	0	✓	52	0.50	0.95	0.82	✓	0	(1)	4	✓
Frankland	12	0	0	✓	7	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Gibson	12	0	0	✓	8	0	✓	2	0.35	0.35	0.35	✓	0	(1)	2	✓
Gnowangerup	52	0	0	✓	52	0	✓	5	0.75	0.90	0.82	✓	0	(1)	2	✓
Grass Patch	12	0	0	✓	8	0	✓	4	0.75	0.80	0.79	✓	2	✓	2	✓
Harrismith TWS	12	0	0	✓	12	0	✓	4	0.80	0.85	0.83	✓	0	(1)	2	✓
Highbury	12	0	0	✓	12	0	✓	4	0.75	0.85	0.81	✓	0	(1)	2	✓
Hopetoun	52	0	0	✓	35	0	✓	3	<0.1	<0.1	<0.1	✓	1	✓	2	✓
Hyden	12	0	0	✓	12	0	✓	4	0.35	0.85	0.70	✓	0	(1)	2	✓
Jerramungup	12	0	0	✓	6	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Karlgarin	12	0	0	✓	12	0	✓	4	0.80	0.90	0.84	✓	0	(1)	2	✓
Katanning	65	0	0	✓	65	0	✓	52	0.75	1.00	0.84	✓	0	(1)	2	✓
Kendenup	12	0	0	✓	7	0	✓	4	0.75	0.85	0.80	✓	0	(1)	2	✓
Kojonup	52	0	0	✓	52	0	✓	4	0.80	1.00	0.86	✓	0	(1)	2	✓
Kondinin	12	0	0	✓	12	0	✓	4	0.80	0.95	0.86	✓	0	(1)	2	✓
Kukerin	12	0	0	✓	12	0	✓	4	0.70	0.85	0.79	✓	0	(1)	3	✓
Kulin	12	0	0	✓	12	0	✓	4	0.75	0.85	0.80	✓	0	(1)	2	✓
Lake Grace	52	0	0	✓	52	0	✓	5	0.75	0.85	0.80	✓	2	✓	2	✓
Lake King	12	0	0	✓	12	0	✓	4	0.70	0.85	0.80	✓	0	(1)	2	✓
Mt Barker	52	0	0	✓	30	0	✓	52	0.60	0.85	0.78	✓	0	(1)	2	✓
Munglinup	12	0	0	✓	8	0	✓	2	<0.1	0.35	0.18	✓	2	✓	2	✓
Muradup	12	0	0	✓	12	0	✓	4	0.80	0.95	0.86	✓	0	(1)	2	✓
Narrikup	12	0	0	✓	6	0	✓	4	0.75	0.85	0.80	✓	0	(1)	2	✓
Narrogin	65	0	0	✓	65	0	✓	52	0.65	0.90	0.80	✓	0	(1)	2	✓
Newdegate	12	0	0	✓	12	0	✓	4	0.70	0.90	0.80	✓	2	✓	2	✓
Nyabing	12	0	0	✓	12	0	✓	4	0.75	0.95	0.84	✓	2	✓	2	✓
Ongerup	12	0	0	✓	6	0	✓	2	0.25	0.75	0.50	✓	2	✓	2	✓
Pingaring	12	0	0	✓	12	0	✓	4	0.75	0.90	0.81	✓	0	(1)	2	✓
Pingelly	52	0	0	✓	52	0	✓	4	0.70	0.80	0.78	✓	0	(1)	2	✓
Pingrup	12	0	0	✓	12	0	✓	4	0.80	0.85	0.83	✓	2	✓	2	✓
Popanyinning	12	0	0	✓	12	0	✓	4	0.75	0.80	0.79	✓	0	(1)	2	✓
Ravensthorpe	12	0	0	✓	8	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	2	✓
Rocky Gully	12	0	0	✓	6	0	✓	4	0.70	0.85	0.78	✓	0	(1)	2	✓
Salmon Gums	12	0	0	✓	7	0	✓	2	0.35	0.40	0.38	✓	0	(1)	2	✓
Tambellup	12	0	0	✓	12	0	✓	4	0.75	1.00	0.85	✓	2	✓	2	✓
Tincurrin TWS	12	0	0	✓	12	0	✓	4	0.70	0.85	0.79	✓	0	(1)	2	✓
Varley	12	0	0	✓	12	0	✓	4	0.75	0.80	0.78	✓	2	✓	2	✓
Wagin	52	0	0	✓	52	0	✓	5	0.80	0.95	0.85	✓	0	(1)	2	✓
Walpole	52	0	0	✓	26	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Wandering	12	0	0	✓	12	0	✓	4	0.65	0.80	0.74	✓	0	(1)	2	✓
Wellstead	12	0	0	✓	6	0	✓	2	0.25	0.75	0.50	✓	0	(1)	2	✓
Wickepin TWS	12	0	0	✓	12	0	✓	4	0.75	0.90	0.81	✓	0	(1)	2	✓
Williams	12	0	0	✓	12	0	✓	4	0.45	0.85	0.70	✓	0	(1)	2	✓
Woodanilling	12	0	0	✓	12	0	✓	4	0.75	0.85	0.80	✓	2	✓	2	✓
Yealering	12	0	0	✓	12	0	✓	4	0.75	0.85	0.80	✓	0	(1)	2	✓

(1) No samples required in this 12 month period.

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Table 22 Health related variables

