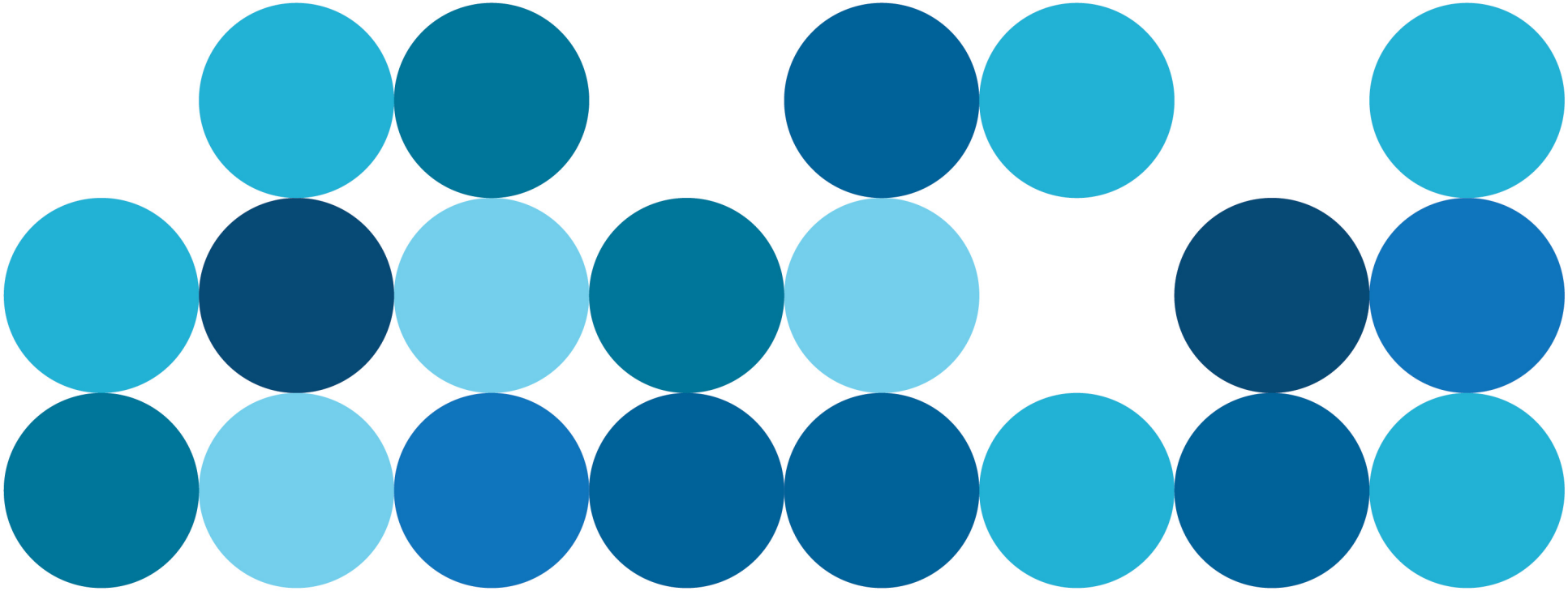
Drinking Water Quality

Annual Report 2020-21



WATER CORPORATION

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About this report

Water Corporation's 2020-21 Drinking Water Quality Annual Report is a review of our performance for the financial year ending 30 June 2021.

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 19th Drinking Water Quality Annual Report; we trust it provides our customers with the information they require about their drinking water quality.

Summary

Ensuring supply of safe drinking water is our highest priority. In 2020-21, 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 or to provide feedback on this report:

- Call us on 13 13 85
- Visit watercorporation.com.au/drinkingwaterquality
- Email us at report@watercorporation.com.au

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.

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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
DoH	Department of Health
DPIRD	Department of Primary Industry and Regional Development
EBM	Event Based monitoring
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
mL	Millilitres
MoU	Memorandum of Understanding
MPN/100mL	Most probable number / 100mL
MWR	Mid-West Region

Acronym	Description
NHMRC	National Health and Medical Research Council
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

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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 regional water schemes where there may be few sources of drinking water available and where installation of treatment can be very costly.

In 2020-21, 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 2020-21, the feedback from our customers about their water quality was consistent. The end of year average was 6.15 for “the taste of the water” and 7.01 for “providing a consistent level of water quality” (refer to *Customer Research* on page 49 for further information on this rating).

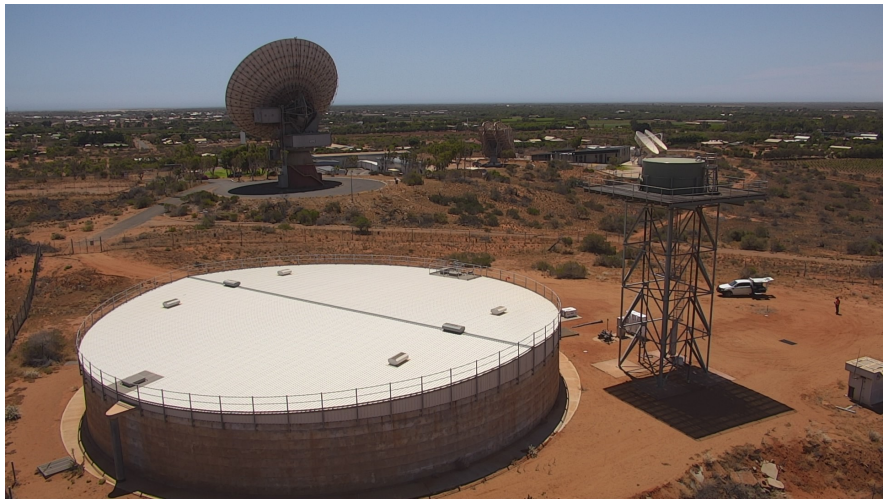

Figure 1: Carnarvon ground level and elevated tanks

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

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Our commitment to you

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

To achieve this, we have partnered with relevant agencies to:

- 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 customers, 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 *ADWG 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 41 and *Case study – Nitrates in the Murchison* on page 38).

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


Drinking Water Quality Policy

Water Corporation is committed to effective management of its drinking water supplies to provide a safe, high-quality product that consistently meets the Australian Drinking Water Guidelines, customer and regulatory requirements, and the corporate objectives and vision.

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

Manage water
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 customers, stakeholders, regulators and employees into our planning.

Protect our sources
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.

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 health standards
Meet the health-related requirements of the Australian Drinking Water Guidelines and work to progressively improve the aesthetic quality of water supplied to our customers.
Contribute to setting industry regulations and guidelines, and other standards relevant to public health and the water cycle.

Improve our practices
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.

The Corporation will implement and maintain a drinking water quality management system consistent with the Australian Drinking Water Guidelines 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 drinking water quality management and outcomes.

Pat Donovan
Chief Executive Officer, Water Corporation

PC1261
May 2020

WATER CORPORATION


Drinking Water Source Protection Policy

Water Corporation is committed to effective management of its drinking water supplies to provide a safe, high-quality product that consistently meets the Australian Drinking Water Guidelines, customer and regulatory requirements, and the corporate objectives and vision. Source Protection is recognised as a key component of this process.

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

Protect water quality
Strongly advocate source protection and the primacy of drinking water quality over other land uses.
Recognise robust source protection practices provide a safer, more practical and economical approach to drinking water safety than water treatment.

Manage risk
Continuously maintain robust multiple barriers appropriate to the risk to drinking water protection failing the raw water supply starting with source protection.
Uphold, support and promote catchment protection despite pressure from competing land uses and activities.

Monitor and respond
Routinely monitor our source protection systems and use effective reporting mechanisms to provide relevant and timely information on their performance.
Maintain active catchment surveillance and protection programs to prevent contamination or degradation of our drinking water sources.

Protect our sources
Ensure land uses and activities within catchments comply with legislation, approval conditions and best management practices.
Collaborate with key stakeholders and the community to protect drinking water catchments.

Guiding principle 1 of the Australian Drinking Water Guidelines 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.

All Water Corporation employees, partners and contractors are responsible for understanding their role in water source protection, and for implementing and continuously improving protection of our drinking water catchments.

Pat Donovan
Chief Executive Officer, Water Corporation

PC1123
May 2020

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WATER CORPORATION

Introduction

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

This year we delivered more than 374 billion litres of drinking water to 1.3 million properties through 34,947 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: Manjimup (Scabby Gully) Dam

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Water service types

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

Farmlands area water service: water that has been treated to drinking water service standard. 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.

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: The Goldfields and Agricultural Water Supply pipeline

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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. Nearly 300 billion litres of water was delivered in 2020-21 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 2020-21, the percentage of water from each source type was 45 per cent desalinated seawater, 11 per cent surface water, 40 per cent groundwater and 4 per cent GWR. Desalinated seawater and GWR are both climate independent sources.

Desalination

The Perth Seawater Desalination Plant (PSDP) located in Kwinana produced 45.1 billion litres of water for the IWSS in 2020-21. 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 98.5 billion litres of water for the IWSS in 2020-21. 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 2020-21, 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 137.1 billion litres.

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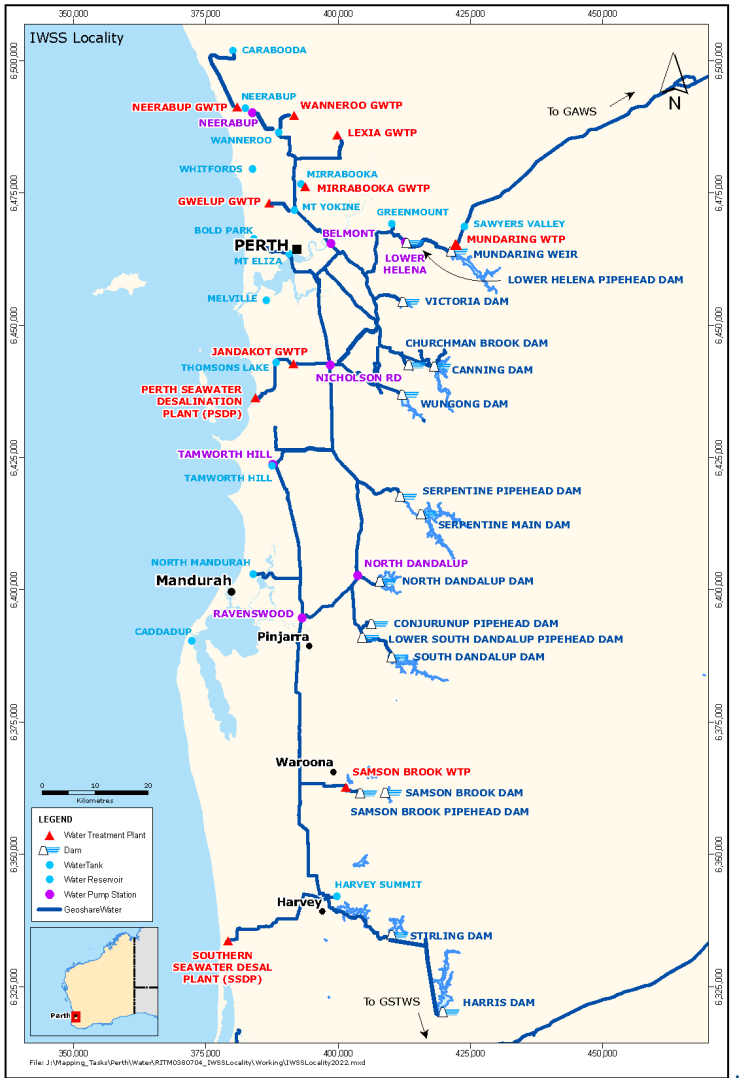

Figure 5: Overview map of the IWSS sources

Groundwater Replenishment

Groundwater replenishment (GWR) is the process by which secondary treated wastewater undergoes advanced treatment to a drinking-quality water standard. 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, the Groundwater Replenishment Scheme (GWRS), located at the Beenyup Wastewater Treatment Plant in Craigie, was announced in October 2014. Stage 1 commenced recharge in 2017 and has a nameplate production capacity up to 14 billion litres of recycled water each year.

GWRS Stage 2 commenced construction in late 2017, with above-ground infrastructure completed in late 2019. Approval for recharge of the GWRS Stage 2 expansion was granted in 2020. The Stage 2 expansion is currently being commissioned and tested and is on track to be operational in 2022. Once operational, the GWRS will effectively double the scheme capacity and Water Corporation is now licensed to recharge up to 28 billion litres of water each year under the conditions of recharge, providing a climate independent water source.

Since an initial GWR trial began in 2010, the cumulative GWR storage is around 10.4 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.

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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 14.6 billion litres of water to more than 50,000 connected properties in 2020-21.

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

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Great Southern Region

In the Great Southern Region 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 12.8 billion litres of drinking water to more than 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. The construction of a new pipeline from the LGSTWS to Denmark, to supplement supply from local dams should be complete early in 2021-22.

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.

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Figure 7: Overview map of the Great Southern region

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Goldfields and Agricultural Region

The Goldfields and Agricultural Region provided 22,750 million litres of water to more than 39,000 connected properties through 9,647 kilometres of water mains, including farms, mines and other enterprises in 2020-21.

The main water supply scheme for the region is the Goldfields and Agricultural Water Supply (GAWS) scheme, where water is sourced from Mundaring Weir near Perth before undergoing treatment at Mundaring Water Treatment Plant. Mundaring Weir is supplemented with desalinated seawater and groundwater.

In addition to the GAWS, water is carted to Broad Arrow and Menzies from Kalgoorlie and 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 33).

Chloramination is used in the GAWS to maintain a disinfectant residual across the network. (Refer to *How is your water treated? – Disinfection* on page 34). Additional disinfection facilities have largely been installed throughout the distribution system. Both strategies will maintain stable disinfection within the GAWS (refer to *Improving your water quality – Goldfields and Agricultural Region* section on page 50 for information on projects to improve disinfection along the GAWS).

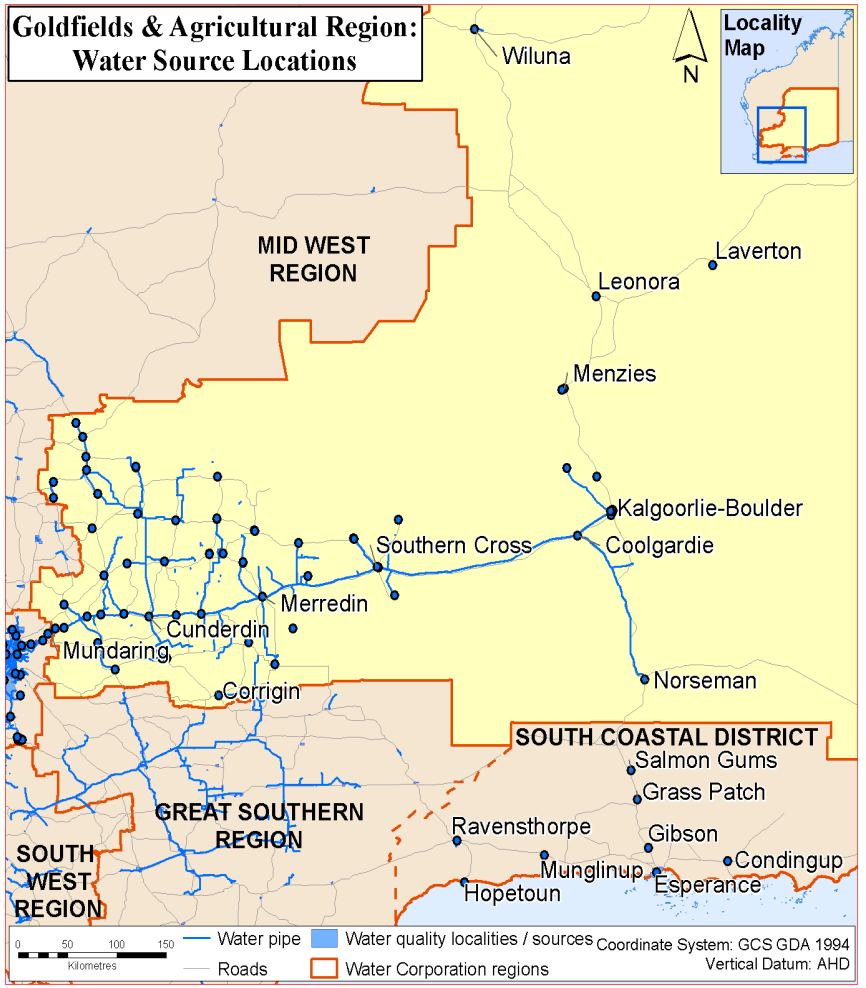

Figure 8: Overview map of the Goldfields and Agricultural region

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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 41,700 connected properties in 51 localities. The total drinking water supplied from these sources was over 17 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.

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 33).

The building of specialised water treatment plants using electrodialysis reversal (EDR) in the Murchison towns of Cue, Meekatharra, Sandstone and Mt Magnet will improve water quality in these towns. The water treatment plant at Mt Magnet commenced production in October 2020, and the water treatment at Cue will commence operation in August 2021. Plants at Sandstone and Meekatharra are scheduled to be commissioned during 2021-22 (refer to *Case Study - Nitrates in the Murchison* on page 38).

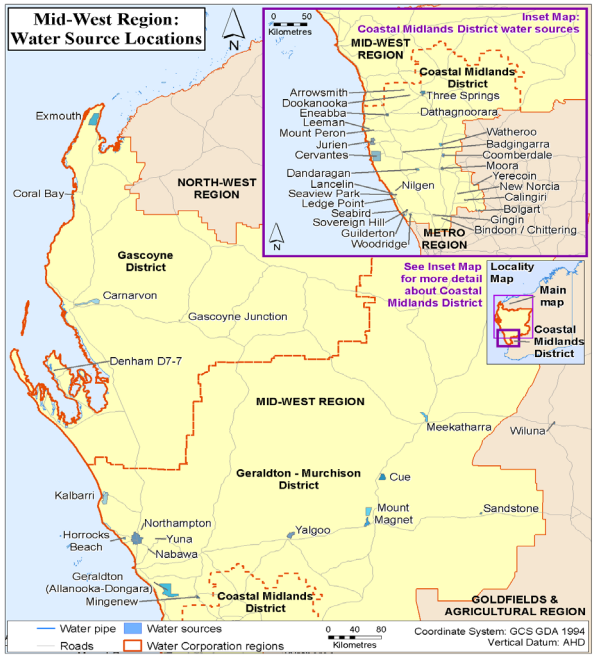

Figure 9: Overview map of the Mid West region

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North West Region

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

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

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

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

Overall, the North West Region supplied more than 37.6 billion litres of drinking water to more than 35,600 connected properties in 2020-21.

