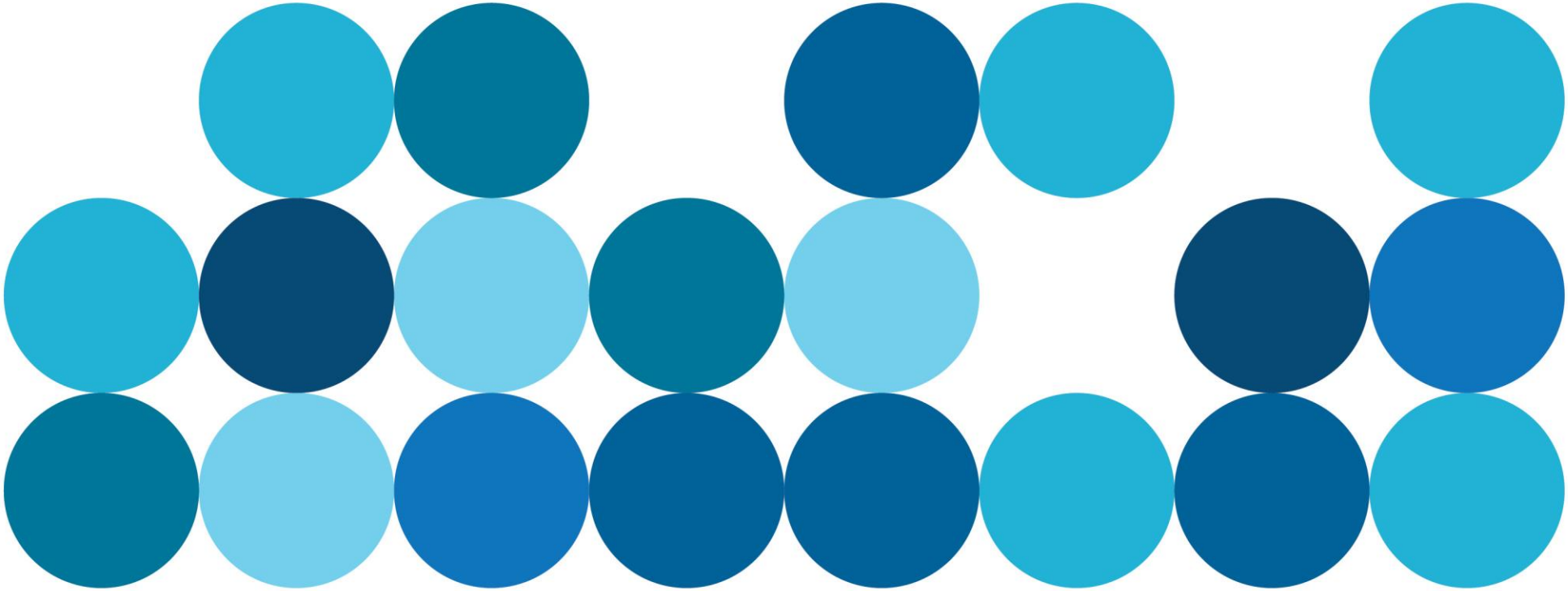
Drinking Water Quality

Annual Report 2019-20



WATER CORPORATION

Contents

ISSN 2202-879X

ISSN 2202-879X

List of Tables

List of Figures

ISSN 2202-879X

About this report

Water Corporation's 2019-20 Drinking Water Quality Annual Report is a review of our performance for the financial year ending 30 June 2020.

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.

This is our 18th Drinking Water Quality Annual Report and we trust it provides our customers with the information they require about their drinking water quality.

We acknowledge the Traditional Owners throughout Western Australia and their continuing connection to the land, water and community. We pay our respects to all members of the Aboriginal communities, their cultures and to Elders past, present and emerging.

ISSN 2202-879X

Acronyms

Acronym	Description
ADWG	Australian Drinking Water Guidelines
AWRP	Advanced Water Recycling Plant
DBCA	Department of Biodiversity, Conservation and Attractions
BRA	Barrier Risk Assessment
CMS	Catchment Management Strategy
CVS	Customer Value survey
DoH	Department of Health
DPIRD	Department of Primary Industry and Regional Development
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 / GSTWS	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
PSDP	Peth Seawater Desalination Plant
RBOM	Risk Based Observational Monitoring
RO	Reverse osmosis
RPZ	Reservoir protection zone
SCADA	Supervisory Control and Data Acquisition
SSDP	Southern Seawater Desalination Plant
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
WHPZ	Well Head Protection Zone
WQMS	Water Quality Management System
WTP	Water Treatment Plant

ISSN 2202-879X

Summary

Ensuring supply of safe drinking water is our highest priority. In 2019-20, we achieved compliance with the health-related requirements and met all health targets for drinking water quality set by the Department of Health (DoH).

Further information and feedback

For further information about our Drinking Water Quality

Call us on 13 13 85 or visit Water Corporation's website at:

Watercorporation.com.au/About-us/Our-performance/Drinking-water-quality

To provide feedback on this report please email:

report@watercorporation.com.au

ISSN 2202-879X

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 2019-20 our performance for all aesthetic analyses was 93 per cent. Although we meet all obligations under our Water Services Licence, we recognise there are always opportunities for improvement.

Customer Value Survey

For 2019-20, the feedback from our customers about their water quality was strong – with the end of year average of 6.15 for “the taste of the water” and 7.02 for “providing a consistent level of water quality” (refer to *Customer Research* on page 44 for further information on this rating).

Figure 1: Denham elevated tank

ISSN 2202-879X

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

ISSN 2202-879X

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 water source to water meter and promote confidence in the supply of safe drinking water.
- Incorporate the needs and expectations of our consumers and stakeholders, regulators and employees into our planning.
- Strongly advocate source protection and the primacy of drinking water quality over other land uses.
- Use a risk-based approach to identify and manage hazards and ensure appropriate barriers to protect water quality.
- Routinely monitor our systems and use effective reporting mechanisms to provide relevant and timely information on our performance.
- Use appropriate contingency planning and maintain incident response capability.
- Meet the health-related requirements of the *Australian Drinking Water Guidelines and work to progressively improve the aesthetic quality of water supplied.
- 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 objectives and stakeholder expectations.
- Participate in research and development activities to ensure we continually improve understanding and management of our drinking water supply systems.

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, partners and contractors are responsible for understanding their role in implementing and continuously improving the drinking water quality management and outcomes.

*We have a Memorandum of Understanding with the Department of Health that grants exemptions to the nitrate 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 (refer to *Nitrate* on page 36).

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


Drinking Water Quality Policy


Drinking Water Source Protection Policy

ISSN 2202-879X

Introduction

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

This year we delivered almost 375 billion litres of drinking water to more than 1.32 million properties through 34,842 kilometres of water mains. This water came from 40 surface water sources, 88 groundwater sources, two major desalination plants (the Perth Seawater Desalination Plant and Southern Seawater Desalination Plant) and one Groundwater Replenishment Scheme.

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 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.

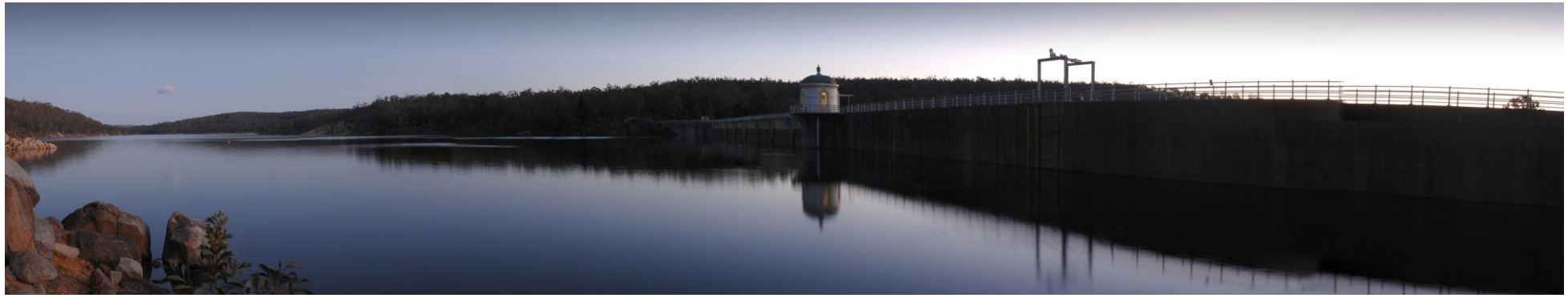


Figure 3: Mundaring Weir

ISSN 2202-879X

Water service types

In addition to the standard drinking water service our MoU describes three additional water service types:

Farmlands area water service: water that has been treated to drinking water service standard, however, after long detention times in extended pipeline systems it may not comply with microbiological provisions of the guidelines although it would still be compliant with the chemical provisions. These services are only found in the Great Southern and Goldfields and Agricultural regions.

Services provided by agreement: due to lack of treatment or operational requirements, Water Corporation cannot provide assurance on water quality such that it will meet the provisions of the MoU. The water provided under a service by agreement will have come from a drinking water catchment.

Non-drinking water service is water that may be sourced from an alternative water supply, such as stormwater, rainwater or untreated groundwater source. There is no intention that this water service should ever be used for human consumption. Such water may not originate from a drinking water or similarly highly controlled catchment.

Figure 4: Section of the Goldfields and Agricultural Water Supply pipeline

ISSN 2202-879X

Where does your water come from?

Perth Metropolitan Region

Integrated Water Supply Scheme (IWSS)

The Integrated Water Supply Scheme (IWSS) is Water Corporation's largest scheme. It delivered more than 298 billion litres of water in 2019-20 to over two million people in Perth, Mandurah, some towns in the South West, Goldfields and Agricultural Water Supply (GAWS), and the Great Southern Towns Water Supply Scheme (GSTWSS).

The IWSS has four different water source types, including desalinated seawater, surface water, groundwater and groundwater replenishment (GWR). In 2019-20 the percentage of water from each source type was 43 per cent desalinated seawater, 15 per cent surface water, 39 per cent groundwater and 3 per cent GWR. Desalinated seawater and GWR are both climate independent sources.

Desalination

The Perth Seawater Desalination Plant (PSDP) located in Kwinana produced 46.3 billion litres of water for the IWSS in 2019-20. The PSDP desalinated water enters the IWSS via Thomsons Reservoir where it is blended with Jandakot groundwater and scheme water.

The Southern Seawater Desalination Plant (SSDP), located just north of Binningup produced 93.7 billion litres of water for the IWSS in 2019-20. The SSDP desalinated water enters the IWSS via Harvey summit tanks and is transferred north through the Stirling and Serpentine trunk mains.

For further information, refer to the Desalination section in *Diversifying our sources* (page 19).

Surface water

The IWSS has a total of 13 surface water dams - Canning, Churchmans, Conjurunup, Lower Helena, Mundaring Weir, North Dandalup, Samson Brook, Serpentine, Serpentine pipehead, South Dandalup, Stirling, Victoria and Wungong.

In addition to collecting and storing natural inflow water, six of the IWSS dams are used to store scheme water for future source development and climate responsiveness purposes. This stored scheme water is managed through pumpbacks, transfers and direct inflows into the dams when operational capability requires. Surface water is used predominantly in planning and catering for peak demands within the IWSS.

Groundwater

Groundwater is abstracted from four aquifers, superficial, Mirrabooka, Leederville and Yarragadee, across the Gnangara and Jandakot systems. Once abstracted, groundwater is treated at one of six groundwater treatment plants. Most of our abstraction bores are located in Perth's northern suburbs. We also have independent artesian bores which pump water directly into service reservoirs.

In 2019-20, drinking water production from groundwater sources was delivered on target and within the respective water licence allocation. The total groundwater abstracted volume, including groundwater replenishment recovery was 136.7 billion litres.

ISSN 2202-879X

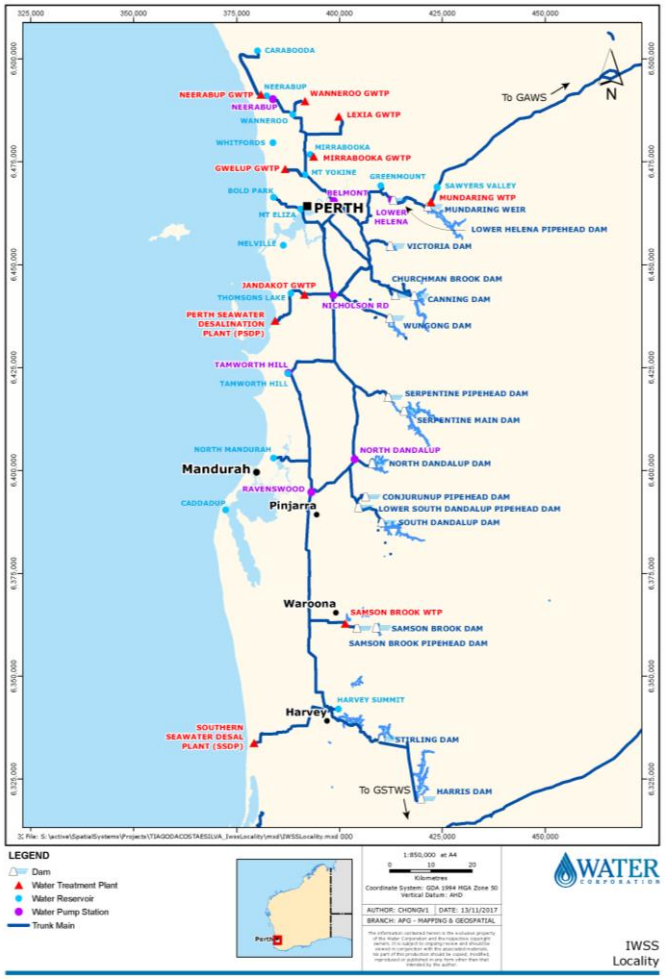


Figure 5: Overview map of the IWSS sources

Groundwater Replenishment

Groundwater Replenishment (GWR) is the process by which secondary treated wastewater undergoes advanced treatment to produce drinking-quality water. The water is recharged to deep underground aquifers where it is stored for a number of years before being abstracted and further treated as part of the IWSS.

In an Australian first, Stage 1 of the Groundwater Replenishment Scheme (GWRS), located at the Beenyup Wastewater Treatment Plant in Craigie, was announced in October 2014 with construction completed in 2016. GWRS Stage 1 commenced recharge in 2017 and has a nameplate capacity to recharge up to 14 billion litres of recycled water.

Construction of Perth GWRS Stage 2 was completed in October 2019. The scheme will double the capacity to enable a recharge up to 28 billion litres of water each year.

Water Corporation is licensed to recover up to 28 billion litres each year under the conditions of recharging, prior to recovery, providing a climate independent water source. In 2019-20 around 12.7 billion litres was recharged to the Leederville and Yarragadee aquifers and around 9.9 billion litres was recovered with 2.8 billion litres stored in the aquifers.

Since an initial GWR trial began in 2010, the cumulative GWR storage is around 7.8 billion litres. This storage provides flexibility in future years for source planning and climate responsiveness purposes.

Refer to the Groundwater Replenishment section in *Diversifying our sources* (page 19) for further information.

ISSN 2202-879X

South West Region

Towns in the South West are supplied with water from a number of surface and groundwater sources. The South West provided more than 14 billion litres of water to more than 50,000 connected properties in 2019-20.

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 12). Quinninup and Northcliffe are supplied with carted water from either Manjimup or Pemberton and Logue Brook is supplied with carted water from the IWSS.

The Great Southern Towns Water Supply Scheme (GSTWSS), which supplies Collie, Allanson and Darkan in the South West and 38 towns in the Great Southern region, is supplied from the Harris and Stirling dams.

Figure 6: Overview map of the South West region

ISSN 2202-879X

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 around 15 individual supplies. This year the region supplied more than 12 billion litres of drinking water to nearly 42,000 connected properties.

Harris Dam, near Collie, is the main source for the GSTWSS. Additional buffer storage was installed in Hyden to improve reserve storage. Construction of a contingency booster pump station also commenced in Karlgarin to improve flow through the GSTWS to Hyden to help reduce reliance on local storages.

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. We commenced the construction of a new pipeline from the LGSTWS to Denmark, to supplement supply from local dams. This project aims to be completed in 2020-21.

Hopetoun, Bremer Bay, Esperance, Condingup and Gibson are all supplied from local groundwater sources. Denmark, Walpole 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. Projects to install carting infrastructure at the towns of Wellstead and Munglinup, allowing the decommissioning of local sources and improvement of water quality at these towns, are progressing. Water is carted from various treated water sources such as Albany, Lake Grace, and Esperance.

In 2019-20, the GSR experienced below average rainfall across the region, resulting in low storage levels in many local sources. Water carting was needed to supplement many of these local surface water sources including Walpole, Ravensthorpe, Frankland, Ongerup, Jerramungup and Salmon Gums. Water was also supplied to twelve water deficiency declared areas across the region to support farmers with water for stock.

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 (refer to *Water Service Types on* page 11).

Figure 7: Overview map of the Great Southern region

ISSN 2202-879X

Goldfields and Agricultural Region

The Goldfields and Agricultural Water Supply (GAWS) scheme consists of 9,624 kilometres of water mains that provides more than 22,000 million litres of water to more than 38,000 connected properties, including farms, mines and other enterprises. 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.

Figure 8: Mundaring Water Treatment Plant

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 29).

Chloramination is used in the GAWS to maintain a disinfectant residual across the network. (Refer to *How is your water treated? – Disinfection* on page 31). Additional disinfection facilities have largely been installed throughout the distribution system. Both 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 (refer to *Water Service Types on* page 11).

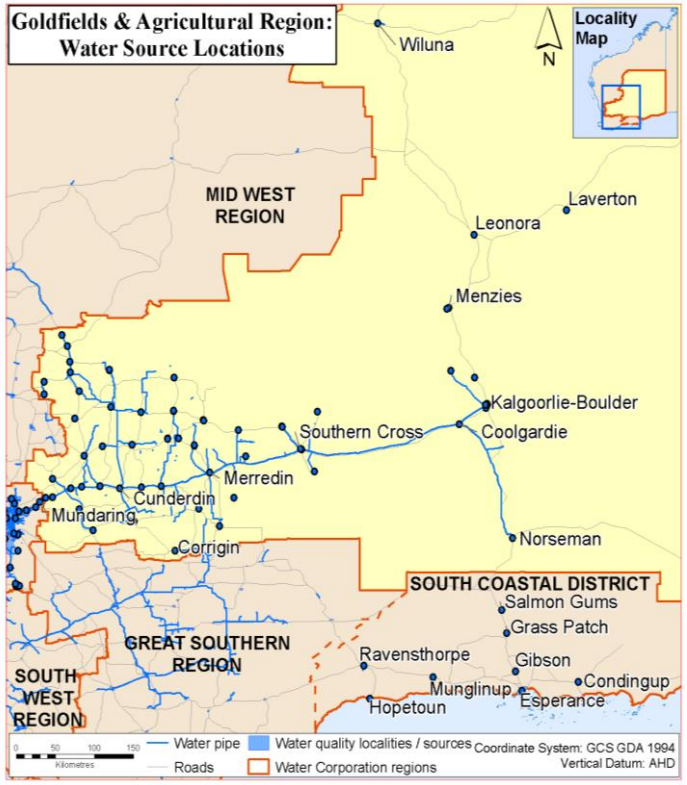


Figure 9: Overview map of the Goldfields and Agricultural region

ISSN 2202-879X

Mid West Region

Drinking water throughout the Mid West is supplied from local sources, with 42 independent groundwater borefields providing drinking water to more than 41,000 connected properties in 51 localities. The total drinking water supplied from these sources was over 16.3 billion litres.

The region is divided into three separate districts: Gascoyne, Geraldton Murchison & Coastal Midlands. Of these, the Coastal Midlands has the highest number of small schemes where supply is sourced from individual borefields and a number of treatment plants are operated to manage the natural characteristics in the groundwater.

Three communities, Coomberdale, Nabawa and Yuna, receive water carted from nearby towns. Water is also carted to some communities when schemes experience asset failure or water quality issues to maintain supply.

In the Mid West Region our largest borefields are Allanooka, Carnarvon and Exmouth. Allanooka borefield comprises of 19 production bores which supplies Geraldton and the surrounding towns of Dongara, Northampton, Mullewa, Walkaway, Greenough and Narngulu. It also supplies farmland services along the pipelines from Geraldton to Mullewa, Northampton and Dongara.

Water for Carnarvon is sourced from 40 production bores located along the Gascoyne River, which provides water for both the town and irrigated horticulture under separate licences. The Exmouth Borefield, located along the western side of the Cape Range Peninsula, consists of 34 production bores, of which 10 are solar operated and are the sole supply for the town.

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 29).

The building of specialised water treatment plants using electrodialysis reversal (EDR) in the Murchison towns of Cue, Meekatharra, Sandstone and Mt Magnet is progressing, with the Mt Magnet plant scheduled to commence the first stage of commissioning in September 2020. These water treatment plants will improve water quality and are expected to be operational by mid to late 2021.

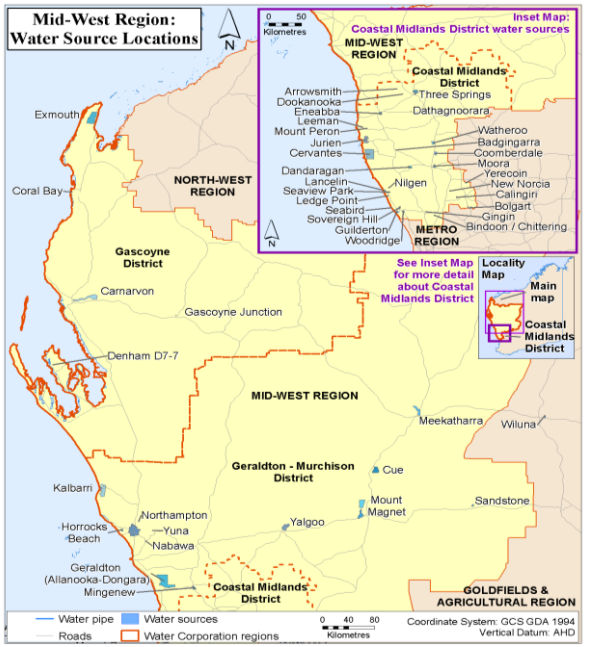


Figure 10: Overview map of the Mid West region

ISSN 2202-879X

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 are supplied by local groundwater sources, with the exception of Wyndham which is supplied by Moochalabra Dam.

Figure 11: Harding 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 37 billion litres of drinking water to more than 35,000 connected properties in 2019-20.

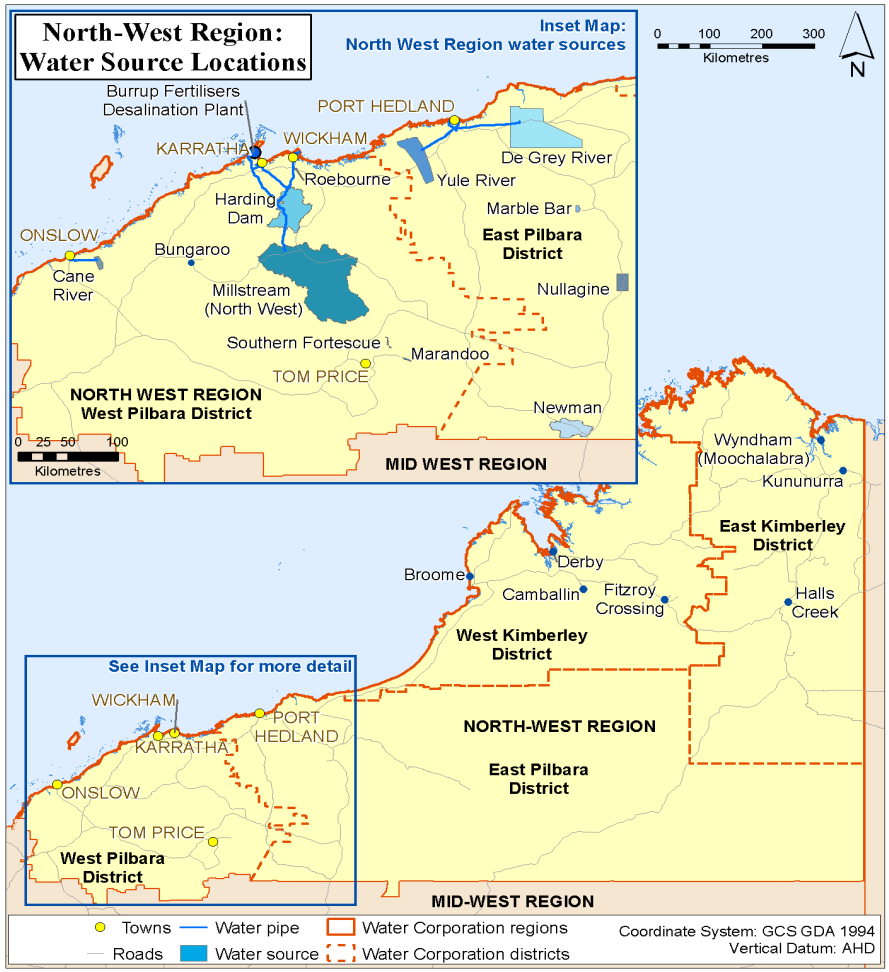


Figure 12: Overview map of the North West region

ISSN 2202-879X

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 largest source of water for the IWSS in 2019-20, supplying more than 45 per cent of the drinking water for Perth. (Refer to *How is your water treated? – Desalination* section on page 29.

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 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 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 IWSS. Figure 13 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.

ISSN 2202-879X

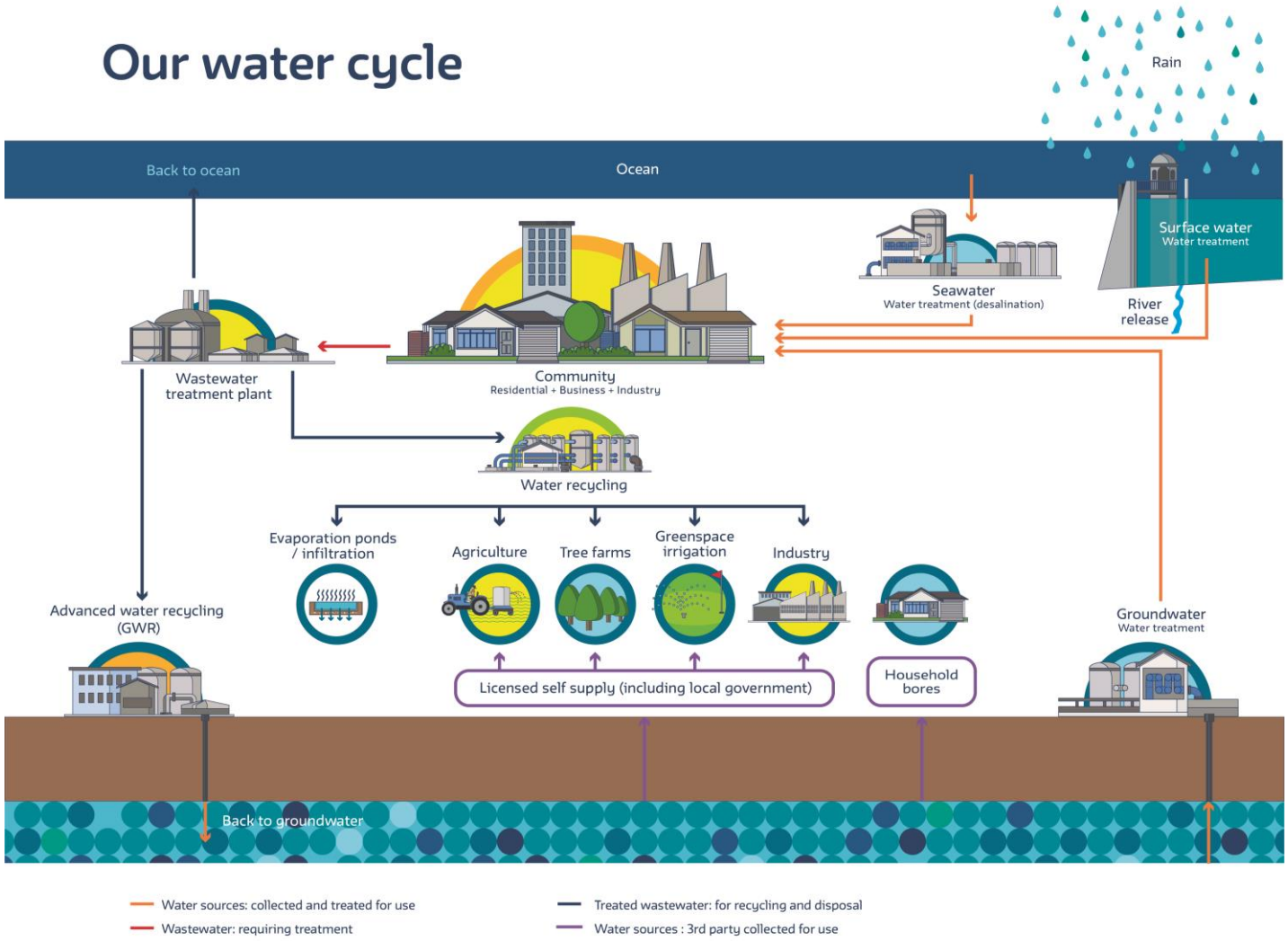


Figure 13: Groundwater replenishment in the water cycle

ISSN 2202-879X

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 12.7 billion litres recharged during 2019-20.

The Stage 2 expansion of the scheme doubles 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.

Further information can be found on the Water Corporation website.

Figure 14: GWR Stages 1 and 2

ISSN 2202-879X

Drinking water quality risk management

The NHMRC define the requirements for safe drinking water in Australia through the 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 DoH regulates drinking water quality in Western Australia. We have an 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 DoH 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 32).

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 2019-20, 42 Water Safety Plans from schemes across the state were fully reviewed. In addition, 102 Water Safety Plans were updated to include recent capital upgrades and other modifications to those schemes.

ISSN 2202-879X

Operator training and competence

Water Corporation has a nationally accredited training program. All operators who perform water treatment, quality management and sampling tasks are flagged to complete the program. This consists of a Certificate II, III or IV from the National Water Package (NWP). The accredited program, which is internally developed and delivered, allows employees to attain a nationally recognised qualification (refer figure 15). Water Corporation has an auspicing arrangement with North Metropolitan TAFE who provide quality control over the course development, delivery and assessment, and issue credentials. As part of this partnership with NMTAFE, Water Corporation offers traineeships to its new and existing workforce, and Vocational Education and Training (VET) in schools pathway.

The program also includes a suite of water quality courses which contribute to our implementation of element #7, Employee Awareness and Involvement, of the 12 element ADWG framework. Employee awareness, understanding and commitment to performance optimisation and continuous improvement are vital to ensure a drinking water supplier's ability to successfully operate a water supply system (adapted from ADWG)

Water Corporation has a contemporary Learning Management System (LMS) which allows for the correct qualification to be assigned to each employee, to ensure they have the correct training to perform their role safely and competently. The LMS data is regularly checked to maintain accuracy, therefore ensuring the correct training is allocated for the role being performed.

Innovation in training is on-going and includes a move towards virtual delivery, exploration of visual intelligence technologies to provide hands free point of vision capabilities, and the use of eLearning to supplement existing face-to-face courses. Water Corporation is proud of the investment made towards its workforces' current and future capability.