Great Southern Region	Nitrate					Pesticides		Radiological		Trihalomethanes					Other Health Related	
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Guideline Met	Samples Taken	Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Requirement Met
		Min	Max	Mean							Min	Max	Mean			
Albany	16	0.4	1.3	0.9	✓	4	✓	0	(1)	8	0.120	0.150	0.133	✓	2	✓
Boddington	2	<0.2	0.4	<0.2	✓	1	✓	0	(1)	5	0.062	0.110	0.088	✓	0	(1)
Borden	2	<0.2	0.4	<0.2	✓	1	✓	2	✓	2	0.038	0.068	0.053	✓	1	✓
Bremer Bay	4	24.6	34.8	30.4	✓	1	✓	0	(1)	2	0.068	0.100	0.084	✓	0	(1)
Brookton	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	9	0.042	0.085	0.062	✓	0	(1)
Broomehill	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	4	0.068	0.110	0.087	✓	0	(1)
Bullaring	4	<0.2	0.4	<0.2	✓	1	✓	0	(1)	4	0.100	0.190	0.148	✓	0	(1)
Condingup	4	1.8	2.2	1.8	✓	1	✓	0	(1)	2	0.013	0.021	0.017	✓	1	✓
Cranbrook	2	0.4	0.4	0.4	✓	1	✓	0	(1)	4	0.042	0.065	0.058	✓	1	✓
Cuballing	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	4	0.063	0.099	0.080	✓	0	(1)
Denmark	5	0.4	0.4	0.4	✓	1	✓	1	✓	5	0.026	0.057	0.037	✓	0	(1)
Dudinin TWS	4	<0.2	0.4	<0.2	✓	1	✓	2	✓	4	0.039	0.089	0.067	✓	0	(1)
Dumbleyung	2	<0.2	0.4	<0.2	✓	1	✓	0	(1)	4	0.094	0.150	0.119	✓	0	(1)
Esperance	10	5.7	30.4	12.8	✓	2	✓	4	✓	4	0.011	0.038	0.021	✓	0	(1)
Frankland	4	<0.2	<0.2	<0.2	✓	1	✓	1	✓	4	0.038	0.069	0.050	✓	0	(1)
Gibson	4	6.6	16.7	11.9	✓	1	✓	1	✓	2	0.030	0.059	0.045	✓	1	✓
Gnowangerup	5	<0.2	0.4	<0.2	✓	1	✓	0	(1)	5	0.016	0.048	0.030	✓	0	(1)
Grass Patch	4	10.6	21.6	15.4	✓	1	✓	0	(1)	2	0.050	0.099	0.075	✓	0	(1)
Harrismith TWS	4	<0.2	0.4	<0.2	✓	1	✓	0	(1)	4	0.076	0.130	0.114	✓	0	(1)
Highbury	4	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	4	0.063	0.079	0.071	✓	0	(1)
Hopetoun	5	1.3	4.4	2.2	✓	1	✓	2	✓	2	0.012	0.012	0.012	✓	0	(1)
Hyden	4	<0.2	0.4	<0.2	✓	1	✓	1	✓	4	0.048	0.100	0.069	✓	0	(1)
Jerramungup	4	0.4	28.2	7.5	✓	1	✓	0	(1)	2	0.064	0.068	0.066	✓	0	(1)
Karlgarin	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	4	0.048	0.082	0.066	✓	0	(1)
Katanning	4	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	4	0.042	0.062	0.052	✓	0	(1)
Kendenup	4	0.9	0.9	0.9	✓	1	✓	2	✓	4	0.110	0.180	0.145	✓	0	(1)
Kojonup	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	4	0.059	0.140	0.095	✓	0	(1)
Kondinin	4	<0.2	0.4	<0.2	✓	1	✓	0	(1)	4	0.055	0.120	0.077	✓	0	(1)
Kukerin	4	0.4	0.4	0.4	✓	1	✓	0	(1)	4	0.120	0.130	0.125	✓	0	(1)
Kulin	4	<0.2	0.4	0.4	✓	1	✓	0	(1)	4	0.085	0.180	0.124	✓	0	(1)
Lake Grace	5	<0.2	0.4	<0.2	✓	1	✓	2	✓	5	0.088	0.130	0.110	✓	2	✓
Lake King	2	<0.2	0.4	<0.2	✓	1	✓	0	(1)	2	0.062	0.074	0.068	✓	0	(1)
Mt Barker	4	0.4	1.3	0.9	✓	1	✓	2	✓	4	0.100	0.160	0.140	✓	0	(1)
Munglinup	2	<0.2	3.5	1.8	✓	1	✓	0	(1)	2	0.055	0.060	0.058	✓	2	✓
Muradup	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	4	0.081	0.110	0.098	✓	0	(1)
Narrikup	4	0.4	1.3	0.9	✓	1	✓	2	✓	4	0.110	0.160	0.138	✓	0	(1)
Narrogin	4	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	0.058	0.110	0.084	✓	0	(1)
Newdegate	2	0.4	0.4	0.4	✓	1	✓	2	✓	4	0.084	0.130	0.111	✓	2	✓
Nyabing	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	0.069	0.070	0.070	✓	2	✓
Ongerup	2	0.4	0.9	0.4	✓	1	✓	2	✓	2	0.095	0.130	0.113	✓	2	✓
Pingaring	4	<0.2	0.4	<0.2	✓	1	✓	0	(1)	4	0.120	0.230	0.173	✓	0	(1)
Pingelly	3	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	4	0.046	0.095	0.071	✓	0	(1)
Pingrup	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	4	0.032	0.050	0.043	✓	2	✓
Popanyinning	2	<0.2	<0.2	<0.2	✓	1	✓	1	✓	4	0.091	0.140	0.113	✓	0	(1)
Ravensthorpe	4	<0.2	4.0	1.3	✓	4	✓	0	(1)	4	0.017	0.140	0.064	✓	2	✓
Rocky Gully	4	0.9	0.9	0.9	✓	1	✓	2	✓	2	0.097	0.100	0.099	✓	0	(1)
Salmon Gums	4	0.9	1.3	0.9	✓	1	✓	0	(1)	2	0.087	0.130	0.109	✓	0	(1)
Tambellup	2	0.4	0.4	0.4	✓	1	✓	0	(1)	4	0.053	0.086	0.071	✓	2	✓
Tincurrin TWS	4	<0.2	0.4	0.4	✓	1	✓	0	(1)	4	0.088	0.130	0.100	✓	0	(1)
Varley	2	0.4	0.4	0.4	✓	1	✓	0	(1)	2	0.038	0.048	0.043	✓	2	✓
Wagin	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	5	0.086	0.160	0.118	✓	0	(1)
Walpole	4	0.9	1.3	1.3	✓	1	✓	0	(1)	4	0.066	0.097	0.087	✓	0	(1)
Wandering	2	0.4	0.4	0.4	✓	1	✓	0	(1)	4	0.085	0.110	0.099	✓	0	(1)
Wellstead	2	0.4	1.3	0.9	✓	1	✓	0	(1)	2	0.100	0.160	0.130	✓	0	(1)
Wickepin TWS	4	<0.2	0.4	<0.2	✓	1	✓	0	(1)	4	0.055	0.090	0.066	✓	0	(1)
Williams	2	<0.2	0.4	0.4	✓	1	✓	0	(1)	4	0.070	0.130	0.101	✓	0	(1)
Woodanilling	2	0.4	0.4	0.4	✓	1	✓	0	(1)	4	0.110	0.160	0.135	✓	1	✓
Yealering	4	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	4	0.070	0.140	0.111	✓	0	(1)

(1) No samples required in this 12 month period.

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Table 23 **Aesthetic (Non-health related) Variables**