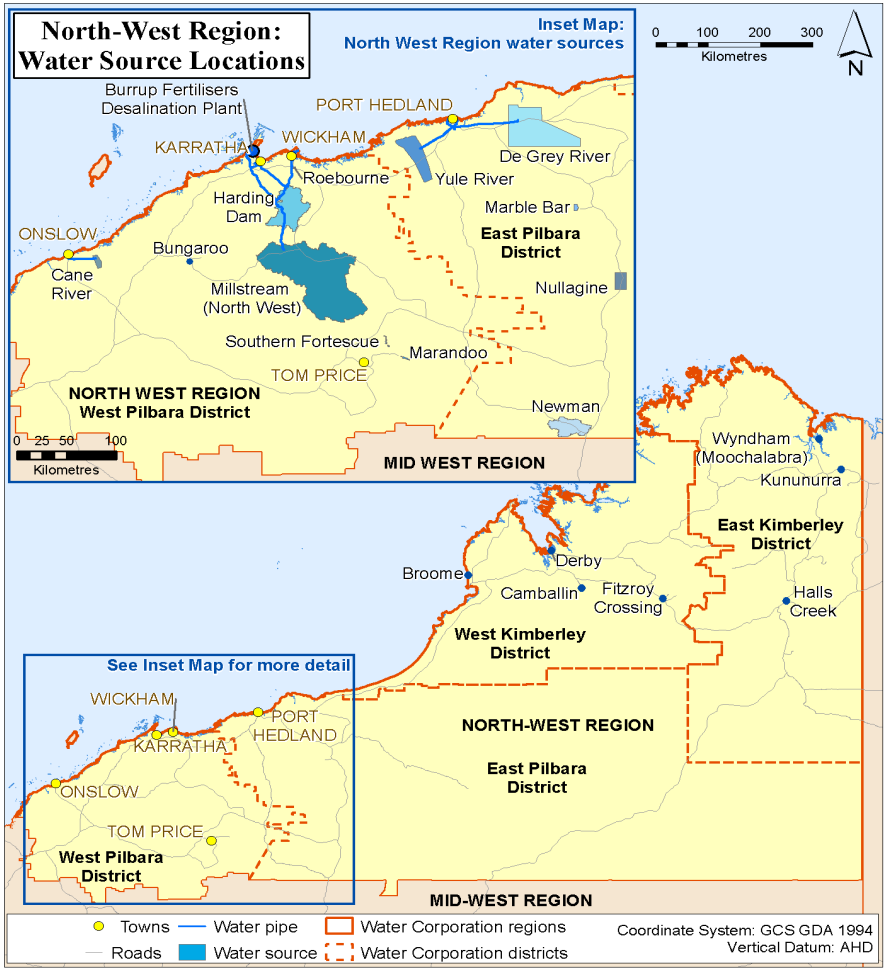

Figure 10: Overview map of the North West region

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Diversifying our sources

We have planned ahead to secure our water supplies in response to climate change, reduced streamflow and expanding population. These plans are based on a three-pronged approach to reduce water use, increase water recycling and develop new water sources such as desalination and groundwater replenishment.

Desalination

Desalination, using reverse osmosis (RO), is a membrane based treatment. This process was 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 2020-21, supplying more than 45 per cent of the drinking water for Perth. (Refer to *How is your water treated? – Desalination* section on page 33.

Perth Seawater Desalination Plant

The Perth Seawater Desalination Plant is located in Kwinana 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, 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 confined Leederville and 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 11 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 1970's. Water recycling schemes are also used to supplement drinking water supplies in Singapore and in Windhoek, Namibia.

Benefits of groundwater replenishment

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

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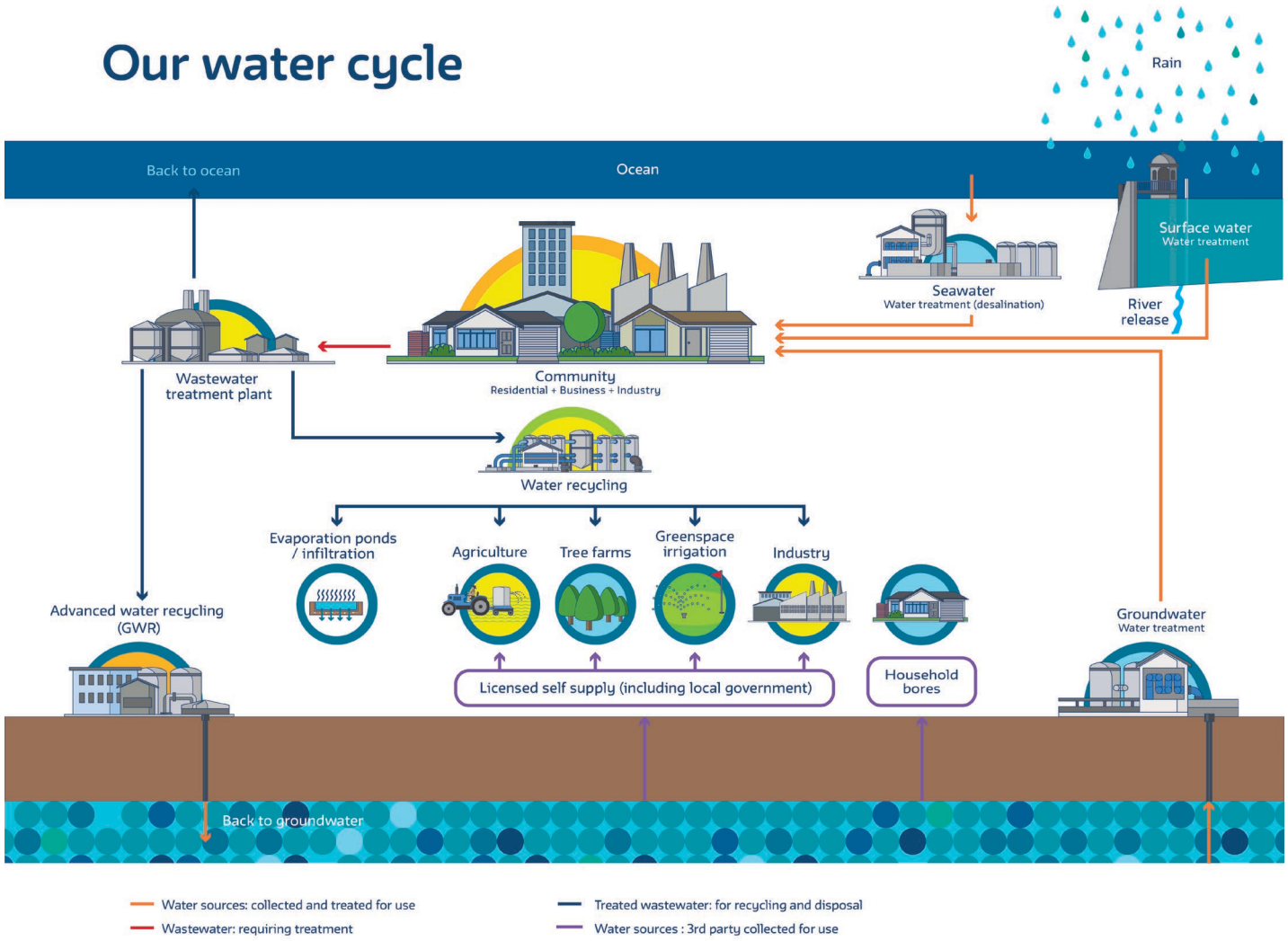

Figure 11: Groundwater replenishment in the water cycle

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Groundwater Replenishment Scheme update

Since recharge from Stage 1 began in late 2017, the accumulative recharge has now reached a total of 39.84 billion litres into the Leederville and Yarragadee aquifers. During fiscal year 2020-21, almost 15.3 billion litres was recharged with a total of 12.6 billion litres abstracted.

GWRS Stage 2 effectively doubles the scheme capacity to enable production of up to 28 billion litres of water each year. That is enough water to supply around 100,000 Perth homes.

Stage 2 infrastructure has been constructed and is currently being commissioned and tested. Stage 2 is expected to become fully operational in 2022 and consists of a second, independent Advanced Water Recycling Plant (AWRP) and a 13 kilometre recharge pipeline to two recharge sites in Neerabup and Wanneroo. The treatment process for Stage 2 is identical to Stage 1.

Further information can be found on our website.

Figure 12: GWR Stages 1 and 2

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Drinking water quality risk management

The National Health and Medical Research Council (NHMRC) define the requirements for safe drinking water in Australia through the Australian Drinking Water Guidelines (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 (refer to Figure 13).

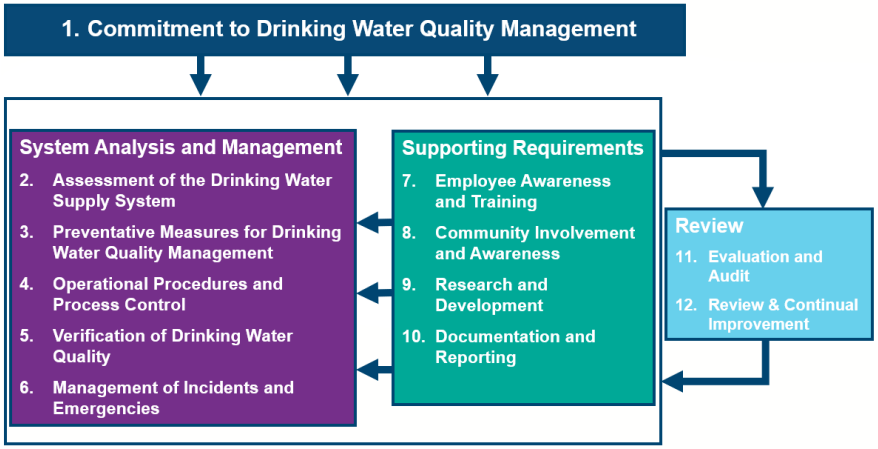

Figure 13: Framework for the management of drinking water quality (ADWG)

Engagement with Department of Health

The DoH regulates drinking water quality in Western Australia. We have an MoU with the DoH 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 41 and *Case Study - Nitrates in the Murchison* on page 38). This forms part of our Water Services Licence as issued by the Economic Regulation Authority. Along with the DoH, we recognise the practices and processes used to maintain high levels of drinking water quality need to be 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 many years, bearing in mind the significant investment required to achieve this.

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, who regularly review our monitoring results and corrective actions (refer to *monitoring and incident management* on page 37).

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.

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Engagement with Advisory Committee for the Purity of Water

The Advisory Committee for the Purity of Water (ACPoW) is a non-statutory inter-departmental committee chaired by the DoH. As one core function, the Advisory Committee provides advice to the Ministers for Health and Water on protecting, monitoring, and managing drinking water quality in Western Australia and fosters inter-agency co-operation on related matters. Water Corporation is an active member of ACPoW, utilising the Advisory Committee for the ongoing review of our drinking water quality management.

The Advisory Committee created two specialist sub-committees of which Water Corporation are active members – one focussing on source protection and catchment management and the other focusing on drinking water quality management including water sampling, results and monitoring. Both sub-committees provide additional expertise to review, monitor and advise the Advisory Committee on any issue affecting drinking water supplies within Western Australia, from water source to water meter.

Water Safety Plans

Having a water safety plan for each of our schemes is a large part of implementing the ADWG 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. This ensures appropriate preventative measures and all pertinent barriers are in place and identifies the operational controls necessary to guarantee the safety of our drinking water supplies.

We routinely review all water safety plans to re-evaluate the risks and update any site or treatment details. During 2020-21, 49 water safety plans from schemes across the state were fully reviewed. In addition, 122 water safety plans were updated to include recent capital upgrades and other modifications to those schemes.

Operator training and competence

Water Corporation has a mature nationally accredited training program for all operational staff. 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 14). 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, Water Corporation offers traineeships to its new and existing workforce, and Vocational Education and Training 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 monitored to maintain

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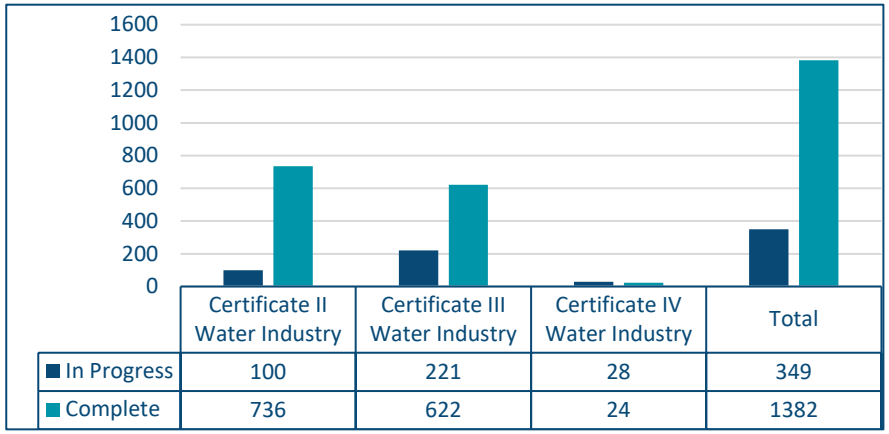
accuracy, therefore ensuring the correct training is allocated for the role being performed or the asset being operated.

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 workforce's current and future capability and the maturity of the process.



	Certificate II Water Industry	Certificate III Water Industry	Certificate IV Water Industry	Total
In Progress	100	221	28	349
Complete	736	622	24	1382

Figure 14: Certificate training completed

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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 26)
- Large reservoirs with long water detention (storage) times
- Water treatment (refer to *How is your water treated?* on page 32)
- Ensuring tanks and bores are sealed to prevent contamination
- Disinfection of water (refer to *How is your water treated? – Disinfection* on page 34)
- 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 15: Multiple barriers for drinking water quality protection

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Source protection

What is source protection and why do we protect our drinking water catchments?

Source protection is the protection and management of our drinking water catchments in a multiple barrier approach to providing safe drinking water to the community.

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. Our catchments provide 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 – the objective is to avoid unnecessary water quality contamination risks,
- Priority 2 – the objective is to minimise water quality contamination risks, and
- Priority 3 areas – the objective is to manage water quality contamination risks.

Prohibited Zones, such as Reservoir Protection Zones (RPZ), 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 16: Aerial view of Harding dam (North West Region)

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How we protect our drinking water catchments

Department of Water and Environmental Regulation (DWER) is responsible for managing and protecting the state's water resources. An MoU 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 120 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 have 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 from land uses and activities within each catchment and recommends 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. RBOM is used to gather semi-quantitative data which is used to inform operational responses and substantiate source risk levels.

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

Surveillance and by-law enforcement are key elements used to control potentially polluting activities in PDWSAs. In 2020-21, over 20,000 surveillance hours were undertaken state wide with 130 by-law offence prosecutions, 32 infringements and 917 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.

Storage barrier

The reservoir in a surface water catchment acts as a storage barrier. A storage barrier promotes natural processes that reduce microbiological contamination and provides a potential buffer to minimise the impact of inflow variation on the quality of water stored in the reservoir.

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

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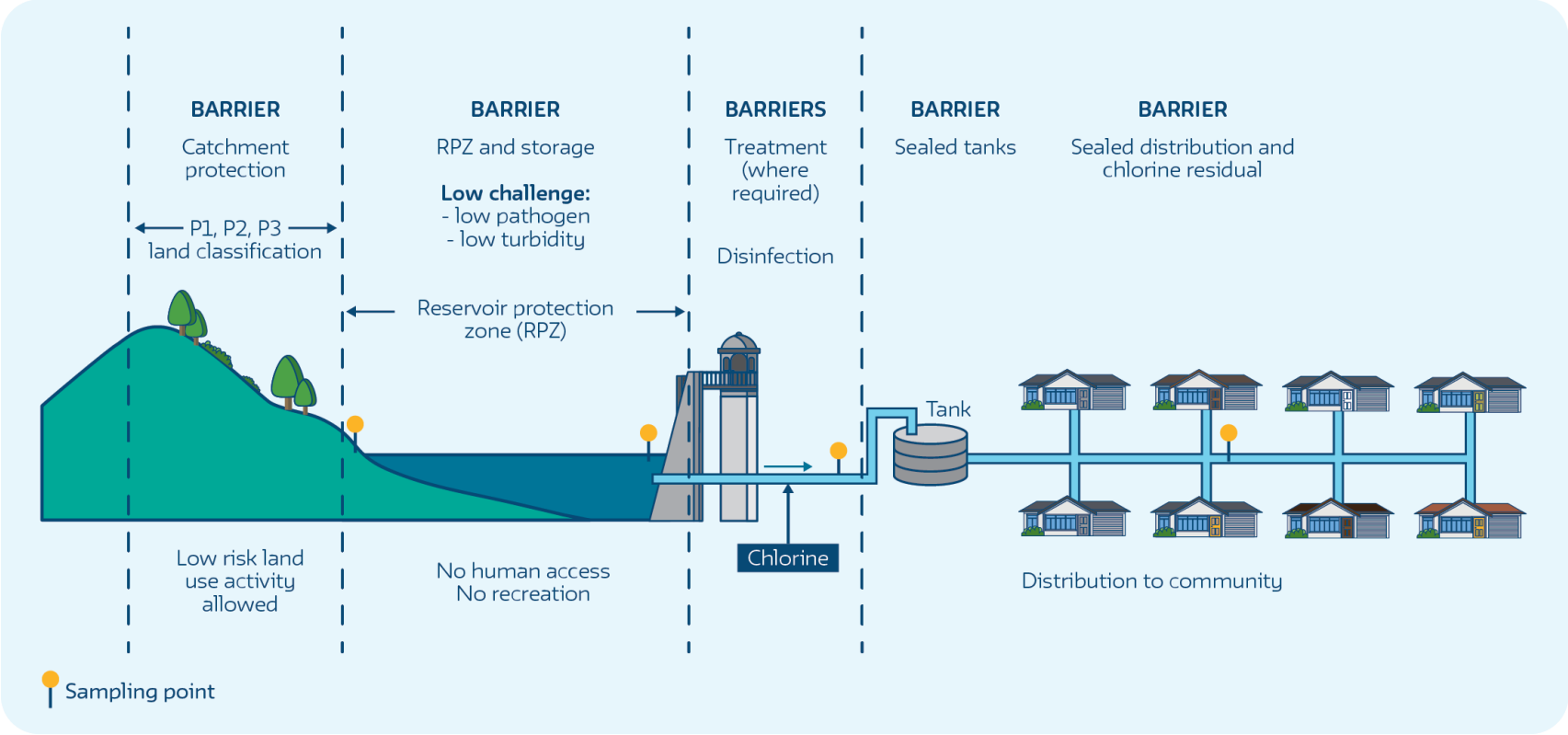

Figure 17: Surface water catchment – showing source protection and additional multiple barriers

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Case study - Event based monitoring

The ADWG state:

> *Any sudden or extreme change in water quality, flow or environmental conditions (e.g. extreme rainfall or flooding) should arouse suspicion that drinking water might become contaminated.*

Around the world, outbreaks of disease have occurred from drinking water that has been contaminated as a result of an extreme weather event, rainfall or sudden change in the source. Event-based monitoring (EBM) is the collection of data during extreme conditions and is a requirement of the Health Based Targets framework (WSAA 2015) as part of the source water assessment process.