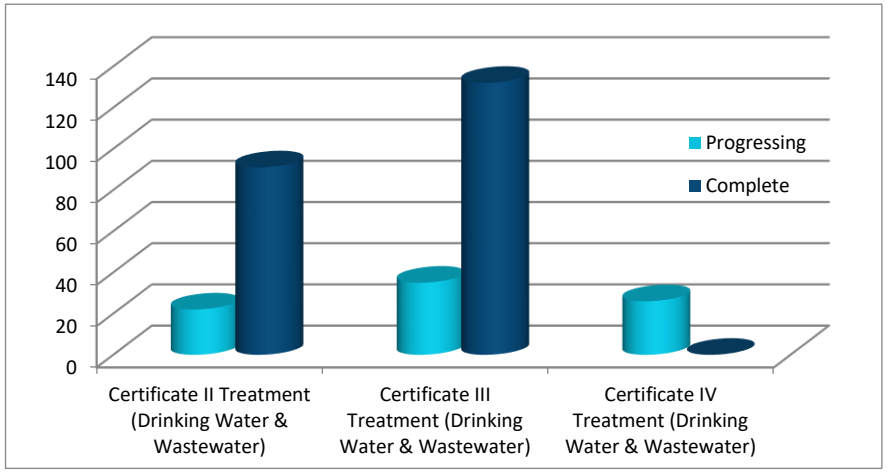


Figure 15: Certificate training completed

ISSN 2202-879X

Multiple barrier approach to drinking water quality management

Preventing contamination and minimising risk is an essential part of providing 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 25)
- Large reservoirs with long water detention (storage) times
- Water treatment (refer to *How is your water treated?* on page 28)
- Ensuring tanks and bores are sealed to prevent contamination
- Disinfection of water (refer to *How is your water treated? – Disinfection* on page 31)
- 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 source 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

ISSN 2202-879X

Source protection

What is source protection and why is it done?

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 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 (WHPZ), may also be applied around reservoirs and bores to provide additional protection to those areas closest to the water supply.

Figure 17: Aerial view of Canning dam – catchment and storage

ISSN 2202-879X

How we do source protection

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 and by-law enforcement 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.

Additionally, in accordance with the 2011 ADWG, a process known as risk based observational monitoring (RBOM) is being progressively rolled out within our catchments across the state. The RBOM process is used to gather quantitative data which is used to continually confirm that the established drinking water source risk levels are appropriate, and risks are within our treatment capabilities.

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 2019-20, approximately 19,164 surveillance hours were undertaken state wide with 92 by-law offence prosecutions, 26 infringements and 1159 warning letters issued. Further information on drinking water catchment management and protection can be found on the Visiting our dams or Drinking water quality pages on our website or on the DWER website.

Refer to the Case Study: Interagency collaboration to protect drinking water catchments (page 33) for further information on current means of catchment protection.

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.

ISSN 2202-879X

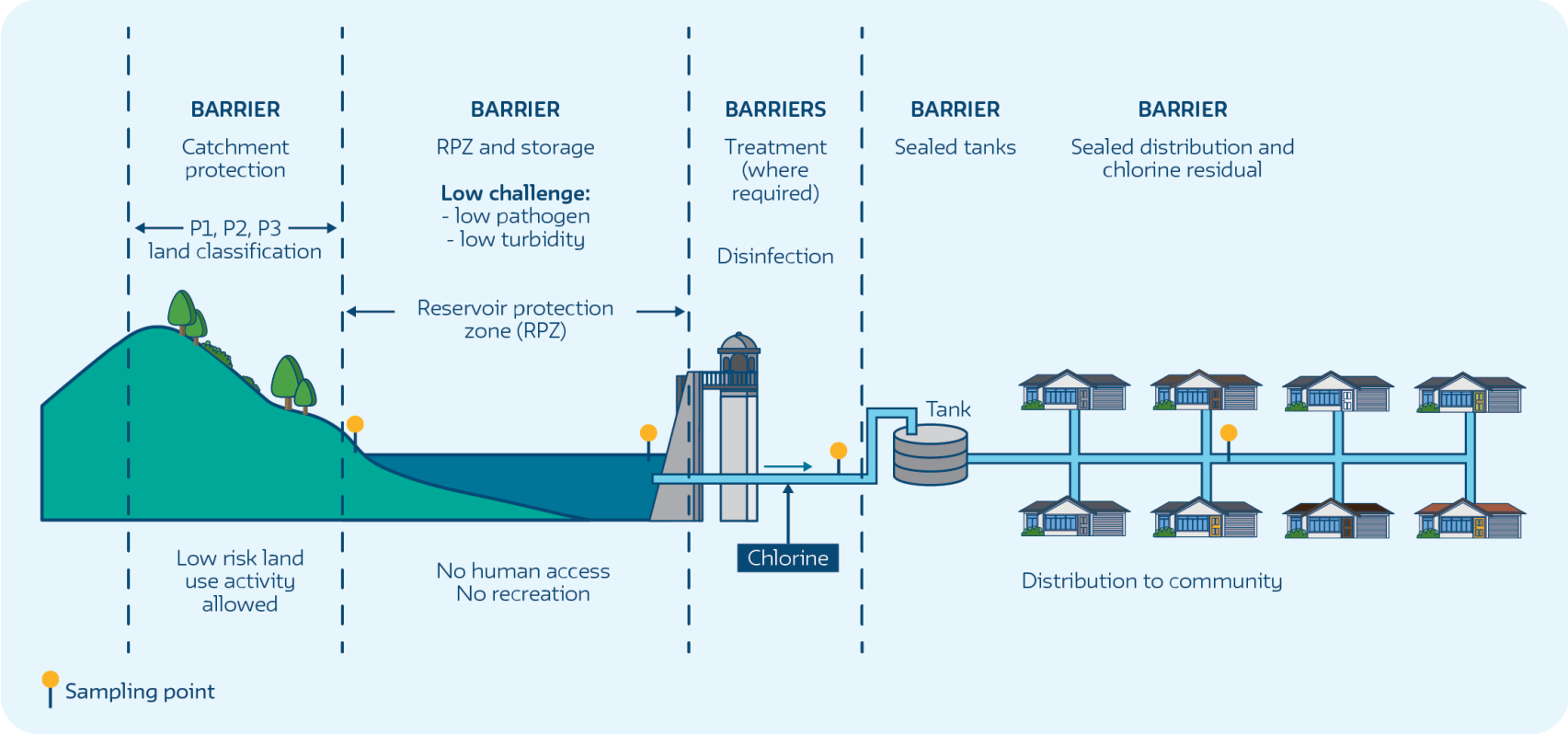


Figure 18: Surface water catchment – showing source protection and additional multiple barriers

ISSN 2202-879X

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 where source water is forced through a 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)

ISSN 2202-879X

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 semi-permeable 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 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 an undesirable taste, difficulty in forming a soap lather, or leaves a white crystalline deposit after evaporation.

Figure 20: EDR at Wiluna

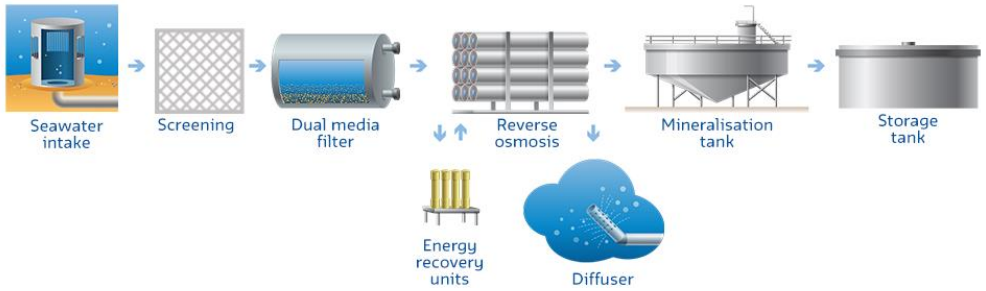


Figure 21: Typical desalination treatment process

ISSN 2202-879X

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 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 to ensure the quality management systems are operating to a level of best practice.

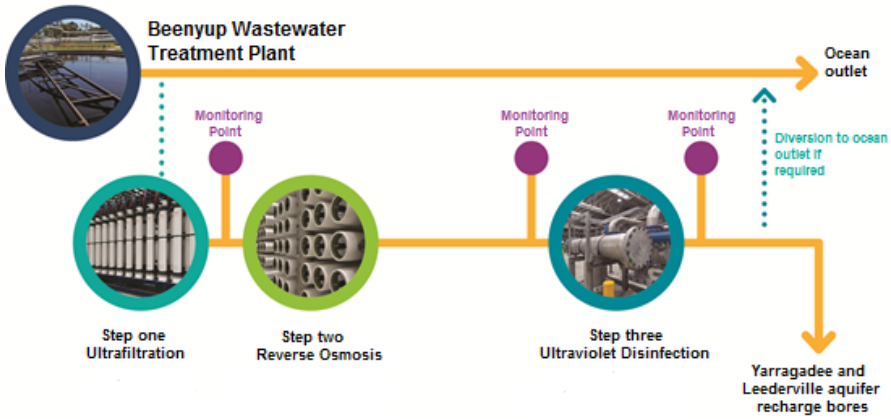


Figure 22: Advanced water treatment process

Chemicals and materials in contact with drinking water

The MoU between DoH and Water Corporation requires all chemicals and materials that come into contact with drinking water are approved by DoH or are AS4020 compliant. In addition, Water Corporation may utilise a self-assessment process, as agreed with DoH, and provide all information associated with the self-assessment to DoH

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

ISSN 2202-879X

Disinfection

Disinfection is undertaken to 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 for disinfection and to ensure a residual of chlorine or chloramine is maintained, within a narrow range in the water. This ensures 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 where there are increased microbiological risks from activities in the catchment. UV does not provide a residual disinfection barrier, so it is used in combination with chlorination.

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 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. Today, 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. 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.

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. Purity and quality control standards for chemicals added to drinking water are strictly controlled by Department of Health.

Fluoridated water supplies are monitored continuously via an online fluoride analyser at the dosing point. Localities at which fluoride is added to the water are sampled at least weekly to confirm acceptable fluoridation performance, other localities are sampled at least six monthly. Fluoridation performance is reported quarterly to the DoH. The data tables in Appendix C show the localities that receive fluoridated water. More information is available on the DoH website.

ISSN 2202-879X

Monitoring and incident management

Critical Control Points

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

Water Corporation has processes in a water supply scheme that will always have an associated CCP, including chlorination for disinfection. Every Water Corporation drinking water scheme has at least one CCP. 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 22).

We continuously monitor the performance of CCPs 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. In 2019-20, we took more than 71,000 water samples from water sources, treatment plants and pipe networks which supply our customers, and had almost 292,000 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 the community.

We maintain a fleet of mobile 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 Department of Health to continually improve our incident management processes.

ISSN 2202-879X

Case study - Interagency collaboration to protect drinking water catchments

While our catchments boast some of the most beautiful locations in the state to have a picnic and enjoy the scenery, their most important function is to provide safe drinking water to the community.

Figure 24: Family enjoying the scenery at Water Corporation dam (Serpentine dam)

Drinking water catchments are protected by the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* or the *Country Areas Water Supply Act 1947*, which prohibits activities such as swimming and marroning which may introduce pathogens into our drinking water supplies.

Despite signage defining the catchment areas and prohibited activities, and physical barriers, like boom gates, in our drinking water catchments, we still see a number of illegal activities.

Water Corporation works closely with many external stakeholders, including the Department of Primary Industries and Regional Development (DPIRD) to provide protection of our drinking water catchments.

We have developed risk based observational monitoring (RBOM) and observe and understand patterns of illegal activity through Catchment Ranger patrols, a range of surveillance cameras and helicopter surveillance, in conjunction with DPIRD.

Water Corporation Rangers can become Honorary Fisheries Officers, allowing them to perform that role using the powers of the *Fish Resources Management Act 1994* to prosecute. We have nine Honorary Fisheries Officers across the business in our Metropolitan, South West and Great Southern regions.

Working together with the DPIRD we are able to share information enabling us to plan and execute targeted patrols in the right areas at the right time. Most illegal activity occurs out of business hours under the cover of darkness and in a recent night-time operation, our rangers in the South West worked with DPIRD to catch people illegally fishing in Harris Dam near Collie. Multiple offenders were identified and apprehended resulting in the seizure of marron and fines of more than $4000.

In another covert operation with DPIRD in the metropolitan area, rangers found quad bike tracks and signs of illegal marroning at Reynolds Bay, North Dandalup Dam. This led to hidden camera surveillance of the area which caught two people illegally poaching hundreds of marron over 10 months.

ISSN 2202-879X

We also work closely with police and other government agencies to keep our drinking water catchments safe from other illegal activity, such as providing vehicle information, photos and GPS locations to police on drug activities within our catchments. We've also provided surveillance footage to DWER to combat rubbish dumping. For example, DWER recently prosecuted an individual for illegally dumping around 30 tyres within Canning Dam catchment.

In the Great Southern our rangers regularly liaise and share information with the Department of Biodiversity, Conservation and Attractions (DBCA) on prescribed burning, land management, illegal fire wood cutting, feral pig control and rubbish dumping within our drinking water catchments.

DBCA and Water Corporation jointly fund the feral cat control program within the Exmouth Water Reserve in the Mid West region. The feral cats have been satellite tagged and are known to eat Greens, Loggerhead and Hawkesbill sea turtle hatchlings, which are critically endangered species within Ningaloo Marine Park. Research within the water reserve has also confirmed the presence of black flanked rock wallabies, which are a near-threatened species. To further protect the area, DBCA and Water Corporation also conduct electronic surveillance to catch people vandalising equipment and trespassing within the Reserve. Fines of $1,000 have recently been applied.

Interagency collaboration is essential to the protection of our drinking water catchments. Water Corporation will continue to work closely with all stakeholders and the public to ensure safe drinking water is provided to the community.

See '<u>Our public drinking water source areas</u>' pamphlet on the DWER website for more information.

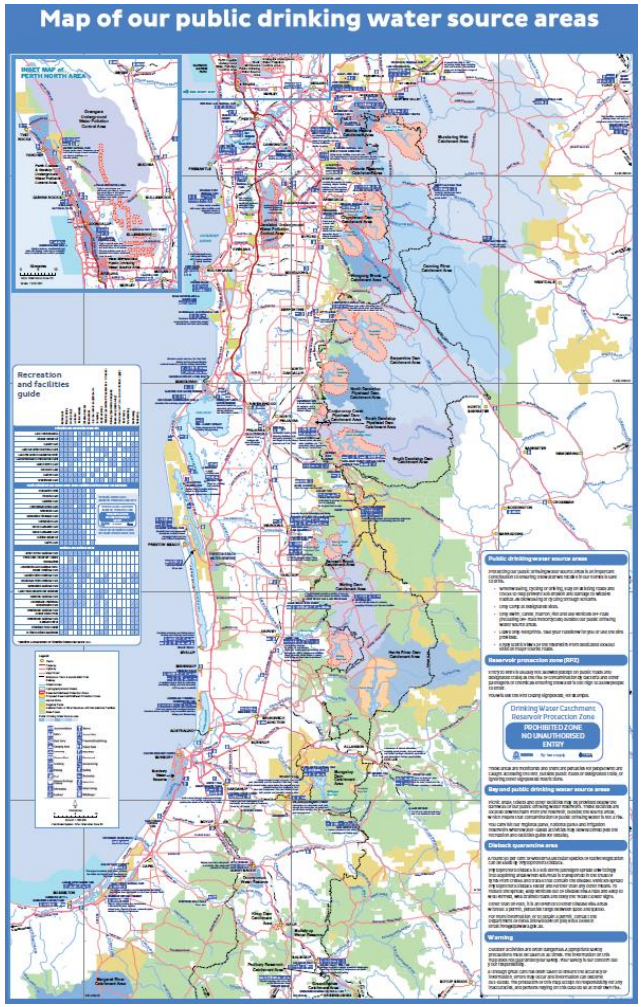


Figure 25: Map of public drinking water source areas see <u>DWER website</u> for full pamphlet

ISSN 2202-879X

Understanding water quality test results

The following summaries are intended to assist you with interpreting the results presented in Appendix C of this report. Additional information can be obtained by referring to the Fact Sheets contained in the 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 C. 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 24) to prevent microbial contamination, however, if there is an *E. coli* detection it is immediately addressed to ensure the water supplied is safe.

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* in water. 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 fluoride compounds. 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 31). 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.

[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).

ISSN 2202-879X

Nitrate

In Western Australia, elevated nitrate concentrations are usually due to the natural process of plant decay that has occurred underground over geological time. Some agricultural practices have also led to elevated nitrate concentrations of underlying groundwater. 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 due to elevated nitrate concentrations in drinking water 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 had been granted infant nitrate exemptions by DoH for eleven towns in the Mid West and Goldfields and Agricultural regions, however, with the installation of treatment followed by a proving period at Nabawa we had this exemption removed from our MoU in 2018-19. The Community Health Nurse, in each town with an infant nitrate exemption, 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 nitrate 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
- Menzies by carting water from Kalgoorlie (short term solution).

We are working on the installation of Electrodialysis Reversal (EDR) water treatment plants in Cue, Meekatharra, Mt Magnet and Sandstone (see section *Where does our water come from? – Mid-West Region*, page 17).

We are investigating long term options for New Norcia and Menzies.

Figure 26: 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.

ISSN 2202-879X

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 constituents that impart colour and particulate matter that causes 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 saltwater intrusion. In Australian drinking water supplies chloride levels range up to 650 mg/L depending on local water 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 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 1: 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 iron-containing soil or rock in the catchment. It can accumulate in pipe sediments and be re-suspended during periods of rapid changes to water 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 due to customer impacts.

ISSN 2202-879X

Manganese

Manganese in water can come from contact with manganese-containing soil or rock in the catchment. It can accumulate in pipe sediments and be re-suspended during periods of rapid changes to water 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 48.

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 clothing, carpets, paper, food wrappings and cosmetic products as well as in industrial products including firefighting foams and hydraulic fluids. 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 ADWG were amended to incorporate two PFAS health-based guideline values. These are 0.07 micrograms per litre (µg/L) for combined perfluorooctane sulfonate and perfluorohexane sulfonate (PFOS and PFHxS) and 0.56 µg/L for 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 DoH, based on land uses around all drinking water catchments to determine which 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 DoH.

Sampling so far has found that if drinking water contains PFAS it is well below the ADWG health-based guideline values. In Esperance, 2018-19, PFAS was found in groundwater production bores within one borefield; with one production bore at 90 per cent of the health-based guideline value of combined PFOS and PFHxS. This bore was immediately removed from production and has since been decommissioned. Sampling has been ongoing with all PFAS detections in the 2019-20 financial year consistently below the ADWG health-based guideline value and the majority less than 10 per cent of the ADWG health-based guideline value. 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 31). 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.

ISSN 2202-879X

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 2.

Table 2: 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 water 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 of water.

Turbidity

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

ISSN 2202-879X

Sampling parameters

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

Figure 27: Harding Dam overflowing

ISSN 2202-879X

Our performance

Health related performance

We again achieved excellent microbiological performance in 2019-20 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 DoH requirements (see figure 28).

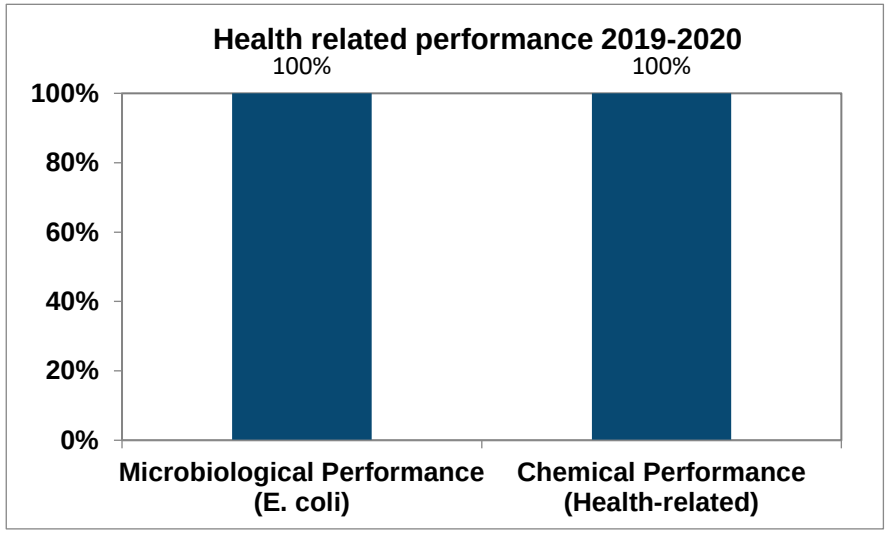


Figure 28: Microbiological and chemical health performance

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 MoU with DoH were all met for the past six years (figure 29).

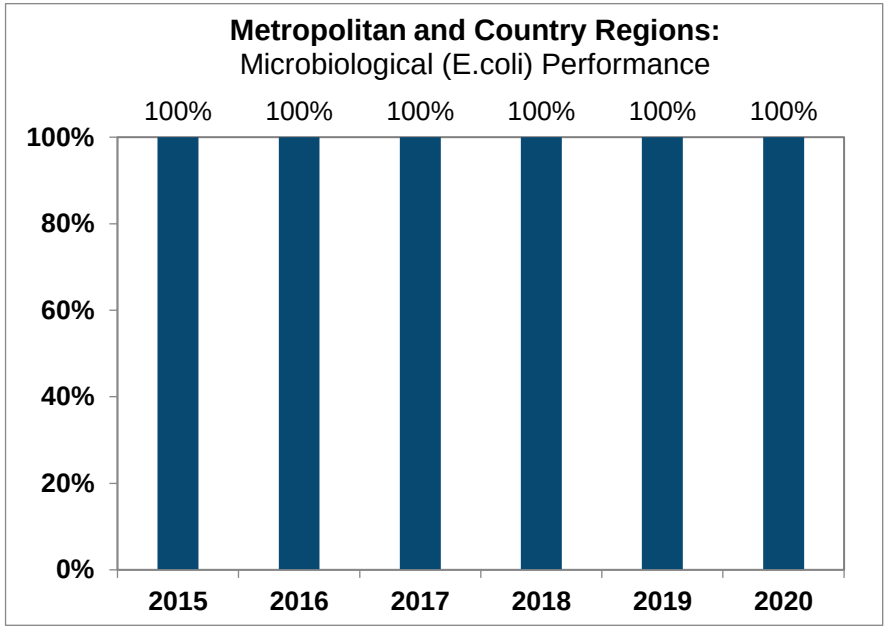


Figure 29: Six-year microbiological performance

ISSN 2202-879X

Non-health (aesthetic) related performance

While we strive to meet the 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 2019-20

Appendix C provides a detailed summary of test results for each scheme throughout the state. In 2019-20, there were 149 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 93 per cent, with 8,110 out of 8,683 analyses complying with the aesthetic guidelines.

The results in Appendix C 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).

ISSN 2202-879X

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 2019-20, our Operations Centre received 7,872 water quality related customer contacts (compared with 7,643 in 2018-19), of which 7,755 were customer enquiries and 117 were related to complaints. Figure 30 shows the category of water quality contacts and their proportion of the total (7,872). Note: miscellaneous contacts are predominately related to water hardness).

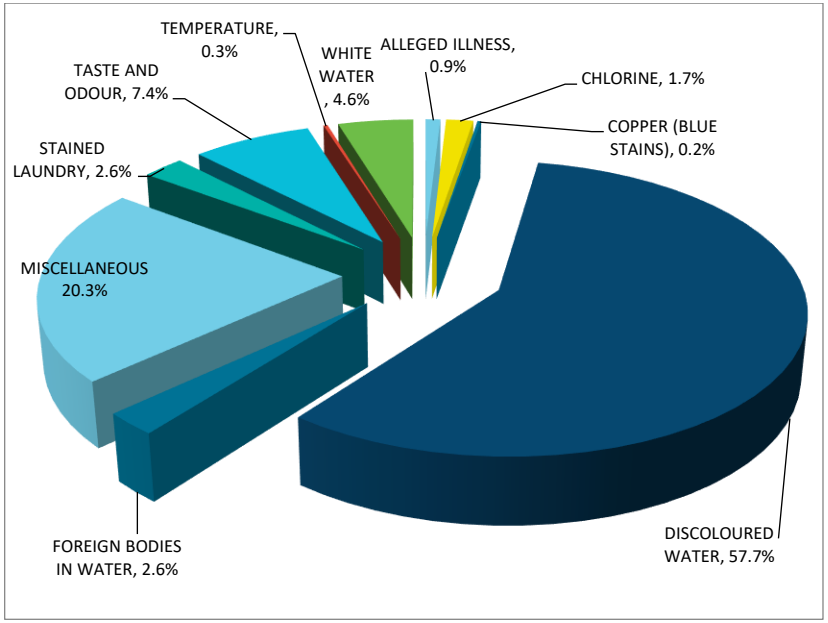


Figure 30: Water quality contacts profile 2019-20

Faults responsiveness

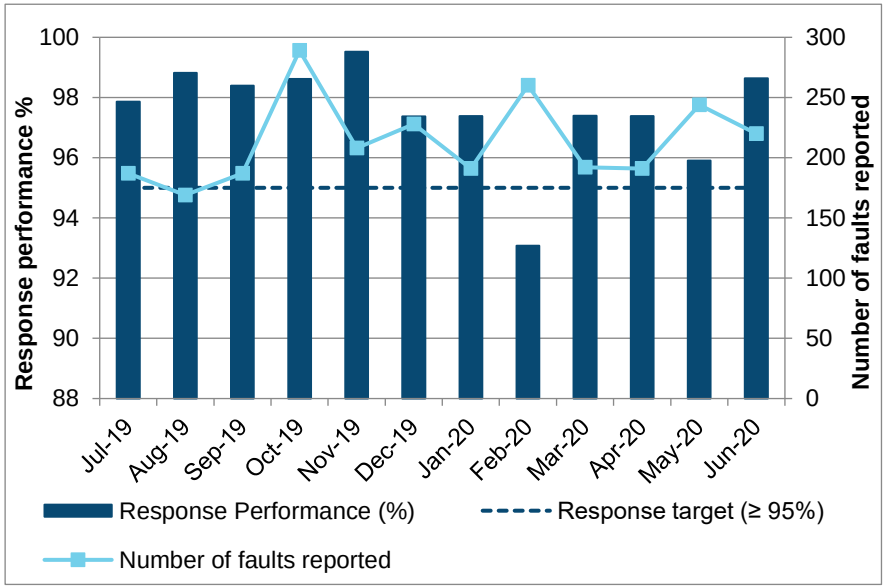


Figure 31: State-wide monthly response performance to water quality faults

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 2019-20, we exceeded this target in 11 of 12 months and responded to an average of 97.5 per cent of recorded faults within two hours or at an agreed time (as shown in figure 31, the state-wide monthly faults responsiveness).

.

ISSN 2202-879X

Customer research

We measure community perceptions of the quality of drinking water through our quarterly Customer Value survey. Although the methodology behind our surveys has remained the same the questions have changed slightly this year, and therefore cannot be compared to previous years.

In our survey, customers are asked to rate the quality of the water supplied to their home in the following categories:

- Overall impressions - thinking about the water that comes out of the tap, how would you rate the quality of the water supplied to your home?
- How would you rate:
  - The taste of the water
  - The smell of the water
  - The clarity/ colour of the water
  - Providing a consistent level of water quality
  - The water's impact on household fixtures and appliances (e.g. shower screens, kettles)

The rating for these questions (where 1 is 'poor' and 10 is 'excellent'), for each quarter of the year, is shown in Figure 32 below.

Refer to *Improving your water quality*, page 45, for information on improvements we have been making to water safety and aesthetics.

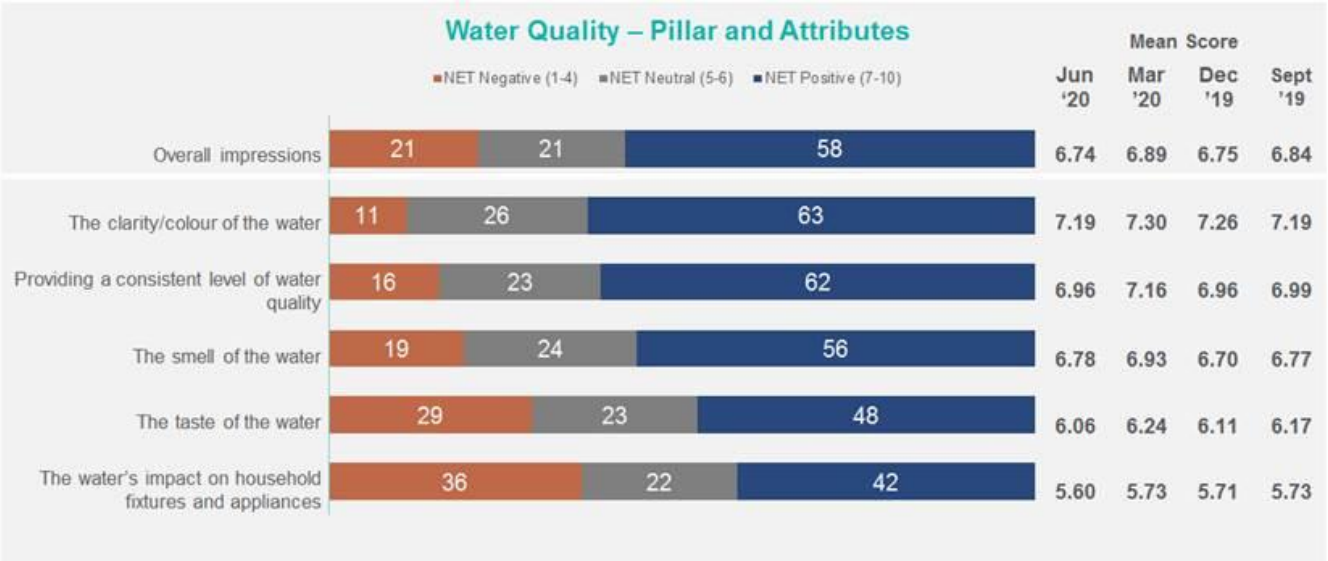


Figure 32: Water quality customer value survey ratings

ISSN 2202-879X

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 22). 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 32).

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 four million litre water tank to replace an open reservoir in Norseman is completed. Additionally, we progressed projects to replace open reservoirs in Merredin and Derdari with sealed water tanks. Once the GAWSS is sealed, water quality will improve, helping to maintain chloramine residuals throughout the extensive pipeline network.

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. This will be achieved through the addition of more advanced analysers that have the capability of measuring four water quality parameters, which provides improved water quality information critical for chloramination management.

To improve the maintenance of disinfection residual along the main from Kambalda to Norseman towns, a new chloramination plant project commenced, the plant will be located between Coolgardie and Kambalda and is due for completion in 2024.

Projects in Marvel Loch and Bullfinch were completed to improve the operability of the existing chlorinators and reduce water quality risk.

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 groundwater. The project is due to be completed by 2021.

ISSN 2202-879X

To address the damage caused by Tropical Cyclone Veronica to the roof of Karratha Tank 3, various projects are under way to provide a bypass around the tank so that it can be replaced in the near future. Tank sealing is a very important program of work undertaken at Water Corporation to reduce water quality risk.