Great Southern Region	Alkalinity (as CaCO3)					Aluminium					Chloride					Hardness				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met
		Min Value	Max Value	Mean Value			Min	Max	Mean			Min Value	Max Value	Mean Value			Min	Max	Mean	
Albany	16	150	240	202	(1)	16	<0.008	<0.008	<0.008	✓	16	110	135	122	✓	16	170	300	249	(3)
Boddington	2	7	10	9	(1)	2	0.018	0.020	0.019	✓	2	60	65	63	✓	2	28	35	32	✓
Borden	2	15	43	29	(1)	2	0.030	0.090	0.060	✓	2	15	26	21	✓	2	20	41	31	✓
Bremer Bay	4	270	290	275	(1)	4	<0.008	<0.008	<0.008	✓	4	125	190	155	✓	4	170	230	208	(3)
Brookton	2	12	12	12	(1)	2	0.025	0.055	0.040	✓	2	70	85	78	✓	2	43	55	49	✓
Broomehill	2	15	15	15	(1)	2	0.020	0.020	0.020	✓	2	75	95	85	✓	2	50	54	52	✓
Bullaring	4	11	52	29	(1)	4	0.010	0.035	0.019	✓	4	70	95	83	✓	4	47	88	62	✓
Condingup	4	130	140	133	(1)	4	<0.008	<0.008	<0.008	✓	4	360	405	383	(2)	4	78	80	79	✓
Cranbrook	2	8	9	9	(1)	2	0.012	0.020	0.016	✓	2	19	26	23	✓	2	18	19	19	✓
Cuballing	2	3	9	6	(1)	2	0.012	0.025	0.019	✓	2	65	90	78	✓	2	29	44	37	✓
Denmark	5	7	9	8	(1)	5	0.012	0.018	0.016	✓	5	205	295	249	✓	5	72	110	92	✓
Dudinin TWS	4	17	31	22	(1)	4	0.008	0.045	0.020	✓	4	70	100	86	✓	4	51	72	61	✓
Dumbleyung	2	21	22	22	(1)	2	0.012	0.018	0.015	✓	2	65	90	78	✓	2	46	59	53	✓
Esperance	10	260	300	271	(1)	10	<0.008	<0.008	<0.008	✓	10	170	215	199	✓	10	340	370	351	(3)
Frankland	4	1	4	3	(1)	4	<0.008	0.030	0.010	✓	4	13	16	15	✓	4	10	11	11	✓
Gibson	4	68	72	70	(1)	4	<0.008	<0.008	<0.008	✓	4	205	225	215	✓	4	43	45	44	✓
Gnowangerup	5	15	24	20	(1)	5	0.016	0.025	0.022	✓	5	80	105	92	✓	5	53	62	57	✓
Grass Patch	4	270	270	270	(1)	4	<0.008	0.010	<0.008	✓	4	185	205	194	✓	4	350	380	363	(3)
Harrismith TWS	4	14	23	18	(1)	4	0.016	0.020	0.018	✓	4	65	95	80	✓	4	49	61	53	✓
Highbury	4	4	12	8	(1)	4	0.014	0.030	0.019	✓	4	65	90	79	✓	4	32	42	38	✓
Hopetoun	5	41	150	84	(1)	5	<0.008	<0.008	<0.008	✓	5	130	300	232	✓	5	63	170	105	✓
Hyden	4	16	23	20	(1)	4	0.014	0.020	0.017	✓	4	42	100	81	✓	4	42	65	57	✓
Jerramungup	4	7	270	73	(1)	4	<0.008	0.025	0.010	✓	4	46	155	82	✓	4	19	210	70	✓
Karlgarin	2	18	26	22	(1)	2	0.014	0.018	0.016	✓	2	90	100	95	✓	2	62	67	65	✓
Katanning	4	9	15	12	(1)	4	<0.008	0.016	0.011	✓	4	75	100	89	✓	4	40	55	48	✓
Kendenup	4	200	220	210	(1)	4	<0.008	<0.008	<0.008	✓	4	115	120	119	✓	4	250	290	270	(3)
Kojonup	2	14	17	16	(1)	2	0.020	0.025	0.023	✓	2	70	95	83	✓	2	49	56	53	✓
Kondinin	4	21	26	23	(1)	4	0.016	0.025	0.022	✓	4	85	105	95	✓	4	58	70	63	✓
Kukerin	4	22	24	23	(1)	4	0.012	0.018	0.016	✓	4	70	95	83	✓	4	54	62	59	✓
Kulin	4	16	22	20	(1)	4	0.012	0.018	0.015	✓	4	65	95	80	✓	4	49	60	53	✓
Lake Grace	5	23	32	27	(1)	5	0.008	0.025	0.015	✓	5	70	95	84	✓	5	55	63	60	✓
Lake King	2	25	27	26	(1)	2	0.016	0.016	0.016	✓	2	75	95	85	✓	2	59	63	61	✓
Mt Barker	4	200	240	218	(1)	4	<0.008	<0.008	<0.008	✓	4	110	120	116	✓	4	260	280	268	(3)
Munglinup	2	6	120	63	(1)	2	<0.008	0.014	<0.008	✓	2	34	105	70	✓	2	16	150	83	✓
Muradup	2	17	24	21	(1)	2	0.020	0.025	0.023	✓	2	90	100	95	✓	2	52	60	56	✓
Narrikup	4	210	230	218	(1)	4	<0.008	<0.008	<0.008	✓	4	115	120	118	✓	4	260	280	270	(3)
Narrogin	4	4	12	8	(1)	4	0.014	0.018	0.016	✓	4	60	90	78	✓	4	28	44	38	✓
Newdegate	2	25	27	26	(1)	2	0.018	0.025	0.022	✓	2	70	95	83	✓	2	58	65	62	✓
Nyabing	2	10	15	13	(1)	2	0.010	0.012	0.011	✓	2	85	95	90	✓	2	46	51	49	✓
Ongerup	2	33	110	72	(1)	2	<0.008	0.040	0.020	✓	2	43	100	72	✓	2	29	150	90	✓
Pingaring	4	18	33	25	(1)	4	0.012	0.018	0.016	✓	4	70	95	81	✓	4	52	71	61	✓
Pingelly	3	6	13	10	(1)	3	0.016	0.025	0.019	✓	3	70	95	87	✓	3	37	53	47	✓
Pingrup	2	8	16	12	(1)	2	0.012	0.012	0.012	✓	2	80	95	88	✓	2	44	52	48	✓
Popanyinning	2	7	7	7	(1)	2	0.014	0.014	0.014	✓	2	75	85	80	✓	2	37	43	40	✓
Ravensthorpe	4	25	170	73	(1)	4	<0.008	0.040	0.022	✓	4	32	270	156	✓	4	26	190	86	✓
Rocky Gully	4	200	220	208	(1)	4	<0.008	<0.008	<0.008	✓	4	105	125	118	✓	4	240	280	265	(3)
Salmon Gums	4	190	200	193	(1)	4	0.012	0.025	0.017	✓	4	41	43	42	✓	4	110	110	110	✓
Tambellup	2	15	23	19	(1)	2	0.018	0.025	0.022	✓	2	90	100	95	✓	2	55	62	59	✓
Tincurrin TWS	4	15	18	17	(1)	4	0.018	0.035	0.025	✓	4	65	100	84	✓	4	45	61	54	✓
Varley	2	24	28	26	(1)	2	0.020	0.020	0.020	✓	2	70	100	85	✓	2	56	64	60	✓
Wagin	2	10	10	10	(1)	2	0.012	0.018	0.015	✓	2	80	85	83	✓	2	42	44	43	✓
Walpole	4	16	25	20	(1)	4	0.010	0.014	0.012	✓	4	100	140	119	✓	4	40	53	46	✓
Wandering	2	11	12	12	(1)	2	0.016	0.020	0.018	✓	2	60	75	68	✓	2	34	41	38	✓
Wellstead	2	6	210	108	(1)	2	<0.008	0.016	<0.008	✓	2	40	120	80	✓	2	15	260	138	✓
Wickepin TWS	4	4	13	8	(1)	4	0.012	0.018	0.015	✓	4	65	90	80	✓	4	34	47	41	✓
Williams	2	8	16	12	(1)	2	0.012	0.025	0.019	✓	2	75	90	83	✓	2	37	43	40	✓
Woodanilling	2	10	12	11	(1)	2	0.020	0.060	0.040	✓	2	65	90	78	✓	2	38	47	43	✓
Yealering	4	17	26	22	(1)	4	0.014	0.030	0.022	✓	4	65	95	80	✓	4	44	59	53	✓