A two-year pilot project was set up between mid-2019 to mid-2021 to trial EBM across the state by collecting microbiological water quality samples using portable auto-samplers during significant rainfall events. This assisted with:

- A better understanding of source and catchment challenges and risks during significant rainfall and other events, allowing for the ability to develop more detailed operational strategies during extreme conditions;
- A more quantified risk assessment process that captures dynamic changes in the catchment, and
- Establishing a process for undertaking event-based sampling as 'business as usual' routine water quality sampling programs.

Five pilot sites were selected across the state encompassing a mix of surface water sources and varying climatic conditions (e.g. prolonged or heavy rainfall due to cyclonic events) to identify what challenges may be encountered at each source. Autosampling equipment was set up at a site prior to an event and sample collection was automatically triggered based on stream level or rainfall. Water samples were then physically collected and transported back to a laboratory for analysis.

Figure 18: Auto-sampler within Harding Dam Catchment Area

Example of Results – Ten Mile Brook, Margaret River

An event, captured at Ten Mile Brook (Margaret River), provides a good example of how EBM can help us understand how the catchment and source will behave during a rainfall event. Two autosamplers were placed in the field prior to the event: one in the main feeder creek to the dam (portable unit), and one at the raw offtake at the Water Treatment Plant (WTP) (non-portable, refrigerated unit). Data from this event are shown in Figure 19 and 20.

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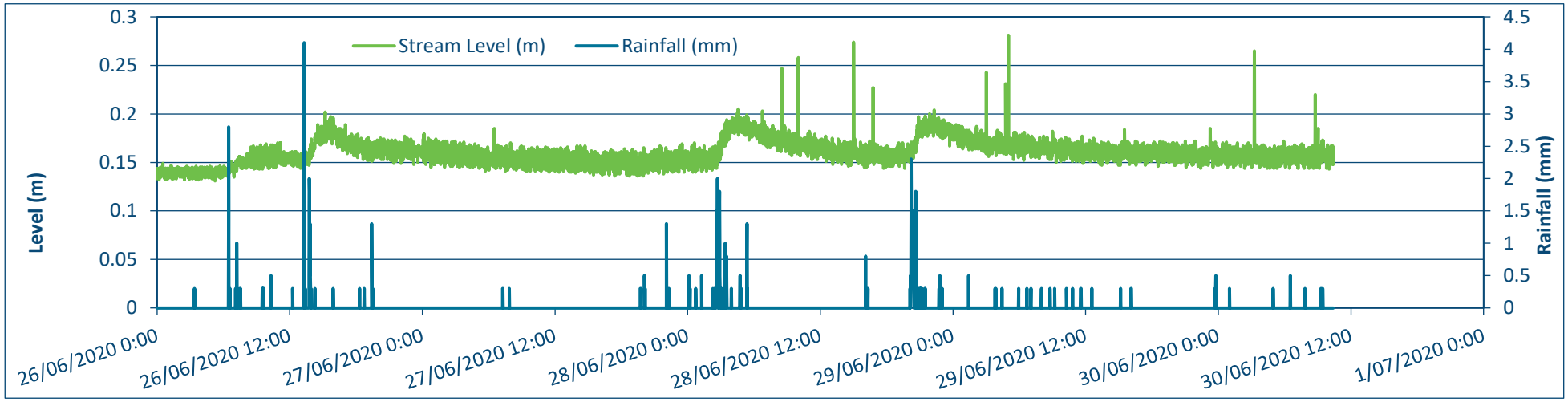

Figure 19. Ten Mile Brook Dam main feeder creek level and rainfall.

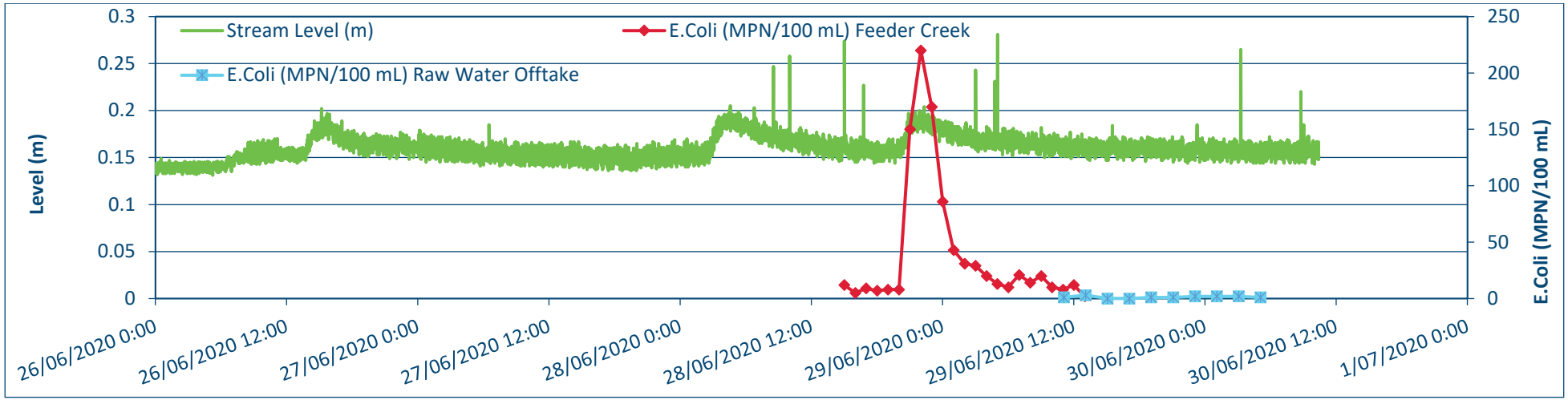

Figure 20. Ten Mile Brook Dam main feeder creek level, and *E. coli* and Water Treatment Plant raw water offtake *E. coli*.

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Key learnings

- The feeder creek responds quickly to rainfall with the stream level and *E. coli* both peaking within 2 hours of heavy rainfall. This response was expected considering the relatively small catchment size (4.6 km2).
- The *E. coli* peak did not last long, returning to baseline (<20 MPN/100mL) within 8 hours of rain stopping (Figure 20).
- No significant *E. coli* spikes were observed at the raw water offtake in the 10 - 30 hours following the *E. coli* peak observed in the catchment. The reasons for this may include:
    - The sampling period at the outlet of the dam did not align with the residence time of the dam (i.e. the high *E. coli* water in the feeder stream had not yet reached the dam outlet).
    - There is sufficient pathogen die off in the dam, so *E. coli* is not observed at the raw water offtake.
    - Considering the short rainfall event and short *E. coli* spike, it is possible only a small volume of high pathogen load water (compared to the volume of the dam) entered the dam, causing dilution of the *E. coli*.
    - A combination of all three of the above hypotheses - this needs to be confirmed in future rainfall events with a longer sampling period at the offtake.
- Margaret River scheme has sufficient disinfection to adequately treat the conditions observed.

Where to from here

The results collected have provided valuable information about catchment and source behaviour during heavy rainfall. A process for implementing EBM as 'business as usual' is currently being developed. A program of priority sites will be developed and progressively rolled out within Water Corporation catchments. Future trials will investigate the possibility of a permanent autosampler setup at selected sites and collection of water quality data from non-rainfall events (e.g. bushfires, pesticide applications, hydrocarbon spills).

Figure 21: Ten Mile Brook Dam

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How is your water treated?

Water treatment

The specific water quality of each source dictates the necessity of water treatment 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 22). 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 that used to occur 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 22: Example of a basic water treatment process *(see *Fluoridation* section for those towns that have fluoride added to their water)

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Desalination and electrodialysis reversal

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

The filtered seawater is then forced under pressure through 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, Yalgoo, and Mt Magnet. 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 (refer to *Case Study - Nitrates in the Murchison* on page 38).

Figure 23: EDR at Wiluna

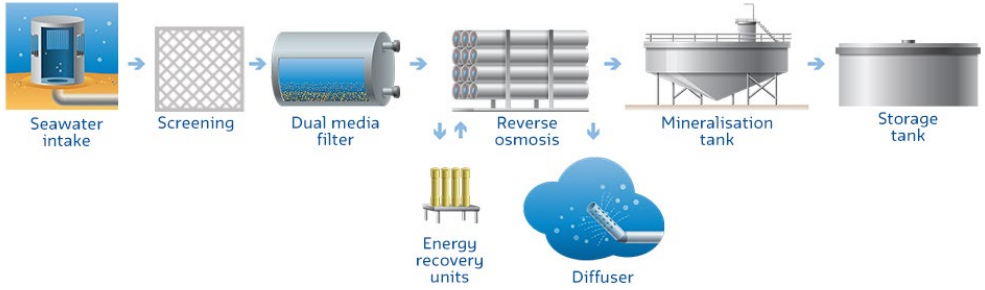

Figure 24: Typical desalination treatment process

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Water treatment for groundwater replenishment

Wastewater undergoes treatment at Beenyup Water Resource Recovery Facility 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 25) 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.

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 chloramine as a longer lasting disinfectant compared to chlorine alone. Chloramination is used extensively 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.

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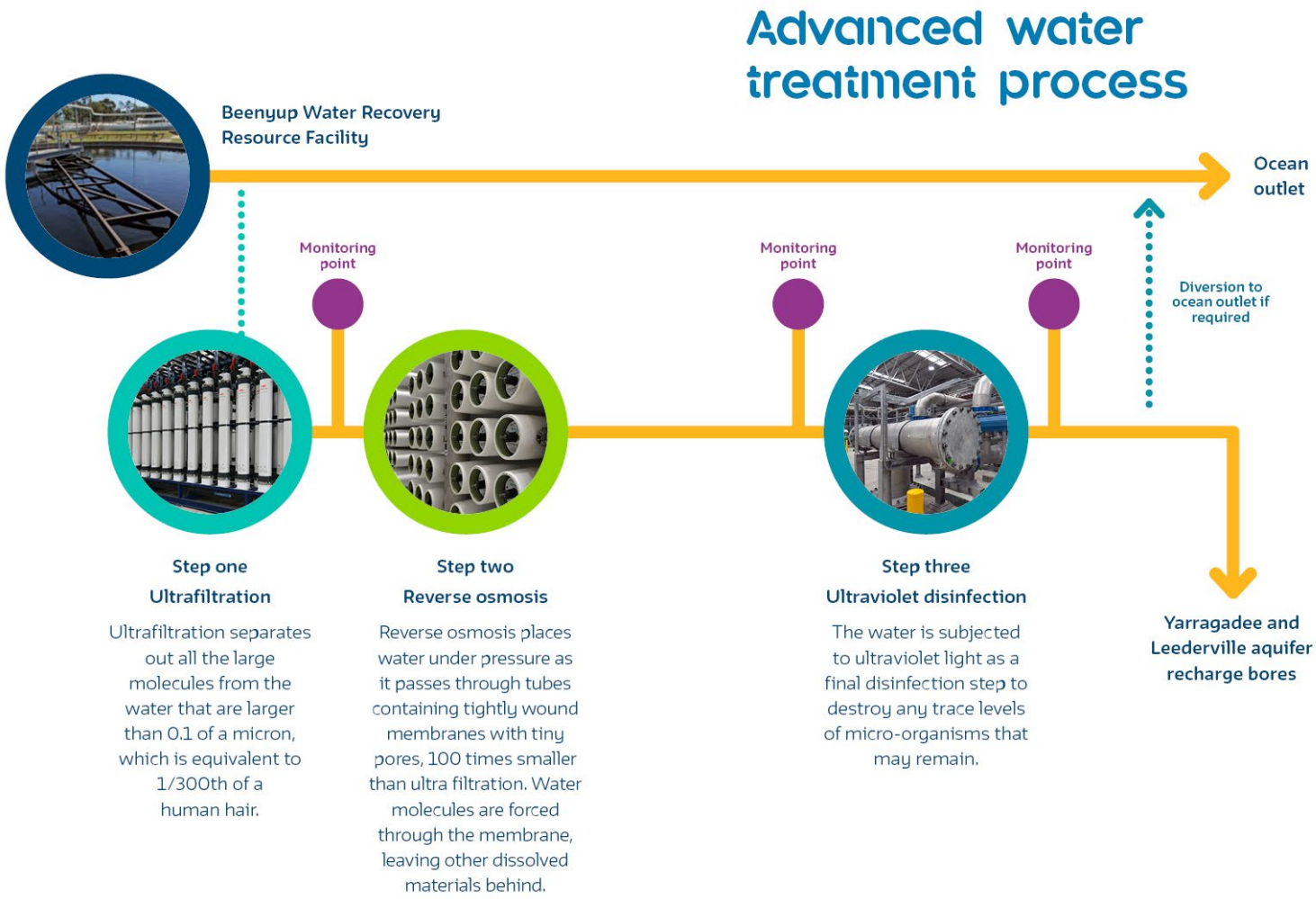

Figure 25: Advanced water treatment process

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Fluoridation

In Western Australia, fluoridation of community water supplies is regulated by the *Fluoridation of Public Water Supplies Act 1966,* which is administered by DoH. 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 worldwide, including the World Health Organization, the Australian Dental Association, the Australian Medical Association and 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. Fluoridation is undertaken to provide fluoride levels in the water within a narrow, required range specified by a directive.

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 and needs to be maintained at the same level as fluoridated schemes in the South West Region.

The water fluoridation process involves adding either fluorosilicic acid or sodium fluoride, in a controlled manner, where it then dissolves to release the fluoride ion to result in fluoride levels within the required range. Purity and quality control standards for chemicals added to drinking water are strictly controlled by DoH.

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, while 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.

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 drinking water are listed on the DoH website.

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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. Every Water Corporation drinking water scheme has at least one CCP, including chlorination for disinfection. Water quality CCP 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 23).

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 2020-21, we took more than 71,800 water samples from water sources, treatment plants and pipe networks which supply our customers, and had almost 302,000 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 26: Suburban water sampling point

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 DoH to continually improve our incident management processes.

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Case study – Nitrates in the Murchison

Many towns in Western Australia depend on groundwater for their water supply. However, elevated nitrate concentrations in groundwater are quite common in some regional areas; usually due to naturally occurring processes of plant decay that have occurred over geological time.

Nitrate in drinking water can cause both acute and long-term health effects. To protect public health, the ADWG specify a nitrate guideline of 50 mg/L for infants less than three months old, and a guideline of 100 mg/L for adults and children over three months old.

With the groundwater sources available, meeting the adult guideline value is usually relatively easy, but meeting the infant guideline can be a challenge. In addition, these groundwaters can have elevated levels of salinity and 'hardness' giving the water a poor taste and making it difficult to lather soap.

Historically, the DoH has granted Water Corporation an exemption from compliance with the infant nitrate guidelines for some localities including the Murchison towns of Cue, Sandstone, Meekatharra, Mt Magnet, Yalgoo and Wiluna (refer to Schedule 2 of the Memorandum of Understanding with DoH for Drinking Water). The water supplied in these localities do not always comply with the infant nitrate guideline, however they do comply with the adult nitrate guideline (refer to Table 7 of Appendix C – Health related data of Mid West Region).

The exemption from the infant nitrate guideline for these towns is conditional on the community health nurse advising parents and carers of infants to use alternative water for bottle feeds, and bottled water being made available for infants. There is also the expectation that water quality concerns will be progressively addressed and the exemptions subsequently surrendered.

Electrodialysis Reversal

Electrodialysis reversal (EDR) is a water treatment process in which electricity is applied to immersed electrodes to pull the naturally occurring dissolved salts through an ion exchange process and membrane, thus separating the water from the salts (the 'electrodialysis' part of EDR). The process produces a stream of fresh water and a much smaller flow containing the concentrated salts. The voltage on the electrodes is reversed every 15 to 30 minutes to reduce fouling of the membranes (the 'reversal' part of EDR).

Figure 27: Mt Magnet EDR plant - feed pumps and chemical dosing systems

The current EDRs are achieving 90 to 92 per cent water recovery rates (i.e. small volumes of concentrated salt waste) with low chemical use and high energy efficiency. The concentrated salt waste is often managed via evaporation ponds. The membranes typically last 7-10 years.

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EDR is an effective tool for removing nitrate and has the side-benefit of reducing water salinity and hardness (improving water taste and soap lathering). As it only removes 'charged' particles, such as salts (NO_3^-, Na^+), from water, EDR does not remove micro-organisms or most naturally occurring organic compounds that could be present in the water. A separate water treatment step is required for this purpose.

Implementation

Water Corporation began trials of EDR technology over a decade ago. Subsequently EDR units were installed at Wiluna and Yalgoo. More recently Water Corporation began the installation of improved EDR designs at Cue, Mt Magnet, Meekatharra and Sandstone.

Mt Magnet EDR was commissioned in late 2020 and is now running through a proving period. The Cue, Sandstone and Meekatharra EDRs are largely complete and are to be commissioned in the 2021-22 financial year. In total the Water Corporation will be spending over $20M on the installation of EDR plants and water supply asset upgrades for these four towns.

With the commencement of operation of the Mt Magnet EDR there should be a noticeable improvement in the quality of water supplied, particularly related to a reduction in salty taste and improved soap lathering. Improvements in Cue, Sandstone and Meekatharra will follow in coming months. Once the EDR units are fully 'proven', Water Corporation will also commence the process of surrendering the infant nitrate guideline exemptions for these towns.

Figure 28: Mt Magnet 200-Kilowatt solar panel system - the entire site is powered from solar power

Figure 29: Mt Magnet battery storage system and water tank

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Understanding water quality test results

The following summaries are intended to assist you with interpreting the results presented in Appendix 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 *E. coli* 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 25) to prevent microbial contamination of water supplies, 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 and to ensure the water supplied is safe.

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 36). 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).

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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 currently have infant nitrate exemptions from DoH for 10 towns in the Mid West and Goldfields and Agricultural regions, including: Wiluna, Yalgoo, Leonora, Laverton, Menzies, Cue, Meekatharra, Mt Magnet, Sandstone and New Norcia. The Community Health Nurse, in each town with an infant nitrate compliance 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 to these towns as required.

We are committed to progressively reducing nitrate in the water supply in these towns. Despite the exemptions 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) with investigation of long-term options.

We are working on the installation of EDR water treatment plants in Cue, Meekatharra, Mt Magnet and Sandstone to reduce nitrate levels in those towns. The Mt Magnet EDR was commissioned in late 2020 and is now running through a proving period. The Cue, Sandstone and Meekatharra EDRs are largely complete and are to be commissioned in the 2021-22 financial year. Refer to *Case study – Nitrates in the Murchison* on page 38.

Figure 30: 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

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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.

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.

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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.

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 for three PFAS chemicals. 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. Sampling has been ongoing with all PFAS detections in customer water supplies in the 2019-20 and 2020-21 financial years 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 pH may be specifically adjusted as part of chloramine disinfection (refer to *Disinfection* section on page 34). These conditions may be found at a number of localities in our large water supply schemes. Where low pH is experienced, this is typically a consequence of the source characteristic rather than the influence of treatment. Buffering is a treatment process that stabilises the pH of the water.

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Silica

In Australia, dissolved silica can range between 0.6 mg/L in some surface waters to 110 mg/L in ground waters. Dissolved silica can precipitate on some surfaces forming a white residue. In cases where customer complaints occur due to scale build-up, water hardness and silica concentrations are often identified as the primary cause. There are 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 considerations, 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.