In West Pilbara, Harding Dam has had two of its membrane trains replaced, to maintain the water quality. Below are photos of membrane trains at Harding Dam.

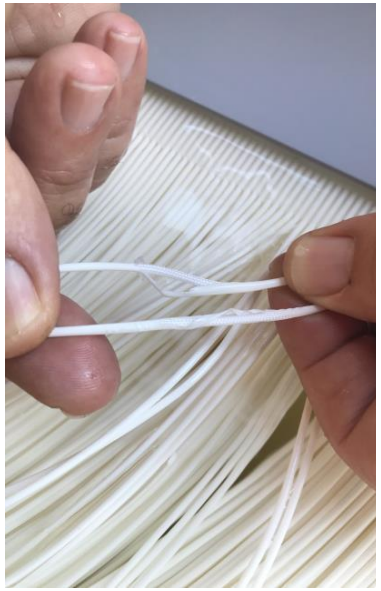


Figure 33: Old membrane train to be replaced

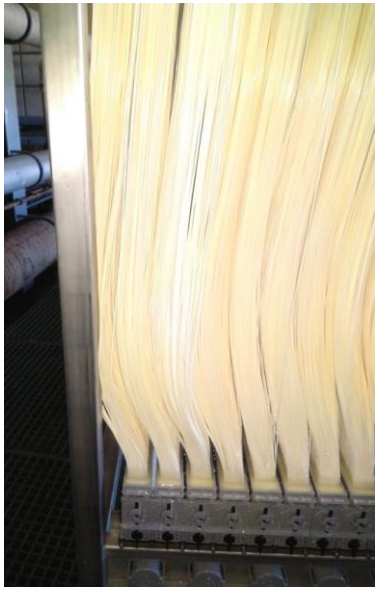


Figure 34: New membrane trains

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 nitrate and aesthetic water quality issues, which will be addressed via water treatment. The water treatment plant at Mt Magnet will start commissioning in September 2020 and will undergo a proving period before we look to have the nitrate exemption removed from our MoU with DoH. To address discoloured water issues at Horrocks, several additions and upgrades to the existing treatment will be completed in 2021.

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.

Watheroo WTP upgrade project to replace existing filter is in progress and due for completion in 2021.

Stage 1 of the Allanooka chlorinator upgrade and redirection of Mt Hill bores is completed. In addition, a project to replace the open reservoir with a sealed tank to improve the water quality for the greater Geraldton scheme has progressed and is expected to be online by 2024.

Works will soon be under way at the Coomberdale tank site to install new tanks, online analysers and a new and secure carting intake point. This work will enable remote visibility of the tanks operation to ensure it continues to operate safely.

ISSN 2202-879X

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. The project scheduled completion of mid-2020 has been extended to mid-2021.

The extension of the Warren Blackwood Regional Water Supply Scheme (WBRWSS) to Kirup and Mullalyup is progressing with the project due for completion mid 2021.

Mungalup Dam has been isolated from the Collie scheme; Collie will now be solely supplied via Harris or Stirling dams.

A project has also commenced to build a new three million litre tank in Collie. This project will allow the removal of Worsley Tank, which requires intensive monitoring and management to maintain water quality, from the Great Southern Town Water Supply Scheme; thus, reducing water quality risk in Collie and Allanson.

Great Southern Region (GSR)

Treatment is still a big part of the water quality improvement program for the GSR. Several water quality projects were finished in 2019-20 including commissioning of a new treatment plant in Ravensthorpe; a new 2.5 million litre tank, pump station and 18.35 km of water main to improve water quality in Kondinin, Karlgarin and Hyden; and installation of a new roof and liner at Wardelocking Reservoir to improve reserve storage in Wagin. The works at Wardelocking also included a new aeration system for management of Trihalomethanes, a disinfection by-product.

Installation of a new ultrafiltration plant is progressing at Cranbrook and is due to be completed in 2022.

Projects commenced at the South Coastal reservoir in Albany to assist with management of iron and manganese, including installation of a floating offtake, additional turbidity and chlorine analysers and continuing a trial to test the effectiveness of an Automatic Microfibre Filter to remove iron and manganese.

A temporary chlorinator was installed near Tincurrin to improve disinfection in this area and ensure supply of safe drinking water. A permanent chlorinator is planned to be installed in coming years.

To improve source protection, a diversion drain was constructed near the Denmark River Dam to divert runoff from an adjacent farm to downstream of the local source.

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.

ISSN 2202-879X

Appendix A – List of sampling parameters

Table 3: 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

ISSN 2202-879X

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 DoH

Other pesticides may be assessed as indicated

ISSN 2202-879X

Table 4: 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

ISSN 2202-879X

Table 5: Radiological

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

Table 6: Inorganic Chemicals

Chemical	Health Guideline Value (mg/L)	Aesthetic Guideline Value (mg/L)
Chloride	Not set	250
Cyanide [1]	0.08	Not set
Fluoride [2]	1.5	Not set
Iodide [1]	0.5	Not set
Nitrate [3]	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] While the ADWG health guideline value is 1.5 mg/L, the fluoride concentration after dosing is set by the Fluoridation of Public Water Supplies Advisory Committee to not exceed 1 mg/L.

[3] 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.

[4] Guideline set by DoH - ADWG has not set a guideline value for this organism.

Results should not exceed the health guideline value

Table 7: 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 8: Microbiological

Organism	Health Guideline Value
Escherichia coli	0 organisms per 100 ml
Naegleria tolerant to ≤ 42°C	[4] No sample should contain *Naegleria fowleri*

ISSN 2202-879X

Table 9: 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 – Perth localities maps

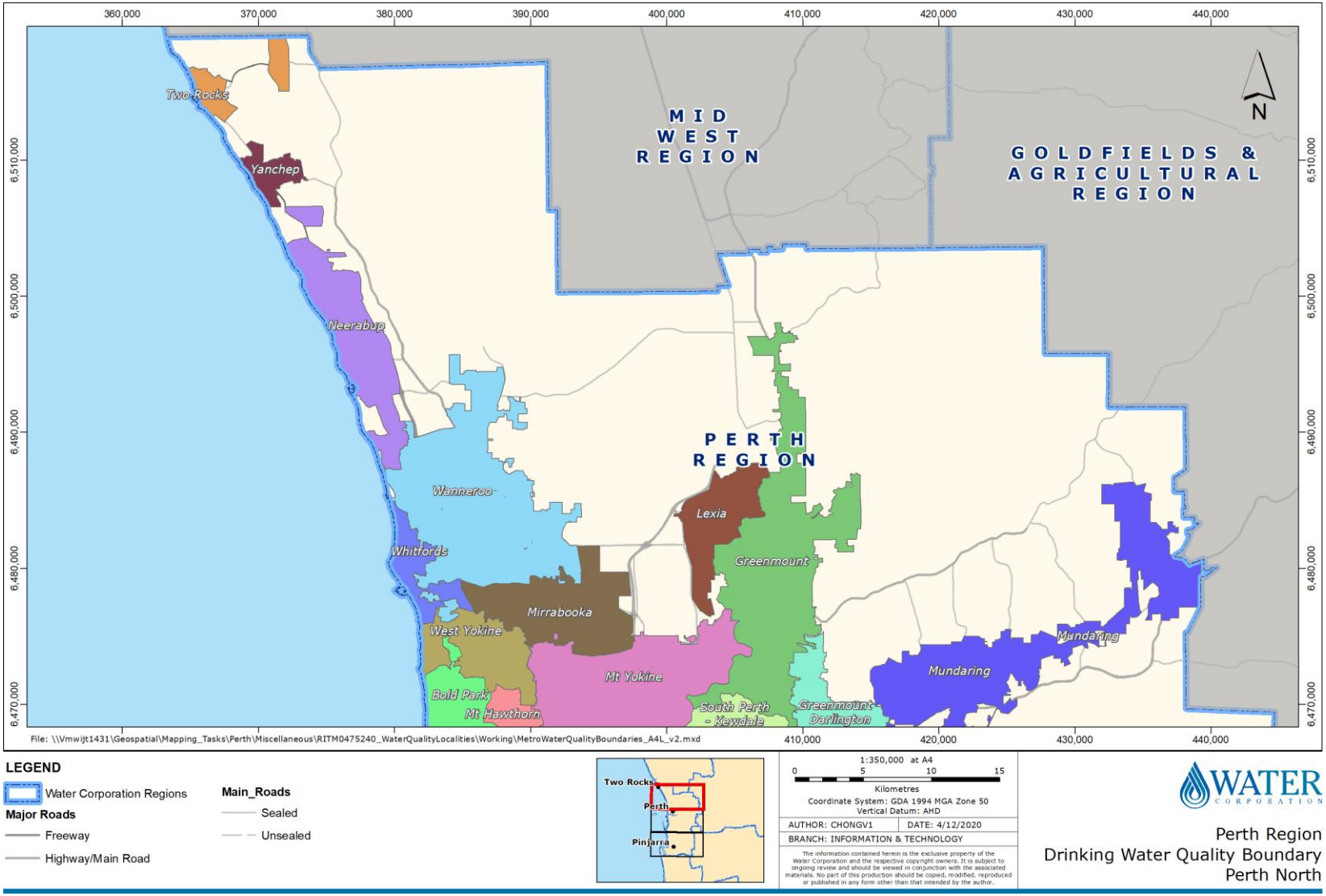


Figure 35: Perth north localities

ISSN 2202-879X

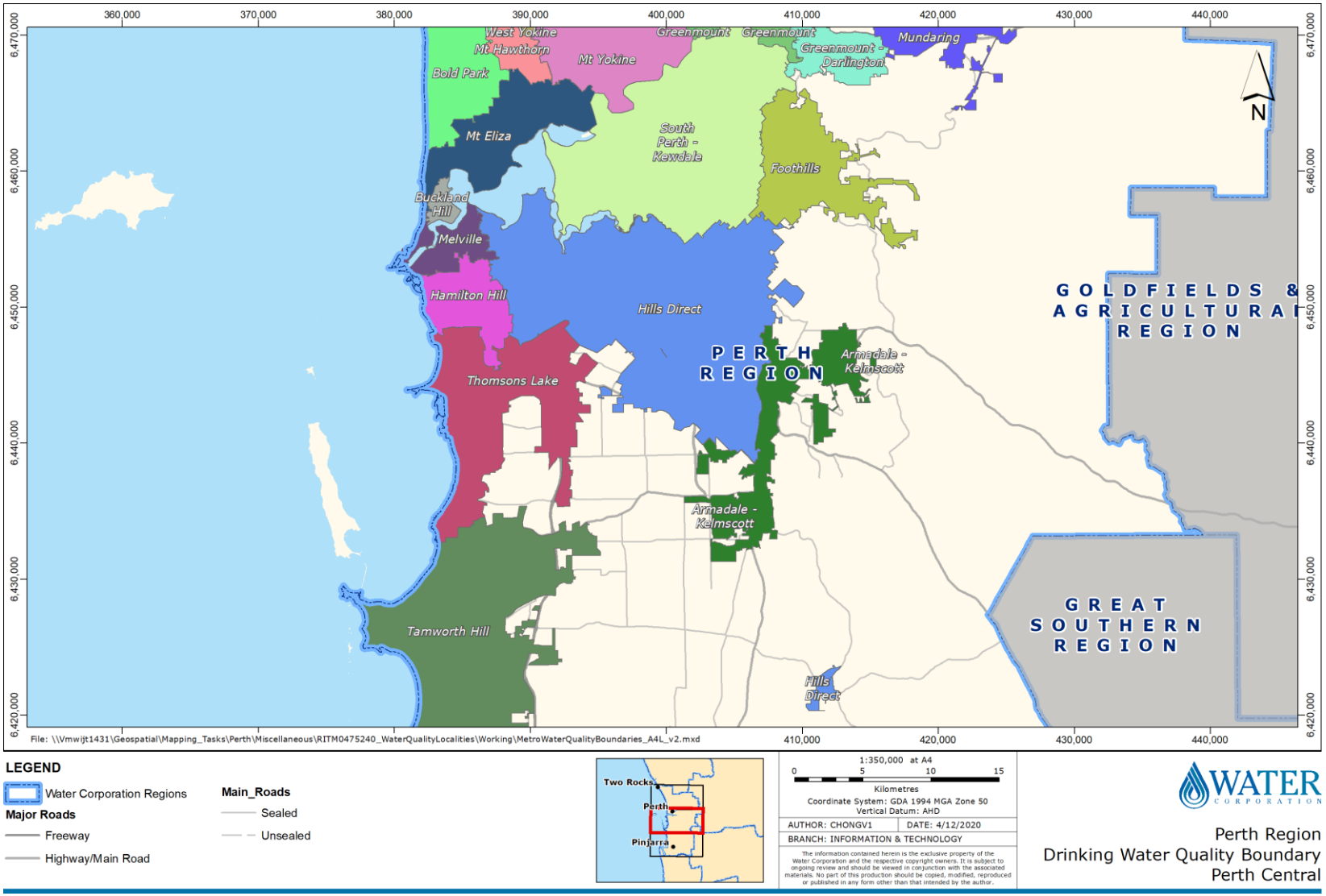


Figure 36: Perth central localities

ISSN 2202-879X

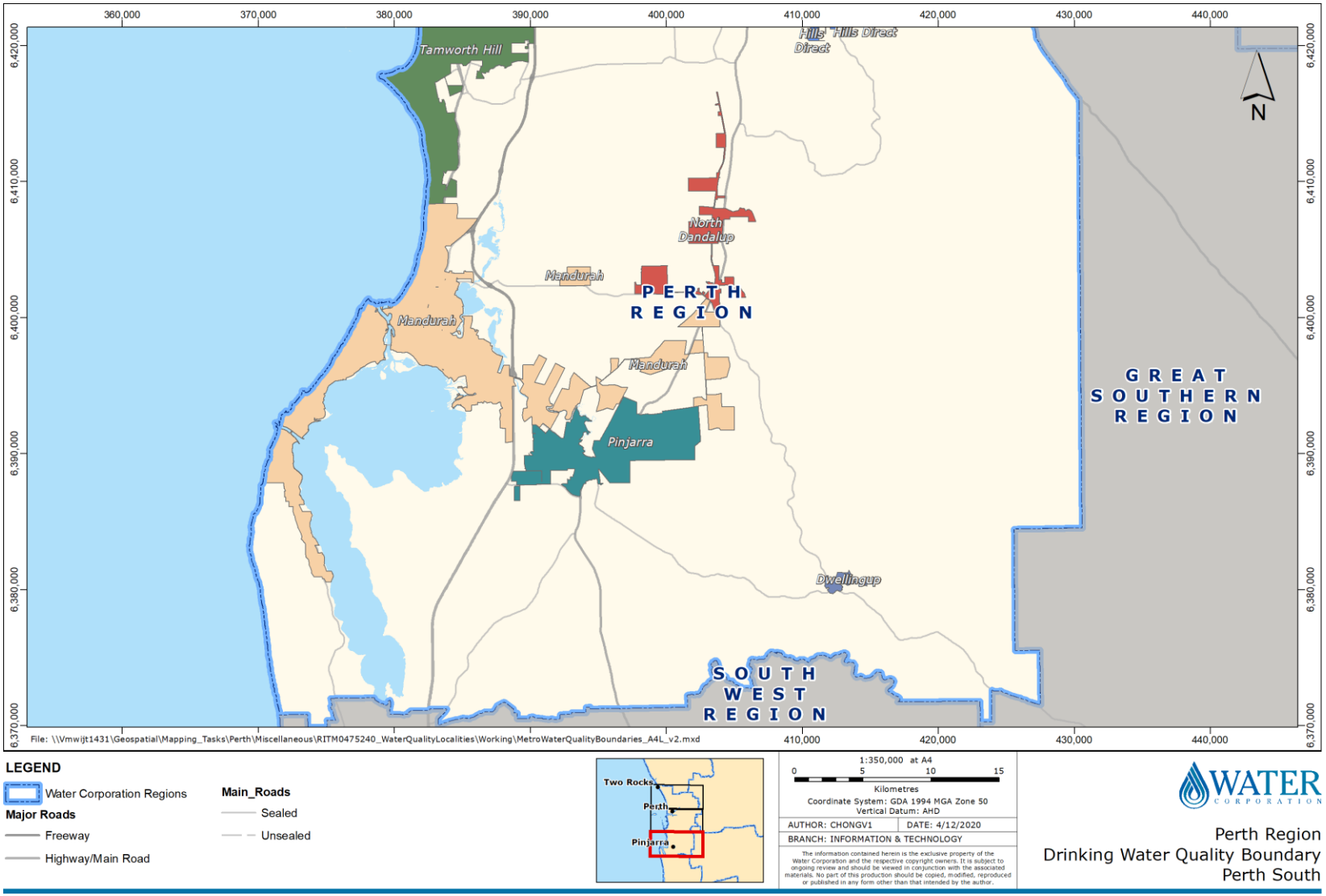


Figure 37: Perth south localities

ISSN 2202-879X

Appendix C – 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 Region

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

ISSN 2202-879X

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	288	0	0	✓	275	0	✓	52	0.75	0.9	0.82	(2)	0	(1)	2	✓
Bold Park	329	0	0	✓	147	0	✓	53	0.75	0.85	0.8	(2)	1	✓	2	✓
Buckland Hill	93	0	0	✓	67	0	✓	53	0.7	0.8	0.74	(2)	0	(1)	2	✓
Dwellingup	13	0	0	✓	6	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Foothills	132	0	0	✓	132	0	✓	53	0.7	0.9	0.81	(2)	2	✓	2	✓
Greenmount	196	0	0	✓	105	0	✓	52	0.75	0.9	0.81	(2)	2	✓	2	✓
Greenmount/Darlington	117	0	0	✓	79	0	✓	52	0.7	0.85	0.8	(2)	2	✓	2	✓
Hamilton Hill	223	0	0	✓	106	0	✓	53	0.7	0.85	0.77	(2)	1	✓	2	✓
Hills Direct	716	0	0	✓	300	0	✓	52	0.7	0.85	0.81	(2)	3	✓	4	✓
Lexia	144	0	0	✓	66	0	✓	53	0.65	0.85	0.75	(2)	2	✓	2	✓
Mandurah	393	0	0	✓	323	0	✓	53	0.8	0.9	0.84	(2)	0	(1)	6	✓
Melville	185	0	0	✓	107	0	✓	53	0.7	0.8	0.75	(2)	1	✓	2	✓
Mirrabooka	341	0	0	✓	118	0	✓	52	0.65	0.85	0.76	(2)	1	✓	2	✓
Mt. Eliza	433	0	0	✓	130	0	✓	52	0.7	0.8	0.74	(2)	0	(1)	2	✓
Mt. Hawthorn	184	0	0	✓	78	0	✓	52	0.7	0.9	0.81	(2)	2	✓	2	✓
Mt. Yokine	521	0	0	✓	183	0	✓	52	0.7	0.9	0.81	(2)	1	✓	2	✓
Mundaring	117	0	0	✓	117	0	✓	52	0.7	0.9	0.81	(2)	2	✓	2	✓
Neerabup	338	0	0	✓	117	0	✓	53	0.65	0.9	0.78	(2)	0	(1)	2	✓
North Dandalup	13	0	0	✓	6	0	✓	2	0.7	0.75	0.73	(2)	1	✓	2	✓
Pinjarra	66	0	0	✓	53	0	✓	53	0.75	0.9	0.83	(2)	1	✓	2	✓
South Perth/Kewdale	551	0	0	✓	241	0	✓	51	0.7	0.9	0.8	(2)	1	✓	2	✓
Tamworth Hill	430	0	0	✓	171	0	✓	53	0.8	0.9	0.83	(2)	1	✓	2	✓
Thomsons Lake	341	0	0	✓	92	0	✓	52	0.7	0.85	0.76	(2)	0	(1)	2	✓
Two Rocks	104	0	0	✓	39	0	✓	2	0.15	0.15	0.15	(2)	0	(1)	6	✓
Wanneroo	511	0	0	✓	191	0	✓	52	0.65	0.85	0.75	(2)	2	✓	2	✓
West Yokine	262	0	0	✓	117	0	✓	53	0.7	0.9	0.8	(2)	2	✓	3	✓
Whitfords	144	0	0	✓	66	0	✓	53	0.65	0.85	0.75	(2)	1	✓	2	✓
Yanchep	113	0	0	✓	61	0	✓	54	0.65	0.85	0.76	(2)	1	✓	2	✓

(1) No samples required in this 12 month period. (2) Receives water from a fluoridated source within the dosing range set by the Fluoridation of Water Supplies Advisory Committee

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	0.4	0.4	0.4	✓	1	✓	0	(1)	13	0.054	0.100	0.073	✓	1	✓
Bold Park	2	0.4	0.4	0.4	✓	2	✓	0	(1)	13	0.025	0.091	0.047	✓	1	✓
Buckland Hill	4	<0.2	0.4	<0.2	✓	1	✓	0	(1)	13	0.050	0.130	0.085	✓	0	(1)
Dwellingup	5	<0.2	0.4	<0.2	✓	2	✓	0	(1)	2	0.033	0.049	0.039	✓	0	(1)
Foothills	2	<0.2	<0.2	<0.2	✓	2	✓	2	✓	13	0.050	0.120	0.085	✓	2	✓
Greenmount	4	1.8	2.6	2.2	✓	2	✓	0	(1)	13	0.058	0.180	0.135	✓	1	✓
Greenmount/Darlington	2	0.4	0.9	0.4	✓	2	✓	2	✓	13	0.066	0.180	0.106	✓	1	✓
Hamilton Hill	2	<0.2	0.4	<0.2	✓	2	✓	2	✓	13	0.044	0.100	0.074	✓	1	✓
Hills Direct	4	<0.2	<0.2	<0.2	✓	3	✓	1	✓	24	0.011	0.059	0.033	✓	3	✓
Lexia	2	<0.2	7.9	4.0	✓	2	✓	1	✓	13	0.085	0.160	0.123	✓	1	✓
Mandurah	7	<0.2	<0.2	<0.2	✓	3	✓	0	(1)	39	<0.001	0.043	0.011	✓	0	(1)
Melville	5	<0.2	0.4	<0.2	✓	2	✓	0	(1)	13	0.034	0.095	0.063	✓	1	✓
Mirrabooka	5	1.3	1.8	1.8	✓	2	✓	0	(1)	13	0.083	0.170	0.132	✓	0	(1)
Mt. Eliza	3	<0.2	0.4	0.4	✓	1	✓	1	✓	13	0.053	0.120	0.083	✓	0	(1)
Mt. Hawthorn	5	1.3	2.2	1.8	✓	2	✓	1	✓	13	0.051	0.140	0.114	✓	1	✓
Mt. Yokine	4	1.8	2.2	1.8	✓	2	✓	0	(1)	13	0.098	0.150	0.129	✓	0	(1)
Mundaring	2	0.4	0.4	0.4	✓	2	✓	0	(1)	5	0.022	0.050	0.036	✓	2	✓
Neerabup	5	9.2	10.6	9.7	✓	1	✓	0	(1)	13	0.026	0.110	0.047	✓	1	✓
North Dandalup	4	<0.2	0.4	<0.2	✓	2	✓	0	(1)	2	0.035	0.067	0.051	✓	1	✓
Pinjarra	3	<0.2	<0.2	<0.2	✓	2	✓	1	✓	2	0.001	0.003	0.002	✓	1	✓
South Perth/Kewdale	2	0.9	1.8	1.3	✓	2	✓	0	(1)	13	0.079	0.140	0.118	✓	1	✓
Tamworth Hill	2	<0.2	0.4	<0.2	✓	2	✓	1	✓	13	<0.001	0.038	0.009	✓	1	✓
Thomsons Lake	5	<0.2	0.4	<0.2	✓	1	✓	0	(1)	13	0.025	0.091	0.068	✓	1	✓
Two Rocks	4	2.2	4.4	4.0	✓	2	✓	1	✓	13	0.007	0.014	0.011	✓	0	(1)
Wanneroo	4	2.6	7.0	4.4	✓	2	✓	2	✓	13	0.058	0.160	0.090	✓	1	✓
West Yokine	4	0.9	1.8	1.3	✓	2	✓	1	✓	13	0.120	0.180	0.148	✓	1	✓
Whitfords	4	<0.2	2.2	1.3	✓	2	✓	0	(1)	13	0.070	0.130	0.103	✓	1	✓
Yanchep	5	5.7	6.2	6.2	✓	2	✓	0	(1)	13	0.012	0.025	0.018	✓	3	✓

(1) No samples required in this 12 month period

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	56	66	61	(1)	2	<0.008	0.012	<0.008	✓	2	145	155	150	✓	2	71	74	73	✓
Bold Park	2	54	61	57.5	(1)	2	0.012	0.014	0.013	✓	2	65	90	77.5	✓	2	65	65	65	✓
Buckland Hill	4	64	82	74.5	(1)	4	0.010	0.040	0.018	✓	4	160	205	188.8	✓	4	61	71	67	✓
Dwellingup	2	9	9	9	(1)	2	0.012	0.014	0.013	✓	2	60	65	62.5	✓	2	28	32	30	✓
Foothills	2	55	68	61.5	(1)	2	<0.008	0.014	<0.008	✓	2	90	140	115	✓	2	50	75	63	✓
Greenmount	4	120	150	132.5	(1)	4	<0.008	<0.008	<0.008	✓	4	165	185	172.5	✓	4	100	110	108	✓
Greenmount/Darlington	4	70	97	80.5	(1)	4	<0.008	0.014	<0.008	✓	4	115	160	138.8	✓	4	75	89	82	✓
Hamilton Hill	2	82	85	83.5	(1)	2	0.010	0.012	0.011	✓	2	185	190	187.5	✓	2	89	93	91	✓
Hills Direct	4	49	52	50.3	(1)	4	0.016	0.025	0.020	✓	4	40	80	55.8	✓	4	46	61	53	✓
Lexia	2	96	150	123	(1)	2	0.010	0.014	0.012	✓	2	70	115	92.5	✓	3	110	160	140	✓
Mandurah	6	53	57	55.8	(1)	6	0.016	0.030	0.026	✓	6	33	38	35	✓	6	54	59	56	✓
Melville	4	68	75	72	(1)	4	0.012	0.020	0.016	✓	4	135	175	156.3	✓	4	57	64	62	✓
Mirrabooka	4	48	75	58	(1)	4	0.014	0.018	0.016	✓	4	180	210	197.5	✓	4	120	130	123	✓
Mt. Eliza	5	66	89	75.4	(1)	5	<0.008	0.014	0.010	✓	5	160	205	178	✓	5	64	77	71	✓
Mt. Hawthorn	4	110	130	120	(1)	4	<0.008	0.012	<0.008	✓	4	145	175	160	✓	4	89	99	93	✓
Mt. Yokine	4	120	140	130	(1)	3	<0.008	<0.008	<0.008	✓	4	175	185	177.5	✓	4	100	110	105	✓
Mundaring	2	59	70	64.5	(1)	2	0.016	0.030	0.023	✓	2	165	185	175	✓	2	91	100	96	✓
Neerabup	4	160	190	175	(1)	3	<0.008	<0.008	<0.008	✓	4	125	135	130	✓	4	180	190	185	✓
North Dandalup	4	14	54	32.5	(1)	4	<0.008	0.020	0.011	✓	4	35	70	53.8	✓	4	32	57	45	✓
Pinjarra	2	52	52	52	(1)	2	0.014	0.025	0.020	✓	2	34	38	36	✓	2	54	55	55	✓
South Perth/Kewdale	2	120	120	120	(1)	2	<0.008	<0.008	<0.008	✓	2	170	180	175	✓	2	89	100	95	✓
Tamworth Hill	3	53	54	53.7	(1)	2	0.025	0.035	0.030	✓	3	29	38	33	✓	3	51	51	51	✓
Thomsons Lake	4	82	90	86.5	(1)	3	<0.008	0.010	<0.008	✓	4	165	210	193.8	✓	4	90	110	97	✓
Two Rocks	5	190	210	202	(1)	5	<0.008	<0.008	<0.008	✓	5	100	110	105	✓	5	210	230	220	(2)
Wanneroo	4	87	150	111.8	(1)	4	<0.008	<0.008	<0.008	✓	4	115	135	123.8	✓	4	110	160	123	✓
West Yokine	4	120	140	125	(1)	4	<0.008	<0.008	<0.008	✓	4	155	185	172.5	✓	4	98	110	102	✓
Whitfords	2	51	85	68	(1)	2	<0.008	0.010	<0.008	✓	2	125	130	127.5	✓	2	75	100	88	✓
Yanchep	4	200	210	205	(1)	4	<0.008	<0.008	<0.008	✓	4	115	115	115	✓	4	220	230	228	(2)

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

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	0.020	0.040	0.030	✓	2	0.003	0.004	0.004	✓	2	7.48	7.62	7.55	✓	2	1.9	3.2	2.6	✓
Bold Park	2	0.015	0.025	0.020	✓	2	0.002	0.005	0.004	✓	2	7.71	7.85	7.78	✓	2	1.8	4.4	3.1	✓
Buckland Hill	5	0.025	0.090	0.055	✓	5	0.003	0.007	0.005	✓	4	7.71	8.09	7.96	✓	4	5.4	8.1	6.8	✓
Dwellingup	2	0.050	0.050	0.050	✓	2	0.002	0.007	0.005	✓	2	6.64	6.90	6.77	✓	2	1.9	2.2	2.1	✓
Foothills	2	0.030	0.090	0.060	✓	2	0.002	0.008	0.005	✓	2	7.58	7.75	7.67	✓	2	3.7	4.0	3.9	✓
Greenmount	4	0.006	0.010	0.009	✓	4	<0.002	<0.002	<0.002	✓	4	7.98	8.38	8.11	✓	4	16.0	18.0	17.3	✓
Greenmount/Darlington	4	0.010	0.030	0.023	✓	4	0.003	0.004	0.004	✓	4	8.10	8.24	8.17	✓	4	6.1	9.8	7.3	✓
Hamilton Hill	2	0.008	0.008	0.008	✓	2	0.005	0.007	0.006	✓	2	7.98	8.08	8.03	✓	2	5.1	5.4	5.3	✓
Hills Direct	4	0.015	0.050	0.029	✓	4	0.003	0.005	0.004	✓	4	7.73	7.91	7.83	✓	4	1.3	1.9	1.6	✓
Lexia	2	0.008	0.008	0.008	✓	2	<0.002	0.006	0.003	✓	2	7.27	8.01	7.64	✓	2	12.0	20.0	16.0	✓
Mandurah	6	<0.003	0.015	0.008	✓	6	<0.002	<0.002	<0.002	✓	6	8.01	8.29	8.14	✓	6	0.8	1.3	1.0	✓
Melville	4	0.020	0.035	0.029	✓	4	0.004	0.005	0.005	✓	4	7.93	8.06	7.98	✓	4	4.0	5.2	4.8	✓
Mirrabooka	4	0.020	0.100	0.055	✓	4	0.002	0.003	0.003	✓	4	7.03	7.29	7.20	✓	4	14.0	15.0	14.5	✓
Mt. Eliza	5	0.020	0.070	0.037	✓	5	0.003	0.012	0.007	✓	5	7.84	8.08	7.94	✓	5	4.9	8.6	6.5	✓
Mt. Hawthorn	4	0.020	0.025	0.024	✓	4	0.002	0.003	0.003	✓	4	7.88	8.14	8.00	✓	4	13.0	17.0	14.8	✓
Mt. Yokine	4	0.008	0.050	0.030	✓	4	<0.002	0.006	0.004	✓	4	7.81	8.16	7.98	✓	4	16.0	18.0	17.0	✓
Mundaring	2	<0.003	0.006	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.37	8.39	8.38	✓	2	4.4	5.4	4.9	✓
Neerabup	4	0.010	0.020	0.015	✓	4	<0.002	0.003	<0.002	✓	4	7.21	7.63	7.40	✓	4	19.0	21.0	19.8	✓
North Dandalup	4	0.020	0.045	0.030	✓	4	<0.002	0.005	<0.002	✓	4	7.08	8.23	7.61	✓	4	1.6	2.2	1.8	✓
Pinjarra	2	0.004	0.010	0.007	✓	2	<0.002	0.003	<0.002	✓	2	7.96	8.12	8.04	✓	2	1.9	2.0	2.0	✓
South Perth/Kewdale	2	0.050	0.100	0.075	✓	2	0.007	0.014	0.011	✓	2	7.96	7.99	7.98	✓	2	14.0	17.0	15.5	✓
Tamworth Hill	3	0.006	0.008	0.007	✓	3	<0.002	<0.002	<0.002	✓	3	7.90	8.13	7.99	✓	3	0.7	1.2	0.9	✓
Thomsons Lake	4	<0.003	0.008	0.005	✓	4	0.003	0.009	0.005	✓	4	7.98	8.08	8.03	✓	4	4.6	5.9	5.5	✓
Two Rocks	5	<0.003	<0.003	<0.003	✓	5	<0.002	<0.002	<0.002	✓	5	7.21	7.75	7.52	✓	5	11.0	12.0	11.6	✓
Wanneroo	4	0.006	0.015	0.012	✓	4	<0.002	0.005	0.003	✓	4	7.25	7.78	7.51	✓	4	17.0	21.0	18.5	✓
West Yokine	4	0.015	0.070	0.036	✓	4	<0.002	0.009	0.004	✓	4	7.97	8.16	8.06	✓	4	16.0	18.0	17.0	✓
Whitfords	2	0.006	0.015	0.011	✓	2	0.002	0.004	0.003	✓	2	7.64	7.82	7.73	✓	2	15.0	17.0	16.0	✓
Yanchep	4	<0.003	0.050	0.029	✓	4	<0.002	0.003	<0.002	✓	4	7.39	7.69	7.52	✓	4	15.0	17.0	16.0	✓