(1) No guideline value available as per ADWG 2011. (2) Elevated chloride is characteristic of the source supplying this locality. (3) Elevated hardness is characteristic of the source supplying this locality

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Table 24 Aesthetic (Non-health related) Variables

Great Southern Region	Iron					Manganese					pH					Silicon				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Value (pH units)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met
		Min	Max	Mean			Min	Max	Mean			Min	Max	Mean			Min Value	Max Value	Mean Value	
Albany	16	0.035	0.900	0.125	✓	16	<0.002	0.009	<0.002	✓	16	7.32	7.94	7.60	✓	16	13.0	26.0	17.8	✓
Boddington	2	0.025	0.060	0.043	✓	2	0.003	0.003	0.003	✓	2	6.89	6.95	6.92	✓	2	3.8	5.9	4.9	✓
Borden	2	0.004	0.010	0.007	✓	2	<0.002	<0.002	<0.002	✓	2	7.52	7.66	7.59	✓	2	1.1	1.1	1.1	✓
Bremer Bay	4	<0.003	0.015	0.008	✓	4	<0.002	<0.002	<0.002	✓	4	8.09	8.37	8.20	✓	4	49.0	50.0	49.8	✓
Brookton	2	0.100	0.260	0.180	✓	2	0.004	0.030	0.017	✓	2	7.52	8.38	7.95	✓	2	2.8	3.5	3.2	✓
Broomehill	2	0.160	0.280	0.220	✓	2	0.004	0.005	0.005	✓	2	6.88	8.31	7.60	✓	2	1.0	2.4	1.7	✓
Bullaring	4	0.060	0.220	0.120	✓	4	<0.002	0.009	0.005	✓	4	7.49	8.89	7.98	✓	4	1.9	4.4	3.4	✓
Condingup	4	0.015	0.035	0.023	✓	4	<0.002	0.002	<0.002	✓	4	6.53	7.30	6.87	✓	4	60.0	65.0	61.3	✓
Cranbrook	2	0.050	0.090	0.070	✓	2	<0.002	0.003	<0.002	✓	2	6.84	6.88	6.86	✓	2	1.9	1.9	1.9	✓
Cuballing	2	0.160	0.180	0.170	✓	2	0.012	0.025	0.019	✓	2	6.73	7.35	7.04	✓	2	2.1	5.5	3.8	✓
Denmark	5	0.010	0.015	0.011	✓	5	<0.002	<0.002	<0.002	✓	5	6.95	7.30	7.12	✓	5	3.2	7.3	5.3	✓
Dudinin TWS	4	0.100	0.960	0.370	(1)	4	0.003	0.055	0.017	✓	4	8.60	9.65	9.00	(2)	4	1.7	5.0	3.1	✓
Dumbleyung	2	0.080	0.120	0.100	✓	2	0.005	0.007	0.006	✓	2	8.39	8.66	8.53	(2)	2	2.0	4.6	3.3	✓
Esperance	10	<0.003	0.015	0.006	✓	10	<0.002	<0.002	<0.002	✓	10	7.30	7.70	7.55	✓	10	9.4	13.0	11.4	✓
Frankland	4	0.008	0.020	0.012	✓	4	<0.002	<0.002	<0.002	✓	4	6.08	7.35	6.53	✓	4	0.7	1.2	1.0	✓
Gibson	4	0.050	0.090	0.073	✓	4	<0.002	<0.002	<0.002	✓	4	6.80	6.96	6.89	✓	4	42.0	44.0	43.0	✓
Gnowangerup	5	0.100	0.200	0.140	✓	5	0.003	0.006	0.004	✓	5	6.90	7.84	7.52	✓	5	1.0	2.3	1.7	✓
Grass Patch	4	0.004	0.020	0.009	✓	4	<0.002	<0.002	<0.002	✓	4	8.14	8.36	8.24	✓	4	10.0	11.0	10.8	✓
Harrismith TWS	4	0.160	0.300	0.210	✓	4	0.012	0.035	0.023	✓	4	7.23	9.50	8.56	(2)	4	1.5	4.6	3.3	✓
Highbury	4	0.100	0.220	0.165	✓	4	0.010	0.050	0.025	✓	4	6.62	7.30	6.84	✓	4	2.2	5.7	3.2	✓
Hopetoun	5	<0.003	0.050	0.018	✓	5	<0.002	0.004	<0.002	✓	5	6.74	7.65	7.24	✓	5	16.0	26.0	23.4	✓
Hyden	4	0.015	0.070	0.051	✓	4	<0.002	0.004	<0.002	✓	4	6.85	7.52	7.31	✓	4	1.1	4.1	2.6	✓
Jerramungup	4	0.015	0.050	0.035	✓	4	<0.002	<0.002	<0.002	✓	4	6.50	8.25	7.27	✓	4	4.0	41.0	13.5	✓
Karlgarin	2	0.060	0.070	0.065	✓	2	0.002	0.002	0.002	✓	2	7.27	8.42	7.85	✓	2	1.2	4.2	2.7	✓
Katanning	4	0.180	0.420	0.260	✓	4	0.004	0.009	0.006	✓	4	7.03	7.64	7.25	✓	4	0.5	2.4	1.3	✓
Kendenup	4	0.035	0.070	0.053	✓	4	<0.002	<0.002	<0.002	✓	4	7.58	8.03	7.87	✓	4	13.0	19.0	16.0	✓