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Sampling parameters

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

Figure 31: Harding Dam overflowing

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Our performance

Health related performance

We again achieved excellent microbiological performance in 2020-21 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 32).

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 40).

Microbiological performance requirements of our MoU with DoH were all met for the past seven years (Figure 33).

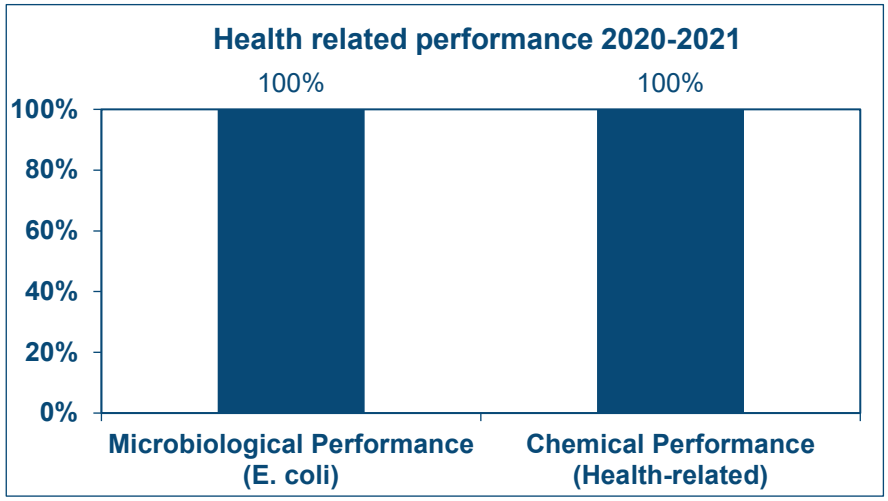

Figure 32: Microbiological and chemical health performance

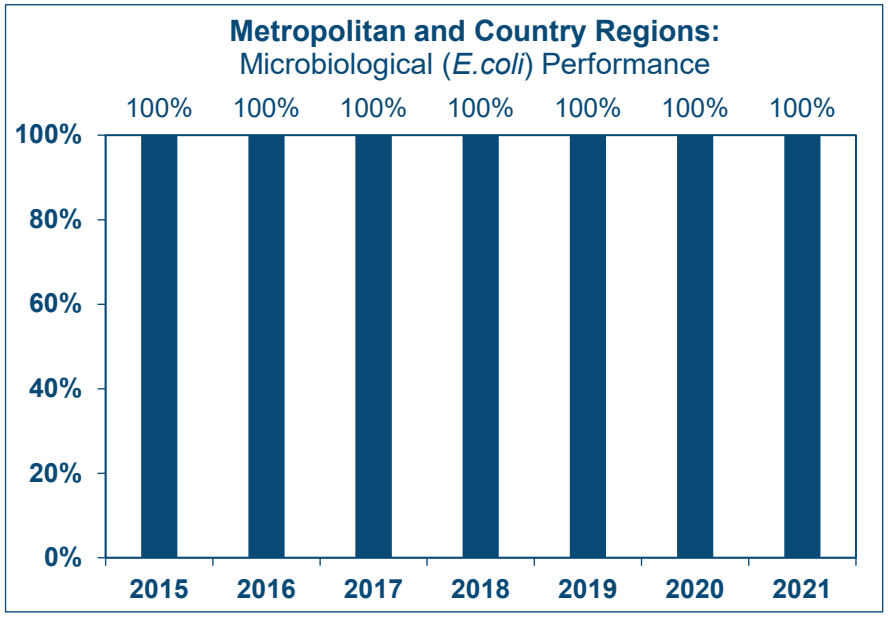

Figure 33: Seven-year microbiological performance

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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 2020-21

Appendix C provides a detailed summary of test results for each scheme throughout the state. In 2020-21, there were 157 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 8,131 out of 8,753 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 40).

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Customer expectations

Customer contacts

Water quality related customer contacts (enquiries and complaints) are recorded and monitored continuously to identify any trends and areas for improvement. In 2020-21, our Operations Centre received 8,040 water quality related customer contacts (compared with 7,872 in 2019-20), of which 7,990 were customer enquiries and 50 were related to complaints. Figure 34 shows the category of water quality contacts and their proportion of the total (8,040). Note: miscellaneous contacts are predominately related to water hardness).

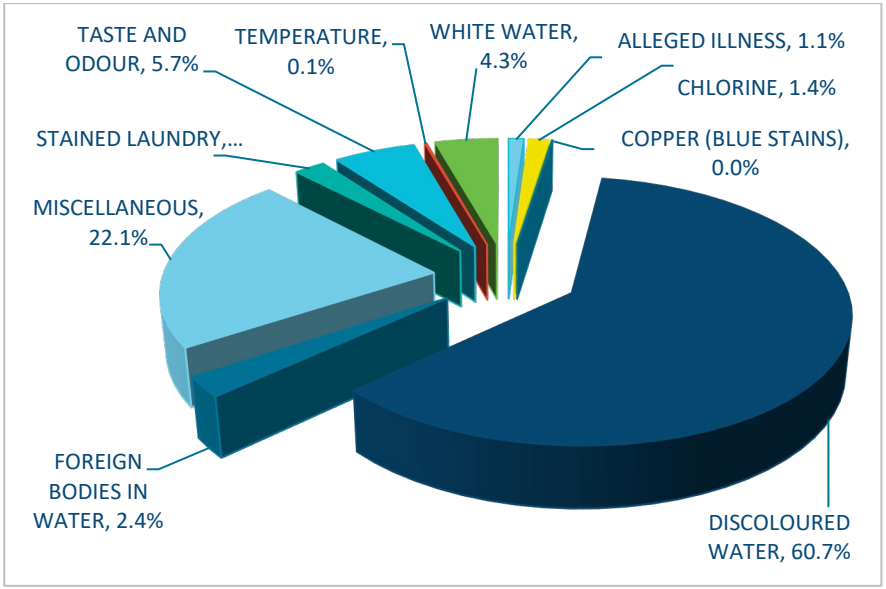

Figure 34: Water quality contacts profile 2020-21

Faults responsiveness

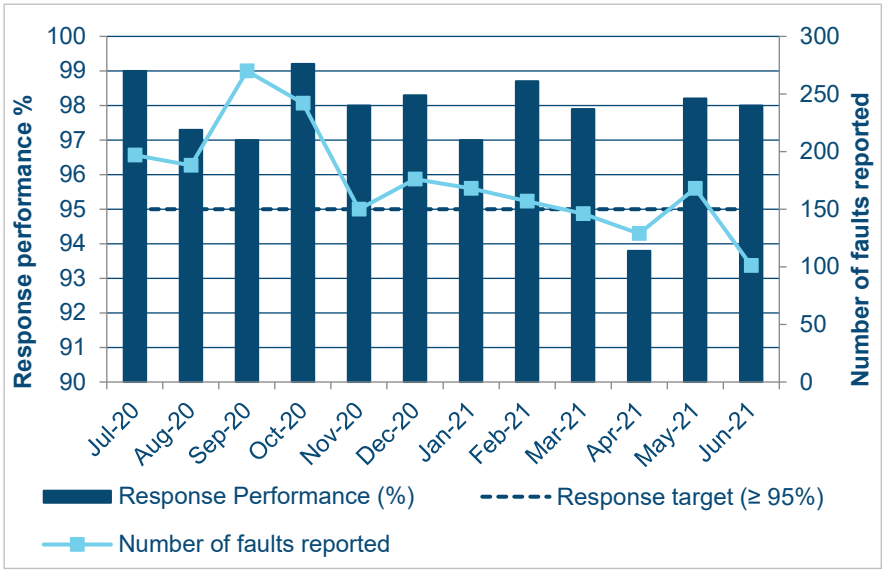

Figure 35: State-wide response performance to water quality faults

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 2020-21, we exceeded this target in 11 of 12 months and responded to an average of 97.7 per cent of recorded faults within two hours or at an agreed time (as shown in Figure 35, the state-wide monthly faults responsiveness).

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Customer research

We measure community perceptions of the quality of drinking water through our quarterly customer value survey.

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 36 below.

The data demonstrates consistency in the customer perceptions of aesthetic water quality this financial year compared to last year.

Refer to *Improving your water quality*, page 50, for information on improvements we have been making to water safety and aesthetics.

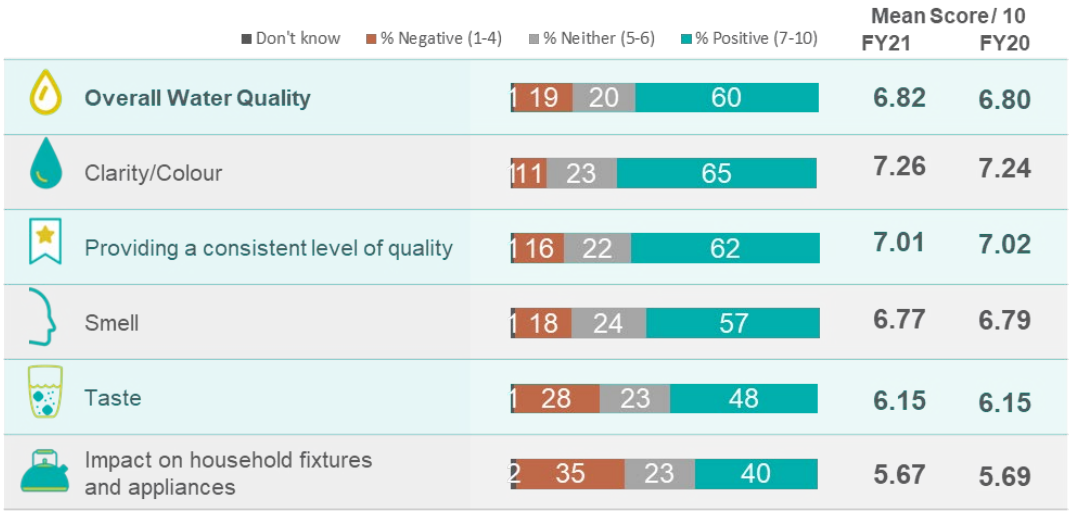

Figure 36: Water quality customer value survey ratings

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Improving your water quality

Monitoring and reporting improvements

We are continuing to strengthen the performance of our operational monitoring and critical control point compliance. These key operational and monitoring requirements are detailed within scheme water safety plans which we update regularly and review in detail on a periodic basis (refer to *water safety plans* on page 23). 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 37).

Quality operational information and data is critical as it informs our Barrier Risk Assessment (BRA - refer to page 25 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 has been completed. Additionally, the construction of sealed tanks to replace open reservoirs in Merredin and Dedari is currently underway. Figure 37 below shows the tank construction underway at Dedari. Once the GAWSS is sealed, water quality will improve, helping to maintain chloramine residuals throughout the extensive pipeline network (refer to *Disinfection* section on page 34).

Figure 37: Sealed water tank construction in Dedari

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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, therefore providing water quality information critical for chloramination management. This includes installation of the analysers at several new sites including Meckering, West Kellerberrin, Yerbillion, Ghooli, Toodyay Tank and Burges Siding (York).

To improve the maintenance of disinfection residual along the main from Kambalda to Norseman towns, a new chloramination plant will be located between Coolgardie and Kambalda. The project to construct this plant has commenced.

North West Region (NWR)

The NWR bore sealing project, to ensure that bore headworks are in good condition, is nearing completion. This has been a large project for the NWR due to the number of schemes that are supplied from groundwater.

A project to construct a dedicated treated water main to the storage tanks in Nullagine has commenced and is in design, which will allow greater control over reticulation residuals.

Funding has been obtained to investigate a new analyser that can speciate cyanobacteria at Harding Dam. If successful, this will be beneficial in reducing operational response time, and in optimising the use of Harding Dam.

In West Pilbara, Harding Dam has had two of its membrane trains replaced, to maintain the water quality. An additional three membrane trains will be replaced by February 2022. Below are photos of membrane trains at Harding Dam.

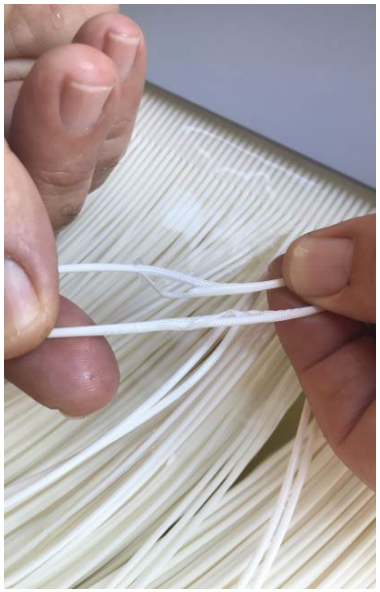

Figure 38: Old membrane train to be replaced

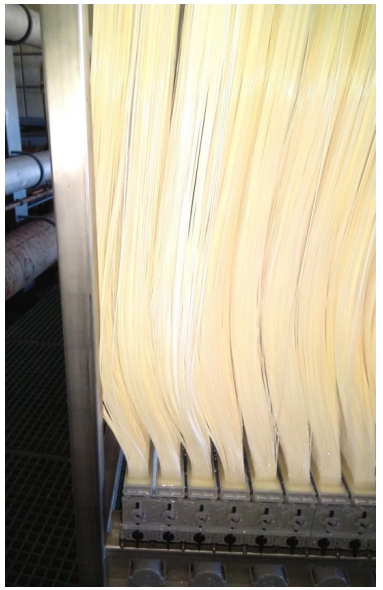

Figure 39: New membrane trains

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 commenced production in October 2020, and the water treatment at Cue will commence operation in August 2021. The plants will undergo a proving period before we look to have the nitrate exemption removed from our

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MoU with DoH. Plants at Sandstone and Meekatharra are scheduled to be commissioned during 2021-22.

To address discoloured water issues at Horrocks, several additions and upgrades to the existing treatment will be completed in 2021.

Watheroo WTP upgrade project to replace existing filter is currently in commissioning and will be completed in 2021.

Allanooka chlorinator and fluoridation upgrade and redirection of Mt Hill bores is complete. 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.

The project to install new tanks, online analysers and a new and secure carting intake point at Coomberdale is progressing towards completion in 2022. This work will enable remote visibility of the tanks operation to ensure it continues to operate safely.

The MWR critical valve project has been progressing this year with critical valve upgrades at over 20 sites. The objective of the project is to isolate or provide a suitable barrier (air gap) between raw and treated water pipes. The project is scheduled for completion in 2022.

South West Region (SWR)

The new supply bore for the Australind Eaton Scheme has been drilled next to the Picton Water Treatment Plant and will be equipped in 2022 to ensure the ongoing supply to the Australind Eaton Water Scheme.

Fluoridation of Australind Eaton was completed, with new fluoridation plants in Australind and Eaton and recommissioning the plant at Picton, in late 2020 and the scheme is now supplied fluoridated water in accordance with the ADWG.

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 last valve removal is a complex job at the Ten Mile Dam and is scheduled for completion in mid-2022.

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

The project to build a new six million litre tank in Collie is progressing. 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.

Projects to install new chlorinators at Peppermint Grove and Prevelly are progressing through planning and design phases with the intention of construction commencing in 2023.

Great Southern Region (GSR)

We continue to move towards fully enclosing the Great Southern Towns Water Supply Scheme (GSTWSS) through the construction of sealed water tanks to replace Pinwernying and Bottle Creek open reservoirs. Construction of new tanks at Katanning and Narrogin are progressing through the design phase with anticipated completion in 2024.

Projects are progressing at the South Coastal reservoir in Albany to assist with management of iron and manganese, which is the main cause of discoloured water; projects include installation of floating offtakes; and additional turbidity and chlorine analysers. Commissioning of turbidity and chlorine has commenced.

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A new chlorinator is being installed upstream of the offtake to Tincurrin to improve disinfection in this area and ensure continued supply of safe drinking water. Completion is anticipated to be early 2022. A temporary chlorinator is in place in the interim.

A new aeration system has been installed at Pingrup Tank. This will mitigate disinfection by-products that are due to long detention time and source characteristics.

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.

New water sample points have been installed on tanks which have common inlet and outlet arrangements following a state wide review. The next step is to collect data from these sample points and prioritise upgrades to address turnover issues that may be associated with these arrangements.