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	84	92	88	✓	2	348	379	364	✓	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Bold Park	2	41	51	46	✓	2	212	256	234	✓	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Buckland Hill	4	97	140	120.5	✓	4	382	496	450	✓	4	<1	<1	<1	✓	4	0.1	0.2	0.2	✓
Dwellingup	2	33	35	34	✓	2	133	146	140	✓	2	1	2	2	✓	2	0.3	0.3	0.3	✓
Foothills	2	55	87	71	✓	2	247	364	306	✓	2	<1	<1	<1	✓	2	0.2	0.4	0.3	✓
Greenmount	4	115	130	121.3	✓	4	512	577	548	✓	4	<1	<1	<1	✓	4	<0.1	<0.1	<0.1	✓
Greenmount/Darlington	4	74	110	93	✓	4	330	441	393	✓	4	<1	<1	<1	✓	4	<0.1	0.4	0.2	✓
Hamilton Hill	2	115	115	115	✓	2	471	471	471	✓	2	<1	<1	<1	✓	2	0.1	0.1	0.1	✓
Hills Direct	4	24	46	33.3	✓	4	152	227	180	✓	4	<1	<1	<1	✓	4	0.1	0.3	0.2	✓
Lexia	2	36	66	51	✓	2	376	467	422	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Mandurah	6	18	23	20.2	✓	6	142	152	148	✓	6	<1	<1	<1	✓	6	<0.1	0.2	0.2	✓
Melville	4	89	110	101.8	✓	4	353	422	390	✓	4	<1	<1	<1	✓	4	0.1	0.3	0.2	✓
Mirrabooka	4	98	115	107	✓	4	472	518	503	✓	4	<1	<1	<1	✓	4	<0.1	0.1	<0.1	✓
Mt. Eliza	5	100	125	114	✓	5	387	498	438	✓	5	<1	<1	<1	✓	5	0.1	0.3	0.2	✓
Mt. Hawthorn	4	98	130	112	✓	4	444	555	498	✓	4	<1	<1	<1	✓	4	<0.1	0.2	<0.1	✓
Mt. Yokine	4	120	135	126.3	✓	4	539	569	556	✓	4	<1	<1	<1	✓	4	<0.1	0.2	<0.1	✓
Mundaring	2	98	110	104	✓	2	405	458	432	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Neerabup	4	67	76	71.3	✓	4	514	543	529	✓	4	<1	<1	<1	✓	4	0.1	0.3	0.2	✓
North Dandalup	4	21	35	29.3	✓	4	144	163	152	✓	4	<1	<1	<1	✓	4	0.1	0.4	0.3	✓
Pinjarra	2	21	25	23	✓	2	145	156	151	✓	2	<1	<1	<1	✓	2	0.1	0.1	0.1	✓
South Perth/Kewdale	2	120	120	120	✓	2	514	542	528	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Tamworth Hill	3	18	23	20	✓	3	135	151	142	✓	3	<1	<1	<1	✓	3	<0.1	0.1	<0.1	✓
Thomsons Lake	4	105	135	123.8	✓	4	431	524	495	✓	4	<1	<1	<1	✓	4	<0.1	<0.1	<0.1	✓
Two Rocks	5	54	58	55.8	✓	5	511	531	525	✓	5	<1	<1	<1	✓	5	<0.1	0.1	<0.1	✓
Wanneroo	4	71	79	74.3	✓	4	400	470	428	✓	4	<1	<1	<1	✓	4	<0.1	0.2	<0.1	✓
West Yokine	4	115	125	121.3	✓	4	512	557	539	✓	4	<1	<1	<1	✓	4	<0.1	0.3	0.2	✓
Whitfords	2	70	73	71.5	✓	2	333	389	361	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Yanchep	4	57	63	59.3	✓	4	537	548	542	✓	4	<1	<1	<1	✓	4	0.1	0.4	0.3	✓

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	✓	10	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	2	✓
Bindoon /Chittering	52	0	0	✓	27	0	✓	2	0.35	0.4	0.38	✓	1	✓	2	✓
Bolgart	13	0	0	✓	9	0	✓	2	0.15	0.2	0.18	✓	3	✓	2	✓
Calingiri	13	0	0	✓	9	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	2	✓
Carnamah	13	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	2	✓
Carnarvon	66	0	0	✓	39	0	✓	2	0.35	0.4	0.38	✓	2	✓	2	✓
Cervantes	53	0	0	✓	10	0	✓	2	0.15	0.15	0.15	✓	2	✓	2	✓
Coomberdale	13	0	0	✓	9	0	✓	2	0.8	0.85	0.83	(2)	2	✓	2	✓
Coorow	13	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	2	✓
Coral Bay	13	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Cue	14	0	0	✓	14	0	✓	2	0.25	0.3	0.28	✓	0	(1)	2	✓
Dandaragan	13	0	0	✓	9	0	✓	2	0.25	0.25	0.25	✓	2	✓	2	✓
Denham	52	0	0	✓	26	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	2	✓
Dongara/Denison	65	0	0	✓	26	0	✓	53	0.6	0.9	0.8	(2)	2	✓	2	✓
Eneabba	13	0	0	✓	13	0	✓	3	0.15	0.15	0.15	✓	2	✓	3	✓
Exmouth	67	0	0	✓	40	0	✓	53	0.25	0.9	0.72	(2)	2	✓	2	✓
Gascoyne Junction	26	0	0	✓	26	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	2	✓
Geraldton	183	0	0	✓	183	0	✓	56	0.7	0.95	0.81	(2)	2	✓	4	✓
Gingin	53	0	0	✓	20	0	✓	2	<0.1	<0.1	<0.1	✓	1	✓	1	(3)
Greenhead	53	0	0	✓	14	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	2	✓
Guilderton	53	0	0	✓	17	0	✓	2	0.2	0.25	0.23	✓	2	✓	2	✓
Horrocks	13	0	0	✓	13	0	✓	2	0.35	0.35	0.35	✓	2	✓	2	✓
Jurien Bay	53	0	0	✓	10	0	✓	2	0.3	0.3	0.3	✓	2	✓	2	✓
Kalbarri	52	0	0	✓	25	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Lancelin	53	0	0	✓	20	0	✓	2	0.2	0.2	0.2	✓	2	✓	2	✓
Latham	52	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Ledge Point	52	0	0	✓	10	0	✓	2	0.15	0.15	0.15	✓	2	✓	2	✓
Leeman	53	0	0	✓	14	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Meekatharra	53	0	0	✓	13	0	✓	2	0.55	0.6	0.58	✓	2	✓	2	✓
Mingenew	13	0	0	✓	13	0	✓	2	0.15	0.15	0.15	✓	2	✓	2	✓
Moora	53	0	0	✓	17	0	✓	53	0.7	0.85	0.79	(2)	2	✓	2	✓
Morawa	52	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	2	✓
Mt Magnet	52	0	0	✓	14	0	✓	2	0.3	0.3	0.3	✓	1	✓	2	✓
Mullewa	13	0	0	✓	13	0	✓	2	0.8	0.9	0.85	(2)	0	(1)	2	✓
Nabawa	13	0	0	✓	13	0	✓	2	0.75	0.75	0.75	✓	2	✓	2	✓
New Norcia	13	0	0	✓	9	0	✓	2	0.2	0.2	0.2	✓	2	✓	2	✓
Nilgern (Ocean Farms)	12	0	0	✓	8	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Northampton	53	0	0	✓	14	0	✓	2	0.8	0.8	0.8	(2)	2	✓	2	✓
Perenjori	13	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	2	✓
Piawaning	27	0	0	✓	8	0	✓	2	<0.1	0.1	<0.1	✓	1	✓	2	✓
Port Kalbarri	13	0	0	✓	13	0	✓	2	<0.1	0.15	<0.1	✓	2	✓	2	✓
Sandstone	13	0	0	✓	13	0	✓	2	0.4	0.45	0.43	✓	2	✓	6	✓
Seabird	13	0	0	✓	9	0	✓	2	0.25	0.3	0.28	✓	2	✓	2	✓
Seaview Park	12	0	0	✓	8	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	2	✓
Sovereign Hills	26	0	0	✓	16	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	2	✓
Three Springs	13	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	3	✓
Watheroo	13	0	0	✓	9	0	✓	2	<0.1	0.1	<0.1	✓	0	(1)	3	✓
Woodridge	12	0	0	✓	8	0	✓	2	0.25	0.3	0.28	✓	2	✓	2	✓
Yalgoo	13	0	0	✓	13	0	✓	2	0.1	0.15	0.13	✓	2	✓	2	✓
Yerecoin	13	0	0	✓	9	0	✓	2	<0.1	<0.1	<0.1	✓	1	✓	2	✓
Yuna	13	0	0	✓	13	0	✓	1	0.8	0.8	0.8	(2)	2	✓	2	✓

(1) No samples required in this 12 month period. (2) Receives water from a fluoridated source within the dosing range set by the Fluoridation of Water Supplies Advisory Committee. (3) Second sample assessed in operational sampling program

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	0.88	0.88	0.88	✓	2	✓	0	(1)	2	<0.001	<0.001	<0.001	✓	2	✓
Bindoon /Chittering	2	<0.2	<0.2	<0.2	✓	2	✓	1	✓	2	0.014	0.014	0.014	✓	2	✓
Bolgart	2	30.8	35.64	33.44	✓	4	✓	1	✓	2	0.006	0.006	0.006	✓	1	✓
Calingiri	5	14.52	21.56	17.16	✓	2	✓	3	✓	2	0.017	0.019	0.018	✓	1	✓
Carnamah	2	0.88	1.32	0.88	✓	2	✓	0	(1)	2	0.009	0.010	0.010	✓	2	✓
Carnarvon	2	3.52	4.4	3.96	✓	3	✓	2	✓	2	0.003	0.008	0.006	✓	2	✓
Cervantes	5	14.52	17.16	15.84	✓	2	✓	0	(1)	2	0.010	0.014	0.012	✓	2	✓
Coomberdale	2	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	2	0.031	0.032	0.032	✓	2	✓
Coorow	2	0.88	0.88	0.88	✓	2	✓	0	(1)	2	0.007	0.011	0.009	✓	2	✓
Coral Bay	2	0.44	0.44	0.44	✓	1	✓	2	✓	2	0.003	0.003	0.003	✓	0	(1)
Cue	4	47.08	53.68	51.04	(2)	1	✓	0	(1)	2	0.004	0.004	0.004	✓	2	✓
Dandaragan	2	<0.2	0.44	<0.2	✓	2	✓	0	(1)	2	0.008	0.011	0.010	✓	2	✓
Denham	2	0.44	0.44	0.44	✓	2	✓	0	(1)	2	0.004	0.023	0.014	✓	1	✓
Dongara/Denison	4	2.20	3.08	2.64	✓	2	✓	1	✓	2	0.011	0.011	0.011	✓	1	✓
Eneabba	4	<0.2	<0.2	<0.2	✓	2	✓	1	✓	2	0.009	0.009	0.009	✓	2	✓
Exmouth	2	7.48	8.36	7.92	✓	2	✓	0	(1)	2	<0.001	<0.001	<0.001	✓	2	✓
Gascoyne Junction	2	0.44	0.44	0.44	✓	2	✓	2	✓	2	0.003	0.004	0.004	✓	1	✓
Geraldton	4	2.20	3.08	2.64	✓	3	✓	2	✓	4	0.006	0.010	0.009	✓	1	✓
Gingin	2	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	2	0.002	0.004	0.003	✓	2	✓
Greenhead	2	3.96	3.96	3.96	✓	2	✓	1	✓	2	0.003	0.004	0.004	✓	2	✓
Guilderton	3	38.72	40.48	39.6	✓	2	✓	2	✓	2	0.018	0.019	0.019	✓	1	✓
Horrocks	4	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	2	0.015	0.018	0.017	✓	2	✓
Jurien Bay	4	14.52	16.28	15.4	✓	2	✓	0	(1)	2	0.006	0.013	0.010	✓	2	✓
Kalbarri	2	3.08	3.08	3.08	✓	1	✓	0	(1)	2	0.003	0.010	0.007	✓	1	✓
Lancelin	2	4.40	4.84	4.40	✓	2	✓	0	(1)	2	0.008	0.011	0.010	✓	2	✓
Latham	2	0.88	0.88	0.88	✓	1	✓	1	✓	2	0.023	0.034	0.029	✓	2	✓
Ledge Point	4	19.36	22.00	21.12	✓	2	✓	1	✓	2	0.013	0.018	0.016	✓	2	✓
Leeman	2	3.96	4.40	3.96	✓	1	✓	0	(1)	2	0.004	0.004	0.004	✓	2	✓
Meekatharra	4	53.24	66.44	62.04	(2)	2	✓	1	✓	2	0.004	0.005	0.005	✓	2	✓
Mingenew	2	8.36	9.24	8.80	✓	2	✓	0	(1)	2	0.005	0.007	0.006	✓	2	✓
Moora	2	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	2	0.028	0.030	0.029	✓	2	✓
Morawa	2	0.88	0.88	0.88	✓	2	✓	2	✓	2	0.002	0.005	0.004	✓	2	✓
Mt Magnet	7	66.00	73.92	69.08	(2)	1	✓	1	✓	2	0.003	0.003	0.003	✓	1	✓
Mullewa	2	2.64	2.64	2.64	✓	1	✓	0	(1)	2	0.02	0.035	0.028	✓	1	✓
Nabawa	2	3.08	3.52	3.08	✓	2	✓	0	(1)	2	0.008	0.029	0.019	✓	1	✓
New Norcia	10	48.84	59.4	51.48	(2)	2	✓	1	✓	2	0.009	0.009	0.009	✓	1	✓
Nilgern (Ocean Farms)	5	23.32	25.96	24.2	✓	1	✓	0	(1)	2	0.002	0.006	0.004	✓	0	(1)
Northampton	2	2.20	2.64	2.64	✓	2	✓	0	(1)	2	0.025	0.033	0.029	✓	2	✓
Perenjori	3	0.88	0.88	0.88	✓	2	✓	0	(1)	2	0.006	0.006	0.006	✓	2	✓
Piawaning	2	8.36	10.12	9.24	✓	2	✓	0	(1)	2	0.089	0.100	0.095	✓	2	✓
Port Kalbarri	2	0.44	0.88	0.44	✓	2	✓	0	(1)	2	0.037	0.052	0.045	✓	0	(1)
Sandstone	6	51.92	62.04	56.76	(2)	2	✓	2	✓	2	0.007	0.019	0.013	✓	2	✓
Seabird	2	<0.2	0.44	<0.2	✓	2	✓	0	(1)	2	0.053	0.066	0.060	✓	1	✓
Seaview Park	4	24.64	27.28	25.52	✓	2	✓	1	✓	2	0.003	0.004	0.004	✓	0	(1)
Sovereign Hills	6	2.64	13.64	4.84	✓	2	✓	1	✓	2	0.030	0.033	0.032	✓	0	(1)
Three Springs	2	0.88	1.32	0.88	✓	2	✓	0	(1)	2	0.003	0.006	0.005	✓	2	✓
Watheroo	4	<0.2	0.44	<0.2	✓	1	✓	2	✓	5	0.098	0.150	0.122	✓	0	✓
Woodridge	5	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	2	0.110	0.120	0.115	✓	1	✓
Yalgoo*	2	21.56	38.72	30.36	✓	2	✓	0	(1)	2	0.020	0.021	0.021	✓	2	✓
Yerecoin	5	1.76	14.08	9.68	✓	2	✓	1	✓	2	0.068	0.087	0.078	✓	2	✓
Yuna	2	2.64	3.08	2.64	✓	2	✓	0	(1)	2	0.017	0.027	0.022	✓	2	✓

(1) No samples required in this 12 month period. (2) 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.

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	120	130	125	(1)	2	<0.008	<0.008	<0.008	✓	2	205	215	210	✓	2	42	42	42	✓
Bindoon /Chittering	2	91	96	93.5	(1)	2	<0.008	<0.008	<0.008	✓	2	155	155	155	✓	2	50	52	51	✓
Bolgart	2	31	33	32	(1)	2	<0.008	<0.008	<0.008	✓	2	230	250	240	✓	2	120	120	120	✓
Calingiri	5	32	48	39	(1)	5	<0.008	<0.008	<0.008	✓	5	435	525	489	(2)	5	160	210	192	✓
Carnamah	2	9	12	10.5	(1)	2	<0.008	0.010	<0.008	✓	2	410	450	430	(2)	2	130	140	135	✓
Carnarvon	2	100	100	100	(1)	2	<0.008	<0.008	<0.008	✓	2	130	160	145	✓	2	150	180	165	✓
Cervantes	5	230	240	236	(1)	5	<0.008	<0.008	<0.008	✓	5	270	305	294	(2)	5	320	340	326	(3)
Coomberdale	2	29	35	32	(1)	2	0.0080	0.010	0.009	✓	2	245	265	255	(2)	2	72	76	74	✓
Coorow	2	9	11	10	(1)	2	<0.008	<0.008	<0.008	✓	2	410	410	410	(2)	2	130	140	135	✓
Coral Bay	2	74	86	80	(1)	1	<0.008	<0.008	<0.008	✓	2	60	70	65	✓	2	75	87	81	✓
Cue	2	64	64	64	(1)	2	<0.008	<0.008	<0.008	✓	2	275	290	283	(2)	2	180	190	185	✓
Dandaragan	2	120	150	135	(1)	2	<0.008	<0.008	<0.008	✓	2	235	250	243	✓	2	95	95	95	✓
Denham	2	23	25	24	(1)	2	<0.008	<0.008	<0.008	✓	2	150	160	155	✓	2	59	64	62	✓
Dongara/Denison	4	62	70	65	(1)	4	<0.008	<0.008	<0.008	✓	4	370	410	389	(2)	4	120	120	120	✓
Eneabba	4	15	17	16	(1)	4	<0.008	<0.008	<0.008	✓	4	325	340	335	(2)	4	95	100	99	✓
Exmouth	2	250	250	250	(1)	2	<0.008	<0.008	<0.008	✓	2	225	225	225	✓	2	330	330	330	(3)
Gascoyne Junction	2	14	23	18.5	(1)	2	<0.008	<0.008	<0.008	✓	2	55	150	103	✓	2	26	67	47	✓
Geraldton	4	60	63	61.8	(1)	4	<0.008	<0.008	<0.008	✓	4	370	400	391	(2)	4	110	120	118	✓
Gingin	2	38	40	39	(1)	2	<0.008	<0.008	<0.008	✓	2	100	110	105	✓	2	27	31	29	✓
Greenhead	2	21	22	21.5	(1)	2	<0.008	<0.008	<0.008	✓	2	275	300	288	(2)	2	110	110	110	✓
Guilderton	3	200	210	203.3	(1)	3	<0.008	<0.008	<0.008	✓	3	335	360	350	(2)	3	310	310	310	(3)
Horrocks	4	99	140	122.3	(1)	4	<0.008	<0.008	<0.008	✓	4	595	605	601	(2)	4	130	140	133	✓
Jurien Bay	4	250	260	252.5	(1)	4	<0.008	<0.008	<0.008	✓	4	235	565	326	(2)	4	300	420	340	(3)
Kalbarri	2	8	9	8.5	(1)	2	<0.008	<0.008	<0.008	✓	2	200	205	203	✓	2	66	67	67	✓
Lancelin	2	210	210	210	(1)	2	<0.008	<0.008	<0.008	✓	2	225	235	230	✓	2	270	280	275	(3)
Latham	2	44	45	44.5	(1)	2	<0.008	<0.008	<0.008	✓	2	310	325	318	(2)	2	94	110	102	✓
Ledge Point	4	210	220	215	(1)	4	<0.008	<0.008	<0.008	✓	4	160	170	165	✓	4	240	270	255	(3)
Leeman	2	21	23	22	(1)	2	<0.008	<0.008	<0.008	✓	2	280	295	288	(2)	2	100	110	105	✓
Meekatharra	4	160	180	170	(1)	4	<0.008	<0.008	<0.008	✓	4	280	290	286	(2)	4	280	300	285	(3)
Mingenew	2	23	26	24.5	(1)	2	<0.008	<0.008	<0.008	✓	2	360	370	365	(2)	2	86	87	87	✓
Moora	2	26	28	27	(1)	2	<0.008	<0.008	<0.008	✓	2	255	260	258	(2)	2	68	69	69	✓
Morawa	2	21	22	21.5	(1)	2	<0.008	<0.008	<0.008	✓	2	270	315	293	(2)	2	67	75	71	✓
Mt Magnet	2	190	200	195	(1)	2	<0.008	<0.008	<0.008	✓	2	260	270	265	(2)	2	270	270	270	(3)
Mullewa	2	72	78	75	(1)	2	<0.008	<0.008	<0.008	✓	2	360	400	380	(2)	2	120	130	125	✓
Nabawa	2	62	62	62	(1)	2	0.010	0.010	0.010	✓	2	390	410	400	(2)	2	120	120	120	✓
New Norcia	6	26	31	28.3	(1)	2	<0.008	<0.008	<0.008	✓	6	480	600	550	(2)	6	200	230	213	(3)
Nilgern (Ocean Farms)	5	220	230	222	(1)	5	<0.008	<0.008	<0.008	✓	5	135	140	136	✓	5	230	250	236	(3)
Northampton	2	66	71	68.5	(1)	2	<0.008	0.008	<0.008	✓	2	370	390	380	(2)	2	120	120	120	✓
Perenjori	3	25	26	25.7	(1)	3	<0.008	<0.008	<0.008	✓	3	290	320	300	(2)	3	67	79	72	✓
Piawaning	2	51	61	56	(1)	2	<0.008	<0.008	<0.008	✓	2	180	210	195	✓	2	100	110	105	✓
Port Kalbarri	2	73	88	80.5	(1)	2	<0.008	<0.008	<0.008	✓	2	305	340	323	(2)	2	76	110	93	✓
Sandstone	2	93	99	96	(1)	2	<0.008	<0.008	<0.008	✓	2	340	350	345	(2)	2	310	320	315	(3)
Seabird	2	120	120	120	(1)	2	<0.008	<0.008	<0.008	✓	2	205	215	210	✓	2	90	100	95	✓
Seaview Park	4	170	180	177.5	(1)	4	<0.008	<0.008	<0.008	✓	4	85	90	88	✓	4	180	200	188	✓
Sovereign Hills	2	210	210	210	(1)	2	<0.008	<0.008	<0.008	✓	2	185	190	188	✓	2	240	250	245	(3)
Three Springs	2	17	17	17	(1)	2	<0.008	0.008	<0.008	✓	2	365	370	368	(2)	2	87	88	88	✓
Watheroo	4	190	190	190	(1)	4	<0.008	<0.008	<0.008	✓	4	190	200	195	✓	4	260	260	260	(3)
Woodridge	5	54	57	55.6	(1)	5	0.035	0.045	0.040	✓	5	180	190	185	✓	5	45	51	48	✓
Yalgoo	2	86	100	93	(1)	2	<0.008	<0.008	<0.008	✓	2	85	130	108	✓	2	37	97	67	✓
Yerecoin	5	35	73	46.4	(1)	5	<0.008	<0.008	<0.008	✓	5	185	380	239	✓	5	91	200	126	✓
Yuna	2	59	64	61.5	(1)	1	0.008	0.008	0.008	✓	2	375	395	385	(2)	2	110	120	115	✓

(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.

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	0.008	0.007	✓	2	0.003	0.004	0.004	✓	2	7.06	7.22	7.14	✓	2	40	42	41	✓
Bindoon /Chittering	2	0.01	0.045	0.028	✓	2	<0.002	0.005	0.003	✓	2	7.28	7.30	7.29	✓	2	36	36	36	✓
Bolgart	2	0.015	0.025	0.02	✓	2	<0.002	<0.002	<0.002	✓	2	6.90	7.12	7.01	✓	2	40	44	42	✓
Calingiri	5	0.035	0.06	0.048	✓	5	<0.002	<0.002	<0.002	✓	5	6.50	6.86	6.71	✓	5	14	17	15	✓
Carnamah	2	0.025	0.05	0.038	✓	2	<0.002	<0.002	<0.002	✓	2	6.65	6.89	6.77	✓	2	22	23	22.5	✓
Carnarvon	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.70	7.71	7.71	✓	2	37	41	39	✓
Cervantes	5	<0.003	0.008	<0.003	✓	5	<0.002	<0.002	<0.002	✓	5	7.36	7.70	7.56	✓	5	12	14	13	✓
Coomberdale	2	0.045	0.05	0.048	✓	2	<0.002	<0.002	<0.002	✓	2	7.79	8.20	8.00	✓	2	21	22	21.5	✓
Coorow	2	0.015	0.02	0.018	✓	2	<0.002	<0.002	<0.002	✓	2	6.49	6.82	6.66	✓	2	24	24	24	✓
Coral Bay	2	0.01	0.015	0.013	✓	2	<0.002	0.003	<0.002	✓	2	7.28	7.46	7.37	✓	2	0.6	0.6	0.6	✓
Cue	2	0.004	0.004	0.004	✓	2	<0.002	<0.002	<0.002	✓	2	7.89	7.99	7.94	✓	2	80	80	80	(2)
Dandaragan	2	0.045	0.08	0.063	✓	2	0.002	0.004	0.003	✓	2	7.34	7.35	7.35	✓	2	40	40	40	✓
Denham	2	0.015	0.05	0.033	✓	2	<0.002	<0.002	<0.002	✓	2	7.09	7.26	7.18	✓	2	2.7	3	2.9	✓
Dongara/Denison	4	0.02	0.14	0.051	✓	4	<0.002	0.009	<0.002	✓	4	7.11	7.33	7.18	✓	4	20	24	21.8	✓
Eneabba	4	0.01	0.02	0.015	✓	4	<0.002	<0.002	<0.002	✓	4	7.01	7.12	7.07	✓	4	42	45	43.5	✓
Exmouth	2	<0.003	0.004	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.40	7.61	7.51	✓	2	15	15	15	✓
Gascoyne Junction	2	0.004	0.004	0.004	✓	2	<0.002	<0.002	<0.002	✓	2	7.07	7.18	7.13	✓	2	3.3	4.1	3.7	✓
Geraldton	4	0.01	0.07	0.029	✓	4	<0.002	0.003	<0.002	✓	4	6.71	7.17	6.97	✓	4	21	24	22.8	✓
Gingin	2	0.045	0.06	0.053	✓	2	<0.002	<0.002	<0.002	✓	2	7.36	7.55	7.46	✓	2	29	30	29.5	✓
Greenhead	2	0.015	0.02	0.018	✓	2	<0.002	<0.002	<0.002	✓	2	7.04	7.32	7.18	✓	2	23	23	23	✓
Guilderton	3	<0.003	0.004	<0.003	✓	3	<0.002	<0.002	<0.002	✓	3	7.72	7.93	7.80	✓	3	8.7	8.9	8.8	✓
Horrocks	4	0.04	0.06	0.049	✓	4	0.004	0.007	0.006	✓	4	7.19	7.44	7.33	✓	4	14	15	14.8	✓
Jurien Bay	4	<0.003	<0.003	<0.003	✓	4	<0.002	<0.002	<0.002	✓	4	7.45	7.68	7.58	✓	4	14	15	14.5	✓
Kalbarri	2	0.06	0.1	0.08	✓	2	<0.002	<0.002	<0.002	✓	2	6.81	6.92	6.87	✓	2	39	41	40	✓
Lancelin	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.71	7.86	7.79	✓	2	15	15	15	✓
Latham	2	0.025	0.045	0.035	✓	2	<0.002	<0.002	<0.002	✓	2	9.06	9.22	9.14	(1)	2	42	44	43	✓
Ledge Point	4	<0.003	0.006	0.004	✓	4	<0.002	<0.002	<0.002	✓	4	7.80	8.10	7.90	✓	4	14	15	14.8	✓
Leeman	2	0.01	0.02	0.015	✓	2	<0.002	<0.002	<0.002	✓	2	7.39	7.73	7.56	✓	2	23	24	23.5	✓
Meekatharra	4	<0.003	<0.003	<0.003	✓	4	<0.002	<0.002	<0.002	✓	4	8.00	8.17	8.09	✓	4	75	80	77.5	✓
Mingenew	2	0.015	0.1	0.058	✓	2	<0.002	0.007	0.004	✓	2	7.02	7.16	7.09	✓	2	50	55	52.5	✓
Moora	2	0.015	0.04	0.028	✓	2	<0.002	<0.002	<0.002	✓	2	6.96	7.25	7.11	✓	2	22	23	22.5	✓
Morawa	2	0.008	0.015	0.012	✓	2	<0.002	<0.002	<0.002	✓	2	6.83	6.85	6.84	✓	2	44	45	44.5	✓
Mt Magnet	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.90	8.13	8.02	✓	2	70	70	70	✓
Mullewa	2	0.02	0.05	0.035	✓	2	<0.002	<0.002	<0.002	✓	2	8.09	8.11	8.10	✓	2	21	24	22.5	✓
Nabawa	2	0.015	0.025	0.02	✓	2	<0.002	<0.002	<0.002	✓	2	7.77	7.79	7.78	✓	2	20	21	20.5	✓
New Norcia	6	0.015	0.05	0.026	✓	6	<0.002	<0.002	<0.002	✓	6	6.67	7.04	6.81	✓	6	42	44	43	✓
Nilgern (Ocean Farms	5	0.004	0.01	0.006	✓	5	<0.002	<0.002	<0.002	✓	5	7.42	7.83	7.66	✓	5	17	19	18.4	✓
Northampton	2	0.008	0.035	0.022	✓	2	<0.002	0.003	<0.002	✓	2	8.18	8.43	8.31	✓	2	22	22	22	✓
Perenjori	3	0.01	0.025	0.018	✓	3	<0.002	<0.002	<0.002	✓	3	7.06	7.32	7.21	✓	3	45	46	45.3	✓
Piawaning	2	0.015	0.025	0.02	✓	2	<0.002	<0.002	<0.002	✓	2	7.40	7.76	7.58	✓	2	17	18	17.5	✓
Port Kalbarri	2	0.004	0.008	0.006	✓	2	<0.002	<0.002	<0.002	✓	6	7.54	7.9	7.66	✓	2	29	42	35.5	✓
Sandstone	2	0.006	0.008	0.007	✓	2	<0.002	<0.002	<0.002	✓	2	7.42	7.46	7.44	✓	2	35	36	35.5	✓
Seabird	2	0.035	0.05	0.043	✓	2	<0.002	<0.002	<0.002	✓	2	7.81	8.06	7.94	✓	2	16	17	16.5	✓
Seaview Park	4	<0.003	0.004	<0.003	✓	4	<0.002	<0.002	<0.002	✓	4	7.77	8.03	7.89	✓	4	16	17	16.3	✓
Sovereign Hills	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.76	8.23	8.00	✓	2	19	20	19.5	✓
Three Springs	2	0.035	0.045	0.04	✓	2	0.004	0.006	0.005	✓	2	7.24	7.26	7.25	✓	2	48	49	48.5	✓
Watheroo	4	0.006	0.015	0.01	✓	4	<0.002	<0.002	<0.002	✓	4	7.46	7.73	7.65	✓	4	13	13	13	✓
Woodridge	5	0.015	0.045	0.023	✓	5	0.004	0.007	0.005	✓	5	7.05	7.46	7.28	✓	5	24	25	24.6	✓
Yalgoo	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.58	7.74	7.66	✓	2	80	80	80	(2)
Yerecoin	5	0.015	0.035	0.02	✓	5	<0.002	<0.002	<0.002	✓	5	6.85	8.00	7.33	✓	5	16	19	17.2	✓
Yuna	2	0.035	0.045	0.04	✓	2	<0.002	<0.002	<0.002	✓	2	7.55	7.81	7.68	✓	2	22	22	22	✓