Kojonup	2	0.140	0.280	0.210	✓	2	0.003	0.004	0.004	✓	2	7.60	7.71	7.66	✓	2	1.1	2.4	1.8	✓
Kondinin	4	0.045	0.080	0.059	✓	4	<0.002	0.007	0.003	✓	4	7.67	8.28	7.89	✓	4	1.3	4.3	2.7	✓
Kukerin	4	0.030	0.100	0.073	✓	4	<0.002	0.003	<0.002	✓	4	7.45	8.65	8.23	✓	4	1.7	4.2	3.0	✓
Kulin	4	0.080	0.180	0.113	✓	4	0.004	0.010	0.006	✓	4	7.94	9.01	8.26	✓	4	1.5	4.4	3.1	✓
Lake Grace	5	0.070	0.160	0.092	✓	5	0.003	0.009	0.005	✓	5	7.64	8.80	8.39	✓	5	1.5	4.7	2.8	✓
Lake King	2	0.070	0.070	0.070	✓	2	0.003	0.004	0.004	✓	2	7.59	7.70	7.65	✓	2	1.5	5.0	3.3	✓
Mt Barker	4	0.030	0.090	0.063	✓	4	<0.002	<0.002	<0.002	✓	4	7.63	7.91	7.76	✓	4	14.0	17.0	15.8	✓
Munglinup	2	0.035	0.240	0.138	✓	2	0.002	0.003	0.003	✓	2	6.75	8.08	7.42	✓	2	0.4	5.0	2.7	✓
Muradup	2	0.160	0.180	0.170	✓	2	0.003	0.004	0.004	✓	2	7.45	8.05	7.75	✓	2	1.0	2.4	1.7	✓
Narrikup	4	0.045	0.100	0.066	✓	4	<0.002	<0.002	<0.002	✓	4	7.64	7.69	7.66	✓	4	14.0	18.0	15.8	✓
Narrogin	4	0.120	0.240	0.170	✓	4	0.004	0.018	0.009	✓	4	7.04	7.52	7.28	✓	4	2.1	5.6	3.1	✓
Newdegate	2	0.070	0.100	0.085	✓	2	0.003	0.005	0.004	✓	2	7.81	7.90	7.86	✓	2	1.6	4.7	3.2	✓
Nyabing	2	0.120	0.160	0.140	✓	2	0.002	0.003	0.003	✓	2	7.12	7.39	7.26	✓	2	0.7	2.2	1.5	✓
Ongerup	2	0.006	0.100	0.053	✓	2	<0.002	0.003	<0.002	✓	2	7.25	7.93	7.59	✓	2	3.7	7.8	5.8	✓
Pingaring	4	0.070	0.120	0.090	✓	4	<0.002	0.006	0.003	✓	4	8.70	9.53	9.15	(2)	4	1.2	4.6	2.8	✓
Pingelly	3	0.090	0.140	0.110	✓	3	0.004	0.012	0.007	✓	3	6.99	7.88	7.53	✓	3	1.6	4.6	2.7	✓
Pingrup	2	0.140	0.240	0.190	✓	2	0.006	0.010	0.008	✓	2	7.02	7.21	7.12	✓	2	0.5	2.3	1.4	✓
Popanyinning	2	0.120	0.180	0.150	✓	2	0.010	0.014	0.012	✓	2	6.96	7.18	7.07	✓	2	2.2	4.3	3.3	✓
Ravensthorpe	4	<0.003	0.090	0.038	✓	4	<0.002	0.008	0.003	✓	4	6.96	8.15	7.56	✓	4	1.9	24.0	13.9	✓
Rocky Gully	4	0.060	0.100	0.078	✓	4	<0.002	<0.002	<0.002	✓	4	7.97	8.29	8.16	✓	4	13.0	19.0	16.0	✓
Salmon Gums	4	<0.003	0.004	<0.003	✓	4	<0.002	<0.002	<0.002	✓	4	8.34	8.51	8.45	✓	4	6.0	6.6	6.4	✓
Tambellup	2	0.140	0.180	0.160	✓	2	0.003	0.004	0.004	✓	2	7.74	7.82	7.78	✓	2	1.1	2.3	1.7	✓
Tincurrin TWS	4	0.200	0.380	0.275	✓	4	0.007	0.020	0.015	✓	4	7.23	7.71	7.41	✓	4	1.7	4.7	3.0	✓
Varley	2	0.060	0.080	0.070	✓	2	0.003	0.004	0.004	✓	2	7.43	7.64	7.54	✓	2	1.8	4.6	3.2	✓
Wagin	2	0.140	0.300	0.220	✓	2	0.003	0.016	0.010	✓	2	6.88	7.11	7.00	✓	2	2.8	4.3	3.6	✓
Walpole	4	0.008	0.035	0.018	✓	4	<0.002	<0.002	<0.002	✓	4	7.00	7.71	7.36	✓	4	6.8	8.5	7.7	✓
Wandering	2	0.070	0.120	0.095	✓	2	0.006	0.009	0.008	✓	2	6.79	7.22	7.01	✓	2	3.3	5.2	4.3	✓
Wellstead	2	0.070	0.160	0.115	✓	2	<0.002	0.003	<0.002	✓	2	7.22	7.71	7.47	✓	2	0.9	17.0	9.0	✓
Wickepin TWS	4	0.090	0.180	0.120	✓	4	0.007	0.014	0.010	✓	4	6.92	7.38	7.19	✓	4	1.8	4.8	3.1	✓
Williams	2	0.050	0.080	0.065	✓	2	0.020	0.020	0.020	✓	2	6.81	7.23	7.02	✓	2	1.5	2.6	2.1	✓
Woodanilling	2	0.160	0.200	0.180	✓	2	0.008	0.016	0.012	✓	2	7.24	7.51	7.38	✓	2	1.9	5.2	3.6	✓
Yealering	4	0.070	0.240	0.138	✓	4	<0.002	0.014	0.006	✓	4	7.43	8.63	8.26	✓	4	1.7	4.8	3.5	✓