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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

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Pesticide	Health Guideline Value (µg/L)
Imazapyr	9000 µg/L
Maldison (Malathion)	70 µg/L
MCPA	40 µg/L
Methidathion	6 µg/L
Methiocarb	7 µg/L
Methomyl	20 µg/L
Metolachlor	300 µg/L
Metribuzin	70 µg/L
Metsulfuron-methyl	40 µg/L
Mevinphos	5 µg/L
Napropamide	400 µg/L
Nicarbazin	1000 µg/L
Norflurazon	50 µg/L
Omethoate	1 µg/L
Oryzalin	400 µg/L
Oxamyl	7 µg/L
Paraquat	20 µg/L
Parathion-ethyl	20 µg/L
Parathion-methyl	0.7 µg/L
Pendimethalin	400 µg/L
Permethrin	200 µg/L
Picloram	300 µg/L
Piperonyl butoxide	600 µg/L
Pirimicarb	7 µg/L
Pirimiphos-methyl	90 µg/L
Polihexanide	700 µg/L
Propachlor	70 µg/L
Propargite	7 µg/L
Propiconazole	100 µg/L

Pesticide	Health Guideline Value (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

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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

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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*

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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

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Appendix B – Perth localities maps

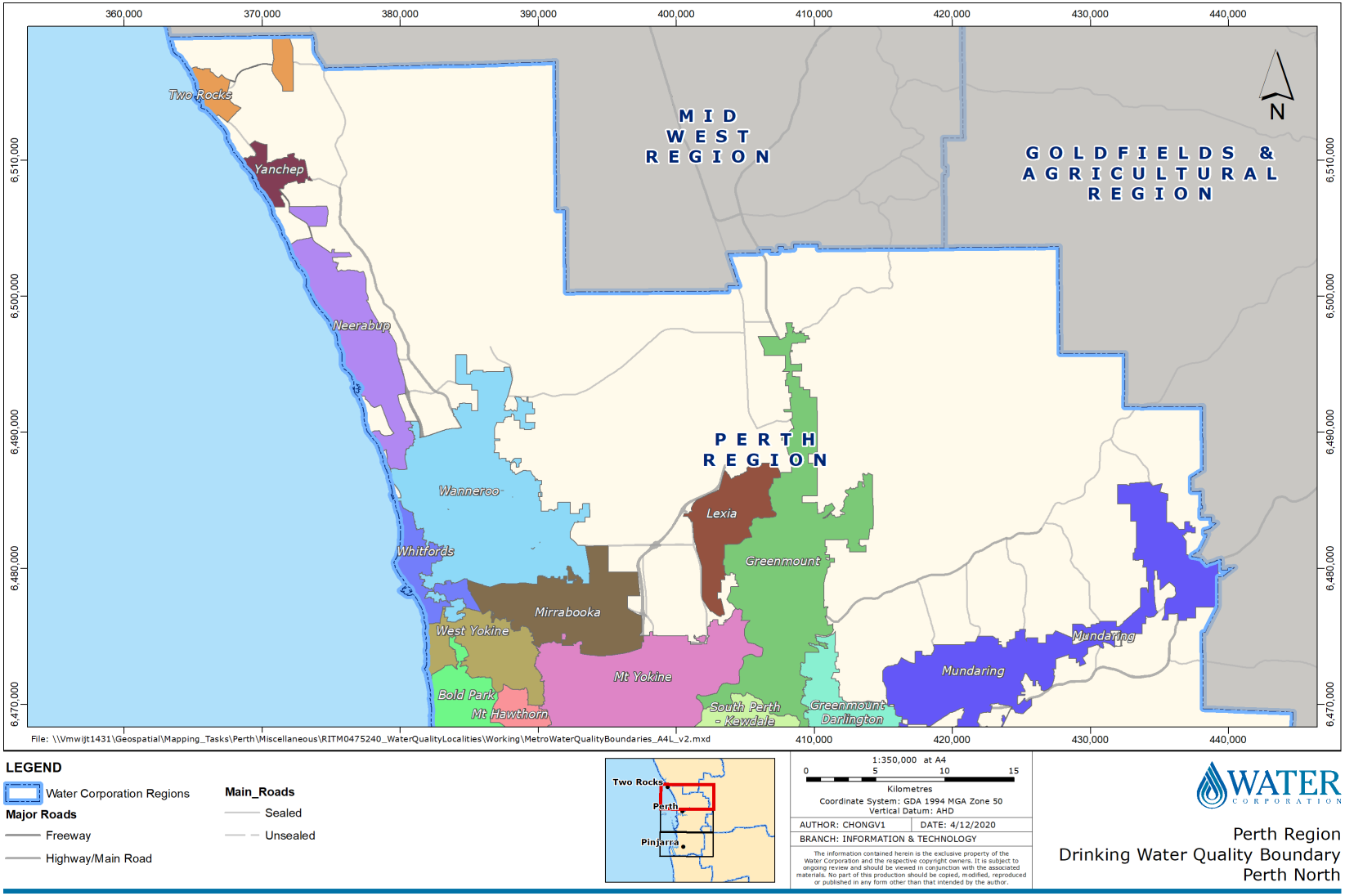

Figure 40: Perth north localities

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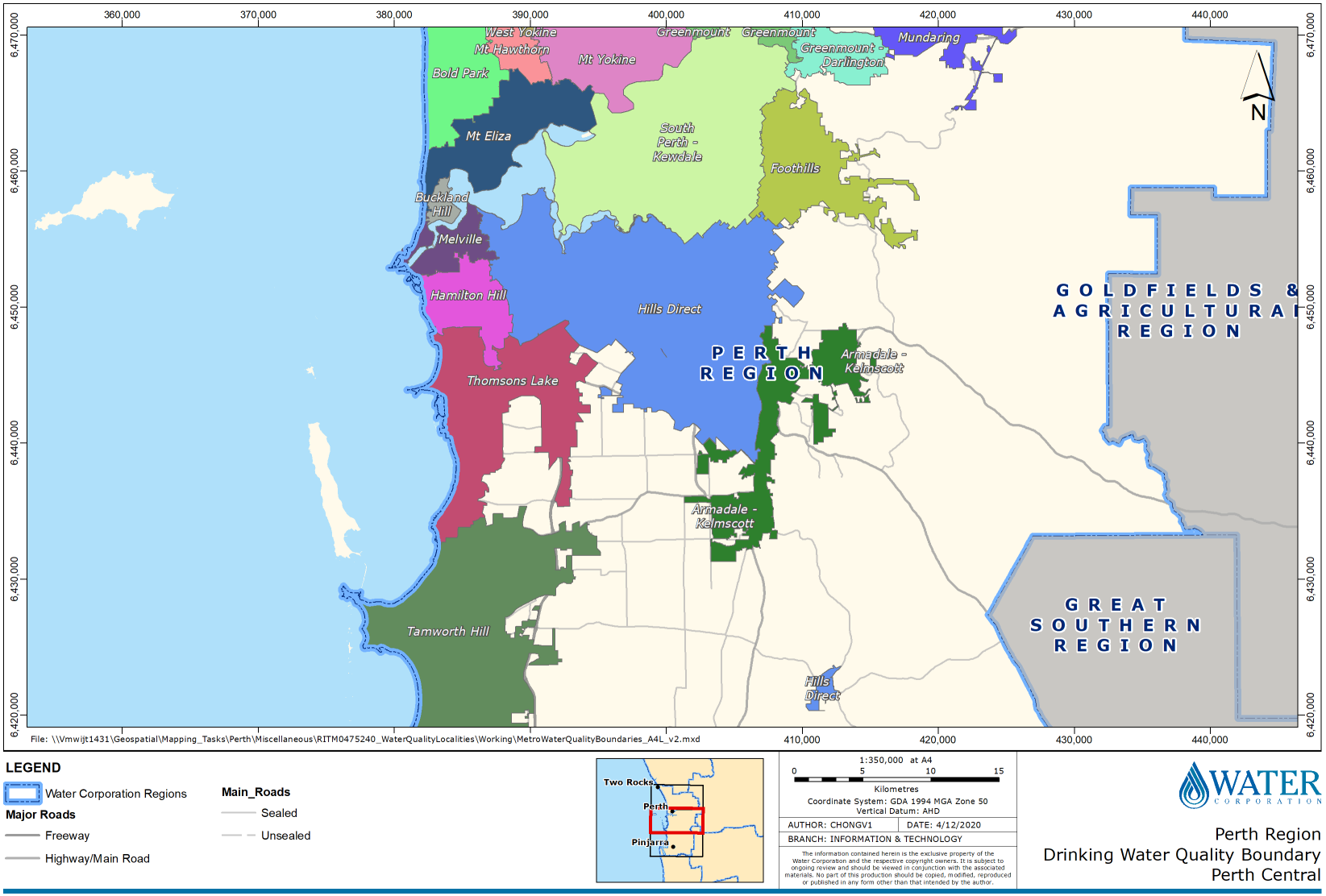

Figure 41: Perth central localities

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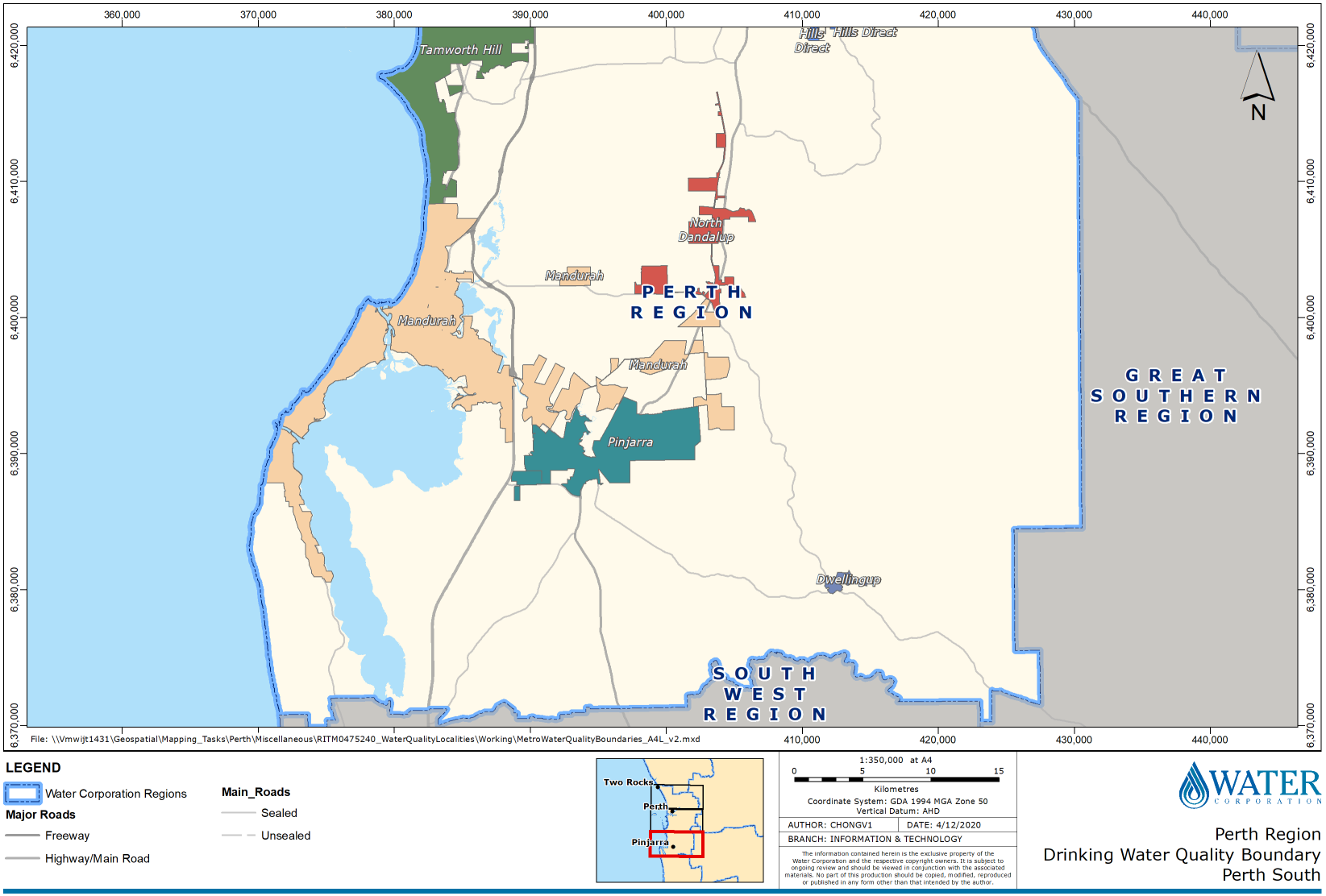

Figure 42: Perth south localities

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

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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	289	0	0	✓	277	0	✓	53	0.75	0.85	0.80	(2)	1	✓	2	✓
Bold Park	375	0	0	✓	168	0	✓	63	0.70	0.85	0.81	(2)	0	(1)	2	✓
Buckland Hill	91	0	0	✓	65	0	✓	52	0.65	0.80	0.75	(2)	0	(1)	2	✓
Dwellingup	14	0	0	✓	6	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Foothills	131	0	0	✓	131	0	✓	52	0.70	0.90	0.81	(2)	0	(1)	2	✓
Greenmount	199	0	0	✓	109	0	✓	52	0.75	0.85	0.80	(2)	0	(1)	2	✓
Greenmount/Darlington	119	0	0	✓	80	0	✓	53	0.70	0.85	0.81	(2)	0	(1)	2	✓
Hamilton Hill	221	0	0	✓	104	0	✓	52	0.75	0.90	0.81	(2)	0	(1)	2	✓
Hills Direct	732	1	4	✓	290	0	✓	53	0.70	0.90	0.81	(2)	0	(1)	2	✓
Lexia	145	0	0	✓	65	0	✓	52	0.70	0.85	0.75	(2)	0	(1)	2	✓
Mandurah	390	0	0	✓	312	0	✓	52	0.80	0.85	0.83	(2)	4	✓	4	✓
Melville	181	0	0	✓	103	0	✓	52	0.65	0.85	0.77	(2)	1	✓	2	✓
Mirrabooka	342	0	0	✓	122	0	✓	53	0.70	0.80	0.75	(2)	1	✓	2	✓
Mt. Eliza	434	0	0	✓	130	0	✓	53	0.65	0.85	0.75	(2)	0	(1)	2	✓
Mt. Hawthorn	184	0	0	✓	79	0	✓	53	0.70	0.85	0.80	(2)	0	(1)	2	✓
Mt. Yokine	528	0	0	✓	190	0	✓	53	0.70	0.90	0.80	(2)	0	(1)	2	✓
Mundaring	119	0	0	✓	119	0	✓	53	0.70	0.90	0.81	(2)	0	(1)	2	✓
Neerabup	351	0	0	✓	117	0	✓	52	0.70	0.90	0.81	(2)	0	(1)	2	✓
North Dandalup	13	0	0	✓	6	0	✓	2	0.80	0.85	0.83	(2)	0	(1)	2	✓
Pinjarra	65	0	0	✓	52	0	✓	52	0.75	0.90	0.82	(2)	0	(1)	2	✓
South Perth/Kewdale	549	0	0	✓	234	0	✓	53	0.70	0.85	0.80	(2)	0	(1)	2	✓
Tamworth Hill	446	0	0	✓	185	0	✓	52	0.75	0.90	0.83	(2)	0	(1)	2	✓
Thomsons Lake	342	0	0	✓	93	0	✓	53	0.70	0.85	0.81	(2)	0	(1)	2	✓
Two Rocks	104	0	0	✓	42	0	✓	2	0.15	0.15	0.15	✓	2	✓	2	✓
Wanneroo	511	0	0	✓	182	0	✓	53	0.60	0.80	0.75	(2)	0	(1)	2	✓
West Yokine	213	0	0	✓	95	0	✓	41	0.75	0.85	0.79	(2)	0	(1)	2	✓
Whitfords	144	0	0	✓	66	0	✓	52	0.65	0.80	0.74	(2)	0	(1)	2	✓
Yanchep	114	0	0	✓	64	0	✓	52	0.60	0.90	0.81	(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

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Table 2 **Health related variables**

Perth Region	Nitrate					Pesticides		Radiological		Trihalomethanes					Other Health Related	
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Guideline Met	Samples Taken	Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Requirement Met
		Min	Max	Mean							Min	Max	Mean			
Armadale/Kelmscott	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	14	0.053	0.110	0.084	✓	0	(1)
Bold Park	2	<0.2	0.9	0.4	✓	1	✓	2	✓	4	0.024	0.091	0.042	✓	0	(1)
Buckland Hill	5	<0.2	0.4	<0.2	✓	1	✓	2	✓	13	0.050	0.140	0.085	✓	0	(1)
Dwellingup	2	<0.2	0.4	<0.2	✓	1	✓	0	(1)	4	0.023	0.043	0.034	✓	0	(1)
Foothills	2	0.4	2.6	1.8	✓	1	✓	0	(1)	13	0.042	0.130	0.084	✓	0	(1)
Greenmount	5	0.4	2.6	1.3	✓	1	✓	2	✓	13	0.092	0.170	0.132	✓	0	(1)
Greenmount/Darlington	5	0.4	1.3	0.9	✓	1	✓	0	(1)	13	0.023	0.160	0.102	✓	0	(1)
Hamilton Hill	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	14	0.024	0.100	0.062	✓	0	(1)
Hills Direct	2	<0.2	<0.2	<0.2	✓	1	✓	1	✓	15	0.005	0.067	0.030	✓	0	(1)
Lexia	2	0.9	1.8	1.3	✓	1	✓	1	✓	14	0.067	0.190	0.122	✓	0	(1)
Mandurah	4	<0.2	<0.2	<0.2	✓	4	✓	0	(1)	29	<0.001	0.010	0.004	✓	4	✓
Melville	4	<0.2	<0.2	<0.2	✓	1	✓	2	✓	13	0.018	0.094	0.052	✓	0	(1)
Mirrabooka	4	<0.2	1.3	0.9	✓	1	✓	2	✓	9	0.068	0.170	0.144	✓	0	(1)
Mt. Eliza	4	<0.2	0.4	<0.2	✓	1	✓	1	✓	13	0.020	0.120	0.067	✓	0	(1)
Mt. Hawthorn	4	<0.2	1.8	1.3	✓	1	✓	2	✓	14	0.057	0.180	0.117	✓	0	(1)
Mt. Yokine	4	0.4	2.2	1.8	✓	1	✓	2	✓	13	0.075	0.160	0.128	✓	0	(1)
Mundaring	2	0.4	0.4	0.4	✓	0	(2)	0	(1)	13	0.008	0.064	0.022	✓	0	(1)
Neerabup	4	0.9	10.1	7.5	✓	1	✓	2	✓	13	0.025	0.130	0.047	✓	0	(1)
North Dandalup	5	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	0.012	0.051	0.032	✓	0	(1)
Pinjarra	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	0.001	0.004	0.003	✓	0	(1)
South Perth/Kewdale	3	1.3	2.2	1.8	✓	1	✓	1	✓	13	0.052	0.180	0.114	✓	0	(1)
Tamworth Hill	2	<0.2	<0.2	<0.2	✓	1	✓	1	✓	14	<0.001	0.007	<0.001	✓	0	(1)
Thomsons Lake	4	<0.2	<0.2	<0.2	✓	1	✓	3	✓	13	0.037	0.100	0.064	✓	0	(1)
Two Rocks	4	1.8	8.8	4.8	✓	2	✓	1	✓	2	0.010	0.014	0.012	✓	2	✓
Wanneroo	5	<0.2	4.4	2.6	✓	1	✓	0	(1)	13	0.057	0.110	0.085	✓	0	(1)
West Yokine	5	1.3	3.1	2.2	✓	1	✓	1	✓	13	0.120	0.200	0.153	✓	0	(1)
Whitfords	2	0.4	2.6	1.3	✓	1	✓	2	✓	14	0.053	0.150	0.094	✓	0	(1)
Yanchep	5	4.0	9.2	6.6	✓	1	✓	4	✓	3	0.009	0.068	0.045	✓	0	(1)

(1) No samples required in this 12 month period. (2) Sample scheduled outside of reporting year