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

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	180	190	185	(1)	2	618	648	633	(2)	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Bindoon /Chittering	2	125	125	125	✓	2	471	472	472	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Bolgart	2	130	130	130	✓	2	539	557	548	✓	2	<1	<1	<1	✓	2	0.5	0.9	0.7	✓
Calingiri	5	240	290	272	(1)	5	847	1006	946	(2)	5	<1	<1	<1	✓	5	<0.1	0.3	<0.1	✓
Carnamah	2	245	245	245	(1)	2	796	823	810	(2)	2	<1	<1	<1	✓	2	<0.1	0.3	0.2	✓
Carnarvon	2	76	86	81	✓	2	480	547	514	✓	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Cervantes	5	165	185	172	✓	5	897	958	938	(2)	5	<1	<1	<1	✓	5	<0.1	<0.1	<0.1	✓
Coomberdale	2	135	150	142.5	✓	2	510	533	522	✓	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Coorow	2	240	250	245	(1)	2	782	800	791	(2)	2	<1	3	2	✓	2	<0.1	0.2	<0.1	✓
Coral Bay	2	39	45	42	✓	2	229	263	246	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Cue	2	180	185	182.5	(1)	2	815	824	820	(2)	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Dandaragan	2	165	180	172.5	✓	2	650	714	682	(2)	2	<1	<1	<1	✓	2	0.3	0.3	0.3	✓
Denham	2	89	94	91.5	✓	2	331	348	340	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Dongara/Denison	4	245	250	248.8	(1)	4	795	855	831	(2)	4	<1	<1	<1	✓	4	0.1	1	0.4	✓
Eneabba	4	180	185	181.3	(1)	4	635	649	644	(2)	4	<1	<1	<1	✓	4	0.2	0.2	0.2	✓
Exmouth	2	120	120	120	✓	2	812	816	814	(2)	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Gascoyne Junction	2	37	88	62.5	✓	2	138	333	236	✓	2	<1	<1	<1	✓	2	<0.1	0.3	0.2	✓
Geraldton	4	225	250	241.3	(1)	4	797	852	834	(2)	4	<1	<1	<1	✓	4	0.1	0.4	0.2	✓
Gingin	2	62	71	66.5	✓	2	269	290	280	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Greenhead	2	160	160	160	✓	2	560	583	572	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Guilderton	3	200	205	201.7	(1)	3	989	1017	1007	(2)	3	<1	<1	<1	✓	3	<0.1	0.2	<0.1	✓
Horrocks	4	385	435	412.5	(1)	4	1307	1341	1325	(2)	4	<1	<1	<1	✓	4	0.2	0.2	0.2	✓
Jurien Bay	4	125	295	175	✓	4	838	1401	1000	(2)	4	<1	<1	<1	✓	4	<0.1	0.2	<0.1	✓
Kalbarri	2	105	105	105	✓	2	399	405	402	✓	2	<1	<1	<1	✓	2	0.5	0.7	0.6	✓
Lancelin	2	110	120	115	✓	2	728	755	742	(2)	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Latham	2	185	195	190	(1)	2	695	696	696	(2)	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Ledge Point	4	100	105	103.8	✓	4	695	719	704	(2)	4	<1	<1	<1	✓	4	<0.1	0.2	<0.1	✓
Leeman	2	155	155	155	✓	2	558	573	566	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Meekatharra	4	195	205	201.3	(1)	4	1026	1071	1053	(2)	4	<1	<1	<1	✓	4	<0.1	<0.1	<0.1	✓
Mingenew	2	205	220	212.5	(1)	2	726	749	738	(2)	2	<1	<1	<1	✓	2	<0.1	0.3	0.2	✓
Moora	2	145	150	147.5	✓	2	517	525	521	✓	2	<1	<1	<1	✓	2	0.2	0.5	0.4	✓
Morawa	2	175	190	182.5	(1)	2	585	657	621	(2)	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Mt Magnet	2	175	180	177.5	✓	2	979	981	980	(2)	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Mullewa	2	235	240	237.5	(1)	2	819	861	840	(2)	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Nabawa	2	245	250	247.5	(1)	2	830	854	842	(2)	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
New Norcia	6	285	330	298.3	(1)	6	992	1176	1083	(2)	6	<1	<1	<1	✓	6	0.1	0.4	0.3	✓
Nilgern (Ocean Farms	5	83	89	86	✓	5	638	662	645	(2)	5	<1	<1	<1	✓	5	<0.1	0.2	<0.1	✓
Northampton	2	245	250	247.5	(1)	2	825	846	836	(2)	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Perenjori	3	170	190	178.3	✓	3	613	665	632	(2)	3	<1	<1	<1	✓	3	0.1	0.2	0.1	✓
Piawaning	2	95	120	107.5	✓	2	451	488	470	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Port Kalbarri	2	190	215	202.5	(1)	2	694	787	741	(2)	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Sandstone	2	185	185	185	(1)	2	969	976	973	(2)	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Seabird	2	145	155	150	✓	2	601	609	605	(2)	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Seaview Park	4	58	61	59.5	✓	4	486	499	493	✓	4	<1	<1	<1	✓	4	<0.1	0.2	<0.1	✓
Sovereign Hills	2	105	105	105	✓	2	680	686	683	(2)	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Three Springs	2	210	220	215	(1)	2	722	740	731	(2)	2	<1	<1	<1	✓	2	0.2	0.4	0.3	✓
Watheroo	4	94	100	96.3	✓	4	640	651	643	(2)	4	<1	<1	<1	✓	4	<0.1	<0.1	<0.1	✓
Woodridge	5	125	135	129	✓	5	453	472	464	✓	5	<1	<1	<1	✓	5	<0.1	0.2	<0.1	✓
Yalgoo	2	77	99	88	✓	2	387	523	455	✓	2	<1	<1	<1	✓	2	<0.1	0.4	0.2	✓
Yerecoin	5	100	190	130	✓	5	436	769	542	✓	5	<1	<1	<1	✓	5	<0.1	0.3	<0.1	✓
Yuna	2	230	240	235	(1)	2	799	835	817	(2)	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓

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

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	11	0	0	✓	11	0	✓	2	0.8	0.8	0.80	(2)	2	✓	2	✓
Avon Hills	60	0	0	✓	60	0	✓	2	0.75	0.8	0.78	(2)	1	✓	2	✓
Ballidu	12	0	0	✓	12	0	✓	2	0.8	0.85	0.83	(2)	2	✓	2	✓
Beacon	12	0	0	✓	12	0	✓	2	0.75	0.8	0.78	(2)	1	✓	2	✓
Bencubbin	12	0	0	✓	12	0	✓	2	0.75	0.75	0.75	(2)	1	✓	2	✓
Beverley	53	0	0	✓	26	0	✓	2	0.8	0.9	0.85	(2)	1	✓	2	✓
Bind Bindi	12	0	0	✓	12	0	✓	2	0.75	0.8	0.78	(2)	1	✓	2	✓
Broad Arrow	12	0	0	✓	12	0	✓	2	0.85	0.9	0.88	(2)	2	✓	2	✓
Bruce Rock	52	0	0	✓	12	0	✓	2	0.75	0.9	0.83	(2)	1	✓	2	✓
Bullfinch	12	0	0	✓	12	0	✓	2	0.75	0.8	0.78	(2)	0	(1)	2	✓
Buntine	12	0	0	✓	12	0	✓	2	0.8	0.8	0.80	(2)	1	✓	2	✓
Cadoux	12	0	0	✓	12	0	✓	2	0.75	0.9	0.83	(2)	1	✓	2	✓
Coolgardie	52	0	0	✓	26	0	✓	2	0.85	0.85	0.85	(2)	2	✓	2	✓
Corrigin	52	0	0	✓	25	0	✓	2	0.75	0.8	0.78	(2)	1	✓	2	✓
Cunderdin	53	0	0	✓	12	0	✓	2	0.75	0.9	0.83	(2)	1	✓	2	✓
Dalwallinu	53	0	0	✓	12	0	✓	2	0.75	0.75	0.75	(2)	1	✓	2	✓
Dowerin	12	0	0	✓	12	0	✓	2	0.8	0.9	0.85	(2)	1	✓	2	✓
Goomalling	53	0	0	✓	12	0	✓	2	0.85	0.85	0.85	(2)	0	(1)	2	✓
Greater Bodallin	12	0	0	✓	12	0	✓	2	0.75	0.75	0.75	(2)	2	✓	2	✓
Greater Burracoppin	36	0	0	✓	36	0	✓	2	0.8	0.85	0.83	(2)	2	✓	2	✓
Greater Doolakine	36	0	0	✓	36	0	✓	2	0.75	0.8	0.78	(2)	2	✓	2	✓
Greater Meckering	39	0	0	✓	40	0	✓	2	0.75	0.9	0.83	(2)	1	✓	2	✓
Greenhills	12	0	0	✓	12	0	✓	2	0.75	0.85	0.80	(2)	0	✓	2	✓
Jennacubbine	12	0	0	✓	12	0	✓	2	0.8	0.85	0.83	(2)	1	✓	2	✓
Kalannie	12	0	0	✓	12	0	✓	2	0.75	0.85	0.80	(2)	1	✓	2	✓
Kalgoorlie	160	0	0	✓	134	0	✓	55	0.75	0.9	0.82	(2)	2	✓	2	✓
Kambalda	53	0	0	✓	53	0	✓	2	0.85	0.85	0.85	(2)	0	(1)	2	✓
Kellerberrin	52	0	0	✓	27	0	✓	2	0.75	0.75	0.75	(2)	1	✓	2	✓
Koolyanobbing	12	0	0	✓	12	0	✓	2	0.75	0.9	0.83	(2)	1	✓	2	✓
Koorda	12	0	0	✓	12	0	✓	2	0.75	0.85	0.80	(2)	1	✓	2	✓
Kununoppin	12	0	0	✓	12	0	✓	2	0.75	0.95	0.85	(2)	1	✓	2	✓
Laverton	12	0	0	✓	11	0	✓	4	0.85	1.2	1.00	(3)	2	✓	6	✓
Leonora	52	0	0	✓	27	0	✓	2	0.5	0.5	0.50	(3)	2	✓	2	✓
Marvel Loch	12	0	0	✓	12	0	✓	2	0.8	0.85	0.83	(2)	1	✓	2	✓
Menzies	12	0	0	✓	12	0	✓	2	0.8	0.8	0.80	(2)	2	✓	6	✓
Merredin	52	0	0	✓	52	0	✓	53	0.75	0.9	0.82	(2)	1	✓	2	✓
Miling	12	0	0	✓	12	0	✓	2	0.75	0.8	0.78	(2)	1	✓	2	✓
Mukinbudin	12	0	0	✓	12	0	✓	2	0.75	0.85	0.80	(2)	1	✓	2	✓
Muntadgin	12	0	0	✓	12	0	✓	2	0.75	0.8	0.78	(2)	1	✓	2	✓
Narembeen	12	0	0	✓	12	0	✓	2	0.85	0.85	0.85	(2)	1	✓	2	✓
Norseman	52	0	0	✓	27	0	✓	2	0.85	0.95	0.90	(2)	1	✓	2	✓
Northam	80	0	0	✓	80	0	✓	53	0.75	0.9	0.81	(2)	0	(1)	2	✓
Nungarin	12	0	0	✓	12	0	✓	2	0.75	0.9	0.83	(2)	1	✓	2	✓
Ora Banda	12	0	0	✓	12	0	✓	2	0.8	0.85	0.83	(2)	2	✓	2	✓
Pithara	12	0	0	✓	12	0	✓	2	0.75	0.8	0.78	(2)	1	✓	2	✓
Quairading	53	0	0	✓	27	0	✓	2	0.75	0.85	0.80	(2)	1	✓	2	✓
Seabrook	12	0	0	✓	12	0	✓	2	0.8	0.8	0.80	(2)	0	(1)	2	✓
Shackleton	12	0	0	✓	12	0	✓	2	0.8	0.8	0.80	(2)	2	✓	2	✓
Southern Cross	52	0	0	✓	39	0	✓	2	0.75	0.85	0.80	(2)	1	✓	2	✓
Spencers Brook	12	0	0	✓	12	0	✓	2	0.8	0.8	0.80	(2)	1	✓	2	✓
Tammin	24	0	0	✓	24	0	✓	2	0.8	0.85	0.83	(2)	1	✓	2	✓
Toodyay	53	0	0	✓	26	0	✓	2	0.8	0.85	0.83	(2)	1	✓	2	✓
Trayning	12	0	0	✓	12	0	✓	2	0.75	0.85	0.80	(2)	1	✓	2	✓
Warralakin	12	0	0	✓	12	0	✓	2	0.75	0.8	0.78	(2)	1	✓	2	✓
Westonia	12	0	0	✓	12	0	✓	2	0.8	0.8	0.80	(2)	1	✓	2	✓
Wiluna	13	0	0	✓	13	0	✓	2	0.2	0.25	0.23	✓	2	✓	2	✓
Wongan Hills	53	0	0	✓	26	0	✓	2	0.8	0.85	0.83	(2)	1	✓	2	✓
Wubin	12	0	0	✓	12	0	✓	2	0.8	0.8	0.80	(2)	1	✓	2	✓
Wyalkatchem	12	0	0	✓	12	0	✓	2	0.8	0.9	0.85	(2)	1	✓	2	✓
York	79	0	0	✓	79	0	✓	53	0.75	0.9	0.80	(2)	1	✓	2	✓

(1) No samples required in this 12 month period (2) Receives water from a fluoridated source within the dosing range set by the Fluoridation of Water Supplies Advisory Committee (3) Naturally ocurring fluoride below the ADWG guideline

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	0.9	2.2	1.3	✓	2	✓	2	✓	2	0.014	0.023	0.019	✓	2	✓
Avon Hills	2	0.4	0.9	0.9	✓	2	✓	2	✓	2	0.028	0.037	0.033	✓	1	✓
Ballidu	2	0.9	0.9	0.9	✓	2	✓	0	(1)	2	0.024	0.036	0.03	✓	1	✓
Beacon	2	1.3	4.8	3.1	✓	2	✓	2	✓	2	0.016	0.024	0.02	✓	2	✓
Bencubbin	2	0.9	3.5	2.2	✓	2	✓	2	✓	2	0.013	0.021	0.017	✓	1	✓
Beverley	2	0.9	1.8	1.3	✓	2	✓	0	(1)	2	0.024	0.033	0.029	✓	2	✓
Bind Bindi	2	1.3	2.2	1.8	✓	2	✓	2	✓	2	0.023	0.034	0.029	✓	1	✓
Broad Arrow	2	1.8	3.1	2.2	✓	2	✓	2	✓	2	0.12	0.13	0.125	✓	1	✓
Bruce Rock	2	0.9	2.6	1.8	✓	2	✓	2	✓	2	0.018	0.024	0.021	✓	2	✓
Bullfinch	2	1.3	4.0	2.6	✓	1	✓	0	(1)	2	0.016	0.11	0.063	✓	0	(1)
Buntine	2	1.8	3.1	2.2	✓	2	✓	0	(1)	2	0.011	0.018	0.015	✓	1	✓
Cadoux	2	0.9	0.9	0.9	✓	2	✓	2	✓	2	0.025	0.032	0.029	✓	1	✓
Coolgardie	2	1.8	2.2	2.2	✓	2	✓	2	✓	2	0.036	0.064	0.05	✓	1	✓
Corrigin	2	0.9	0.9	0.9	✓	2	✓	2	✓	2	0.01	0.014	0.012	✓	2	✓
Cunderdin	2	0.4	0.4	0.4	✓	2	✓	2	✓	2	0.039	0.049	0.044	✓	1	✓
Dalwallinu	2	0.9	2.2	1.8	✓	2	✓	2	✓	2	0.028	0.031	0.03	✓	1	✓
Dowerin	2	1.3	1.3	1.3	✓	2	✓	2	✓	2	0.029	0.029	0.029	✓	1	✓
Goomalling	2	0.4	0.9	0.9	✓	1	✓	2	✓	2	0.029	0.038	0.034	✓	1	✓
Greater Bodallin	2	0.9	0.9	0.9	✓	2	✓	2	✓	2	0.022	0.033	0.028	✓	2	✓
Greater Burracoppin	2	0.9	1.3	0.9	✓	2	✓	2	✓	2	0.011	0.03	0.021	✓	2	✓
Greater Doolakine	2	0.4	0.4	0.4	✓	2	✓	2	✓	2	0.038	0.042	0.04	✓	2	✓
Greater Meckering	2	0.4	0.4	0.4	✓	2	✓	2	✓	2	0.041	0.049	0.045	✓	1	✓
Greenhills	2	0.9	2.2	1.3	✓	1	✓	2	✓	2	0.023	0.026	0.025	✓	2	✓
Jennacubbine	2	0.9	1.3	1.3	✓	2	✓	0	(1)	2	0.03	0.032	0.031	✓	2	✓
Kalannie	2	3.1	3.1	3.1	✓	2	✓	2	✓	2	0.027	0.082	0.055	✓	1	✓
Kalgoorlie	2	0.9	2.6	1.8	✓	2	✓	2	✓	2	0.098	0.13	0.114	✓	1	✓
Kambalda	2	1.3	3.5	2.2	✓	1	✓	0	(1)	2	0.17	0.18	0.175	✓	0	(1)
Kellerberrin	2	0.4	0.4	0.4	✓	2	✓	0	(1)	2	0.039	0.04	0.04	✓	1	✓
Koolyanobbing	2	0.9	3.1	1.8	✓	2	✓	1	✓	2	0.016	0.022	0.019	✓	1	✓
Koorda	2	0.4	0.9	0.9	✓	2	✓	2	✓	2	0.019	0.028	0.024	✓	1	✓
Kununoppin	2	2.2	2.6	2.2	✓	2	✓	2	✓	2	0.021	0.037	0.029	✓	1	✓
Laverton*	10	34.3	39.6	36.5	✓	2	✓	0	(1)	2	0.08	0.09	0.085	✓	1	✓
Leonora*	10	25.5	29.5	27.7	✓	2	✓	0	(1)	2	<0.001	<0.001	<0.001	✓	2	✓
Marvel Loch	2	0.9	3.1	1.8	✓	2	✓	2	✓	2	0.026	0.056	0.041	✓	1	✓
Menzies*	6	0.9	2.2	1.8	✓	2	✓	2	✓	2	0.094	0.13	0.112	✓	1	✓
Merredin	2	0.4	0.9	0.4	✓	2	✓	0	(1)	2	0.019	0.031	0.025	✓	1	✓
Miling	2	0.9	4.4	2.6	✓	2	✓	0	(1)	2	0.022	0.031	0.027	✓	1	✓
Mukinbudin	2	1.8	2.6	2.2	✓	2	✓	2	✓	2	0.013	0.014	0.014	✓	1	✓
Muntadgin	2	0.9	2.6	1.8	✓	2	✓	2	✓	2	0.028	0.053	0.041	✓	1	✓
Narembeen	2	0.9	0.9	0.9	✓	2	✓	2	✓	2	0.011	0.02	0.016	✓	1	✓
Norseman	2	0.9	2.2	1.8	✓	2	✓	2	✓	2	0.065	0.1	0.083	✓	1	✓
Northam	2	0.9	0.9	0.9	✓	1	✓	2	✓	2	0.024	0.025	0.025	✓	0	(1)
Nungarin	2	0.9	0.9	0.9	✓	2	✓	2	✓	2	0.016	0.028	0.022	✓	1	✓
Ora Banda	2	1.3	5.3	3.1	✓	2	✓	2	✓	2	0.071	0.095	0.083	✓	1	✓
Pithara	2	0.9	0.9	0.9	✓	2	✓	2	✓	2	0.029	0.036	0.033	✓	1	✓
Quairading	2	0.9	2.6	1.8	✓	2	✓	0	(1)	2	0.017	0.035	0.026	✓	1	✓
Seabrook	2	0.4	0.9	0.4	✓	1	✓	1	✓	2	0.029	0.049	0.039	✓	2	✓
Shackleton	2	0.9	1.3	0.9	✓	2	✓	2	✓	2	0.029	0.04	0.035	✓	2	✓
Southern Cross	2	0.9	1.8	1.3	✓	2	✓	2	✓	2	0.017	0.018	0.018	✓	1	✓
Spencers Brook	2	0.4	0.4	0.4	✓	2	✓	0	(1)	2	0.031	0.039	0.035	✓	2	✓
Tammin	2	0.4	0.9	0.4	✓	2	✓	2	✓	2	0.031	0.036	0.034	✓	1	✓
Toodyay	2	0.4	0.9	0.4	✓	2	✓	2	✓	2	0.031	0.034	0.033	✓	1	✓
Trayning	2	1.3	1.3	1.3	✓	2	✓	2	✓	2	0.019	0.03	0.025	✓	1	✓
Warralakin	2	0.9	4.0	2.2	✓	2	✓	2	✓	2	0.009	0.02	0.015	✓	1	✓
Westonia	2	0.9	2.6	1.8	✓	2	✓	2	✓	2	0.01	0.02	0.015	✓	1	✓
Wiluna*	2	37.0	40.0	38.7	✓	2	✓	0	(1)	2	0.002	0.006	0.004	✓	2	✓
Wongan Hills	2	0.4	0.9	0.4	✓	2	✓	2	✓	2	0.018	0.13	0.074	✓	1	✓
Wubin	2	0.9	2.6	1.8	✓	2	✓	2	✓	2	0.014	0.015	0.015	✓	1	✓
Wyalkatchem	2	0.4	0.9	0.4	✓	2	✓	2	✓	2	0.024	0.032	0.028	✓	1	✓
York	2	0.4	0.9	0.4	✓	2	✓	2	✓	2	0.033	0.038	0.036	✓	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.

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	65	74	69.5	(1)	2	0.014	0.045	0.03	✓	2	175	190	182.5	✓	2	100	110	105	✓
Avon Hills	2	59	71	65	(1)	2	0.02	0.025	0.023	✓	2	170	185	177.5	✓	2	97	100	99	✓
Ballidu	2	72	75	73.5	(1)	2	0.012	0.045	0.029	✓	2	170	185	177.5	✓	2	99	100	100	✓
Beacon	2	65	70	67.5	(1)	2	0.01	0.025	0.018	✓	2	185	200	192.5	✓	2	100	110	105	✓
Bencubbin	2	68	77	72.5	(1)	2	0.012	0.03	0.021	✓	2	180	200	190	✓	2	99	110	105	✓
Beverley	2	65	73	69	(1)	2	0.018	0.04	0.029	✓	2	175	180	177.5	✓	2	98	110	104	✓
Bind Bindi	2	64	71	67.5	(1)	2	0.012	0.045	0.029	✓	2	170	200	185	✓	2	100	110	105	✓
Broad Arrow	2	63	71	67	(1)	2	0.025	0.035	0.03	✓	2	200	215	207.5	✓	2	110	120	115	✓
Bruce Rock	2	63	78	70.5	(1)	2	0.014	0.03	0.022	✓	2	180	195	187.5	✓	2	94	110	102	✓
Bullfinch	2	66	73	69.5	(1)	2	0.012	0.045	0.029	✓	2	180	210	195	✓	2	99	110	105	✓
Buntine	2	74	76	75	(1)	2	0.016	0.045	0.031	✓	2	180	190	185	✓	2	100	120	110	✓
Cadoux	2	61	71	66	(1)	2	0.012	0.04	0.026	✓	2	170	185	177.5	✓	2	97	98	98	✓
Coolgardie	2	56	64	60	(1)	2	0.018	0.035	0.027	✓	2	180	205	192.5	✓	2	96	110	103	✓
Corrigin	2	67	71	69	(1)	2	0.014	0.04	0.027	✓	2	180	195	187.5	✓	2	100	110	105	✓
Cunderdin	2	60	69	64.5	(1)	2	0.012	0.03	0.021	✓	2	170	180	175	✓	2	97	98	98	✓
Dalwallinu	2	63	82	72.5	(1)	2	0.018	0.025	0.022	✓	2	175	180	177.5	✓	2	100	100	100	✓
Dowerin	2	64	74	69	(1)	2	0.018	0.025	0.022	✓	2	180	185	182.5	✓	2	99	110	105	✓
Goomalling	2	61	71	66	(1)	2	0.016	0.025	0.021	✓	2	175	195	185	✓	2	97	100	99	✓
Greater Bodallin	2	61	69	65	(1)	2	0.014	0.03	0.022	✓	2	165	195	180	✓	2	93	110	102	✓
Greater Burracoppin	2	61	73	67	(1)	2	0.014	0.035	0.025	✓	2	180	195	187.5	✓	2	93	100	97	✓
Greater Doolakine	2	64	72	68	(1)	2	0.012	0.035	0.024	✓	2	170	190	180	✓	2	98	100	99	✓
Greater Meckering	2	73	74	73.5	(1)	2	0.014	0.03	0.022	✓	2	165	180	172.5	✓	2	98	100	99	✓
Greenhills	2	63	69	66	(1)	2	0.025	0.04	0.033	✓	2	170	185	177.5	✓	2	95	100	98	✓
Jennacubbine	2	63	74	68.5	(1)	2	0.012	0.035	0.024	✓	2	175	195	185	✓	2	91	110	101	✓
Kalannie	2	66	72	69	(1)	2	0.016	0.035	0.026	✓	2	190	195	192.5	✓	2	100	110	105	✓
Kalgoorlie	2	52	66	59	(1)	2	0.014	0.03	0.022	✓	2	190	195	192.5	✓	2	110	110	110	✓
Kambalda	2	53	73	63	(1)	2	0.014	0.02	0.017	✓	2	180	185	182.5	✓	2	110	110	110	✓
Kellerberrin	2	66	73	69.5	(1)	2	0.014	0.025	0.02	✓	2	190	190	190	✓	2	100	100	100	✓
Koolyanobbing	2	63	73	68	(1)	2	0.014	0.025	0.02	✓	2	175	190	182.5	✓	2	99	100	100	✓
Koorda	2	65	71	68	(1)	2	0.012	0.045	0.029	✓	2	170	185	177.5	✓	2	99	100	100	✓
Kununoppin	2	64	74	69	(1)	2	0.016	0.025	0.021	✓	2	175	185	180	✓	2	99	110	105	✓
Laverton	6	100	130	111.7	(1)	2	<0.008	<0.008	<0.008	✓	6	135	150	142.5	✓	6	110	130	120	✓
Leonora	6	100	130	111.7	(1)	2	<0.008	<0.008	<0.008	✓	6	150	165	155.8	✓	6	130	140	137	✓
Marvel Loch	2	62	63	62.5	(1)	2	0.02	0.03	0.025	✓	2	165	210	187.5	✓	2	95	110	103	✓
Menzies	6	53	63	57.5	(1)	2	0.014	0.05	0.032	✓	6	180	205	194.2	✓	6	100	120	108	✓
Merredin	2	62	69	65.5	(1)	2	0.012	0.03	0.021	✓	2	170	195	182.5	✓	2	97	100	99	✓
Miling	2	63	83	73	(1)	2	0.018	0.03	0.024	✓	2	175	175	175	✓	2	98	100	99	✓
Mukinbudin	2	62	73	67.5	(1)	2	0.018	0.035	0.027	✓	2	180	195	187.5	✓	2	97	110	104	✓
Muntadgin	2	59	71	65	(1)	2	0.014	0.035	0.025	✓	2	180	200	190	✓	2	94	100	97	✓
Narembeen	2	60	72	66	(1)	2	0.012	0.04	0.026	✓	2	180	190	185	✓	2	98	98	98	✓
Norseman	2	54	71	62.5	(1)	2	0.02	0.025	0.023	✓	2	210	215	212.5	✓	2	110	130	120	✓
Northam	2	66	72	69	(1)	2	0.018	0.025	0.022	✓	2	185	190	187.5	✓	2	100	100	100	✓
Nungarin	2	64	75	69.5	(1)	2	0.012	0.03	0.021	✓	2	175	200	187.5	✓	2	95	110	103	✓
Ora Banda	2	67	71	69	(1)	2	0.012	0.012	0.012	✓	2	190	200	195	✓	2	120	130	125	✓
Pithara	2	72	78	75	(1)	2	0.018	0.055	0.037	✓	2	170	185	177.5	✓	2	95	110	103	✓
Quairading	2	67	69	68	(1)	2	0.012	0.03	0.021	✓	2	180	200	190	✓	2	100	110	105	✓
Seabrook	2	57	72	64.5	(1)	2	0.01	0.035	0.023	✓	2	175	190	182.5	✓	2	92	100	96	✓
Shackleton	2	60	73	66.5	(1)	2	0.01	0.03	0.02	✓	2	170	190	180	✓	2	96	100	98	✓
Southern Cross	2	65	71	68	(1)	2	0.018	0.018	0.018	✓	2	180	190	185	✓	2	100	100	100	✓
Spencers Brook	2	59	70	64.5	(1)	2	0.012	0.035	0.024	✓	2	170	190	180	✓	2	92	100	96	✓
Tammin	2	60	73	66.5	(1)	2	0.014	0.02	0.017	✓	2	170	190	180	✓	2	96	100	98	✓
Toodyay	2	62	73	67.5	(1)	2	0.014	0.055	0.035	✓	2	175	190	182.5	✓	2	92	100	96	✓
Trayning	2	63	74	68.5	(1)	2	0.012	0.02	0.016	✓	2	170	185	177.5	✓	2	96	100	98	✓
Warralakin	2	65	68	66.5	(1)	2	0.02	0.02	0.02	✓	2	180	195	187.5	✓	2	99	110	105	✓
Westonia	2	63	70	66.5	(1)	2	0.018	0.02	0.019	✓	2	180	195	187.5	✓	2	97	110	104	✓
Wiluna	2	83	84	83.5	(1)	2	<0.008	<0.008	<0.008	✓	2	70	75	72.5	✓	2	110	110	110	✓
Wongan Hills	2	64	78	71	(1)	2	0.02	0.045	0.033	✓	2	175	185	180	✓	2	99	110	105	✓
Wubin	2	70	84	77	(1)	2	0.018	0.035	0.027	✓	2	180	195	187.5	✓	2	100	120	110	✓
Wyalkatchem	2	63	72	67.5	(1)	2	0.014	0.04	0.027	✓	2	170	185	177.5	✓	2	93	100	97	✓
York	2	62	88	75	(1)	2	0.01	0.03	0.02	✓	2	170	190	180	✓	2	92	100	96	✓