(1) Caused by mobilisation of sediment within the distribution system (2) Elevated pH is caused by leaching of calcium carbonate from the protective cement lining of the pipes after long water transit times. This characteristic is found in a number of our localities on our large water supply schemes. Experience shows that pH at this level is not objectionable to our customers.

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Table 25 **Aesthetic (Non-health related) Variables**

Great Southern Region	Sodium					TDS					True Colour					Turbidity				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Value (TCU)			Guideline Met	Samples Taken	Value (NTU)			Guideline Met
		Min Value	Max Value	Mean Value			Min	Max	Mean			Min	Max	Mean			Min	Max	Mean	
Albany	16	59	81	67	✓	16	497	630	580	✓	16	<1	<1	<1	✓	16	0.1	4.5	0.6	✓
Boddington	2	30	34	32	✓	2	125	149	137	✓	2	<1	<1	<1	✓	2	0.3	0.4	0.4	✓
Borden	2	7.5	17	12	✓	2	58	124	91	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Bremer Bay	4	120	185	146	✓	4	761	871	819	(2)	4	<1	<1	<1	✓	4	<0.1	<0.1	<0.1	✓
Brookton	2	34	44	39	✓	2	156	189	173	✓	2	<1	2	1	✓	2	0.3	0.8	0.6	✓
Broomehill	2	37	45	41	✓	2	166	200	183	✓	2	3	7	5	✓	2	0.5	1.2	0.9	✓
Bullaring	4	32	48	40	✓	4	169	249	201	✓	4	<1	<1	<1	✓	4	0.1	0.9	0.4	✓
Condingup	4	280	310	299	(1)	4	968	1036	1009	(2)	4	<1	<1	<1	✓	4	<0.1	0.3	0.2	✓
Cranbrook	2	9	14	12	✓	2	59	74	67	✓	2	1	2	2	✓	2	0.5	0.6	0.6	✓
Cuballing	2	32	44	38	✓	2	132	184	158	✓	2	2	2	2	✓	2	0.4	0.5	0.5	✓
Denmark	5	110	155	132	✓	5	381	530	456	✓	5	<1	<1	<1	✓	5	<0.1	0.2	0.1	✓
Dudinin TWS	4	33	46	41	✓	4	163	224	195	✓	4	<1	2	1	✓	4	0.4	3.9	1.3	✓
Dumbleyung	2	30	41	36	✓	2	154	199	177	✓	2	<1	1	<1	✓	2	0.3	0.3	0.3	✓
Esperance	10	105	115	109	✓	10	800	856	821	(2)	10	<1	<1	<1	✓	10	<0.1	0.2	0.1	✓
Frankland	4	5.5	7	6	✓	4	37	41	39	✓	4	<1	<1	<1	✓	4	<0.1	0.2	0.1	✓
Gibson	4	175	190	185	(1)	4	615	646	635	(2)	4	<1	<1	<1	✓	4	0.3	0.9	0.5	✓
Gnowangerup	5	36	48	43	✓	5	181	226	201	✓	5	1	5	3	✓	5	0.3	1.0	0.6	✓
Grass Patch	4	100	115	109	✓	4	802	848	828	(2)	4	<1	<1	<1	✓	4	<0.1	0.2	0.1	✓
Harrismith TWS	4	33	49	40	✓	4	153	216	181	✓	4	<1	3	2	✓	4	0.4	1.6	0.9	✓
Highbury	4	34	44	40	✓	4	136	184	164	✓	4	<1	2	2	✓	4	0.4	0.7	0.6	✓
Hopetoun	5	81	185	147	✓	5	490	636	578	✓	5	<1	<1	<1	✓	5	<0.1	0.2	0.1	✓
Hyden	4	21	49	39	✓	4	116	223	186	✓	4	<1	<1	<1	✓	4	0.2	0.3	0.2	✓
Jerramungup	4	27	125	56	✓	4	107	783	292	✓	4	<1	<1	<1	✓	4	0.1	0.2	0.2	✓
Karlgarin	2	41	48	45	✓	2	200	229	215	✓	2	<1	<1	<1	✓	2	0.3	0.5	0.4	✓
Katanning	4	35	47	42	✓	4	156	208	183	✓	4	1	5	3	✓	4	0.5	7.6	3	✓
Kendenup	4	61	65	64	✓	4	569	608	592	✓	4	<1	<1	<1	✓	4	0.2	0.5	0.3	✓
Kojonup	2	35	46	41	✓	2	157	203	180	✓	2	3	7	5	✓	2	0.4	1.0	0.7	✓
Kondinin	4	36	51	44	✓	4	188	238	213	✓	4	<1	<1	<1	✓	4	0.2	0.5	0.3	✓
Kukerin	4	31	44	39	✓	4	169	209	192	✓	4	<1	<1	<1	✓	4	0.2	0.3	0.3	✓
Kulin	4	32	45	38	✓	4	158	213	183	✓	4	<1	2	1	✓	4	0.2	0.5	0.3	✓
Lake Grace	5	31	45	40	✓	5	169	218	199	✓	5	<1	2	1	✓	5	0.2	0.5	0.3	✓
Lake King	2	34	44	39	✓	2	180	219	200	✓	2	<1	2	1	✓	2	0.1	0.3	0.2	✓
Mt Barker	4	60	65	63	✓	4	581	622	597	✓	4	<1	<1	<1	✓	4	0.1	0.5	0.3	✓
Munglinup	2	18	55	37	✓	2	93	397	245	✓	2	<1	8	4	✓	2	0.8	0.8	0.8	✓
Muradup	2	44	50	47	✓	2	194	223	209	✓	2	2	4	3	✓	2	0.4	0.7	0.6	✓
Narrikup	4	61	65	63	✓	4	591	604	599	✓	4	<1	<1	<1	✓	4	0.2	0.5	0.3	✓
Narrogin	4	31	43	38	✓	4	128	185	163	✓	4	1	3	2	✓	4	0.2	0.5	0.4	✓
Newdegate	2	34	46	40	✓	2	179	222	201	✓	2	2	2	2	✓	2	0.2	0.5	0.4	✓
Nyabing	2	40	46	43	✓	2	171	199	185	✓	2	1	4	3	✓	2	0.4	0.6	0.5	✓
Ongerup	2	28	52	40	✓	2	140	374	257	✓	2	<1	2	1	✓	2	<0.1	0.5	0.3	✓
Pingaring	4	32	44	38	✓	4	163	226	191	✓	4	<1	2	1	✓	4	0.2	0.4	0.3	✓
Pingelly	3	35	45	41	✓	3	147	197	179	✓	3	<1	3	2	✓	3	0.1	0.4	0.3	✓
Pingrup	2	36	47	42	✓	2	158	202	180	✓	2	1	5	3	✓	2	0.6	1.2	0.9	✓
Popanyinning	2	38	40	39	✓	2	155	173	164	✓	2	<1	4	2	✓	2	0.3	0.8	0.6	✓
Ravensthorpe	4	22	165	97	✓	4	115	634	415	✓	4	<1	3	2	✓	4	0.1	0.8	0.5	✓
Rocky Gully	4	57	67	63	✓	4	545	600	581	✓	4	<1	<1	<1	✓	4	0.3	0.5	0.4	✓
Salmon Gums	4	58	66	62	✓	4	388	411	396	✓	4	<1	<1	<1	✓	4	<0.1	0.2	0.1	✓
Tambellup	2	40	48	44	✓	2	190	220	205	✓	2	2	4	3	✓	2	0.5	0.8	0.7	✓
Tincurrin TWS	4	32	45	41	✓	4	152	206	187	✓	4	1	4	3	✓	4	0.5	0.8	0.6	✓
Varley	2	32	46	39	✓	2	170	227	199	✓	2	<1	<1	<1	✓	2	0.2	0.6	0.4	✓
Wagin	2	40	40	40	✓	2	169	175	172	✓	2	1	5	3	✓	2	0.3	0.9	0.6	✓
Walpole	4	70	88	77	✓	4	263	299	282	✓	4	<1	<1	<1	✓	4	<0.1	0.2	0.1	✓
Wandering	2	32	39	36	✓	2	139	169	154	✓	2	<1	1	<1	✓	2	0.5	0.8	0.7	✓
Wellstead	2	22	62	42	✓	2	88	581	335	✓	2	<1	1	<1	✓	2	0.3	0.8	0.6	✓
Wickepin TWS	4	32	47	40	✓	4	138	191	167	✓	4	<1	3	2	✓	4	0.3	0.5	0.4	✓
Williams	2	37	43	40	✓	2	159	194	177	✓	2	<1	2	1	✓	2	0.4	0.7	0.6	✓
Woodanilling	2	33	45	39	✓	2	145	190	168	✓	2	2	3	3	✓	2	0.6	0.6	0.6	✓
Yealering	4	32	49	41	✓	4	154	219	190	✓	4	<1	2	1	✓	4	0.1	0.6	0.3	✓

(1) Elevated sodium is characteristic of the source supplying this locality. (2) Elevated TDS is characteristic of the source supplying this locality.