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

Perth Region	Alkalinity (as CaCO3)					Aluminium					Chloride					Hardness				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met
		Min Value	Max Value	Mean Value			Min	Max	Mean			Min Value	Max Value	Mean Value			Min	Max	Mean	
Armadale/Kelmscott	2	61.0	67.0	64.0	(1)	2	0.014	0.020	0.017	✓	2	155.0	165.0	160.0	✓	2	75	81	78	✓
Bold Park	2	45.0	71.0	58.0	(1)	2	0.014	0.020	0.017	✓	2	38.0	115.0	76.5	✓	2	50	80	65	✓
Buckland Hill	5	68.0	91.0	79.2	(1)	5	0.008	0.018	0.013	✓	5	130.0	235.0	189.0	✓	5	65	89	74	✓
Dwellingup	2	8.0	13.0	10.5	(1)	2	0.008	0.010	0.009	✓	2	60.0	70.0	65.0	✓	2	28	30	29	✓
Foothills	2	87.0	110.0	98.5	(1)	2	0.014	0.016	0.015	✓	2	165.0	175.0	170.0	✓	2	93	110	102	✓
Greenmount	5	74.0	130.0	104.4	(1)	5	<0.008	0.020	<0.008	✓	5	110.0	180.0	153.0	✓	5	75	110	93	✓
Greenmount/Darlington	5	57.0	94.0	74.6	(1)	5	<0.008	0.018	0.011	✓	5	90.0	160.0	130.0	✓	5	69	88	81	✓
Hamilton Hill	2	70.0	84.0	77.0	(1)	2	0.008	0.014	0.011	✓	2	140.0	195.0	167.5	✓	2	85	95	90	✓
Hills Direct	2	35.0	46.0	40.5	(1)	2	0.018	0.025	0.022	✓	2	55.0	65.0	60.0	✓	2	48	55	52	✓
Lexia	2	94.0	95.0	94.5	(1)	2	0.018	0.020	0.019	✓	2	90.0	115.0	102.5	✓	2	100	160	130	✓
Mandurah	4	49.0	54.0	51.5	(1)	4	0.018	0.035	0.027	✓	4	34.0	41.0	37.8	✓	4	48	54	52	✓
Melville	4	43.0	66.0	57.5	(1)	4	0.014	0.025	0.020	✓	4	80.0	145.0	117.5	✓	4	53	56	55	✓
Mirrabooka	4	49.0	61.0	54.8	(1)	4	0.014	0.035	0.022	✓	4	150.0	215.0	195.0	✓	4	80	140	120	✓
Mt. Eliza	4	71.0	81.0	74.5	(1)	4	0.012	0.016	0.014	✓	4	170.0	210.0	187.5	✓	4	66	76	70	✓
Mt. Hawthorn	4	60.0	130.0	95.8	(1)	4	<0.008	0.014	<0.008	✓	4	70.0	190.0	152.5	✓	4	59	110	92	✓
Mt. Yokine	4	110.0	120.0	115.0	(1)	4	<0.008	0.012	<0.008	✓	4	160.0	185.0	175.0	✓	4	90	110	103	✓
Mundaring	2	67.0	73.0	70.0	(1)	1	0.012	0.012	0.012	✓	2	170.0	170.0	170.0	✓	2	85	94	90	✓
Neerabup	4	74.0	160.0	133.5	(1)	4	<0.008	0.014	<0.008	✓	4	125.0	140.0	131.3	✓	4	86	180	154	✓
North Dandalup	5	17.0	53.0	43.2	(1)	5	0.012	0.045	0.030	✓	5	31.0	65.0	45.4	✓	5	39	56	48	✓
Pinjarra	2	50.0	53.0	51.5	(1)	2	0.020	0.035	0.028	✓	2	35.0	60.0	47.5	✓	2	51	55	53	✓
South Perth/Kewdale	3	87.0	130.0	109.0	(1)	3	<0.008	0.010	<0.008	✓	3	130.0	180.0	158.3	✓	3	76	110	93	✓
Tamworth Hill	2	49.0	50.0	49.5	(1)	2	0.012	0.020	0.016	✓	2	38.0	42.0	40.0	✓	2	49	52	51	✓
Thomsons Lake	4	58.0	86.0	77.5	(1)	4	<0.008	0.016	<0.008	✓	4	24.0	205.0	153.5	✓	4	55	110	89	✓
Two Rocks	4	190.0	200.0	195.0	(1)	4	<0.008	<0.008	<0.008	✓	4	100.0	110.0	105.0	✓	4	220	230	223	(2)
Wanneroo	5	63.0	110.0	90.6	(1)	5	<0.008	0.045	0.013	✓	5	110.0	160.0	136.0	✓	5	70	120	104	✓
West Yokine	5	110.0	140.0	124.0	(1)	5	<0.008	0.012	<0.008	✓	5	160.0	180.0	171.0	✓	5	110	120	112	✓
Whitfords	2	62.0	80.0	71.0	(1)	2	<0.008	0.014	<0.008	✓	2	140.0	145.0	142.5	✓	2	77	110	94	✓
Yanchep	5	140.0	220.0	184.0	(1)	5	<0.008	<0.008	<0.008	✓	5	110.0	135.0	117.0	✓	5	160	240	208	(2)

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

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

Perth Region	Iron					Manganese					pH					Silicon				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Value (pH units)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met
		Min	Max	Mean			Min	Max	Mean			Min	Max	Mean			Min Value	Max Value	Mean Value	
Armadale/Kelmscott	2	0.020	0.025	0.023	✓	2	0.002	0.003	0.003	✓	2	7.70	7.91	7.81	✓	2	1.9	2.1	2.0	✓
Bold Park	2	0.020	0.025	0.023	✓	2	0.003	0.003	0.003	✓	2	7.91	8.02	7.97	✓	2	1.0	5.9	3.5	✓
Buckland Hill	5	0.030	0.140	0.067	✓	5	0.002	0.007	0.004	✓	5	7.66	8.13	7.94	✓	5	4.9	8.1	6.5	✓
Dwellingup	2	0.045	0.050	0.048	✓	2	<0.002	0.008	0.004	✓	2	6.88	7.14	7.01	✓	2	1.2	1.5	1.4	✓
Foothills	2	0.015	0.035	0.025	✓	2	0.003	0.005	0.004	✓	2	7.87	7.91	7.89	✓	2	7.8	17.0	12.4	✓
Greenmount	5	<0.003	0.160	0.039	✓	5	<0.002	0.020	0.004	✓	5	7.92	8.38	8.20	✓	5	8.3	18.0	13.3	✓
Greenmount/Darlington	5	0.015	0.040	0.023	✓	5	<0.002	0.007	0.003	✓	5	7.97	8.37	8.18	✓	5	5.7	10.0	7.3	✓
Hamilton Hill	2	0.006	0.010	0.008	✓	2	0.004	0.006	0.005	✓	2	7.93	8.15	8.04	✓	2	4.0	5.1	4.6	✓
Hills Direct	2	0.025	0.045	0.035	✓	2	<0.002	0.005	0.003	✓	2	7.65	7.70	7.68	✓	2	1.3	1.3	1.3	✓
Lexia	2	0.010	0.015	0.013	✓	2	0.003	0.007	0.005	✓	2	7.46	7.68	7.57	✓	2	15.0	17.0	16.0	✓
Mandurah	4	<0.003	0.010	0.006	✓	4	<0.002	<0.002	<0.002	✓	4	8.15	8.33	8.21	✓	4	0.8	0.9	0.9	✓
Melville	4	0.020	0.035	0.030	✓	4	0.003	0.004	0.003	✓	4	7.75	7.98	7.88	✓	4	1.8	4.8	3.6	✓
Mirrabooka	5	0.008	0.640	0.280	✓	4	0.002	0.006	0.004	✓	4	7.11	7.37	7.22	✓	4	15.0	17.0	15.8	✓
Mt. Eliza	4	0.020	0.060	0.035	✓	4	0.002	0.009	0.005	✓	4	8.01	8.19	8.07	✓	4	5.1	6.7	6.1	✓
Mt. Hawthorn	4	0.025	0.035	0.031	✓	4	0.003	0.004	0.004	✓	4	7.75	8.05	7.94	✓	4	4.7	19.0	14.9	✓
Mt. Yokine	4	0.015	0.060	0.038	✓	4	<0.002	0.007	0.004	✓	4	7.70	8.04	7.92	✓	4	18.0	20.0	18.5	✓
Mundaring	2	<0.003	0.008	0.004	✓	2	<0.002	<0.002	<0.002	✓	2	8.13	8.36	8.25	✓	2	4.0	4.7	4.4	✓
Neerabup	4	0.010	0.070	0.028	✓	4	<0.002	0.004	<0.002	✓	4	7.40	7.53	7.48	✓	4	17.0	22.0	20.0	✓
North Dandalup	5	0.015	0.030	0.022	✓	5	<0.002	0.003	<0.002	✓	5	7.16	8.41	8.01	✓	5	1.0	2.6	1.5	✓
Pinjarra	2	<0.003	0.004	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.15	8.20	8.18	✓	2	0.4	0.8	0.6	✓
South Perth/Kewdale	3	0.010	0.045	0.022	✓	3	<0.002	0.006	0.003	✓	3	7.76	8.02	7.92	✓	3	12.0	18.0	15.7	✓
Tamworth Hill	2	0.006	0.015	0.011	✓	2	<0.002	<0.002	<0.002	✓	2	7.88	8.04	7.96	✓	2	0.6	0.8	0.7	✓
Thomsons Lake	4	<0.003	0.006	<0.003	✓	4	<0.002	0.010	0.005	✓	4	7.70	8.30	7.91	✓	4	1.0	5.9	4.5	✓
Two Rocks	4	<0.003	0.004	<0.003	✓	4	<0.002	<0.002	<0.002	✓	4	7.40	7.71	7.56	✓	4	12.0	13.0	12.3	✓
Wanneroo	5	0.006	0.025	0.012	✓	5	<0.002	0.005	<0.002	✓	5	7.17	7.81	7.45	✓	5	17.0	20.0	18.4	✓
West Yokine	5	0.015	0.140	0.041	✓	5	<0.002	0.016	0.004	✓	5	7.82	8.22	8.00	✓	5	17.0	19.0	18.0	✓
Whitfords	2	0.008	0.010	0.009	✓	2	0.003	0.003	0.003	✓	2	7.42	7.75	7.59	✓	2	17.0	18.0	17.5	✓
Yanchep	5	<0.003	0.015	0.005	✓	5	<0.002	<0.002	<0.002	✓	5	7.45	7.68	7.57	✓	5	16.0	19.0	17.0	✓

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

Perth Region	Sodium					TDS					True Colour					Turbidity				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Value (TCU)			Guideline Met	Samples Taken	Value (NTU)			Guideline Met
		Min Value	Max Value	Mean Value			Min	Max	Mean			Min	Max	Mean			Min	Max	Mean	
Armadale/Kelmscott	2	89.0	99.0	94.0	✓	2	374	401	388	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Bold Park	2	23.0	70.0	46.5	✓	2	141	329	235	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Buckland Hill	5	84.0	145.0	122.8	✓	5	344	547	464	✓	5	<1	<1	<1	✓	5	0.1	0.3	0.2	✓
Dwellingup	2	33.0	36.0	34.5	✓	2	133	152	143	✓	2	<1	1	<1	✓	2	0.5	0.5	0.5	✓
Foothills	2	105.0	120.0	112.5	✓	2	458	519	489	✓	2	<1	<1	<1	✓	2	0.1	0.4	0.3	✓
Greenmount	5	75.0	120.0	101.8	✓	5	331	540	459	✓	5	<1	<1	<1	✓	5	<0.1	0.3	<0.1	✓
Greenmount/Darlington	5	56.0	96.0	79.8	✓	5	273	437	359	✓	5	<1	<1	<1	✓	5	0.1	0.5	0.3	✓
Hamilton Hill	2	78.0	120.0	99.0	✓	2	357	485	421	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Hills Direct	2	31.0	35.0	33.0	✓	2	171	171	171	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Lexia	2	47.0	68.0	57.5	✓	2	376	396	386	✓	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Mandurah	4	22.0	25.0	23.0	✓	4	139	154	147	✓	4	<1	<1	<1	✓	4	<0.1	0.2	<0.1	✓
Melville	4	45.0	92.0	74.8	✓	4	210	357	299	✓	4	<1	<1	<1	✓	4	0.1	0.2	0.2	✓
Mirrabooka	4	88.0	130.0	114.5	✓	4	390	544	497	✓	4	<1	<1	<1	✓	4	0.1	0.3	0.2	✓
Mt. Eliza	4	115.0	140.0	122.5	✓	4	416	501	453	✓	4	<1	<1	<1	✓	4	<0.1	0.3	0.2	✓
Mt. Hawthorn	4	47.0	130.0	104.3	✓	4	227	536	452	✓	4	<1	<1	<1	✓	4	<0.1	0.3	0.2	✓
Mt. Yokine	4	115.0	140.0	126.3	✓	4	509	551	533	✓	4	<1	<1	<1	✓	4	<0.1	0.2	<0.1	✓
Mundaring	2	105.0	105.0	105.0	✓	2	426	434	430	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Neerabup	4	66.0	85.0	73.0	✓	4	395	503	472	✓	4	<1	<1	<1	✓	4	0.1	0.5	0.3	✓
North Dandalup	5	21.0	37.0	27.8	✓	5	130	163	150	✓	5	<1	<1	<1	✓	5	<0.1	0.2	<0.1	✓
Pinjarra	2	20.0	35.0	27.5	✓	2	144	177	161	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
South Perth/Kewdale	3	86.0	120.0	108.7	✓	3	381	531	478	✓	3	<1	<1	<1	✓	3	0.1	0.2	0.1	✓
Tamworth Hill	2	22.0	26.0	24.0	✓	2	143	152	148	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Thomsons Lake	4	14.0	135.0	101.0	✓	4	133	519	409	✓	4	<1	<1	<1	✓	4	0.1	0.2	0.1	✓
Two Rocks	4	55.0	58.0	56.8	✓	4	505	533	520	✓	4	<1	<1	<1	✓	4	<0.1	0.2	<0.1	✓
Wanneroo	5	68.0	96.0	83.4	✓	5	383	476	421	✓	5	<1	<1	<1	✓	5	0.1	0.2	0.2	✓
West Yokine	5	115.0	125.0	119.0	✓	5	507	559	538	✓	5	<1	<1	<1	✓	5	0.2	0.5	0.3	✓
Whitfords	2	79.0	94.0	86.5	✓	2	397	409	403	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Yanchep	5	57.0	77.0	64.8	✓	5	490	560	523	✓	5	<1	<1	<1	✓	5	<0.1	0.3	<0.1	✓

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Table 6 **Health related variables**

Mid 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					
Badgingarra	13	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Bindoon /Chittering	52	0	0	✓	27	0	✓	2	0.35	0.35	0.35	✓	0	(1)	2	✓
Bolgart	13	0	0	✓	9	0	✓	2	0.15	0.20	0.18	✓	4	✓	2	✓
Calingiri	13	0	0	✓	9	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Carnamah	13	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Carnarvon	64	0	0	✓	39	0	✓	2	0.35	0.40	0.38	✓	0	(1)	2	✓
Cervantes	51	0	0	✓	13	0	✓	2	0.15	0.15	0.15	✓	0	(1)	2	✓
Coomberdale	13	0	0	✓	9	0	✓	2	0.75	0.80	0.78	(2)	0	(1)	2	✓
Coorow	13	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Coral Bay	13	0	0	✓	13	0	✓	2	<0.1	0.10	<0.1	✓	0	(1)	2	✓
Cue	13	0	0	✓	13	0	✓	2	0.30	0.30	0.30	✓	0	(1)	2	✓
Dandaragan	13	0	0	✓	9	0	✓	2	0.25	0.25	0.25	✓	0	(1)	2	✓
Denham	52	0	0	✓	26	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Dongara/Denison	65	0	0	✓	26	0	✓	52	0.40	0.95	0.79	(2)	0	(1)	2	✓
Eneabba	13	0	0	✓	13	0	✓	2	0.15	0.15	0.15	✓	0	(1)	2	✓
Exmouth	63	0	0	✓	38	0	✓	51	0.35	0.75	0.66	(2)	0	(1)	2	✓
Gascoyne Junction	23	0	0	✓	23	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Geraldton	189	0	0	✓	164	0	✓	54	0.50	0.95	0.82	(2)	0	(1)	4	✓
Gingin	52	0	0	✓	26	0	✓	2	<0.1	<0.1	<0.1	✓	1	✓	2	✓
Greenhead	52	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Guilderton	51	0	0	✓	17	0	✓	2	0.20	0.25	0.23	✓	0	(1)	2	✓
Horrocks	13	0	0	✓	13	0	✓	2	0.35	0.35	0.35	✓	0	(1)	2	✓
Jurien Bay	51	0	0	✓	13	0	✓	2	0.20	0.20	0.20	✓	0	(1)	2	✓
Kalbarri	52	0	0	✓	26	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Lancelin	51	0	0	✓	26	0	✓	2	0.20	0.20	0.20	✓	0	(1)	2	✓
Latham	53	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	2	✓
Ledge Point	51	0	0	✓	13	0	✓	2	0.15	0.15	0.15	✓	0	(1)	2	✓
Leeman	52	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	3	✓
Meekatharra	52	0	0	✓	13	0	✓	2	0.55	0.55	0.55	✓	0	(1)	2	✓
Mingenew	13	0	0	✓	13	0	✓	2	0.15	0.20	0.18	✓	0	(1)	2	✓
Moora	52	0	0	✓	20	0	✓	52	0.65	0.80	0.75	(2)	0	(1)	2	✓
Morawa	53	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Mt Magnet	52	0	0	✓	13	0	✓	2	0.15	0.20	0.18	✓	0	(1)	2	✓
Mullewa	13	0	0	✓	13	0	✓	2	0.75	0.90	0.83	(2)	0	(1)	2	✓
Nabawa	13	0	0	✓	13	0	✓	2	0.75	0.80	0.78	✓	0	(1)	2	✓
New Norcia	13	0	0	✓	9	0	✓	2	0.15	0.20	0.18	✓	0	(1)	2	✓
Nilgen (Ocean Farms)	13	0	0	✓	9	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Northampton	52	0	0	✓	13	0	✓	2	0.80	0.95	0.88	(2)	0	(1)	2	✓
Perenjori	13	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Piawaning	26	0	0	✓	9	0	✓	2	<0.1	<0.1	<0.1	✓	1	✓	2	✓
Port Kalbarri	13	0	0	✓	13	0	✓	2	0.15	0.15	0.15	✓	0	(1)	2	✓
Sandstone	13	0	0	✓	13	0	✓	2	0.40	0.40	0.40	✓	0	(1)	7	✓
Seabird	13	0	0	✓	9	0	✓	2	0.25	0.30	0.28	✓	0	(1)	2	✓
Seaview Park	13	0	0	✓	9	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Sovereign Hills	26	0	0	✓	17	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Three Springs	13	0	0	✓	13	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Watheroo	13	0	0	✓	9	0	✓	2	0.10	0.15	0.13	✓	0	(1)	2	✓
Woodridge	13	0	0	✓	9	0	✓	2	0.25	0.30	0.28	✓	0	(1)	2	✓
Yalgoo	13	0	0	✓	13	0	✓	2	0.10	0.10	0.10	✓	0	(1)	2	✓
Yerecoin	13	0	0	✓	9	0	✓	2	<0.1	<0.1	<0.1	✓	1	✓	2	✓
Yuna	13	0	0	✓	13	0	✓	2	0.85	0.90	0.88	(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.