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

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	0.01	0.005	✓	2	<0.002	<0.002	<0.002	✓	2	8.85	8.93	8.89	(1)	2	5	5.3	5.2	✓
Avon Hills	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.32	8.49	8.41	✓	2	4.6	5.6	5.1	✓
Ballidu	2	0.015	0.03	0.023	✓	2	<0.002	<0.002	<0.002	✓	2	8.85	9.07	8.96	(1)	2	4.8	6.2	5.5	✓
Beacon	2	<0.003	0.004	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.1	8.9	8.5	✓	2	4.5	5.8	5.2	✓
Bencubbin	2	0.02	0.03	0.025	✓	2	<0.002	<0.002	<0.002	✓	2	8.56	8.62	8.59	(1)	2	5.1	5.6	5.4	✓
Beverley	2	0.008	0.015	0.012	✓	2	<0.002	<0.002	<0.002	✓	2	8.8	8.85	8.83	(1)	2	4.5	5.3	4.9	✓
Bind Bindi	2	0.01	0.01	0.01	✓	2	<0.002	<0.002	<0.002	✓	2	8.59	8.71	8.65	(1)	2	5	5.7	5.4	✓
Broad Arrow	2	<0.003	0.04	0.02	✓	2	<0.002	<0.002	<0.002	✓	2	7.74	8.84	8.29	✓	2	4.1	6.8	5.5	✓
Bruce Rock	2	0.004	0.015	0.01	✓	2	<0.002	<0.002	<0.002	✓	2	7.81	8.73	8.27	✓	2	4.4	5.5	5	✓
Bullfinch	2	<0.003	0.006	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.64	8.96	8.8	(1)	2	4.3	6.1	5.2	✓
Buntine	2	0.015	0.015	0.015	✓	2	<0.002	<0.002	<0.002	✓	2	8.72	9	8.86	(1)	2	5.6	6	5.8	✓
Cadoux	2	<0.003	0.01	0.005	✓	2	<0.002	<0.002	<0.002	✓	2	8.2	8.61	8.41	✓	2	5.1	5.7	5.4	✓
Coolgardie	2	0.008	0.015	0.012	✓	2	<0.002	<0.002	<0.002	✓	2	7.35	7.41	7.38	✓	2	4.7	5.7	5.2	✓
Corrigin	2	0.008	0.015	0.012	✓	2	<0.002	<0.002	<0.002	✓	2	8.7	8.83	8.77	(1)	2	5	5.8	5.4	✓
Cunderdin	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.22	8.34	8.28	✓	2	4.7	4.9	4.8	✓
Dalwallinu	2	0.01	0.015	0.013	✓	2	<0.002	<0.002	<0.002	✓	2	8.79	8.97	8.88	(1)	2	5.3	5.9	5.6	✓
Dowerin	2	0.004	0.008	0.006	✓	2	<0.002	<0.002	<0.002	✓	2	8.57	8.67	8.62	(1)	2	4.9	5.9	5.4	✓
Goomalling	2	<0.003	0.01	0.005	✓	2	<0.002	<0.002	<0.002	✓	2	8.58	8.71	8.65	(1)	2	4.6	5.7	5.2	✓
Greater Bodallin	2	0.008	0.02	0.014	✓	2	<0.002	<0.002	<0.002	✓	2	8.6	8.72	8.66	(1)	2	4.6	5.7	5.2	✓
Greater Burracoppin	2	0.006	0.006	0.006	✓	2	<0.002	<0.002	<0.002	✓	2	8.51	8.69	8.6	(1)	2	4.7	5.4	5.1	✓
Greater Doolakine	2	<0.003	0.004	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.72	9	8.86	(1)	2	4.5	5.3	4.9	✓
Greater Meckering	2	<0.003	0.006	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.44	8.67	8.56	(1)	2	4.9	5.4	5.2	✓
Greenhills	2	0.004	0.09	0.047	✓	2	<0.002	0.01	0.005	✓	2	8.19	8.55	8.37	✓	2	4.5	5.6	5.1	✓
Jennacubbine	2	0.004	0.004	0.004	✓	2	<0.002	<0.002	<0.002	✓	2	8.89	8.92	8.91	(1)	2	4.6	5.6	5.1	✓
Kalannie	2	0.008	0.015	0.012	✓	2	<0.002	<0.002	<0.002	✓	2	8.14	8.39	8.27	✓	2	4.3	5.2	4.8	✓
Kalgoorlie	2	0.015	0.015	0.015	✓	2	<0.002	<0.002	<0.002	✓	2	7.55	7.78	7.67	✓	2	4.8	5.9	5.4	✓
Kambalda	2	0.025	0.025	0.025	✓	2	<0.002	<0.002	<0.002	✓	2	7.95	7.96	7.96	✓	2	5.3	6.3	5.8	✓
Kellerberrin	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.26	8.4	8.33	✓	2	4.4	4.6	4.5	✓
Koolyanobbing	2	0.008	0.01	0.009	✓	2	<0.002	<0.002	<0.002	✓	2	8.6	8.87	8.74	(1)	2	5.3	5.8	5.6	✓
Koorda	2	<0.003	0.01	0.005	✓	2	<0.002	<0.002	<0.002	✓	2	8.63	8.9	8.77	(1)	2	4.9	6	5.5	✓
Kununoppin	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.77	8.82	8.8	(1)	2	4.8	5.5	5.2	✓
Laverton	6	0.01	0.015	0.013	✓	6	<0.002	<0.002	<0.002	✓	6	7.86	8.01	7.95	✓	6	36	45	39	✓
Leonora	6	<0.003	<0.003	<0.003	✓	6	<0.002	<0.002	<0.002	✓	6	7.38	7.84	7.65	✓	6	18	27	21.8	✓
Marvel Loch	2	0.008	0.01	0.009	✓	2	<0.002	<0.002	<0.002	✓	2	7.53	8.65	8.09	✓	2	5.1	5.5	5.3	✓
Menzies	6	0.01	0.035	0.021	✓	6	<0.002	<0.002	<0.002	✓	6	7.73	8.11	7.94	✓	6	4.6	6.2	5.6	✓
Merredin	2	<0.003	0.004	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.61	8.66	8.64	(1)	2	4.7	5.6	5.2	✓
Miling	2	0.008	0.01	0.009	✓	2	<0.002	<0.002	<0.002	✓	2	8.6	8.93	8.77	(1)	2	5.1	5.7	5.4	✓
Mukinbudin	2	0.004	0.006	0.005	✓	2	<0.002	<0.002	<0.002	✓	2	8.28	8.69	8.49	✓	2	4.7	6.7	5.7	✓
Muntadgin	2	0.008	0.025	0.017	✓	2	<0.002	<0.002	<0.002	✓	2	7.95	8.74	8.35	✓	2	4.8	5.3	5.1	✓
Narembeen	2	0.004	0.015	0.01	✓	2	<0.002	<0.002	<0.002	✓	2	8.37	8.61	8.49	✓	2	4.7	5.7	5.2	✓
Norseman	2	0.015	0.015	0.015	✓	2	<0.002	<0.002	<0.002	✓	2	7.87	8.18	8.03	✓	2	4.3	5.2	4.8	✓
Northam	2	0.01	0.01	0.01	✓	2	<0.002	<0.002	<0.002	✓	2	7.87	8.41	8.14	✓	2	4.6	4.7	4.7	✓
Nungarin	2	0.004	0.004	0.004	✓	2	<0.002	<0.002	<0.002	✓	2	8.95	8.98	8.97	(1)	2	4.5	5.5	5	✓
Ora Banda	2	<0.003	0.008	0.004	✓	2	<0.002	<0.002	<0.002	✓	2	8.49	8.53	8.51	(1)	2	5.4	6.7	6.1	✓
Pithara	2	0.025	0.07	0.048	✓	2	<0.002	<0.002	<0.002	✓	2	8.75	8.9	8.83	(1)	2	5	6.1	5.6	✓
Quairading	2	0.008	0.01	0.009	✓	2	<0.002	<0.002	<0.002	✓	2	7.82	8.69	8.26	✓	2	4.4	5	4.7	✓
Seabrook	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.78	8.97	8.88	(1)	2	4.7	5.5	5.1	✓
Shackleton	2	0.008	0.02	0.014	✓	2	<0.002	<0.002	<0.002	✓	2	8.56	8.9	8.73	(1)	2	4.4	5.6	5	✓
Southern Cross	2	0.004	0.008	0.006	✓	2	<0.002	<0.002	<0.002	✓	2	8.4	8.54	8.47	✓	2	4.8	5.8	5.3	✓
Spencers Brook	2	0.01	0.06	0.035	✓	2	<0.002	0.007	0.004	✓	2	8.45	8.5	8.48	✓	2	4.5	5.6	5.1	✓
Tammin	2	0.004	0.01	0.007	✓	2	<0.002	<0.002	<0.002	✓	2	8.37	8.5	8.44	✓	2	4.5	5.5	5	✓
Toodyay	2	0.004	0.01	0.007	✓	2	<0.002	<0.002	<0.002	✓	2	8.51	8.64	8.58	(1)	2	4.5	5.6	5.1	✓
Trayning	2	0.006	0.02	0.013	✓	2	<0.002	<0.002	<0.002	✓	2	8.74	8.85	8.8	(1)	2	4.7	5.8	5.3	✓
Warralakin	2	0.006	0.006	0.006	✓	2	<0.002	<0.002	<0.002	✓	2	7.75	8.98	8.37	✓	2	4.6	5.6	5.1	✓
Westonia	2	<0.003	0.004	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.86	8.86	8.36	✓	2	4.6	5.8	5.2	✓
Wiluna	2	0.004	0.01	0.007	✓	2	<0.002	<0.002	<0.002	✓	2	8.01	8.18	8.1	✓	2	75	85	80	(2)
Wongan Hills	2	0.006	0.006	0.006	✓	2	<0.002	<0.002	<0.002	✓	2	8.91	9.01	8.96	(1)	2	4.6	5.8	5.2	✓
Wubin	2	0.01	0.02	0.015	✓	2	<0.002	<0.002	<0.002	✓	2	8.98	9.11	9.05	(1)	2	5	5.6	5.3	✓
Wyalkatchem	2	<0.003	0.006	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.61	8.69	8.65	(1)	2	5	5.7	5.4	✓
York	2	0.008	0.01	0.009	✓	2	<0.002	<0.002	<0.002	✓	2	8.53	8.58	8.56	(1)	2	4.3	5.4	4.9	✓

(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.

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	105	115	110	✓	2	431	472	452	✓	2	<1	1	<1	✓	2	0.1	0.3	0.2	✓
Avon Hills	2	110	120	115	✓	2	424	467	446	✓	2	<1	<1	<1	✓	2	<0.1	0.3	0.2	✓
Ballidu	2	100	110	105	✓	2	433	459	446	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Beacon	2	110	120	115	✓	2	445	488	467	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Bencubbin	2	100	115	107.5	✓	2	442	491	467	✓	2	<1	<1	<1	✓	2	0.3	0.3	0.3	✓
Beverley	2	98	110	104	✓	2	429	456	443	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Bind Bindi	2	99	110	104.5	✓	2	425	478	452	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Broad Arrow	2	105	115	110	✓	2	486	489	488	✓	2	<1	<1	<1	✓	2	0.4	0.4	0.4	✓
Bruce Rock	2	105	120	112.5	✓	2	431	493	462	✓	2	<1	<1	<1	✓	2	0.3	0.3	0.3	✓
Bullfinch	2	105	120	112.5	✓	2	443	504	474	✓	2	<1	<1	<1	✓	2	<0.1	0.5	0.3	✓
Buntine	2	105	110	107.5	✓	2	455	476	466	✓	2	<1	<1	<1	✓	2	0.3	0.4	0.4	✓
Cadoux	2	96	105	100.5	✓	2	420	455	438	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Coolgardie	2	97	115	106	✓	2	424	479	452	✓	2	<1	<1	<1	✓	2	0.2	0.4	0.3	✓
Corrigin	2	105	115	110	✓	2	440	472	456	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Cunderdin	2	100	105	102.5	✓	2	418	445	432	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Dalwallinu	2	100	105	102.5	✓	2	431	454	443	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Dowerin	2	105	115	110	✓	2	436	469	453	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Goomalling	2	100	110	105	✓	2	425	469	447	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Greater Bodallin	2	97	115	106	✓	2	411	476	444	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Greater Burracoppin	2	99	115	107	✓	2	425	472	449	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Greater Doolakine	2	95	110	102.5	✓	2	415	466	441	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Greater Meckering	2	100	105	102.5	✓	2	433	449	441	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Greenhills	2	100	110	105	✓	2	420	457	439	✓	2	<1	<1	<1	✓	2	0.2	0.7	0.5	✓
Jennacubbine	2	105	115	110	✓	2	426	476	451	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Kalannie	2	105	110	107.5	✓	2	454	469	462	✓	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Kalgoorlie	2	105	115	110	✓	2	444	470	457	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Kambalda	2	110	115	112.5	✓	2	441	473	457	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Kellerberrin	2	110	110	110	✓	2	454	464	459	✓	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Koolyanobbing	2	105	110	107.5	✓	2	435	466	451	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Koorda	2	100	105	102.5	✓	2	428	450	439	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Kununoppin	2	100	110	105	✓	2	428	464	446	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Laverton	6	105	125	117.5	✓	6	531	602	577	✓	6	<1	<1	<1	✓	6	<0.1	0.2	<0.1	✓
Leonora	6	110	130	117.5	✓	6	564	616	581	✓	6	<1	<1	<1	✓	6	0.1	1.5	0.5	✓
Marvel Loch	2	100	115	107.5	✓	2	414	483	449	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Menzies	6	105	115	109.2	✓	6	432	478	456	✓	6	<1	<1	<1	✓	6	0.1	0.4	0.3	✓
Merredin	2	110	115	112.5	✓	2	431	473	452	✓	2	<1	<1	<1	✓	2	0.1	0.1	0.1	✓
Miling	2	99	105	102	✓	2	430	454	442	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Mukinbudin	2	105	120	112.5	✓	2	442	485	464	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Muntadgin	2	100	120	110	✓	2	427	487	457	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Narembeen	2	105	110	107.5	✓	2	437	466	452	✓	2	<1	<1	<1	✓	2	0.1	0.4	0.3	✓
Norseman	2	115	125	120	✓	2	479	525	502	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Northam	2	110	110	110	✓	2	454	468	461	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Nungarin	2	105	115	110	✓	2	426	480	453	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Ora Banda	2	105	115	110	✓	2	465	496	481	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Pithara	2	100	105	102.5	✓	2	441	454	448	✓	2	<1	<1	<1	✓	2	0.4	0.4	0.4	✓
Quairading	2	105	110	107.5	✓	2	450	472	461	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Seabrook	2	96	110	103	✓	2	414	464	439	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Shackleton	2	97	110	103.5	✓	2	412	462	437	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Southern Cross	2	110	120	115	✓	2	446	473	460	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Spencers Brook	2	95	110	102.5	✓	2	412	460	436	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Tammin	2	100	115	107.5	✓	2	415	472	444	✓	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Toodyay	2	98	115	106.5	✓	2	419	472	446	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Trayning	2	100	115	107.5	✓	2	426	464	445	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Warralakin	2	105	120	112.5	✓	2	438	478	458	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Westonia	2	105	120	112.5	✓	2	436	477	457	✓	2	<1	<1	<1	✓	2	0.3	0.3	0.3	✓
Wiluna	2	57	58	57.5	✓	2	423	431	427	✓	2	<1	<1	<1	✓	2	0.1	0.5	0.3	✓
Wongan Hills	2	100	110	105	✓	2	431	466	449	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Wubin	2	99	110	104.5	✓	2	438	492	465	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Wyalkatchem	2	99	110	104.5	✓	2	426	453	440	✓	2	<1	<1	<1	✓	2	0.1	0.1	0.1	✓
York	2	95	110	102.5	✓	2	409	482	446	✓	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	✓	7	0	✓	4	0.75	0.95	0.85	(2)	0	(1)	2	✓
Augusta	67	0	0	✓	42	0	✓	2	0.25	0.25	0.25	✓	2	✓	2	✓
Australind *	119	0	0	✓	119	0	✓	4	0.2	0.3	0.24	✓	1	✓	4	✓
Balingup	13	0	0	✓	7	0	✓	2	0.1	0.1	0.1	✓	2	✓	2	✓
Binningup	53	0	0	✓	25	0	✓	4	0.7	0.85	0.79	(2)	1	✓	2	✓
Boyanup	53	0	0	✓	14	0	✓	2	0.2	0.2	0.2	✓	0	(1)	2	✓
Boyup Brook	53	0	0	✓	17	0	✓	2	0.1	0.1	0.1	✓	0	(1)	2	✓
Bridgetown	66	0	0	✓	33	0	✓	2	0.1	0.15	0.13	✓	2	✓	2	✓
Brunswick Junction	53	0	0	✓	17	0	✓	2	0.2	0.2	0.2	✓	2	✓	2	✓
Capel	53	0	0	✓	40	0	✓	2	0.2	0.2	0.2	✓	0	(1)	2	✓
Collie	79	0	0	✓	38	0	✓	53	0.35	1	0.79	(2)	2	✓	4	✓
Cowaramup	53	0	0	✓	8	0	✓	2	0.2	0.25	0.23	✓	0	(1)	2	✓
Dalyellup	66	0	0	✓	39	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	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	0.8	(2)	2	✓	2	✓
Donnybrook	53	0	0	✓	30	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	5	✓
Dunsborough	93	0	0	✓	93	0	✓	57	0.75	0.95	0.84	(3)	0	(1)	2	✓
Eaton *	80	0	0	✓	80	0	✓	2	0.15	0.2	0.18	✓	0	(1)	2	✓
Greenbushes	26	0	0	✓	13	0	✓	2	0.1	0.15	0.13	✓	1	✓	2	✓
Harvey	53	0	0	✓	53	0	✓	53	0.75	0.9	0.82	(2)	0	(1)	2	✓
Hester TWS	13	0	0	✓	7	0	✓	2	0.1	0.1	0.1	✓	2	✓	2	✓
Kirup	13	0	0	✓	7	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	2	✓
Logue Brook	13	0	0	✓	7	0	✓	2	0.65	0.75	0.7	(2)	0	(1)	2	✓
Manjimup	66	0	0	✓	33	0	✓	55	0.7	0.85	0.78	(2)	2	✓	2	✓
Margaret River	78	0	0	✓	43	0	✓	2	0.2	0.25	0.23	✓	2	✓	2	✓
Mullalyup	13	0	0	✓	6	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	2	✓
Myalup	13	0	0	✓	13	0	✓	2	0.8	0.9	0.85	(2)	0	(1)	2	✓
Nannup	53	0	0	✓	15	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	2	✓
Northcliffe	13	0	0	✓	7	0	✓	2	0.4	0.5	0.45	✓	2	✓	2	✓
Pemberton	53	1	1	✓	12	0	✓	2	<0.1	<0.1	<0.1	✓	1	✓	2	✓
Peppermint Grove	53	0	0	✓	9	0	✓	2	0.25	0.25	0.25	✓	0	(1)	2	✓
Preston Beach	53	0	0	✓	20	0	✓	2	<0.1	0.1	<0.1	✓	1	✓	2	✓
Quinninup	12	0	0	✓	6	0	✓	2	0.45	0.6	0.53	✓	2	✓	2	✓
Waroona	53	0	0	✓	53	0	✓	54	0.45	0.9	0.81	(2)	0	(1)	2	✓
Yarloop	13	0	0	✓	7	0	✓	2	0.85	0.85	0.85	(2)	0	(1)	2	✓

(1) No samples required in this 12 month period (2) Receives water from a fluoridated source within the dosing range set by the Fluoridation of Water Supplies Advisory Committee (3) Naturally ocurring fluoride above the ADWG guideline - undergoes defluoridation. * Australind and Eaton fluoride dosing to commence in November 2020

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	✓	2	✓	2	0.065	0.090	0.078	✓	0	(1)
Augusta	2	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	2	0.016	0.021	0.019	✓	2	✓
Australind	8	<0.2	0.4	<0.2	✓	2	✓	0	(1)	3	0.006	0.072	0.047	✓	1	✓
Balingup	2	0.9	0.9	0.9	✓	2	✓	2	✓	2	0.053	0.088	0.071	✓	2	✓
Binningup	2	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	2	0.015	0.090	0.053	✓	0	(1)
Boyanup	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	<0.001	<0.001	<0.001	✓	0	(1)
Boyup Brook	2	<0.2	0.4	0.4	✓	1	✓	0	(1)	2	0.088	0.093	0.091	✓	0	(1)
Bridgetown	4	0.4	0.4	0.4	✓	2	✓	2	✓	2	0.054	0.077	0.066	✓	2	✓
Brunswick Junction	2	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	2	0.012	0.018	0.015	✓	1	✓
Capel	4	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	<0.001	<0.001	<0.001	✓	0	(1)
Collie	8	<0.2	<0.2	<0.2	✓	4	✓	0	(1)	4	0.035	0.120	0.067	✓	2	✓
Cowaramup	4	<0.2	0.4	<0.2	✓	1	✓	2	✓	4	0.110	0.150	0.135	✓	1	✓
Dalyellup	2	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	2	0.036	0.075	0.056	✓	2	✓
Dardanup	2	<0.2	0.4	<0.2	✓	1	✓	2	✓	2	<0.001	<0.001	<0.001	✓	0	(1)
Darkan	2	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	12	0.080	0.190	0.154	✓	0	(1)
Donnybrook	2	13.2	15.4	14.5	✓	1	✓	1	✓	2	0.005	0.010	0.008	✓	0	(1)
Dunsborough	3	<0.2	0.4	<0.2	✓	1	✓	1	✓	2	0.020	0.021	0.021	✓	1	✓
Eaton	2	<0.2	0.4	<0.2	✓	1	✓	2	✓	2	0.005	0.012	0.009	✓	0	(1)
Greenbushes	2	0.4	0.4	0.4	✓	1	✓	0	(1)	2	0.046	0.060	0.053	✓	0	(1)
Harvey	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	<0.001	0.005	0.003	✓	0	(1)
Hester TWS	4	<0.2	0.4	0.4	✓	2	✓	0	(1)	2	0.100	0.100	0.100	✓	2	✓
Kirup	4	11.4	17.6	14.1	✓	2	✓	2	✓	2	0.009	0.010	0.010	✓	2	✓
Logue Brook	2	1.8	3.1	2.6	✓	1	✓	0	(1)	2	0.002	0.011	0.007	✓	0	(1)
Manjimup	2	<0.2	<0.2	<0.2	✓	5	✓	2	✓	2	0.081	0.120	0.101	✓	1	✓
Margaret River	4	<0.2	<0.2	<0.2	✓	2	✓	1	✓	2	0.150	0.160	0.155	✓	1	✓
Mullalyup	4	11.4	16.7	13.6	✓	2	✓	0	(1)	2	0.017	0.018	0.018	✓	2	✓
Myalup	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	0.013	0.089	0.051	✓	0	(1)
Nannup	2	0.4	1.3	0.9	✓	2	✓	2	✓	2	0.044	0.065	0.055	✓	2	✓
Northcliffe	2	0.4	0.9	0.4	✓	2	✓	0	(1)	2	0.063	0.120	0.092	✓	1	✓
Pemberton	2	0.9	1.3	0.9	✓	5	✓	0	(1)	2	0.110	0.160	0.135	✓	0	(1)
Peppermint Grove	3	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	<0.001	<0.001	<0.001	✓	0	(1)
Preston Beach	4	3.5	5.7	4.4	✓	1	✓	0	(1)	4	0.110	0.170	0.140	✓	0	(1)
Quinninup	2	0.4	0.9	0.4	✓	2	✓	0	(1)	2	0.120	0.140	0.130	✓	2	✓
Waroona	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	0.024	0.038	0.031	✓	1	✓
Yarloop	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	0.005	0.047	0.026	✓	1	✓

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

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	14	21	17.5	(1)	2	0.012	0.012	0.012	✓	2	80	95	87.5	✓	2	39	46	43	✓
Augusta	2	40	49	44.5	(1)	2	<0.008	<0.008	<0.008	✓	2	135	145	140	✓	2	69	73	71	✓
Australind	8	110	140	130	(1)	8	<0.008	<0.008	<0.008	✓	8	145	170	158.8	✓	8	77	120	96	✓
Balingup	2	110	110	110	(1)	2	0.008	0.012	0.01	✓	2	95	110	102.5	✓	2	120	130	125	✓
Binningup	2	45	55	50	(1)	2	<0.008	0.025	0.013	✓	2	33	60	46.5	✓	2	59	60	60	✓
Boyanup	2	120	120	120	(1)	2	<0.008	<0.008	<0.008	✓	2	100	100	100	✓	2	100	100	100	✓
Boyup Brook	2	84	110	97	(1)	2	<0.008	0.014	<0.008	✓	2	100	110	105	✓	2	100	120	110	✓
Bridgetown	4	100	110	107.5	(1)	4	<0.008	0.02	<0.008	✓	4	95	110	102.5	✓	4	110	130	120	✓
Brunswick Junction	2	100	120	110	(1)	2	<0.008	<0.008	<0.008	✓	2	165	170	167.5	✓	2	82	83	83	✓
Capel	4	75	79	77.8	(1)	4	<0.008	<0.008	<0.008	✓	4	55	60	57.5	✓	4	47	49	48	✓
Collie	8	6	22	15.5	(1)	8	0.01	0.014	0.012	✓	8	60	95	82.5	✓	8	26	46	39	✓
Cowaramup	4	23	43	35	(1)	4	0.012	0.03	0.021	✓	4	90	95	92.5	✓	4	35	42	39	✓
Dalyellup	2	140	140	140	(1)	2	<0.008	<0.008	<0.008	✓	2	100	100	100	✓	2	76	77	77	✓
Dardanup	2	70	71	70.5	(1)	2	<0.008	<0.008	<0.008	✓	2	85	85	85	✓	2	27	28	28	✓
Darkan	2	23	24	23.5	(1)	2	0.014	0.018	0.016	✓	2	85	90	87.5	✓	2	50	50	50	✓
Donnybrook	2	99	150	124.5	(1)	2	0.11	0.23	0.17	✓	2	220	225	222.5	✓	2	84	85	85	✓
Dunsborough	3	140	160	153.3	(1)	3	<0.008	0.01	<0.008	✓	3	120	150	135	✓	3	70	73	71	✓
Eaton	2	96	110	103	(1)	2	<0.008	<0.008	<0.008	✓	2	125	130	127.5	✓	2	110	110	110	✓
Greenbushes	2	100	100	100	(1)	2	<0.008	0.014	<0.008	✓	2	95	105	100	✓	2	110	120	115	✓
Harvey	2	45	55	50	(1)	2	0.014	0.025	0.02	✓	2	32	60	46	✓	2	54	61	58	✓
Hester TWS	4	77	110	99.3	(1)	4	<0.008	0.03	0.012	✓	4	95	110	101.3	✓	4	89	130	115	✓
Kirup	4	91	160	130.3	(1)	4	0.1	0.28	0.163	✓	4	160	225	191.3	✓	4	59	87	75	✓
Logue Brook	2	75	86	80.5	(1)	2	0.04	0.065	0.053	✓	2	55	80	67.5	✓	2	53	59	56	✓
Manjimup	2	55	74	64.5	(1)	2	0.008	0.035	0.022	✓	2	85	95	90	✓	2	86	100	93	✓
Margaret River	4	28	48	37	(1)	4	0.012	0.025	0.02	✓	4	90	95	92.5	✓	4	37	43	40	✓
Mullalyup	4	85	160	128.8	(1)	4	0.1	0.23	0.16	✓	4	170	210	190	✓	4	65	90	78	✓
Myalup	2	50	56	53	(1)	2	<0.008	0.03	0.015	✓	2	31	65	48	✓	2	54	67	61	✓
Nannup	2	28	70	49	(1)	2	0.01	0.02	0.015	✓	2	70	95	82.5	✓	2	71	110	91	✓
Northcliffe	2	34	39	36.5	(1)	2	0.018	0.03	0.024	✓	2	85	90	87.5	✓	2	62	68	65	✓
Pemberton	2	22	33	27.5	(1)	2	0.01	0.035	0.023	✓	2	75	80	77.5	✓	2	48	52	50	✓
Peppermint Grove	3	85	88	86.3	(1)	3	<0.008	<0.008	<0.008	✓	3	55	65	60	✓	3	54	57	55	✓
Preston Beach	4	280	300	285	(1)	4	<0.008	<0.008	<0.008	✓	4	175	200	188.8	✓	4	320	330	323	(2)
Quinninup	2	41	56	48.5	(1)	2	0.025	0.03	0.028	✓	2	90	90	90	✓	2	79	85	82	✓
Waroona	2	58	60	59	(1)	2	0.02	0.04	0.03	✓	2	32	36	34	✓	2	59	60	60	✓
Yarloop	2	52	57	54.5	(1)	2	0.025	0.025	0.025	✓	2	34	34	34	✓	2	51	59	55	✓