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Table 26 Health related variables

North West Region	*E. coli*				Thermophilic *Naegleria*			Fluoride					Hydrocarbons		Metals	
Locality	Samples Taken	Samples >0 cfu/100mL	Max cfu/100mL	Requirement Met	Samples Taken	Samples with Thermophilic Naegleria	Requirement Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Guideline Met	Samples Taken	Guideline Met
									Min	Max	Mean					
Broome	100	0	0	✓	75	0	✓	52	<0.1	0.75	0.65	✓	0	(1)	2	✓
Burrup*	24	0	0	✓	24	0	✓	3	0.55	0.70	0.65	✓	0	(1)	4	✓
Camballin	12	0	0	✓	12	0	✓	2	0.25	0.25	0.25	✓	2	✓	2	✓
Cape Lambert TWS	12	0	0	✓	12	0	✓	2	0.65	0.70	0.68	✓	0	(1)	2	✓
Derby	65	0	0	✓	65	0	✓	52	0.50	0.65	0.59	✓	1	✓	3	✓
Fitzroy Crossing	12	0	0	✓	12	0	✓	2	0.25	0.25	0.25	✓	0	(1)	2	✓
Halls Creek	52	0	0	✓	52	0	✓	2	0.65	0.65	0.65	✓	1	✓	3	✓
Hedland	93	0	0	✓	79	0	✓	54	0.60	0.75	0.69	✓	0	(1)	2	✓
Karratha	117	0	0	✓	117	0	✓	52	0.35	0.80	0.66	✓	0	(1)	2	✓
Kununurra	65	0	0	✓	52	0	✓	52	0.45	0.70	0.60	✓	0	(1)	2	✓
Marble Bar	12	0	0	✓	12	0	✓	2	0.60	0.65	0.63	✓	0	(1)	2	✓
Newman	65	0	0	✓	53	0	✓	2	0.20	0.20	0.20	✓	2	✓	2	✓
Nullagine	12	0	0	✓	12	0	✓	2	0.35	0.50	0.43	✓	1	✓	2	✓
Onslow TWS	52	0	0	✓	26	0	✓	2	0.85	0.95	0.90	✓	0	(1)	2	✓
Point Samson	12	0	0	✓	12	0	✓	2	0.65	0.70	0.68	✓	2	✓	2	✓
Roebourne	49	0	0	✓	49	0	✓	2	0.65	0.70	0.68	✓	2	✓	2	✓
Wickham	50	0	0	✓	50	0	✓	2	0.65	0.75	0.70	✓	1	✓	2	✓
Wyndham	52	0	0	✓	52	0	✓	2	<0.1	<0.1	<0.1	✓	1	✓	2	✓

*Burrup LNG and Burrup Supply have been combined into one locality - Burrup (1) No samples required in this 12 month period.

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Table 27 Health related variables

North West Region	Nitrate					Pesticides		Radiological		Trihalomethanes					Other Health Related	
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Guideline Met	Samples Taken	Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Requirement Met
		Min	Max	Mean							Min	Max	Mean			
Broome	2	21.6	25.5	23.8	✓	1	✓	2	✓	2	0.004	0.004	0.004	✓	0	(1)
Burrup*	3	5.3	6.2	5.7	✓	1	✓	2	✓	2	0.001	0.015	0.008	✓	2	✓
Camballin	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	0.001	0.001	0.001	✓	1	✓
Cape Lambert TWS	2	0.9	7.0	4.0	✓	1	✓	0	(1)	4	0.001	0.098	0.045	✓	0	(1)
Derby	2	<0.2	<0.2	<0.2	✓	1	✓	4	✓	2	0.003	0.003	0.003	✓	0	(1)
Fitzroy Crossing	2	3.5	4.0	4.0	✓	4	✓	2	✓	2	<0.001	0.002	0.001	✓	0	(1)
Halls Creek	2	4.4	4.8	4.4	✓	2	✓	2	✓	2	0.001	0.003	0.002	✓	2	✓
Hedland	2	3.1	3.5	3.1	✓	1	✓	0	(1)	2	0.004	0.006	0.005	✓	0	(1)
Karratha	2	2.6	6.2	4.4	✓	1	✓	0	(1)	4	0.003	0.130	0.062	✓	1	✓
Kununurra	4	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	0.014	0.016	0.015	✓	1	✓
Marble Bar	2	7.9	7.9	7.9	✓	1	✓	2	✓	2	0.004	0.011	0.008	✓	0	(1)
Newman	4	0.9	1.8	1.3	✓	1	✓	2	✓	2	0.004	0.004	0.004	✓	0	(1)
Nullagine	4	4.0	5.7	4.8	✓	1	✓	1	✓	2	<0.001	<0.001	<0.001	✓	2	✓
Onslow TWS	2	1.8	2.2	1.8	✓	1	✓	0	(1)	2	<0.001	0.002	0.001	✓	0	(1)
Point Samson	2	1.8	6.6	4.4	✓	1	✓	1	✓	4	<0.001	0.130	0.070	✓	0	(1)
Roebourne	2	<0.2	3.1	1.8	✓	1	✓	2	✓	4	0.002	0.170	0.080	✓	2	✓
Wickham	2	1.8	4.8	3.1	✓	1	✓	1	✓	4	0.005	0.083	0.055	✓	2	✓
Wyndham	3	0.4	1.3	0.9	✓	1	✓	2	✓	4	0.084	0.100	0.091	✓	1	✓

*Burrup LNG and Burrup Supply have been combined into one locality - Burrup (1) No samples required in this 12 month period.

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Table 28 Aesthetic (Non-health related) Variables

North West Region	Alkalinity (as CaCO3)					Aluminium					Chloride					Hardness				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met
		Min Value	Max Value	Mean Value			Min	Max	Mean			Min Value	Max Value	Mean Value			Min	Max	Mean	
Broome	2	81	83	82	(1)	2	<0.008	<0.008	<0.008	✓	2	110	135	123	✓	2	60	77	69	✓
Burrup*	3	110	150	133	(1)	3	<0.008	<0.008	<0.008	✓	3	44	55	51	✓	3	130	160	150	✓
Camballin	2	56	60	58	(1)	2	<0.008	<0.008	<0.008	✓	2	39	41	40	✓	2	44	46	45	✓
Cape Lambert TWS	2	150	180	165	(1)	2	<0.008	<0.008	<0.008	✓	2	65	75	70	✓	2	160	210	185	✓
Derby	2	160	160	160	(1)	2	<0.008	0.010	<0.008	✓	2	90	95	93	✓	2	11	14	13	✓
Fitzroy Crossing	2	170	180	175	(1)	2	<0.008	<0.008	<0.008	✓	2	35	43	39	✓	2	160	160	160	✓
Halls Creek	2	320	360	340	(1)	2	<0.008	<0.008	<0.008	✓	2	150	205	178	✓	2	280	320	300	(2)
Hedland	2	170	190	180	(1)	2	<0.008	<0.008	<0.008	✓	2	125	150	138	✓	2	200	220	210	(2)
Karratha	2	140	210	175	(1)	2	<0.008	<0.008	<0.008	✓	2	60	105	83	✓	2	160	260	210	(3)
Kununurra	4	190	220	203	(1)	4	<0.008	<0.008	<0.008	✓	4	15	18	16	✓	4	150	170	163	✓
Marble Bar	2	400	420	410	(1)	2	<0.008	<0.008	<0.008	✓	2	220	225	223	✓	2	350	370	360	(2)
Newman	4	150	160	155	(1)	4	<0.008	<0.008	<0.008	✓	4	60	75	66	✓	4	140	150	148	✓
Nullagine	4	120	210	158	(1)	4	<0.008	<0.008	<0.008	✓	4	85	95	89	✓	4	190	210	198	✓
Onslow TWS	2	170	190	180	(1)	2	<0.008	<0.008	<0.008	✓	2	80	90	85	✓	2	190	200	195	✓
Point Samson	2	150	210	180	(1)	2	<0.008	<0.008	<0.008	✓	2	60	90	75	✓	2	160	240	200	(3)
Roebourne	2	130	170	150	(1)	2	<0.008	<0.008	<0.008	✓	2	55	60	58	✓	2	150	160	155	✓
Wickham	2	150	280	215	(1)	2	<0.008	0.010	<0.008	✓	2	65	140	103	✓	2	160	360	260	(3)
Wyndham	3	43	46	44	(1)	3	0.010	0.014	0.013	✓	3	22	32	27	✓	3	28	42	36	✓