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Table 7 **Health related variables**

Mid 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			
Badgingarra	2	0.88	0.88	0.88	✓	1	✓	2	✓	2	0.001	0.004	0.003	✓	0	(1)
Bindoon /Chittering	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	0.012	0.014	0.013	✓	0	(1)
Bolgart	4	30.36	37.4	34.76	✓	8	✓	2	✓	2	0.004	0.005	0.005	✓	2	✓
Calingiri	4	14.96	17.16	16.28	✓	1	✓	2	✓	2	0.026	0.027	0.027	✓	1	✓
Carnamah	2	1.32	1.32	1.32	✓	1	✓	2	✓	2	0.01	0.010	0.010	✓	0	(1)
Carnarvon	2	3.08	4.4	3.52	✓	1	✓	0	(1)	2	0.005	0.006	0.006	✓	0	(1)
Cervantes	4	14.52	16.28	15.84	✓	1	✓	2	✓	2	0.014	0.014	0.014	✓	0	(1)
Coomberdale	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	0.031	0.036	0.034	✓	0	(1)
Coorow	2	1.32	1.32	1.32	✓	1	✓	2	✓	2	0.01	0.02	0.015	✓	0	(1)
Coral Bay	2	0.44	0.44	0.44	✓	1	✓	0	(1)	2	<0.001	0.006	0.003	✓	0	(1)
Cue	4	44.88	50.6	48.84	(2)	1	✓	2	✓	2	0.006	0.023	0.015	✓	0	(1)
Dandaragan	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	0.005	0.007	0.006	✓	0	(1)
Denham	2	<0.2	0.44	<0.2	✓	1	✓	2	✓	2	<0.001	0.008	0.004	✓	1	✓
Dongara/Denison	4	2.64	3.08	2.64	✓	1	✓	1	✓	2	0.009	0.016	0.013	✓	0	(1)
Eneabba	5	<0.2	<0.2	<0.2	✓	1	✓	1	✓	2	0.009	0.013	0.011	✓	0	(1)
Exmouth	2	7.92	8.36	8.36	✓	1	✓	2	✓	2	<0.001	<0.001	<0.001	✓	0	(1)
Gascoyne Junction	2	0.44	0.44	0.44	✓	1	✓	0	(1)	2	0.008	0.025	0.017	✓	0	(1)
Geraldton	4	2.64	3.08	2.64	✓	2	✓	2	✓	4	0.007	0.013	0.009	✓	1	✓
Gingin	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	<0.001	0.003	0.002	✓	0	(1)
Greenhead	2	4.4	4.4	4.4	✓	1	✓	1	✓	2	0.002	0.004	0.003	✓	0	(1)
Guilderton	5	35.2	41.8	37.84	✓	1	✓	0	(1)	2	0.014	0.018	0.016	✓	0	(1)
Horrocks	4	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	0.012	0.018	0.015	✓	0	(1)
Jurien Bay	14	10.56	15.4	13.64	✓	1	✓	2	✓	2	0.009	0.011	0.010	✓	0	(1)
Kalbarri	2	2.64	2.64	2.64	✓	1	✓	2	✓	2	0.003	0.004	0.004	✓	1	✓
Lancelin	2	4.40	4.84	4.84	✓	1	✓	2	✓	2	0.014	0.024	0.019	✓	0	(1)
Latham	2	0.88	0.88	0.88	✓	2	✓	1	✓	2	0.009	0.06	0.035	✓	0	(1)
Ledge Point	5	19.8	21.56	20.68	✓	1	✓	2	✓	2	0.008	0.01	0.009	✓	0	(1)
Leeman	2	3.96	4.40	3.96	✓	2	✓	2	✓	2	0.003	0.005	0.004	✓	0	(1)
Meekatharra	5	56.76	66.44	60.72	(2)	1	✓	1	✓	2	0.003	0.005	0.004	✓	0	(1)
Mingenew	1	11.44	11.44	11.44	✓	1	✓	2	✓	2	<0.001	0.004	0.002	✓	0	(1)
Moora	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	0.015	0.031	0.023	✓	0	(1)
Morawa	2	0.88	0.88	0.88	✓	1	✓	0	(1)	2	<0.001	0.007	0.004	✓	0	(1)
Mt Magnet	6	25.52	67.76	33.88	(2)	1	✓	1	✓	2	0.004	0.007	0.006	✓	0	(1)
Mullewa	2	2.64	3.08	2.64	✓	1	✓	2	✓	2	0.032	0.033	0.033	✓	1	✓
Nabawa	2	2.64	3.08	3.08	✓	1	✓	2	✓	2	0.012	0.02	0.016	✓	0	(1)
New Norcia	11	44.88	57.64	49.72	(2)	1	✓	1	✓	2	0.008	0.011	0.01	✓	1	✓
Nilgen (Ocean Farms)	4	22.44	25.08	23.76	✓	1	✓	2	✓	2	<0.001	0.004	0.002	✓	0	(1)
Northampton	2	2.64	3.08	2.64	✓	1	✓	2	✓	2	0.021	0.028	0.025	✓	0	(1)
Perenjori	2	0.88	0.88	0.88	✓	1	✓	2	✓	2	0.006	0.019	0.013	✓	0	(1)
Piawaning	2	10.56	11.88	11.44	✓	1	✓	2	✓	2	0.089	0.095	0.092	✓	0	(1)
Port Kalbarri	2	0.44	0.88	0.88	✓	1	✓	2	✓	2	0.054	0.09	0.072	✓	2	✓
Sandstone	7	54.12	62.04	57.64	(2)	1	✓	0	(1)	2	0.001	0.004	0.003	✓	0	✓
Seabird	2	<0.2	0.44	<0.2	✓	1	✓	2	✓	2	0.027	0.067	0.047	✓	0	(1)
Seaview Park	5	22	25.96	23.76	✓	1	✓	1	✓	2	0.004	0.017	0.011	✓	0	(1)
Sovereign Hills	6	2.64	47.08	15.84	✓	1	✓	1	✓	2	0.020	0.034	0.027	✓	1	(1)
Three Springs	2	1.32	1.76	1.32	✓	1	✓	2	✓	2	0.006	0.012	0.009	✓	0	(1)
Watheroo	5	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	5	0.028	0.170	0.122	✓	1	✓
Woodridge	5	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	0.150	0.150	0.15	✓	1	✓
Yalgoo*	2	19.36	20.68	20.24	✓	1	✓	2	✓	2	0.008	0.015	0.012	✓	0	(1)
Yerecoin	4	11	11.88	11.44	✓	1	✓	1	✓	2	0.055	0.12	0.088	✓	1	✓
Yuna	2	2.64	2.64	2.64	✓	1	✓	2	✓	2	0.022	0.028	0.025	✓	0	(1)

(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.

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

Mid 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	
Badgingarra	2	120.0	150.0	135.0	(1)	2	<0.008	<0.008	<0.008	✓	2	220.0	220.0	220.0	✓	2	41	43	42	✓
Bindoon /Chittering	2	99.0	100.0	99.5	(1)	2	<0.008	<0.008	<0.008	✓	2	155.0	165.0	160.0	✓	2	50	52	51	✓
Bolgart	4	31.0	36.0	33.0	(1)	4	<0.008	0.010	<0.008	✓	4	235.0	260.0	246.3	✓	4	120	130	125	✓
Calingiri	4	37.0	58.0	44.3	(1)	4	<0.008	<0.008	<0.008	✓	4	490.0	525.0	500.0	(2)	4	190	220	205	(3)
Carnamah	2	9.0	13.0	11.0	(1)	2	<0.008	<0.008	<0.008	✓	2	390.0	455.0	422.5	(2)	2	140	140	140	✓
Carnarvon	2	110.0	120.0	115.0	(1)	2	<0.008	<0.008	<0.008	✓	2	135.0	145.0	140.0	✓	2	180	180	180	✓
Cervantes	4	230.0	250.0	235.0	(1)	4	<0.008	<0.008	<0.008	✓	4	280.0	300.0	290.0	(2)	4	330	340	333	(3)
Coomberdale	2	23.0	26.0	24.5	(1)	2	0.012	0.012	0.012	✓	2	240.0	255.0	247.5	✓	2	66	71	69	✓
Coorow	2	10.0	17.0	13.5	(1)	2	<0.008	<0.008	<0.008	✓	2	415.0	430.0	422.5	(2)	2	140	150	145	✓
Coral Bay	2	61.0	77.0	69.0	(1)	2	<0.008	<0.008	<0.008	✓	2	105.0	120.0	112.5	✓	2	57	71	64	✓
Cue	2	62.0	68.0	65.0	(1)	2	<0.008	<0.008	<0.008	✓	2	270.0	295.0	282.5	(2)	2	190	190	190	✓
Dandaragan	2	120.0	150.0	135.0	(1)	2	<0.008	<0.008	<0.008	✓	2	250.0	255.0	252.5	(2)	2	94	96	95	✓
Denham	2	24.0	62.0	43.0	(1)	2	<0.008	0.060	0.030	✓	2	27.0	175.0	101.0	✓	2	55	70	63	✓
Dongara/Denison	4	62.0	67.0	64.3	(1)	4	<0.008	<0.008	<0.008	✓	4	390.0	415.0	401.3	(2)	4	120	120	120	✓
Eneabba	5	14.0	18.0	15.8	(1)	5	<0.008	<0.008	<0.008	✓	5	330.0	335.0	332.0	(2)	5	100	100	100	✓
Exmouth	2	240.0	260.0	250.0	(1)	2	<0.008	<0.008	<0.008	✓	2	230.0	230.0	230.0	✓	2	330	340	335	(3)
Gascoyne Junction	2	24.0	28.0	26.0	(1)	2	<0.008	<0.008	<0.008	✓	2	115.0	125.0	120.0	✓	2	51	67	59	✓
Geraldton	4	61.0	66.0	64.3	(1)	4	<0.008	<0.008	<0.008	✓	4	385.0	405.0	392.5	(2)	4	110	120	115	✓
Gingin	2	36.0	38.0	37.0	(1)	2	<0.008	<0.008	<0.008	✓	2	90.0	115.0	102.5	✓	2	24	30	27	✓
Greenhead	2	21.0	22.0	21.5	(1)	2	<0.008	<0.008	<0.008	✓	2	275.0	290.0	282.5	(2)	2	110	110	110	✓
Guilderton	5	190.0	200.0	194.0	(1)	5	<0.008	<0.008	<0.008	✓	5	260.0	400.0	358.0	(2)	5	290	350	324	(3)
Horrocks	4	47.0	130.0	99.3	(1)	4	<0.008	<0.008	<0.008	✓	4	570.0	610.0	586.3	(2)	4	130	140	135	✓
Jurien Bay	14	180.0	260.0	233.6	(1)	14	<0.008	<0.008	<0.008	✓	14	235.0	695.0	389.6	(2)	14	290	480	359	(3)
Kalbarri	2	6.0	8.0	7.0	(1)	2	<0.008	<0.008	<0.008	✓	2	180.0	185.0	182.5	✓	2	55	57	56	✓
Lancelin	2	200.0	220.0	210.0	(1)	2	<0.008	<0.008	<0.008	✓	2	245.0	265.0	255.0	(2)	2	300	310	305	(3)
Latham	2	42.0	44.0	43.0	(1)	2	<0.008	<0.008	<0.008	✓	2	315.0	320.0	317.5	(2)	2	84	110	97	✓
Ledge Point	5	210.0	220.0	214.0	(1)	5	<0.008	<0.008	<0.008	✓	5	155.0	165.0	160.0	✓	5	250	270	256	(3)
Leeman	2	21.0	23.0	22.0	(1)	2	<0.008	<0.008	<0.008	✓	2	285.0	295.0	290.0	(2)	2	97	98	98	✓
Meekatharra	5	150.0	170.0	166.0	(1)	5	<0.008	<0.008	<0.008	✓	5	260.0	290.0	281.0	(2)	5	270	290	282	(3)
Mingenew	1	24.0	24.0	24.0	(1)	1	<0.008	<0.008	<0.008	✓	1	365.0	365.0	365.0	(2)	1	86	86	86	✓
Moora	2	21.0	26.0	23.5	(1)	2	<0.008	<0.008	<0.008	✓	2	245.0	255.0	250.0	(2)	2	66	67	67	✓
Morawa	2	26.0	28.0	27.0	(1)	2	<0.008	<0.008	<0.008	✓	2	310.0	325.0	317.5	(2)	2	84	88	86	✓
Mt Magnet	2	100.0	110.0	105.0	(1)	2	<0.008	<0.008	<0.008	✓	2	90.0	105.0	97.5	✓	2	61	70	66	✓
Mullewa	2	72.0	76.0	74.0	(1)	2	<0.008	<0.008	<0.008	✓	2	355.0	385.0	370.0	(2)	2	130	130	130	✓
Nabawa	2	63.0	64.0	63.5	(1)	2	<0.008	0.014	<0.008	✓	2	370.0	405.0	387.5	(2)	2	120	120	120	✓
New Norcia	7	28.0	32.0	29.9	(1)	2	<0.008	<0.008	<0.008	✓	7	460.0	695.0	585.7	(2)	7	190	260	226	(3)
Nilgen (Ocean Farms)	4	200.0	220.0	212.5	(1)	4	<0.008	<0.008	<0.008	✓	4	130.0	140.0	135.0	✓	4	230	240	235	(3)
Northampton	2	65.0	67.0	66.0	(1)	2	<0.008	0.014	<0.008	✓	2	360.0	415.0	387.5	(2)	2	120	130	125	✓
Perenjori	2	26.0	27.0	26.5	(1)	2	<0.008	<0.008	<0.008	✓	2	310.0	320.0	315.0	(2)	2	81	89	85	✓
Piawaning	2	31.0	33.0	32.0	(1)	2	<0.008	<0.008	<0.008	✓	2	360.0	490.0	425.0	(2)	2	160	220	190	✓
Port Kalbarri	2	80.0	93.0	86.5	(1)	2	<0.008	<0.008	<0.008	✓	2	330.0	330.0	330.0	(2)	2	100	120	110	✓
Sandstone	2	96.0	97.0	96.5	(1)	2	<0.008	<0.008	<0.008	✓	2	315.0	335.0	325.0	(2)	2	330	330	330	(3)
Seabird	2	110.0	110.0	110.0	(1)	2	<0.008	<0.008	<0.008	✓	2	215.0	215.0	215.0	✓	2	93	97	95	✓
Seaview Park	5	170.0	180.0	178.0	(1)	5	<0.008	<0.008	<0.008	✓	5	80.0	85.0	82.0	✓	5	170	190	182	✓
Sovereign Hills	2	180.0	200.0	190.0	(1)	2	<0.008	<0.008	<0.008	✓	2	175.0	240.0	207.5	✓	2	250	250	250	(3)
Three Springs	2	17.0	22.0	19.5	(1)	2	<0.008	<0.008	<0.008	✓	2	340.0	345.0	342.5	(2)	2	88	88	88	✓
Watheroo	5	56.0	200.0	165.2	(1)	5	<0.008	<0.008	<0.008	✓	5	190.0	240.0	209.0	✓	5	110	260	228	(3)
Woodridge	5	51.0	57.0	53.8	(1)	5	0.050	0.095	0.065	✓	5	185.0	195.0	190.0	✓	5	46	50	48	✓
Yalgoo	2	81.0	92.0	86.5	(1)	2	<0.008	<0.008	<0.008	✓	2	80.0	80.0	80.0	✓	2	30	36	33	✓
Yerecoin	4	31.0	33.0	31.8	(1)	4	<0.008	<0.008	<0.008	✓	4	340.0	570.0	473.8	(2)	4	160	240	215	(3)
Yuna	2	60.0	63.0	61.5	(1)	2	0.010	0.018	0.014	✓	2	390.0	390.0	390.0	(2)	2	120	130	125	✓