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

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	0.05	0.07	0.06	✓	2	0.016	0.018	0.017	✓	2	6.72	7.01	6.87	✓	2	1.4	1.4	1.4	✓
Augusta	2	0.07	0.14	0.105	✓	2	0.003	0.003	0.003	✓	2	7.22	7.23	7.23	✓	2	13	16	14.5	✓
Australind	8	0.015	0.14	0.083	✓	8	<0.002	0.008	<0.002	✓	8	7.22	8.22	7.76	✓	8	21	50	35.1	✓
Balingup	2	0.008	0.01	0.009	✓	2	<0.002	<0.002	<0.002	✓	2	8.38	8.41	8.4	✓	2	6	6.9	6.5	✓
Binningup	2	0.01	0.02	0.015	✓	2	0.002	0.01	0.006	✓	2	7.64	8.2	7.92	✓	2	1.9	4.7	3.3	✓
Boyanup	2	0.01	0.015	0.013	✓	2	<0.002	<0.002	<0.002	✓	2	7.92	8.05	7.99	✓	2	18	19	18.5	✓
Boyup Brook	2	0.015	0.03	0.023	✓	2	0.002	0.007	0.005	✓	2	7.95	8.31	8.13	✓	2	3.6	7	5.3	✓
Bridgetown	4	0.02	0.06	0.031	✓	4	<0.002	0.01	0.003	✓	4	7.54	8.03	7.78	✓	4	6.1	7	6.5	✓
Brunswick Junction	2	0.03	0.07	0.05	✓	2	0.003	0.005	0.004	✓	2	7.63	7.72	7.68	✓	2	49	50	49.5	✓
Capel	4	0.06	0.07	0.063	✓	4	<0.002	<0.002	<0.002	✓	4	6.67	6.97	6.75	✓	4	14	14	14	✓
Collie	8	0.05	0.09	0.066	✓	8	0.007	0.02	0.015	✓	8	6.5	6.98	6.85	✓	8	1.1	4.9	1.7	✓
Cowaramup	4	0.07	0.38	0.205	✓	4	0.005	0.007	0.006	✓	4	7.07	7.53	7.38	✓	4	6.2	8.9	8	✓
Dalyellup	2	0.04	0.07	0.055	✓	2	0.004	0.014	0.009	✓	2	7.96	8	7.98	✓	2	16	17	16.5	✓
Dardanup	2	0.01	0.015	0.013	✓	2	<0.002	<0.002	<0.002	✓	2	7.41	7.45	7.43	✓	2	19	19	19	✓
Darkan	2	0.05	0.09	0.07	✓	2	0.004	0.014	0.009	✓	2	7.54	8.16	7.85	✓	2	2.6	3.1	2.9	✓
Donnybrook	2	0.015	0.05	0.033	✓	2	0.002	0.004	0.003	✓	2	7.55	7.68	7.62	✓	2	9.8	10	9.9	✓
Dunsborough	3	0.006	0.02	0.015	✓	3	<0.002	<0.002	<0.002	✓	3	8.31	8.33	8.32	✓	3	17	17	17	✓
Eaton	2	0.08	0.08	0.08	✓	2	<0.002	<0.002	<0.002	✓	2	7.04	7.33	7.19	✓	2	26	27	26.5	✓
Greenbushes	2	0.01	0.015	0.013	✓	2	<0.002	<0.002	<0.002	✓	2	8.03	8.1	8.07	✓	2	5.7	7.1	6.4	✓
Harvey	2	<0.003	0.045	0.023	✓	2	<0.002	0.03	0.015	✓	2	7.34	8.29	7.82	✓	2	1	5	3	✓
Hester TWS	4	<0.003	0.06	0.023	✓	4	<0.002	0.014	0.007	✓	4	8.17	8.99	8.45	✓	4	2.4	6.8	5.5	✓
Kirup	4	0.004	0.025	0.01	✓	4	<0.002	0.014	0.004	✓	4	7.6	8.25	7.99	✓	4	8.7	10	9.6	✓
Logue Brook	2	0.015	0.03	0.023	✓	2	<0.002	0.004	<0.002	✓	2	8.04	8.08	8.06	✓	2	2.9	3.5	3.2	✓
Manjimup	2	0.045	0.09	0.068	✓	2	0.003	0.014	0.009	✓	2	7.9	8.14	8.02	✓	2	6	6.3	6.2	✓
Margaret River	4	0.07	0.44	0.223	✓	4	0.003	0.007	0.005	✓	4	6.92	7.48	7.28	✓	4	6.2	8.8	7.9	✓
Mullalyup	4	0.008	0.02	0.012	✓	4	<0.002	0.01	0.004	✓	4	7.92	8.38	8.16	✓	4	9.1	12	10.1	✓
Myalup	2	<0.003	0.02	0.01	✓	2	<0.002	0.018	0.009	✓	8	7.76	8.73	8.45	✓	2	1.3	5	3.2	✓
Nannup	2	0.01	0.035	0.023	✓	2	<0.002	<0.002	<0.002	✓	2	7.13	7.45	7.29	✓	2	6.2	6.7	6.5	✓
Northcliffe	2	0.025	0.025	0.025	✓	2	0.003	0.012	0.008	✓	2	7.63	7.64	7.64	✓	2	4.8	6.5	5.7	✓
Pemberton	2	0.015	0.14	0.078	✓	2	<0.002	0.007	0.004	✓	2	7.52	7.75	7.64	✓	2	3.2	5	4.1	✓
Peppermint Grove	3	0.03	0.05	0.04	✓	3	<0.002	<0.002	<0.002	✓	3	7.14	7.56	7.33	✓	3	14	15	14.3	✓
Preston Beach	4	0.004	0.015	0.007	✓	4	<0.002	<0.002	<0.002	✓	4	8.23	8.47	8.31	✓	4	15	17	16	✓
Quinninup	2	0.04	0.06	0.05	✓	2	0.002	0.016	0.009	✓	2	7.99	8.02	8.01	✓	2	5.6	5.6	5.6	✓
Waroona	2	<0.003	0.004	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.67	7.83	7.75	✓	2	1.8	2.7	2.3	✓
Yarloop	2	0.006	0.015	0.011	✓	2	<0.002	<0.002	<0.002	✓	2	7.98	8.13	8.06	✓	2	1.1	1.4	1.3	✓

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	42	50	46	✓	2	176	212	194	✓	2	1	2	2	✓	2	0.4	0.5	0.5	✓
Augusta	2	67	69	68	✓	2	318	320	319	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Australind	8	94	120	105.8	✓	8	499	546	519	✓	8	<1	2	<1	✓	8	0.1	0.4	0.2	✓
Balingup	2	49	56	52.5	✓	2	350	374	362	✓	2	<1	<1	<1	✓	2	0.1	0.1	0.1	✓
Binningup	2	20	31	25.5	✓	2	147	184	166	✓	2	<1	<1	<1	✓	2	0.3	0.3	0.3	✓
Boyanup	2	59	64	61.5	✓	2	384	390	387	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Boyup Brook	2	50	54	52	✓	2	315	372	344	✓	2	<1	<1	<1	✓	2	0.2	0.4	0.3	✓
Bridgetown	4	49	54	51	✓	4	342	370	356	✓	4	<1	<1	<1	✓	4	0.2	0.6	0.4	✓
Brunswick Junction	2	105	115	110	✓	2	504	520	512	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Capel	4	43	49	45.8	✓	4	260	266	263	✓	4	<1	<1	<1	✓	4	0.1	0.2	0.2	✓
Collie	8	35	50	44.4	✓	8	131	212	184	✓	8	1	4	2	✓	8	0.3	0.7	0.4	✓
Cowaramup	4	48	51	49.8	✓	4	216	254	239	✓	4	<1	8	4	✓	4	0.4	1	0.6	✓
Dalyellup	2	78	81	79.5	✓	2	418	431	425	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Dardanup	2	71	71	71	✓	2	284	284	284	✓	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Darkan	2	44	44	44	✓	2	200	208	204	✓	2	<1	<1	<1	✓	2	0.3	0.3	0.3	✓
Donnybrook	2	145	165	155	✓	2	551	634	593	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Dunsborough	3	125	150	133.3	✓	3	520	568	540	✓	3	<1	<1	<1	✓	3	<0.1	0.2	<0.1	✓
Eaton	2	62	71	66.5	✓	2	394	430	412	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Greenbushes	2	48	52	50	✓	2	338	353	346	✓	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Harvey	2	18	32	25	✓	2	141	191	166	✓	2	<1	<1	<1	✓	2	<0.1	0.5	0.3	✓
Hester TWS	4	49	54	51.5	✓	4	300	373	345	✓	4	<1	2	<1	✓	4	0.2	0.6	0.4	✓
Kirup	4	135	150	143.8	✓	4	534	569	554	✓	4	<1	<1	<1	✓	4	0.1	0.3	0.2	✓
Logue Brook	2	41	55	48	✓	2	228	263	246	✓	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Manjimup	2	44	47	45.5	✓	2	270	306	288	✓	2	<1	3	2	✓	2	0.3	0.3	0.3	✓
Margaret River	4	48	52	49.8	✓	4	224	261	242	✓	4	<1	10	4	✓	4	0.4	1.1	0.6	✓
Mullalyup	4	145	160	148.8	✓	4	527	587	557	✓	4	<1	<1	<1	✓	4	<0.1	0.4	0.2	✓
Myalup	2	18	32	25	✓	2	141	201	171	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Nannup	2	53	63	58	✓	2	273	363	318	✓	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Northcliffe	2	51	55	53	✓	2	250	257	254	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Pemberton	2	49	62	55.5	✓	2	220	256	238	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Peppermint Grove	3	45	50	47.3	✓	3	272	290	281	✓	3	<1	<1	<1	✓	3	<0.1	0.2	<0.1	✓
Preston Beach	4	100	110	105	✓	4	790	821	806	(1)	4	<1	<1	<1	✓	4	<0.1	0.3	0.2	✓
Quinninup	2	48	54	51	✓	2	279	281	280	✓	2	1	2	2	✓	2	0.3	0.3	0.3	✓
Waroona	2	20	20	20	✓	2	150	156	153	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Yarloop	2	19	21	20	✓	2	142	149	146	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓

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

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	172	0	0	✓	172	0	✓	53	0.15	0.85	0.72	(2)	4	✓	8	✓
Boddington	52	0	0	✓	52	0	✓	5	0.7	0.85	0.78	(2)	0	(1)	2	✓
Borden	12	0	0	✓	8	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Bremer Bay	53	0	0	✓	35	0	✓	5	0.5	0.55	0.51	✓	0	(1)	2	✓
Brookton	53	0	0	✓	53	0	✓	4	0.7	0.85	0.76	(2)	0	(1)	2	✓
Broomehill	12	0	0	✓	12	0	✓	4	0.75	0.95	0.83	(2)	2	✓	2	✓
Bullaring	12	0	0	✓	12	0	✓	4	0.7	0.8	0.76	(2)	0	(1)	2	✓
Condingup	12	0	0	✓	8	0	✓	2	0.3	0.3	0.3	✓	0	(1)	2	✓
Cranbrook	12	0	0	✓	8	0	✓	2	<0.1	0.55	0.28	✓	0	(1)	2	✓
Cuballing	12	0	0	✓	12	0	✓	4	0.7	0.85	0.78	(2)	0	(1)	2	✓
Denmark	67	0	0	✓	43	0	✓	3	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Dudinin TWS	12	0	0	✓	12	0	✓	4	0.7	0.85	0.79	(2)	1	✓	2	✓
Dumbleyung	12	0	0	✓	12	0	✓	4	0.75	0.85	0.8	(2)	0	(1)	2	✓
Esperance	93	0	0	✓	59	0	✓	53	0.65	0.9	0.81	(2)	4	✓	4	✓
Frankland	12	0	0	✓	8	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Gibson	12	0	0	✓	8	0	✓	2	0.35	0.4	0.38	✓	0	(1)	2	✓
Gnowangerup	53	0	0	✓	53	0	✓	4	0.8	0.95	0.85	(2)	0	(1)	2	✓
Grass Patch	12	0	0	✓	8	0	✓	4	0.75	0.9	0.83	(2)	0	(1)	2	✓
Harrismith TWS	12	0	0	✓	12	0	✓	4	0.75	0.8	0.78	(2)	0	(1)	2	✓
Highbury	12	0	0	✓	12	0	✓	4	0.75	0.85	0.8	(2)	0	(1)	2	✓
Hopetoun	53	0	0	✓	35	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Hyden	12	0	0	✓	12	0	✓	4	0.25	0.8	0.56	(2)	0	(1)	2	✓
Jerramungup	12	0	0	✓	8	0	✓	2	<0.1	0.55	0.28	✓	0	(1)	2	✓
Karlgarin	12	0	0	✓	12	0	✓	4	0.7	0.85	0.78	(2)	0	(1)	2	✓
Katanning	66	0	0	✓	66	0	✓	53	0.7	0.95	0.83	(2)	0	(1)	2	✓
Kendenup	12	0	0	✓	8	0	✓	4	0.25	0.75	0.61	(2)	0	(1)	2	✓
Kojonup	53	0	0	✓	53	0	✓	4	0.75	0.95	0.83	(2)	0	(1)	2	✓
Kondinin	12	0	0	✓	12	0	✓	4	0.75	0.85	0.79	(2)	0	(1)	2	✓
Kukerin	12	0	0	✓	12	0	✓	4	0.75	0.85	0.8	(2)	0	(1)	2	✓
Kulin	12	0	0	✓	12	0	✓	4	0.75	0.8	0.79	(2)	0	(1)	2	✓
Lake Grace	53	0	0	✓	53	0	✓	4	0.7	0.85	0.78	(2)	0	(1)	2	✓
Lake King	12	0	0	✓	12	0	✓	4	0.75	0.85	0.81	(2)	0	(1)	2	✓
Mt Barker	53	0	0	✓	35	0	✓	53	0.15	0.85	0.71	(2)	2	✓	2	✓
Munglinup	12	0	0	✓	8	0	✓	2	<0.1	0.6	0.3	✓	0	(1)	2	✓
Muradup	12	0	0	✓	12	0	✓	4	0.75	0.95	0.84	(2)	0	(1)	2	✓
Narrikup	12	0	0	✓	8	0	✓	4	0.15	0.8	0.61	(2)	0	(1)	2	✓
Narrogin	67	0	0	✓	67	0	✓	53	0.7	0.85	0.8	(2)	0	(1)	2	✓
Newdegate	12	0	0	✓	12	0	✓	4	0.7	0.85	0.79	(2)	0	(1)	2	✓
Nyabing	12	0	0	✓	12	0	✓	4	0.7	0.85	0.8	(2)	0	(1)	2	✓
Ongerup	12	0	0	✓	8	0	✓	2	0.2	0.75	0.48	✓	0	(1)	2	✓
Pingaring	12	0	0	✓	12	0	✓	4	0.75	0.85	0.79	(2)	0	(1)	2	✓
Pingelly	53	0	0	✓	53	0	✓	4	0.75	0.85	0.79	(2)	0	(1)	2	✓
Pingrup	12	0	0	✓	12	0	✓	4	0.75	0.95	0.83	(2)	0	(1)	2	✓
Popanyinning	12	0	0	✓	12	0	✓	4	0.75	0.8	0.78	(2)	0	(1)	2	✓
Ravensthorpe	12	0	0	✓	8	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Rocky Gully	12	0	0	✓	8	0	✓	4	0.45	0.75	0.68	(2)	2	✓	2	✓
Salmon Gums	12	0	0	✓	8	0	✓	2	0.4	0.85	0.63	✓	1	✓	2	✓
Tambellup	12	0	0	✓	12	0	✓	4	0.8	0.9	0.84	(2)	0	(1)	2	✓
Tincurrin TWS	12	0	0	✓	12	0	✓	4	0.75	0.8	0.79	(2)	0	(1)	2	✓
Varley	12	0	0	✓	12	0	✓	4	0.7	0.85	0.76	(2)	0	(1)	2	✓
Wagin	53	0	0	✓	53	0	✓	5	0.75	0.9	0.82	(2)	0	(1)	2	✓
Walpole	53	0	0	✓	35	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Wandering	12	0	0	✓	12	0	✓	4	0.7	0.85	0.76	(2)	0	(1)	2	✓
Wellstead	12	0	0	✓	8	0	✓	2	0.8	0.8	0.8	(2)	0	(1)	2	✓
Wickepin TWS	12	0	0	✓	12	0	✓	4	0.75	0.85	0.8	(2)	0	(1)	2	✓
Williams	12	0	0	✓	12	0	✓	4	0.7	0.8	0.75	(2)	0	(1)	2	✓
Woodanilling	12	0	0	✓	12	0	✓	4	0.7	0.85	0.78	(2)	0	(1)	2	✓
Yealering	12	0	0	✓	12	0	✓	4	0.75	0.8	0.79	(2)	0	(1)	2	✓

(1) No samples required in this 12 month period. (2) Receives water from a fluoridated source within the dosing range set by the Fluoridation of Water Supplies Advisory Committee

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	20	<0.2	1.3	0.9	✓	6	✓	8	✓	16	0.097	0.150	0.123	✓	4	✓
Boddington	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	4	0.048	0.130	0.086	✓	0	(1)
Borden	2	<0.2	0.4	<0.2	✓	1	✓	0	(1)	2	0.043	0.080	0.062	✓	0	(1)
Bremer Bay	5	26.0	29.0	27.7	✓	1	✓	2	✓	3	0.066	0.077	0.071	✓	1	✓
Brookton	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	7	0.048	0.110	0.074	✓	0	(1)
Broomehill	2	<0.2	<0.2	<0.2	✓	2	✓	2	✓	4	0.079	0.098	0.087	✓	2	✓
Bullaring	4	<0.2	0.4	<0.2	✓	1	✓	2	✓	4	0.069	0.140	0.100	✓	0	(1)
Condingup	4	1.8	2.2	1.8	✓	1	✓	2	✓	2	0.011	0.016	0.014	✓	1	✓
Cranbrook	2	0.4	0.9	0.4	✓	1	✓	0	(1)	4	0.042	0.140	0.113	✓	0	(1)
Cuballing	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	4	0.045	0.085	0.073	✓	0	(1)
Denmark	4	<0.2	0.4	0.4	✓	1	✓	1	✓	4	0.015	0.065	0.038	✓	0	(1)
Dudinin TWS	4	<0.2	0.4	<0.2	✓	1	✓	0	(1)	4	0.063	0.093	0.075	✓	0	(1)
Dumbleyung	2	0.4	0.4	0.4	✓	1	✓	2	✓	4	0.071	0.120	0.092	✓	0	(1)
Esperance	8	9.7	16.3	12.3	✓	4	✓	0	(1)	4	0.012	0.022	0.016	✓	2	✓
Frankland	4	<0.2	<0.2	<0.2	✓	1	✓	1	✓	4	0.043	0.094	0.065	✓	0	(1)
Gibson	4	11.9	16.7	13.2	✓	1	✓	2	✓	2	0.067	0.100	0.084	✓	1	✓
Gnowangerup	4	<0.2	0.4	<0.2	✓	1	✓	2	✓	4	0.022	0.053	0.039	✓	0	(1)
Grass Patch	4	10.1	25.1	16.7	✓	1	✓	2	✓	2	0.052	0.074	0.063	✓	1	✓
Harrismith TWS	4	<0.2	0.4	<0.2	✓	1	✓	1	✓	4	0.140	0.170	0.155	✓	2	✓
Highbury	4	<0.2	0.4	<0.2	✓	1	✓	2	✓	4	0.036	0.070	0.053	✓	0	(1)
Hopetoun	4	1.3	3.5	2.2	✓	1	✓	0	(1)	2	0.008	0.016	0.012	✓	2	✓
Hyden	4	<0.2	0.9	0.4	✓	1	✓	0	(1)	4	0.056	0.160	0.093	✓	0	(1)
Jerramungup	4	0.4	27.3	7.0	✓	1	✓	0	(1)	2	0.078	0.110	0.094	✓	0	(1)
Karlgarin	2	<0.2	0.4	<0.2	✓	1	✓	2	✓	4	0.072	0.150	0.105	✓	0	(1)
Katanning	5	<0.2	0.4	<0.2	✓	1	✓	0	(1)	5	0.034	0.064	0.049	✓	0	(1)
Kendenup	4	0.9	1.3	0.9	✓	1	✓	0	(1)	4	0.110	0.160	0.138	✓	0	(1)
Kojonup	2	<0.2	<0.2	<0.2	✓	1	✓	1	✓	4	0.084	0.120	0.096	✓	0	(1)
Kondinin	4	<0.2	0.4	<0.2	✓	1	✓	2	✓	4	0.075	0.200	0.133	✓	0	(1)
Kukerin	4	0.4	0.4	0.4	✓	1	✓	2	✓	4	0.080	0.130	0.099	✓	0	(1)
Kulin	4	<0.2	<0.2	<0.2	✓	1	✓	2	✓	4	0.088	0.150	0.135	✓	0	(1)
Lake Grace	4	<0.2	0.4	<0.2	✓	1	✓	0	(1)	5	0.087	0.130	0.111	✓	0	(1)
Lake King	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	3	0.063	0.097	0.078	✓	0	(1)
Mt Barker	5	0.9	1.3	1.3	✓	2	✓	0	(1)	5	0.130	0.140	0.136	✓	1	✓
Munglinup	2	0.4	11.0	5.7	✓	1	✓	2	✓	3	0.041	0.058	0.047	✓	0	(1)
Muradup	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	4	0.074	0.120	0.101	✓	0	(1)
Narrikup	4	0.9	1.3	0.9	✓	1	✓	0	(1)	4	0.140	0.150	0.145	✓	0	(1)
Narrogin	4	<0.2	0.4	<0.2	✓	1	✓	2	✓	2	0.058	0.091	0.075	✓	0	(1)
Newdegate	2	<0.2	0.4	<0.2	✓	1	✓	0	(1)	4	0.087	0.120	0.104	✓	0	(1)
Nyabing	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	0.075	0.099	0.087	✓	0	(1)
Ongerup	2	0.4	0.9	0.4	✓	1	✓	0	(1)	2	0.079	0.097	0.088	✓	0	(1)
Pingaring	4	<0.2	0.4	<0.2	✓	1	✓	2	✓	4	0.180	0.200	0.188	✓	0	(1)
Pingelly	3	<0.2	<0.2	<0.2	✓	1	✓	2	✓	4	0.058	0.100	0.076	✓	0	(1)
Pingrup	2	<0.2	0.4	0.4	✓	1	✓	2	✓	4	0.053	0.082	0.069	✓	0	(1)
Popanyinning	2	<0.2	<0.2	<0.2	✓	1	✓	1	✓	4	0.082	0.120	0.103	✓	0	(1)
Ravensthorpe	4	<0.2	3.5	1.8	✓	4	✓	0	(1)	4	0.009	0.100	0.034	✓	0	(1)
Rocky Gully	4	0.9	1.3	0.9	✓	2	✓	0	(1)	3	0.084	0.110	0.097	✓	1	✓
Salmon Gums	4	0.9	18.0	10.6	✓	2	✓	0	(1)	2	0.088	0.120	0.104	✓	1	✓
Tambellup	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	4	0.067	0.094	0.082	✓	0	(1)
Tincurrin TWS	4	<0.2	0.4	0.4	✓	1	✓	2	✓	4	0.085	0.120	0.099	✓	0	(1)
Varley	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	0.040	0.048	0.044	✓	0	(1)
Wagin	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	5	0.063	0.130	0.100	✓	0	(1)
Walpole	5	1.3	2.2	1.8	✓	1	✓	2	✓	5	0.068	0.150	0.102	✓	0	(1)
Wandering	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	4	0.071	0.130	0.092	✓	0	(1)
Wellstead	2	0.9	1.3	0.9	✓	1	✓	0	(1)	2	0.120	0.140	0.130	✓	0	(1)
Wickepin TWS	4	<0.2	<0.2	<0.2	✓	1	✓	2	✓	4	0.038	0.100	0.076	✓	0	(1)
Williams	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	4	0.040	0.160	0.108	✓	0	(1)
Woodanilling	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	4	0.075	0.170	0.126	✓	0	(1)
Yealering	4	<0.2	0.4	<0.2	✓	1	✓	2	✓	4	0.036	0.093	0.069	✓	0	(1)

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

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	20	180	230	218	(1)	20	<0.008	<0.008	<0.008	✓	20	100	120	115.3	✓	20	240	280	259	(3)
Boddington	2	7	14	10.5	(1)	2	0.012	0.014	0.013	✓	2	65	80	72.5	✓	2	29	42	36	✓
Borden	2	29	46	37.5	(1)	2	0.05	0.1	0.075	✓	2	22	28	25	✓	2	28	40	34	✓
Bremer Bay	5	280	290	282	(1)	5	<0.008	<0.008	<0.008	✓	5	160	175	168	✓	5	220	230	224	(3)
Brookton	2	11	12	11.5	(1)	2	0.02	0.04	0.03	✓	2	85	95	90	✓	2	46	48	47	✓
Broomehill	2	15	16	15.5	(1)	2	0.016	0.02	0.018	✓	2	90	100	95	✓	2	54	58	56	✓
Bullaring	4	18	32	27.8	(1)	4	0.012	0.02	0.017	✓	4	80	105	93.8	✓	4	51	68	62	✓
Condingup	4	130	150	135	(1)	4	<0.008	<0.008	<0.008	✓	4	380	395	387.5	(2)	4	74	80	77	✓
Cranbrook	2	7	220	113.5	(1)	2	<0.008	0.035	0.018	✓	2	24	125	74.5	✓	2	15	250	133	✓
Cuballing	2	9	11	10	(1)	2	0.014	0.05	0.032	✓	2	80	95	87.5	✓	2	39	46	43	✓
Denmark	4	14	25	17	(1)	4	<0.008	0.012	0.009	✓	4	230	320	276.3	(2)	4	81	110	96	✓
Dudinin TWS	4	24	30	27.5	(1)	4	0.008	0.016	0.013	✓	4	75	100	90	✓	4	61	69	64	✓
Dumbleyung	2	27	27	27	(1)	2	0.012	0.014	0.013	✓	2	85	95	90	✓	2	57	66	62	✓
Esperance	8	260	280	268.8	(1)	8	<0.008	<0.008	<0.008	✓	8	200	260	231.9	✓	8	340	370	351	(3)
Frankland	4	2	4	2.8	(1)	4	<0.008	0.01	<0.008	✓	4	13	19	15.8	✓	4	9	15	12	✓
Gibson	4	68	76	71.8	(1)	4	<0.008	<0.008	<0.008	✓	4	215	230	222.5	✓	4	39	43	42	✓
Gnowangerup	4	15	28	20.3	(1)	4	0.016	0.025	0.02	✓	4	85	105	95	✓	4	53	69	61	✓
Grass Patch	4	270	280	277.5	(1)	4	<0.008	0.01	<0.008	✓	4	190	225	203.8	✓	4	340	360	350	(3)
Harrismith TWS	4	22	25	23.8	(1)	4	0.012	0.02	0.015	✓	4	80	100	92.5	✓	4	54	61	57	✓
Highbury	4	8	13	10.3	(1)	4	<0.008	0.014	0.01	✓	4	75	95	85	✓	4	37	42	40	✓
Hopetoun	4	66	160	116.3	(1)	4	<0.008	<0.008	<0.008	✓	4	170	310	237.5	✓	4	71	170	128	✓
Hyden	4	13	27	20.3	(1)	4	0.014	0.035	0.021	✓	4	41	90	65.3	✓	4	36	58	47	✓
Jerramungup	4	11	240	68.5	(1)	4	<0.008	0.03	0.019	✓	4	60	155	90	✓	4	24	210	74	✓
Karlgarin	2	22	22	22	(1)	2	0.025	0.025	0.025	✓	2	90	105	97.5	✓	2	59	62	61	✓
Katanning	5	11	22	14.2	(1)	5	0.016	0.05	0.025	✓	5	75	100	89	✓	5	41	54	49	✓
Kendenup	4	210	230	222.5	(1)	4	<0.008	<0.008	<0.008	✓	4	105	125	117.5	✓	4	260	290	268	(3)
Kojonup	2	21	22	21.5	(1)	2	0.02	0.02	0.02	✓	2	90	95	92.5	✓	2	54	59	57	✓
Kondinin	4	20	25	22.8	(1)	4	0.018	0.035	0.023	✓	4	80	100	91.3	✓	4	50	66	58	✓
Kukerin	4	21	29	25.3	(1)	4	0.01	0.014	0.012	✓	4	80	100	92.5	✓	4	51	64	59	✓
Kulin	4	16	22	20.3	(1)	4	0.014	0.025	0.018	✓	4	80	100	92.5	✓	4	50	64	56	✓
Lake Grace	4	24	29	27	(1)	4	0.014	0.016	0.015	✓	4	75	100	91.3	✓	4	51	67	61	✓
Lake King	2	14	28	21	(1)	2	0.014	0.02	0.017	✓	2	95	100	97.5	✓	2	50	64	57	✓
Mt Barker	5	210	230	218	(1)	5	<0.008	<0.008	<0.008	✓	5	100	120	113	✓	5	250	270	256	(3)
Munglinup	2	3	210	106.5	(1)	2	<0.008	0.016	<0.008	✓	2	32	170	101	✓	2	13	260	137	✓
Muradup	2	23	25	24	(1)	2	0.018	0.025	0.022	✓	2	90	115	102.5	✓	2	54	68	61	✓
Narrikup	4	210	240	222.5	(1)	4	<0.008	<0.008	<0.008	✓	4	110	120	116.3	✓	4	240	270	255	(3)
Narrogin	4	6	13	10	(1)	4	0.01	0.02	0.016	✓	4	70	95	87.5	✓	4	32	48	42	✓
Newdegate	2	28	29	28.5	(1)	2	0.012	0.014	0.013	✓	2	100	100	100	✓	2	65	68	67	✓
Nyabing	2	13	20	16.5	(1)	2	0.014	0.014	0.014	✓	2	85	105	95	✓	2	47	58	53	✓
Ongerup	2	34	120	77	(1)	2	0.018	0.03	0.024	✓	2	40	100	70	✓	2	31	150	91	✓
Pingaring	4	27	33	30	(1)	4	0.008	0.014	0.012	✓	4	85	100	93.8	✓	4	65	70	67	✓
Pingelly	3	11	14	12.3	(1)	3	0.02	0.02	0.02	✓	3	75	95	86.7	✓	3	43	48	46	✓
Pingrup	2	11	13	12	(1)	2	0.012	0.014	0.013	✓	2	85	90	87.5	✓	2	51	53	52	✓
Popanyinning	2	8	11	9.5	(1)	2	0.01	0.08	0.045	✓	2	75	95	85	✓	2	36	42	39	✓
Ravensthorpe	4	25	160	83	(1)	4	<0.008	0.15	0.038	✓	4	39	245	172.3	✓	4	21	170	90	✓
Rocky Gully	4	210	220	215	(1)	4	<0.008	<0.008	<0.008	✓	4	110	125	118.8	✓	4	250	270	260	(3)
Salmon Gums	4	200	280	242.5	(1)	4	<0.008	0.012	<0.008	✓	4	43	225	165.8	✓	4	120	360	298	(3)
Tambellup	2	24	24	24	(1)	2	0.018	0.025	0.022	✓	2	85	115	100	✓	2	56	66	61	✓
Tincurrin TWS	4	14	23	20	(1)	4	0.016	0.025	0.023	✓	4	80	100	88.8	✓	4	46	59	53	✓
Varley	2	16	31	23.5	(1)	2	0.016	0.02	0.018	✓	2	80	100	90	✓	2	48	66	57	✓
Wagin	2	8	11	9.5	(1)	2	0.014	0.018	0.016	✓	2	70	90	80	✓	2	35	45	40	✓
Walpole	5	15	46	24	(1)	5	0.01	0.014	0.012	✓	5	125	200	170	✓	5	50	68	62	✓
Wandering	2	11	16	13.5	(1)	2	0.016	0.02	0.018	✓	2	70	85	77.5	✓	2	34	43	39	✓
Wellstead	2	220	220	220	(1)	2	<0.008	0.01	<0.008	✓	2	115	140	127.5	✓	2	250	260	255	(3)
Wickepin TWS	4	7	14	11.8	(1)	4	0.008	0.014	0.012	✓	4	75	95	88.8	✓	4	32	48	42	✓
Williams	2	5	12	8.5	(1)	2	0.014	0.016	0.015	✓	2	60	80	70	✓	2	25	39	32	✓
Woodanilling	2	16	16	16	(1)	2	0.04	0.055	0.048	✓	2	75	95	85	✓	2	45	48	47	✓
Yealering	4	24	30	26.8	(1)	4	0.02	0.035	0.025	✓	4	80	105	93.8	✓	4	50	60	56	✓