*Burrup LNG and Burrup Supply have been combined into one locality - Burrup (1) No guideline value available as per ADWG 2011. (2) Elevated hardness is characteristic of the source supplying this locality. (3) Elevated hardness is a characteristic of the source (Millstream) supplying this locality for part of the year.

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Table 29 Aesthetic (Non-health related) Variables

North West Region	Iron					Manganese					pH					Silicon				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Value (pH units)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met
		Min	Max	Mean			Min	Max	Mean			Min	Max	Mean			Min Value	Max Value	Mean Value	
Broome	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.95	8.43	8.19	✓	2	85	90	88	(1)
Burrup*	3	<0.003	<0.003	<0.003	✓	3	<0.002	<0.002	<0.002	✓	3	8.25	8.37	8.32	✓	3	50	55	52	✓
Camballin	2	0.025	0.035	0.030	✓	2	<0.002	<0.002	<0.002	✓	2	6.99	7.21	7.10	✓	2	23	23	23	✓
Cape Lambert TWS	2	0.004	0.004	0.004	✓	2	<0.002	<0.002	<0.002	✓	2	7.74	8.16	7.95	✓	2	20	50	35	✓
Derby	2	0.010	0.010	0.010	✓	2	<0.002	<0.002	<0.002	✓	2	7.69	7.70	7.70	✓	2	15	16	16	✓
Fitzroy Crossing	2	<0.003	0.004	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.40	7.56	7.48	✓	2	21	21	21	✓
Halls Creek	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.86	7.95	7.91	✓	2	49	55	52	✓
Hedland	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.81	8.06	7.94	✓	2	50	55	53	✓
Karratha	2	<0.003	0.004	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.01	8.04	8.03	✓	2	27	50	39	✓
Kununurra	4	<0.003	0.004	<0.003	✓	4	0.004	0.035	0.015	✓	4	7.64	7.88	7.77	✓	4	50	55	51	✓
Marble Bar	2	<0.003	0.004	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.51	7.53	7.52	✓	2	37	38	38	✓
Newman	4	<0.003	0.004	<0.003	✓	4	<0.002	<0.002	<0.002	✓	4	7.03	7.25	7.19	✓	4	17	20	18	✓
Nullagine	4	<0.003	0.015	0.005	✓	4	<0.002	<0.002	<0.002	✓	4	7.08	7.42	7.24	✓	4	30	34	32	✓
Onslow TWS	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.10	8.30	8.20	✓	2	75	75	75	✓
Point Samson	2	<0.003	0.004	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.14	8.19	8.17	✓	2	24	50	37	✓
Roebourne	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.75	7.88	7.82	✓	2	31	33	32	✓
Wickham	2	<0.003	0.015	0.008	✓	2	<0.002	<0.002	<0.002	✓	2	8.06	8.20	8.13	✓	2	23	60	42	✓
Wyndham	3	<0.003	0.004	<0.003	✓	3	<0.002	<0.002	<0.002	✓	3	7.85	7.99	7.93	✓	3	6	9	7	✓

*Burrup LNG and Burrup Supply have been combined into one locality - Burrup (1) Elevated silica is characteristic of the source supplying this locality.

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Table 30 **Aesthetic (Non-health related) Variables**

North West Region	Sodium					TDS					True Colour					Turbidity				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Value (TCU)			Guideline Met	Samples Taken	Value (NTU)			Guideline Met
		Min Value	Max Value	Mean Value			Min	Max	Mean			Min	Max	Mean			Min	Max	Mean	
Broome	2	87	100	94	✓	2	438	482	460	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Burrup*	3	26	34	31	✓	3	328	402	376	✓	3	<1	<1	<1	✓	3	<0.1	<0.1	<0.1	✓
Camballin	2	37	38	38	✓	2	228	238	233	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Cape Lambert TWS	2	46	61	54	✓	2	437	500	469	✓	2	<1	<1	<1	✓	2	<0.1	0.2	0.1	✓
Derby	2	115	125	120	✓	2	441	447	444	✓	2	<1	<1	<1	✓	2	0.1	0.4	0.3	✓
Fitzroy Crossing	2	34	39	37	✓	2	381	383	382	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Halls Creek	2	135	170	153	(1)	2	910	986	948	(2)	2	<1	<1	<1	✓	2	<0.1	0.2	0.1	✓
Hedland	2	86	88	87	✓	2	567	628	598	✓	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Karratha	2	51	57	54	✓	2	403	609	506	✓	2	<1	<1	<1	✓	2	<0.1	0.2	0.1	✓
Kununurra	4	23	31	26	✓	4	383	433	400	✓	4	<1	<1	<1	✓	4	<0.1	0.5	0.2	✓
Marble Bar	2	190	190	190	(1)	2	1148	1171	1160	(2)	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Newman	4	51	67	59	✓	4	398	449	421	✓	4	<1	<1	<1	✓	4	<0.1	0.1	<0.1	✓
Nullagine	4	52	75	61	✓	4	435	581	500	✓	4	<1	<1	<1	✓	4	<0.1	0.4	0.2	✓
Onslow TWS	2	42	50	46	✓	2	512	512	512	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Point Samson	2	50	57	54	✓	2	424	570	497	✓	2	<1	<1	<1	✓	2	<0.1	0.2	0.1	✓
Roebourne	2	42	55	49	✓	2	414	416	415	✓	2	<1	<1	<1	✓	2	<0.1	0.2	0.1	✓
Wickham	2	57	77	67	✓	2	432	809	621	(2)	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Wyndham	3	19	21	20	✓	3	123	132	127	✓	3	<1	<1	<1	✓	3	<0.1	0.2	0.1	✓

*Burrup LNG and Burrup Supply have been combined into one locality - Burrup (1) Elevated sodium is characteristic of the source supplying this locality. (2) Elevated TDS is a characteristic of the source supplying this locality.