(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

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	20	0.03	0.22	0.077	✓	20	<0.002	0.002	<0.002	✓	20	7.38	8.05	7.66	✓	20	13	22	15.1	✓
Boddington	2	0.03	0.05	0.04	✓	2	0.005	0.006	0.006	✓	2	6.9	7.26	7.08	✓	2	1.7	4.6	3.2	✓
Borden	2	0.008	0.015	0.012	✓	2	<0.002	<0.002	<0.002	✓	2	7.37	7.47	7.42	✓	2	1.2	1.8	1.5	✓
Bremer Bay	5	<0.003	0.006	<0.003	✓	5	<0.002	<0.002	<0.002	✓	5	8.04	8.27	8.15	✓	5	48	50	49.4	✓
Brookton	2	0.12	0.2	0.16	✓	2	0.01	0.05	0.03	✓	2	7.32	7.48	7.4	✓	2	2.2	2.5	2.4	✓
Broomehill	2	0.14	0.28	0.21	✓	2	0.005	0.01	0.008	✓	2	7.45	7.57	7.51	✓	2	2	2.8	2.4	✓
Bullaring	4	0.04	0.2	0.15	✓	4	<0.002	0.02	0.011	✓	4	7.25	7.49	7.34	✓	4	2.1	3.3	2.5	✓
Condingup	4	0.015	0.035	0.028	✓	4	<0.002	<0.002	<0.002	✓	4	6.79	7.19	6.97	✓	4	60	60	60	✓
Cranbrook	2	0.045	0.07	0.058	✓	2	<0.002	0.01	0.005	✓	2	6.64	7.9	7.27	✓	2	1.6	14	7.8	✓
Cuballing	2	0.16	0.28	0.22	✓	2	0.012	0.075	0.044	✓	2	6.95	7.02	6.99	✓	2	1.5	2.6	2.1	✓
Denmark	4	0.008	0.015	0.012	✓	4	<0.002	0.003	<0.002	✓	4	7.16	7.42	7.29	✓	4	1.9	5.5	4.2	✓
Dudinin TWS	4	0.1	0.24	0.17	✓	4	0.002	0.01	0.006	✓	4	9.17	9.88	9.5	(2)	4	2	3.4	2.4	✓
Dumbleyung	2	0.05	0.1	0.075	✓	2	0.003	0.003	0.003	✓	2	8.03	8.77	8.4	✓	2	2.1	2.2	2.2	✓
Esperance	8	<0.003	0.008	<0.003	✓	8	<0.002	<0.002	<0.002	✓	8	7.44	7.74	7.53	✓	8	9.9	11	10.6	✓
Frankland	4	0.006	0.1	0.032	✓	4	<0.002	<0.002	<0.002	✓	4	6.16	6.58	6.37	(3)	4	0.8	1.9	1.3	✓
Gibson	4	0.03	0.06	0.049	✓	4	<0.002	<0.002	<0.002	✓	4	6.61	7.13	6.92	✓	4	42	44	43.3	✓
Gnowangerup	4	0.14	0.2	0.155	✓	4	0.005	0.016	0.01	✓	4	7.36	7.97	7.57	✓	4	1.7	2.9	2.2	✓
Grass Patch	4	<0.003	0.006	<0.003	✓	4	<0.002	<0.002	<0.002	✓	4	8.14	8.25	8.21	✓	4	10	11	10.5	✓
Harrismith TWS	4	0.08	0.12	0.1	✓	4	0.004	0.02	0.01	✓	4	8.79	9.67	9.18	(2)	4	1.4	3.3	2.2	✓
Highbury	4	0.1	0.14	0.115	✓	4	0.005	0.016	0.011	✓	4	6.82	6.99	6.91	✓	4	1.3	3.2	2.3	✓
Hopetoun	4	<0.003	0.015	0.006	✓	4	<0.002	0.002	<0.002	✓	4	7.14	7.56	7.32	✓	4	19	25	22.5	✓
Hyden	4	0.015	0.14	0.071	✓	4	<0.002	0.025	0.007	✓	4	7.18	7.6	7.41	✓	4	1.8	2.7	2.4	✓
Jerramungup	4	0.01	0.06	0.035	✓	4	<0.002	<0.002	<0.002	✓	4	6.94	8.27	7.44	✓	4	3.7	41	13.5	✓
Karlgarin	2	0.07	0.12	0.095	✓	2	0.003	0.004	0.004	✓	2	7.93	7.94	7.94	✓	2	2	2.8	2.4	✓
Katanning	5	0.14	1	0.384	(1)	5	0.014	0.05	0.026	✓	5	6.78	7.31	7.03	✓	5	1.1	2.9	1.7	✓
Kendenup	4	0.025	0.05	0.035	✓	4	<0.002	<0.002	<0.002	✓	4	7.79	8.16	8.01	✓	4	14	15	14.5	✓
Kojonup	2	0.14	0.24	0.19	✓	2	0.014	0.018	0.016	✓	2	7.37	7.49	7.43	✓	2	1.8	2.2	2	✓
Kondinin	4	0.08	0.14	0.108	✓	4	0.004	0.012	0.008	✓	4	7.74	8.43	7.98	✓	4	2.5	3.4	3	✓
Kukerin	4	0.03	0.06	0.046	✓	4	<0.002	<0.002	<0.002	✓	4	7.8	8.22	8.08	✓	4	2	2.9	2.3	✓
Kulin	4	0.09	0.12	0.103	✓	4	0.003	0.016	0.01	✓	4	7.7	8.31	8.02	✓	4	1.5	3.3	2.2	✓
Lake Grace	4	0.045	0.1	0.069	✓	4	0.002	0.005	0.004	✓	4	7.66	8.63	8.2	✓	4	2.1	3.5	2.5	✓
Lake King	2	0.1	0.12	0.11	✓	2	0.003	0.012	0.008	✓	2	7.23	7.54	7.39	✓	2	2	2.2	2.1	✓
Mt Barker	5	0.03	0.045	0.042	✓	5	<0.002	<0.002	<0.002	✓	5	7.66	7.93	7.83	✓	5	14	15	14.6	✓
Munglinup	2	0.07	0.08	0.075	✓	2	<0.002	<0.002	<0.002	✓	2	6.19	7.88	7.04	✓	2	0.3	7.9	4.1	✓
Muradup	2	0.16	0.18	0.17	✓	2	0.009	0.009	0.009	✓	2	7.81	7.93	7.87	✓	2	1.8	1.9	1.9	✓
Narrikup	4	0.03	0.06	0.044	✓	4	<0.002	<0.002	<0.002	✓	4	7.48	7.84	7.74	✓	4	14	15	14.5	✓
Narrogin	4	0.12	0.22	0.165	✓	4	0.005	0.03	0.023	✓	4	6.82	7.17	7.01	✓	4	1.4	3.7	2.1	✓
Newdegate	2	0.06	0.12	0.09	✓	2	0.003	0.003	0.003	✓	2	7.48	8.06	7.77	✓	2	2.2	2.3	2.3	✓
Nyabing	2	0.14	0.16	0.15	✓	2	0.009	0.01	0.01	✓	2	6.96	7.19	7.08	✓	2	1.2	1.6	1.4	✓
Ongerup	2	<0.003	0.07	0.035	✓	2	<0.002	0.003	<0.002	✓	2	7.3	8.14	7.72	✓	2	3.1	8.1	5.6	✓
Pingaring	4	0.045	0.09	0.071	✓	4	<0.002	0.003	<0.002	✓	4	9.11	9.52	9.3	(2)	4	2.1	2.6	2.4	✓
Pingelly	3	0.09	0.24	0.157	✓	3	0.005	0.018	0.012	✓	3	7.54	7.59	7.56	✓	3	2.1	3.1	2.5	✓
Pingrup	2	0.12	0.2	0.16	✓	2	0.009	0.012	0.011	✓	2	6.72	6.95	6.84	✓	2	0.8	2	1.4	✓
Popanyinning	2	0.08	0.6	0.34	(1)	2	0.003	0.1	0.052	✓	2	6.96	7.32	7.14	✓	2	2.2	3.5	2.9	✓
Ravensthorpe	4	<0.003	0.045	0.021	✓	4	<0.002	<0.002	<0.002	✓	4	7.37	8.11	7.71	✓	4	1.4	21	15.9	✓
Rocky Gully	4	0.03	0.05	0.04	✓	4	<0.002	<0.002	<0.002	✓	4	8.15	8.33	8.27	✓	4	14	15	14.5	✓
Salmon Gums	4	<0.003	0.004	<0.003	✓	4	<0.002	<0.002	<0.002	✓	4	8.28	8.43	8.36	✓	4	6.4	10	9.1	✓
Tambellup	2	0.12	0.14	0.13	✓	2	0.008	0.012	0.01	✓	2	7.75	8.64	8.2	✓	2	1.8	1.9	1.9	✓
Tincurrin TWS	4	0.2	0.34	0.26	✓	4	0.004	0.012	0.009	✓	4	7.44	7.53	7.49	✓	4	2.2	3.2	2.5	✓
Varley	2	0.06	0.1	0.08	✓	2	0.003	0.004	0.004	✓	2	7.25	7.46	7.36	✓	2	2.3	3	2.7	✓
Wagin	2	0.1	0.24	0.17	✓	2	0.014	0.02	0.017	✓	2	6.76	7.14	6.95	✓	2	2.4	3.4	2.9	✓
Walpole	5	0.008	0.03	0.015	✓	5	<0.002	0.003	<0.002	✓	5	7.22	7.55	7.39	✓	5	7.3	10	9.4	✓
Wandering	2	0.08	0.09	0.085	✓	2	0.01	0.012	0.011	✓	2	7.15	7.46	7.31	✓	2	2	4.2	3.1	✓
Wellstead	2	0.04	0.18	0.11	✓	2	<0.002	<0.002	<0.002	✓	2	7.88	8.14	8.01	✓	2	15	15	15	✓
Wickepin TWS	4	0.07	0.12	0.093	✓	4	0.004	0.014	0.009	✓	4	6.89	7.33	7.11	✓	4	1.5	3.6	2.1	✓
Williams	2	0.06	0.07	0.065	✓	2	0.009	0.02	0.015	✓	2	6.42	6.94	6.68	✓	2	1.4	4.8	3.1	✓
Woodanilling	2	0.08	0.09	0.085	✓	2	0.004	0.014	0.009	✓	2	7.98	8.13	8.06	✓	2	1.9	2.6	2.3	✓
Yealering	4	0.05	0.28	0.148	✓	4	0.002	0.03	0.013	✓	4	7.41	8.19	7.79	✓	4	1.9	3.3	2.5	✓

(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. (3) Low pH is a characteristic of this source.

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	20	54	64	60.8	✓	20	539	613	583	✓	20	<1	<1	<1	✓	20	0.1	0.9	0.4	✓
Boddington	2	33	43	38	✓	2	136	181	159	✓	2	<1	<1	<1	✓	2	0.2	0.4	0.3	✓
Borden	2	12	18	15	✓	2	90	132	111	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Bremer Bay	5	135	145	141	✓	5	820	870	839	(2)	5	<1	<1	<1	✓	5	<0.1	<0.1	<0.1	✓
Brookton	2	40	44	42	✓	2	177	193	185	✓	2	2	4	3	✓	2	0.3	0.6	0.5	✓
Broomehill	2	44	46	45	✓	2	193	211	202	✓	2	5	7	6	✓	2	0.4	0.9	0.7	✓
Bullaring	4	39	49	45.3	✓	4	178	239	216	✓	4	<1	<1	<1	✓	4	0.2	0.7	0.5	✓
Condingup	4	290	325	305	(1)	4	983	1049	1012	(2)	4	<1	<1	<1	✓	4	<0.1	0.2	<0.1	✓
Cranbrook	2	12	61	36.5	✓	2	70	585	328	✓	2	<1	2	<1	✓	2	0.2	2.8	1.5	✓
Cuballing	2	38	48	43	✓	2	165	198	182	✓	2	1	2	2	✓	2	0.5	1.8	1.2	✓
Denmark	4	115	175	147.5	✓	4	424	589	514	✓	4	<1	<1	<1	✓	4	<0.1	0.1	<0.1	✓
Dudinin TWS	4	38	46	43.3	✓	4	185	229	210	✓	4	<1	2	<1	✓	4	0.2	0.8	0.5	✓
Dumbleyung	2	40	51	45.5	✓	2	199	229	214	✓	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Esperance	8	110	140	123.1	✓	8	838	914	864	(2)	8	<1	<1	<1	✓	8	<0.1	0.2	<0.1	✓
Frankland	4	5.5	8	6.8	✓	4	34	51	42	✓	4	<1	<1	<1	✓	4	<0.1	<0.1	<0.1	✓
Gibson	4	175	190	182.5	(1)	4	629	667	645	(2)	4	<1	<1	<1	✓	4	0.2	0.3	0.3	✓
Gnowangerup	4	41	53	46	✓	4	195	244	214	✓	4	3	5	4	✓	4	0.5	0.6	0.6	✓
Grass Patch	4	105	120	112.5	✓	4	818	865	843	(2)	4	<1	<1	<1	✓	4	<0.1	0.7	0.2	✓
Harrismith TWS	4	39	48	44.5	✓	4	182	222	207	✓	4	1	2	1	✓	4	0.2	0.5	0.4	✓
Highbury	4	36	46	41.5	✓	4	156	195	176	✓	4	<1	2	<1	✓	4	0.4	1.2	0.8	✓
Hopetoun	4	105	210	155	✓	4	579	696	639	(2)	4	<1	<1	<1	✓	4	<0.1	0.3	0.2	✓
Hyden	4	20	42	30.8	✓	4	124	202	160	✓	4	<1	<1	<1	✓	4	<0.1	0.7	0.4	✓
Jerramungup	4	31	125	58.3	✓	4	132	751	300	✓	4	<1	<1	<1	✓	4	<0.1	0.2	0.2	✓
Karlgarin	2	41	46	43.5	✓	2	204	227	216	✓	2	1	1	1	✓	2	0.3	0.7	0.5	✓
Katanning	5	38	47	42.4	✓	5	166	209	189	✓	5	3	8	4	✓	5	0.9	6.0	2.3	(3)
Kendenup	4	60	64	62.3	✓	4	563	619	593	✓	4	<1	<1	<1	✓	4	0.2	0.3	0.3	✓
Kojonup	2	45	46	45.5	✓	2	205	213	209	✓	2	3	8	6	✓	2	0.5	0.9	0.7	✓
Kondinin	4	39	48	44	✓	4	182	229	210	✓	4	<1	2	<1	✓	4	0.2	0.8	0.4	✓
Kukerin	4	38	48	43.8	✓	4	184	227	211	✓	4	<1	<1	<1	✓	4	0.1	0.2	0.1	✓
Kulin	4	35	50	44.8	✓	4	174	221	206	✓	4	<1	<1	<1	✓	4	0.2	0.4	0.3	✓
Lake Grace	4	38	50	44.3	✓	4	180	233	214	✓	4	<1	2	<1	✓	4	0.1	0.3	0.2	✓
Lake King	2	43	46	44.5	✓	2	192	229	211	✓	2	<1	1	<1	✓	2	0.4	0.8	0.6	✓
Mt Barker	5	58	64	60.4	✓	5	553	607	580	✓	5	<1	<1	<1	✓	5	0.2	0.4	0.3	✓
Munglinup	2	16	88	52	✓	2	79	663	371	✓	2	<1	4	2	✓	2	0.4	1.3	0.9	✓
Muradup	2	42	53	47.5	✓	2	200	250	225	✓	2	2	3	3	✓	2	0.5	0.6	0.6	✓
Narrikup	4	59	64	61	✓	4	558	621	585	✓	4	<1	<1	<1	✓	4	0.1	0.3	0.2	✓
Narrogin	4	35	48	43.8	✓	4	145	200	182	✓	4	<1	2	2	✓	4	0.2	0.8	0.6	✓
Newdegate	2	45	46	45.5	✓	2	230	231	231	✓	2	<1	1	<1	✓	2	0.2	0.3	0.3	✓
Nyabing	2	38	50	44	✓	2	177	227	202	✓	2	3	5	4	✓	2	0.7	0.8	0.8	✓
Ongerup	2	25	48	36.5	✓	2	138	384	261	✓	2	<1	<1	<1	✓	2	0.1	0.4	0.3	✓
Pingaring	4	41	48	44.8	✓	4	205	233	223	✓	4	<1	2	<1	✓	4	0.2	0.3	0.2	✓
Pingelly	3	40	45	42.3	✓	3	167	201	186	✓	3	<1	3	<1	✓	3	0.3	0.8	0.5	✓
Pingrup	2	43	44	43.5	✓	2	180	190	185	✓	2	3	6	5	✓	2	0.4	0.8	0.6	✓
Popanyinning	2	39	43	41	✓	2	156	190	173	✓	2	1	4	3	✓	2	0.2	0.4	0.3	✓
Ravensthorpe	4	30	160	108.8	✓	4	142	599	464	✓	4	<1	<1	<1	✓	4	0.1	0.3	0.2	✓
Rocky Gully	4	58	64	61.3	✓	4	551	604	582	✓	4	<1	<1	<1	✓	4	0.2	0.3	0.3	✓
Salmon Gums	4	64	120	99.8	✓	4	416	865	718	(2)	4	<1	<1	<1	✓	4	<0.1	0.1	<0.1	✓
Tambellup	2	38	50	44	✓	2	195	243	219	✓	2	3	3	3	✓	2	0.5	0.5	0.5	✓
Tincurrin TWS	4	40	47	43.3	✓	4	173	220	197	✓	4	1	4	3	✓	4	0.4	1.1	0.7	✓
Varley	2	39	48	43.5	✓	2	175	237	206	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Wagin	2	38	45	41.5	✓	2	151	192	172	✓	2	1	3	2	✓	2	0.3	0.5	0.4	✓
Walpole	5	85	110	97.2	✓	5	333	404	359	✓	5	<1	<1	<1	✓	5	<0.1	0.1	<0.1	✓
Wandering	2	38	44	41	✓	2	150	190	170	✓	2	<1	1	<1	✓	2	0.4	0.4	0.4	✓
Wellstead	2	60	68	64	✓	2	582	604	593	✓	2	<1	<1	<1	✓	2	0.1	0.8	0.5	✓
Wickepin TWS	4	35	47	42.8	✓	4	146	198	182	✓	4	<1	2	2	✓	4	0.2	0.4	0.3	✓
Williams	2	33	42	37.5	✓	2	128	176	152	✓	2	<1	1	<1	✓	2	0.3	0.6	0.5	✓
Woodanilling	2	36	47	41.5	✓	2	168	205	187	✓	2	<1	<1	<1	✓	2	0.3	0.5	0.4	✓
Yealering	4	41	50	46.3	✓	4	184	234	214	✓	4	<1	1	<1	✓	4	0.2	0.8	0.5	✓

(1) Elevated sodium is characteristic of the source supplying this locality. (2) Elevated TDS is characteristic of the source supplying this locality. (3) Elevated maximum turbidity - caused by mobilisation of sediment within the distribution system

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	101	0	0	✓	77	0	✓	52	0.55	0.75	0.66	✓	0	(1)	2	✓
Burrup*	24	0	0	✓	24	0	✓	2	0.6	0.65	0.63	(2)	0	(1)	2	✓
Camballin	12	0	0	✓	12	0	✓	2	0.2	0.25	0.23	✓	0	(1)	4	✓
Cape Lambert TWS	12	0	0	✓	12	0	✓	2	0.65	0.7	0.68	(2)	0	(1)	2	✓
Derby	63	0	0	✓	63	0	✓	51	0.5	0.65	0.59	✓	0	(1)	3	✓
Fitzroy Crossing	11	0	0	✓	11	0	✓	2	0.25	0.25	0.25	✓	0	(1)	2	✓
Halls Creek	52	0	0	✓	52	0	✓	2	0.6	0.65	0.63	✓	0	(1)	2	✓
Hedland	106	0	0	✓	80	0	✓	53	0.55	0.75	0.68	✓	0	(1)	2	✓
Karratha	119	0	0	✓	119	0	✓	52	0.6	0.75	0.67	✓	0	(1)	2	✓
Kununurra	65	0	0	✓	52	0	✓	52	0.5	0.7	0.6	✓	0	(1)	2	✓
Marble Bar	12	0	0	✓	12	0	✓	2	0.5	0.65	0.58	✓	0	(1)	2	✓
Newman	65	0	0	✓	52	0	✓	2	0.2	0.25	0.23	✓	0	(1)	2	✓
Nullagine	12	0	0	✓	12	0	✓	2	0.45	0.5	0.48	✓	1	✓	2	✓
Onslow TWS	53	0	0	✓	26	0	✓	2	0.65	0.7	0.68	✓	0	(1)	5	✓
Point Samson	12	0	0	✓	12	0	✓	2	0.7	0.7	0.7	(2)	0	(1)	2	✓
Roebourne	53	0	0	✓	53	0	✓	2	0.65	0.7	0.68	✓	0	(1)	2	✓
Wickham	53	0	0	✓	53	0	✓	2	0.65	0.7	0.68	✓	0	(1)	3	✓
Wyndham	53	0	0	✓	53	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. (2) Receives water from a fluoridated source within the dosing range set by the Fluoridation of Water Supplies Advisory Committee

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	23.8	25.1	24.6	✓	1	✓	0	(1)	2	0.004	0.004	0.004	✓	0	(1)
Burrup*	2	6.2	6.6	6.6	✓	1	✓	1	✓	2	<0.001	0.002	<0.001	✓	0	(1)
Camballin	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	<0.001	<0.001	<0.001	✓	0	(1)
Cape Lambert TWS	2	6.6	7.0	7.0	✓	1	✓	2	✓	2	0.001	0.002	0.002	✓	0	(1)
Derby	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	0.003	0.005	0.004	✓	1	✓
Fitzroy Crossing	2	4.0	4.4	4.0	✓	3	✓	0	(1)	2	<0.001	0.001	<0.001	✓	1	✓
Halls Creek	2	4.4	4.8	4.8	✓	1	✓	0	(1)	2	<0.001	0.002	<0.001	✓	0	(1)
Hedland	2	4.0	4.4	4.4	✓	1	✓	0	(2)	2	0.002	0.005	0.004	✓	0	(1)
Karratha	2	5.7	6.6	6.2	✓	1	✓	2	✓	2	0.006	0.150	0.078	✓	0	(1)
Kununurra	4	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	0.031	0.033	0.032	✓	0	(1)
Marble Bar	2	6.2	7.5	7.0	✓	1	✓	0	(1)	2	0.003	0.005	0.004	✓	0	(1)
Newman	12	0.9	1.3	1.3	✓	1	✓	0	(1)	2	0.005	0.006	0.006	✓	1	✓
Nullagine	3	4.4	5.3	4.8	✓	1	✓	1	✓	2	<0.001	0.002	<0.001	✓	0	(1)
Onslow TWS	2	1.8	2.2	2.2	✓	1	✓	2	✓	2	<0.001	<0.001	<0.001	✓	0	(1)
Point Samson	2	6.2	6.6	6.6	✓	1	✓	1	✓	3	<0.001	0.001	<0.001	✓	0	(1)
Roebourne	2	5.7	6.2	6.2	✓	1	✓	0	(1)	3	0.003	0.110	0.039	✓	0	(1)
Wickham	2	6.2	7.0	6.6	✓	1	✓	1	✓	2	0.006	0.018	0.012	✓	0	(1)
Wyndham	2	0.4	0.4	0.4	✓	2	✓	0	(1)	2	0.069	0.086	0.078	✓	1	✓

*Burrup LNG and Burrup Supply have been combined into one locality - Burrup (1) No samples required in this 12 month period. (2) Assessed under operational sampling program

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	80	85	82.5	(1)	2	<0.008	<0.008	<0.008	✓	2	120	130	125	✓	2	63	66	65	✓
Burrup*	2	180	230	205	(1)	2	<0.008	<0.008	<0.008	✓	2	75	110	92.5	✓	2	210	290	250	✓
Camballin	2	57	58	57.5	(1)	2	<0.008	<0.008	<0.008	✓	2	41	41	41	✓	2	44	44	44	✓
Cape Lambert TWS	2	210	210	210	(1)	2	<0.008	<0.008	<0.008	✓	2	95	100	97.5	✓	2	240	260	250	✓
Derby	2	150	160	155	(1)	2	<0.008	<0.008	<0.008	✓	2	95	95	95	✓	2	15	17	16	✓
Fitzroy Crossing	2	180	180	180	(1)	2	<0.008	<0.008	<0.008	✓	2	43	44	43.5	✓	2	160	160	160	✓
Halls Creek	2	330	350	340	(1)	2	<0.008	<0.008	<0.008	✓	2	155	170	162.5	✓	2	300	310	305	(2)
Hedland	2	180	220	200	(1)	2	<0.008	<0.008	<0.008	✓	2	120	145	132.5	✓	2	180	200	190	(2)
Karratha	2	200	210	205	(1)	2	<0.008	<0.008	<0.008	✓	2	85	100	92.5	✓	2	220	240	230	(3)
Kununurra	4	190	220	212.5	(1)	4	<0.008	<0.008	<0.008	✓	4	15	22	17.5	✓	4	130	170	158	✓
Marble Bar	2	350	370	360	(1)	2	<0.008	<0.008	<0.008	✓	2	185	195	190	✓	2	270	300	285	(2)
Newman	12	120	160	143.3	(1)	12	<0.008	<0.008	<0.008	✓	12	55	85	70.8	✓	12	130	160	143	✓
Nullagine	3	120	150	140	(1)	3	<0.008	<0.008	<0.008	✓	3	75	95	85	✓	3	180	200	190	✓
Onslow TWS	2	170	170	170	(1)	2	<0.008	<0.008	<0.008	✓	2	90	100	95	✓	2	180	190	185	✓
Point Samson	2	200	210	205	(1)	2	<0.008	<0.008	<0.008	✓	2	95	100	97.5	✓	2	250	260	255	(3)
Roebourne	2	190	220	205	(1)	2	<0.008	<0.008	<0.008	✓	2	70	95	82.5	✓	2	200	250	225	✓
Wickham	2	160	220	190	(1)	2	<0.008	<0.008	<0.008	✓	2	75	95	85	✓	3	190	250	217	(3)
Wyndham	2	43	43	43	(1)	2	0.01	0.01	0.01	✓	2	31	35	33	✓	2	39	43	41	✓

*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.

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	8.3	8.57	8.44	✓	2	90	90	90	(1)
Burrup*	2	<0.003	0.004	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.12	8.2	8.16	✓	2	55	55	55	✓
Camballin	2	0.008	0.015	0.012	✓	2	<0.002	<0.002	<0.002	✓	2	6.96	7.2	7.08	✓	2	22	23	22.5	✓
Cape Lambert TWS	2	<0.003	0.004	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.88	8.36	8.12	✓	2	48	50	49	✓
Derby	2	0.004	0.05	0.027	✓	2	<0.002	<0.002	<0.002	✓	2	7.76	7.86	7.81	✓	2	15	16	15.5	✓
Fitzroy Crossing	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.59	7.61	7.6	✓	2	20	21	20.5	✓
Halls Creek	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.54	7.96	7.75	✓	2	43	50	46.5	✓
Hedland	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.03	8.07	8.05	✓	2	50	50	50	✓
Karratha	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.92	8.31	8.12	✓	2	48	50	49	✓
Kununurra	4	<0.003	0.01	0.005	✓	4	<0.002	0.055	0.02	✓	4	7.61	7.93	7.73	✓	4	50	55	53.8	✓
Marble Bar	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.62	7.71	7.67	✓	2	39	39	39	✓
Newman	12	<0.003	0.006	<0.003	✓	12	<0.002	<0.002	<0.002	✓	12	6.94	7.48	7.25	✓	12	15	19	17.1	✓
Nullagine	3	<0.003	0.015	0.005	✓	3	<0.002	<0.002	<0.002	✓	3	7.35	7.48	7.41	✓	3	30	33	31.3	✓
Onslow TWS	2	<0.003	0.004	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.18	8.39	8.29	✓	2	70	75	72.5	✓
Point Samson	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.89	8.41	8.15	✓	2	50	55	52.5	✓
Roebourne	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.98	8	7.99	✓	2	49	50	49.5	✓
Wickham	3	<0.003	<0.003	<0.003	✓	3	<0.002	<0.002	<0.002	✓	2	8.22	8.24	8.23	✓	2	50	50	50	✓
Wyndham	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.92	7.96	7.94	✓	2	7.8	8.6	8.2	✓

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

Drinking Water Quality Annual Report Data 01/07/2019 to 30/06/2020

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	90	95	92.5	✓	2	454	471	463	✓	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Burrup*	2	44	59	51.5	✓	2	505	659	582	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Camballin	2	36	37	36.5	✓	2	228	232	230	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Cape Lambert TWS	2	51	55	53	✓	2	581	605	593	✓	2	<1	<1	<1	✓	2	0.1	0.1	0.1	✓
Derby	2	110	120	115	✓	2	429	433	431	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Fitzroy Crossing	2	36	43	39.5	✓	2	393	394	394	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Halls Creek	2	140	145	142.5	(1)	2	925	925	925	(2)	2	<1	<1	<1	✓	2	0.1	0.1	0.1	✓
Hedland	2	80	88	84	✓	2	556	641	599	✓	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Karratha	2	48	53	50.5	✓	2	547	601	574	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Kununurra	4	28	52	35	✓	4	392	450	426	✓	4	<1	<1	<1	✓	4	0.1	0.5	0.4	✓
Marble Bar	2	170	185	177.5	(1)	2	971	1030	1001	(2)	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Newman	12	49	67	55.9	✓	12	367	431	401	✓	12	<1	<1	<1	✓	12	<0.1	0.1	<0.1	✓
Nullagine	3	53	63	56.7	✓	3	430	504	464	✓	3	<1	<1	<1	✓	3	0.1	0.2	0.1	✓
Onslow TWS	2	41	43	42	✓	2	494	504	499	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Point Samson	2	51	57	54	✓	2	582	607	595	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Roebourne	2	44	51	47.5	✓	2	510	594	552	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Wickham	3	42	52	46	✓	2	475	599	537	(2)	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Wyndham	2	20	21	20.5	✓	2	132	137	135	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<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.