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

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

Mid West 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	
Badgingarra	2	0.004	0.015	0.010	✓	2	0.003	0.003	0.003	✓	2	7.04	7.36	7.20	✓	2	44.0	47.0	45.5	✓
Bindoon /Chittering	2	0.020	0.025	0.023	✓	2	<0.002	<0.002	<0.002	✓	2	7.07	7.39	7.23	✓	2	36.0	38.0	37.0	✓
Bolgart	4	0.010	0.030	0.020	✓	4	<0.002	<0.002	<0.002	✓	4	6.42	6.92	6.62	✓	4	40.0	42.0	41.0	✓
Calingiri	4	0.025	0.070	0.039	✓	4	<0.002	<0.002	<0.002	✓	4	6.56	6.79	6.67	✓	4	15.0	17.0	15.8	✓
Carnamah	2	0.020	0.025	0.023	✓	2	<0.002	<0.002	<0.002	✓	2	6.39	6.72	6.56	✓	2	24.0	24.0	24.0	✓
Carnarvon	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.76	7.99	7.88	✓	2	45.0	46.0	45.5	✓
Cervantes	4	<0.003	0.004	<0.003	✓	4	<0.002	<0.002	<0.002	✓	4	7.40	7.94	7.66	✓	4	13.0	14.0	13.5	✓
Coomberdale	2	0.070	0.080	0.075	✓	2	<0.002	<0.002	<0.002	✓	2	8.19	8.23	8.21	✓	2	22.0	24.0	23.0	✓
Coorow	2	0.015	0.030	0.023	✓	2	<0.002	<0.002	<0.002	✓	2	6.47	7.23	6.85	✓	2	24.0	25.0	24.5	✓
Coral Bay	2	0.010	0.010	0.010	✓	2	0.002	0.002	0.002	✓	2	7.21	7.25	7.23	✓	2	1.1	1.3	1.2	✓
Cue	2	0.004	0.006	0.005	✓	2	<0.002	<0.002	<0.002	✓	2	7.72	7.96	7.84	✓	2	80.0	85.0	82.5	(2)
Dandaragan	2	0.080	0.080	0.080	✓	2	0.004	0.016	0.010	✓	2	7.26	7.29	7.28	✓	2	41.0	41.0	41.0	✓
Denham	2	0.010	0.045	0.028	✓	2	<0.002	0.004	<0.002	✓	2	6.82	8.19	7.51	✓	2	0.9	2.9	1.9	✓
Dongara/Denison	4	0.010	0.020	0.014	✓	4	<0.002	<0.002	<0.002	✓	4	7.05	7.19	7.13	✓	4	22.0	24.0	23.0	✓
Eneabba	5	0.015	0.035	0.026	✓	5	<0.002	<0.002	<0.002	✓	5	6.78	7.22	7.11	✓	5	43.0	47.0	45.0	✓
Exmouth	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.32	8.09	7.71	✓	2	15.0	16.0	15.5	✓
Gascoyne Junction	2	0.004	0.006	0.005	✓	2	<0.002	<0.002	<0.002	✓	2	6.94	7.04	6.99	✓	2	4.1	4.5	4.3	✓
Geraldton	4	0.010	0.240	0.071	✓	4	<0.002	0.012	0.003	✓	4	6.92	7.55	7.22	✓	4	23.0	25.0	24.0	✓
Gingin	2	0.060	0.090	0.075	✓	2	<0.002	0.004	<0.002	✓	2	7.24	7.33	7.29	✓	2	27.0	31.0	29.0	✓
Greenhead	2	0.010	0.020	0.015	✓	2	<0.002	<0.002	<0.002	✓	2	7.13	7.14	7.14	✓	2	25.0	25.0	25.0	✓
Guilderton	5	<0.003	0.004	<0.003	✓	5	<0.002	<0.002	<0.002	✓	5	7.66	7.79	7.76	✓	5	8.6	9.3	9.0	✓
Horrocks	4	0.050	0.070	0.063	✓	4	0.006	0.010	0.007	✓	4	6.83	7.52	7.26	✓	4	15.0	16.0	15.5	✓
Jurien Bay	14	<0.003	0.006	<0.003	✓	14	<0.002	<0.002	<0.002	✓	14	7.37	8.15	7.67	✓	14	11.0	16.0	14.1	✓
Kalbarri	2	0.015	0.040	0.028	✓	2	<0.002	<0.002	<0.002	✓	2	6.60	6.95	6.78	✓	2	40.0	44.0	42.0	✓
Lancelin	2	<0.003	0.010	0.005	✓	2	<0.002	<0.002	<0.002	✓	2	7.74	7.89	7.82	✓	2	16.0	16.0	16.0	✓
Latham	2	0.020	0.020	0.020	✓	2	<0.002	<0.002	<0.002	✓	2	9.14	9.31	9.23	(1)	2	41.0	49.0	45.0	✓
Ledge Point	5	<0.003	0.006	<0.003	✓	5	<0.002	<0.002	<0.002	✓	5	7.72	7.87	7.82	✓	5	15.0	16.0	15.4	✓
Leeman	2	0.010	0.020	0.015	✓	2	<0.002	<0.002	<0.002	✓	2	7.03	7.40	7.22	✓	2	24.0	25.0	24.5	✓
Meekatharra	5	<0.003	<0.003	<0.003	✓	5	<0.002	<0.002	<0.002	✓	5	7.87	8.29	8.08	✓	5	80.0	85.0	81.0	(2)
Mingenew	1	0.010	0.010	0.010	✓	1	<0.002	<0.002	<0.002	✓	1	6.97	6.97	6.97	✓	1	60.0	60.0	60.0	✓
Moora	2	0.025	0.030	0.028	✓	2	<0.002	<0.002	<0.002	✓	2	6.92	7.23	7.08	✓	2	23.0	24.0	23.5	✓
Morawa	2	0.010	0.020	0.015	✓	2	<0.002	<0.002	<0.002	✓	2	6.93	7.21	7.07	✓	2	43.0	50.0	46.5	✓
Mt Magnet	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.02	8.13	8.08	✓	2	75.0	85.0	80.0	(2)
Mullewa	2	0.020	0.045	0.033	✓	2	<0.002	<0.002	<0.002	✓	2	8.06	8.18	8.12	✓	2	22.0	24.0	23.0	✓
Nabawa	2	0.025	0.040	0.033	✓	2	0.002	0.005	0.004	✓	2	7.51	7.76	7.64	✓	2	22.0	25.0	23.5	✓
New Norcia	7	0.020	0.025	0.023	✓	7	<0.002	<0.002	<0.002	✓	7	6.29	6.74	6.48	✓	7	44.0	48.0	46.3	✓
Nilgen (Ocean Farms)	4	0.004	0.008	0.006	✓	4	<0.002	<0.002	<0.002	✓	4	7.59	7.94	7.72	✓	4	19.0	20.0	19.3	✓
Northampton	2	0.025	0.200	0.113	✓	2	0.003	0.018	0.011	✓	2	7.83	8.36	8.10	✓	2	20.0	23.0	21.5	✓
Perenjori	2	0.010	0.015	0.013	✓	2	<0.002	<0.002	<0.002	✓	2	7.07	7.39	7.23	✓	2	45.0	49.0	47.0	✓
Piawaning	2	0.020	0.020	0.020	✓	2	<0.002	<0.002	<0.002	✓	2	6.88	7.09	6.99	✓	2	18.0	19.0	18.5	✓
Port Kalbarri	2	0.004	0.008	0.006	✓	2	<0.002	<0.002	<0.002	✓	7	7.11	7.81	7.48	✓	2	42.0	46.0	44.0	✓
Sandstone	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.30	7.57	7.44	✓	2	35.0	39.0	37.0	✓
Seabird	2	0.035	0.035	0.035	✓	2	<0.002	<0.002	<0.002	✓	2	7.69	7.75	7.72	✓	2	18.0	19.0	18.5	✓
Seaview Park	5	<0.003	0.015	<0.003	✓	5	<0.002	<0.002	<0.002	✓	5	7.74	7.93	7.84	✓	5	16.0	18.0	17.2	✓
Sovereign Hills	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.87	7.93	7.90	✓	2	20.0	21.0	20.5	✓
Three Springs	2	0.035	0.040	0.038	✓	2	0.004	0.006	0.005	✓	2	7.29	7.37	7.33	✓	2	55.0	55.0	55.0	✓
Watheroo	5	0.006	0.060	0.021	✓	5	<0.002	0.010	<0.002	✓	5	7.30	7.64	7.43	✓	5	13.0	18.0	14.8	✓
Woodridge	5	0.020	0.050	0.035	✓	5	0.005	0.025	0.010	✓	5	7.14	7.52	7.38	✓	5	23.0	26.0	24.6	✓
Yalgoo	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.56	7.81	7.69	✓	2	80.0	85.0	82.5	(2)
Yerecoin	4	0.020	0.060	0.036	✓	4	<0.002	<0.002	<0.002	✓	4	6.90	7.30	7.12	✓	4	18.0	20.0	19.3	✓
Yuna	2	0.060	0.080	0.070	✓	2	0.003	0.005	0.004	✓	2	7.77	7.90	7.84	✓	2	21.0	24.0	22.5	✓

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

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

Mid West 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	
Badgingarra	2	175.0	195.0	185.0	(1)	2	634	684	659	(2)	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Bindoon /Chittering	2	120.0	125.0	122.5	✓	2	479	489	484	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Bolgart	4	135.0	140.0	136.3	✓	4	552	576	563	✓	4	<1	<1	<1	✓	4	0.6	0.7	0.7	✓
Calingiri	4	265.0	300.0	283.8	(1)	4	942	1017	977	(2)	4	<1	<1	<1	✓	4	<0.1	0.2	<0.1	✓
Carnamah	2	240.0	245.0	242.5	(1)	2	772	835	804	(2)	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Carnarvon	2	77.0	84.0	80.5	✓	2	531	549	540	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Cervantes	4	155.0	170.0	162.5	✓	4	896	939	924	(2)	4	<1	<1	<1	✓	4	<0.1	<0.1	<0.1	✓
Coomberdale	2	135.0	140.0	137.5	✓	2	501	502	502	✓	2	<1	<1	<1	✓	2	0.3	0.3	0.3	✓
Coorow	2	250.0	250.0	250.0	(1)	2	802	832	817	(2)	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Coral Bay	2	70.0	82.0	76.0	✓	2	289	346	318	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Cue	2	175.0	180.0	177.5	✓	2	817	838	828	(2)	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Dandaragan	2	170.0	180.0	175.0	✓	2	672	731	702	(2)	2	<1	<1	<1	✓	2	0.3	0.5	0.4	✓
Denham	2	20.0	100.0	60.0	✓	2	146	377	262	✓	2	<1	<1	<1	✓	2	<0.1	0.3	0.2	✓
Dongara/Denison	4	240.0	260.0	251.3	(1)	4	841	865	854	(2)	4	<1	<1	<1	✓	4	<0.1	0.2	<0.1	✓
Eneabba	5	170.0	190.0	183.0	(1)	5	634	657	646	(2)	5	<1	<1	<1	✓	5	0.1	0.2	0.2	✓
Exmouth	2	130.0	135.0	132.5	✓	2	831	843	837	(2)	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Gascoyne Junction	2	61.0	69.0	65.0	✓	2	268	275	272	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Geraldton	4	235.0	250.0	246.3	(1)	4	833	850	841	(2)	4	<1	<1	<1	✓	4	<0.1	1.9	0.6	✓
Gingin	2	60.0	67.0	63.5	✓	2	249	286	268	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Greenhead	2	145.0	165.0	155.0	✓	2	563	574	569	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Guilderton	5	155.0	230.0	206.0	(1)	5	838	1078	1010	(2)	5	<1	<1	<1	✓	5	<0.1	0.2	<0.1	✓
Horrocks	4	385.0	415.0	397.5	(1)	4	1219	1319	1267	(2)	4	<1	<1	<1	✓	4	0.2	0.5	0.3	✓
Jurien Bay	14	135.0	390.0	217.5	(1)	14	812	1653	1091	(2)	14	<1	<1	<1	✓	14	<0.1	<0.1	<0.1	✓
Kalbarri	2	94.0	95.0	94.5	✓	2	367	368	368	✓	2	<1	<1	<1	✓	2	0.3	0.4	0.4	✓
Lancelin	2	120.0	140.0	130.0	✓	2	792	806	799	(2)	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Latham	2	185.0	205.0	195.0	(1)	2	679	708	694	(2)	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Ledge Point	5	98.0	105.0	101.6	✓	5	676	721	695	(2)	5	<1	<1	<1	✓	5	<0.1	<0.1	<0.1	✓
Leeman	2	150.0	150.0	150.0	✓	2	558	570	564	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Meekatharra	5	190.0	210.0	198.0	(1)	5	1024	1047	1038	(2)	5	<1	<1	<1	✓	5	<0.1	0.2	<0.1	✓
Mingenew	1	210.0	210.0	210.0	(1)	1	746	746	746	(2)	1	<1	<1	<1	✓	1	0.1	0.1	0.1	✓
Moora	2	135.0	145.0	140.0	✓	2	495	513	504	✓	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Morawa	2	195.0	200.0	197.5	(1)	2	668	688	678	(2)	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Mt Magnet	2	89.0	94.0	91.5	✓	2	450	510	480	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Mullewa	2	245.0	255.0	250.0	(1)	2	835	849	842	(2)	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Nabawa	2	250.0	255.0	252.5	(1)	2	832	857	845	(2)	2	<1	<1	<1	✓	2	0.2	0.4	0.3	✓
New Norcia	7	280.0	370.0	322.9	(1)	7	962	1329	1151	(2)	7	<1	<1	<1	✓	7	<0.1	0.7	0.3	✓
Nilgen (Ocean Farms)	4	80.0	85.0	83.3	✓	4	613	642	632	(2)	4	<1	<1	<1	✓	4	<0.1	0.4	<0.1	✓
Northampton	2	245.0	250.0	247.5	(1)	2	798	877	838	(2)	2	<1	<1	<1	✓	2	0.2	1.1	0.7	✓
Perenjori	2	190.0	195.0	192.5	(1)	2	658	681	670	(2)	2	<1	<1	<1	✓	2	0.1	0.1	0.1	✓
Piawaning	2	205.0	245.0	225.0	(1)	2	750	944	847	(2)	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Port Kalbarri	2	215.0	230.0	222.5	(1)	2	767	810	789	(2)	2	1	2	2	✓	2	<0.1	<0.1	<0.1	✓
Sandstone	2	180.0	190.0	185.0	(1)	2	957	963	960	(2)	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Seabird	2	140.0	150.0	145.0	✓	2	584	592	588	(2)	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Seaview Park	5	55.0	59.0	57.0	✓	5	468	499	480	✓	5	<1	<1	<1	✓	5	<0.1	0.5	0.2	✓
Sovereign Hills	2	97.0	130.0	113.5	✓	2	658	741	700	(2)	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Three Springs	2	215.0	215.0	215.0	(1)	2	708	718	713	(2)	2	<1	<1	<1	✓	2	0.1	0.4	0.3	✓
Watheroo	5	92.0	130.0	102.2	✓	5	528	660	625	(2)	5	<1	<1	<1	✓	5	<0.1	0.2	<0.1	✓
Woodridge	5	125.0	130.0	127.0	✓	5	463	474	470	✓	5	<1	<1	<1	✓	5	0.1	0.2	0.2	✓
Yalgoo	2	75.0	76.0	75.5	✓	2	375	389	382	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Yerecoin	4	195.0	310.0	253.8	(1)	4	716	1095	935	(2)	4	<1	<1	<1	✓	4	<0.1	0.2	0.2	✓
Yuna	2	240.0	260.0	250.0	(1)	2	820	851	836	(2)	2	<1	<1	<1	✓	2	0.6	0.6	0.6	✓

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

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Table 11 **Health related variables**

Goldfields and Agricultural Region	*E. coli*				Thermophilic *Naegleria*			Fluoride					Hydrocarbons		Metals	
Locality	Samples Taken	Samples >0 cfu/100mL	Max cfu/100mL	Requirement Met	Samples Taken	Samples with Thermophilic Naegleria	Requirement Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Guideline Met	Samples Taken	Guideline Met
									Min	Max	Mean					
Ardath	12	0	0	✓	12	0	✓	2	0.80	0.85	0.83	(2)	0	(1)	2	✓
Avon Hills	61	0	0	✓	61	0	✓	2	0.75	0.80	0.78	(2)	1	✓	2	✓
Ballidu	12	0	0	✓	12	0	✓	2	0.80	0.85	0.83	(2)	0	(1)	2	✓
Beacon	12	0	0	✓	12	0	✓	2	0.75	0.85	0.80	(2)	0	(1)	2	✓
Bencubbin	12	0	0	✓	12	0	✓	2	0.75	0.75	0.75	(2)	1	✓	2	✓
Beverley	52	0	0	✓	26	0	✓	2	0.80	0.85	0.83	(2)	1	✓	2	✓
Bind Bindi	12	0	0	✓	12	0	✓	2	0.75	0.75	0.75	(2)	1	✓	2	✓
Broad Arrow	12	0	0	✓	12	0	✓	2	0.80	0.85	0.83	(2)	0	(1)	2	✓
Bruce Rock	51	0	0	✓	12	0	✓	2	0.80	0.85	0.83	(2)	0	(1)	2	✓
Bullfinch	12	0	0	✓	12	0	✓	2	0.80	0.85	0.83	(2)	1	✓	2	✓
Buntine	12	0	0	✓	12	0	✓	2	0.80	0.80	0.80	(2)	1	✓	2	✓
Cadoux	12	0	0	✓	12	0	✓	2	0.80	0.80	0.80	(2)	1	✓	2	✓
Coolgardie	53	0	0	✓	27	0	✓	2	0.75	0.85	0.80	(2)	0	(1)	2	✓
Corrigin	51	0	0	✓	26	0	✓	2	0.80	0.80	0.80	(2)	1	✓	1	(4)
Cunderdin	52	0	0	✓	12	0	✓	2	0.80	0.80	0.80	(2)	1	✓	2	✓
Dalwallinu	52	0	0	✓	12	0	✓	2	0.75	0.80	0.78	(2)	1	✓	2	✓
Dowerin	12	0	0	✓	12	0	✓	2	0.75	0.80	0.78	(2)	1	✓	2	✓
Goomalling	52	0	0	✓	12	0	✓	2	0.75	0.80	0.78	(2)	1	✓	2	✓
Greater Bodallin	12	0	0	✓	12	0	✓	2	0.80	0.85	0.83	(2)	0	(1)	2	✓
Greater Burracoppin	36	0	0	✓	36	0	✓	2	0.85	0.85	0.85	(2)	0	(1)	2	✓
Greater Doolakine	36	0	0	✓	36	0	✓	2	0.80	0.85	0.83	(2)	0	(1)	2	✓
Greater Meckering	39	0	0	✓	38	0	✓	2	0.75	0.80	0.78	(2)	1	✓	3	✓
Greenhills	12	0	0	✓	12	0	✓	2	0.80	0.85	0.83	(2)	2	✓	2	✓
Jennacubbine	12	0	0	✓	12	0	✓	2	0.85	0.85	0.85	(2)	1	✓	2	✓
Kalannie	12	0	0	✓	12	0	✓	2	0.80	0.85	0.83	(2)	1	✓	2	✓
Kalgoorlie	156	0	0	✓	130	0	✓	54	0.75	0.90	0.83	(2)	0	(1)	2	✓
Kambalda	52	0	0	✓	52	0	✓	2	0.80	0.85	0.83	(2)	0	(1)	2	✓
Kellerberrin	51	0	0	✓	25	0	✓	2	0.80	0.85	0.83	(2)	1	✓	2	✓
Koolyanobbing	12	0	0	✓	12	0	✓	2	0.80	0.80	0.80	(2)	1	✓	2	✓
Koorda	12	0	0	✓	12	0	✓	2	0.75	0.80	0.78	(2)	1	✓	2	✓
Kununoppin	12	0	0	✓	12	0	✓	2	0.80	0.80	0.80	(2)	1	✓	2	✓
Laverton	11	0	0	✓	11	0	✓	4	0.90	1.00	0.96	(3)	0	(1)	6	✓
Leonora	52	0	0	✓	26	0	✓	2	0.40	0.55	0.48	(3)	0	(1)	2	✓
Marvel Loch	12	0	0	✓	12	0	✓	2	0.80	0.85	0.83	(2)	1	✓	2	✓
Menzies	12	0	0	✓	12	0	✓	2	0.80	0.90	0.85	(2)	0	(1)	5	✓
Merredin	51	0	0	✓	51	0	✓	51	0.70	0.95	0.83	(2)	0	(1)	2	✓
Miling	12	0	0	✓	12	0	✓	2	0.75	0.80	0.78	(2)	1	✓	2	✓
Mukinbudin	12	0	0	✓	12	0	✓	2	0.75	0.80	0.78	(2)	1	✓	2	✓
Muntadgin	12	0	0	✓	12	0	✓	2	0.75	0.85	0.80	(2)	1	✓	2	✓
Narembeen	12	0	0	✓	12	0	✓	2	0.80	0.80	0.80	(2)	1	✓	2	✓
Norseman	52	0	0	✓	26	0	✓	2	0.80	0.95	0.88	(2)	1	✓	2	✓
Northam	78	0	0	✓	65	0	✓	52	0.75	0.90	0.83	(2)	2	✓	2	✓
Nungarin	12	0	0	✓	12	0	✓	2	0.80	0.85	0.83	(2)	1	✓	2	✓
Ora Banda	12	0	0	✓	12	0	✓	2	0.80	0.85	0.83	(2)	0	(1)	2	✓
Pithara	12	0	0	✓	12	0	✓	2	0.75	0.75	0.75	(2)	1	✓	2	✓
Quairading	52	0	0	✓	26	0	✓	2	0.75	0.80	0.78	(2)	1	✓	2	✓
Seabrook	12	0	0	✓	12	0	✓	2	0.80	0.85	0.83	(2)	2	✓	2	✓
Shackleton	12	0	0	✓	12	0	✓	2	0.85	0.85	0.85	(2)	0	(1)	2	✓
Southern Cross	52	0	0	✓	39	0	✓	2	0.85	0.95	0.90	(2)	1	✓	2	✓
Spencers Brook	12	0	0	✓	12	0	✓	2	0.80	0.90	0.85	(2)	1	✓	2	✓
Tammin	24	0	0	✓	24	0	✓	2	0.75	0.80	0.78	(2)	1	✓	1	(4)
Toodyay	52	0	0	✓	26	0	✓	2	0.80	0.80	0.80	(2)	1	✓	2	✓
Trayning	12	0	0	✓	12	0	✓	2	0.80	0.85	0.83	(2)	1	✓	2	✓
Warralakin	12	0	0	✓	12	0	✓	2	0.80	0.80	0.80	(2)	1	✓	2	✓
Westonia	12	0	0	✓	12	0	✓	2	0.80	0.80	0.80	(2)	1	✓	2	✓
Wiluna	13	0	0	✓	13	0	✓	2	0.20	0.20	0.20	✓	0	(1)	2	✓
Wongan Hills	52	0	0	✓	38	0	✓	2	0.80	0.85	0.83	(2)	1	✓	2	✓
Wubin	12	0	0	✓	12	0	✓	2	0.80	0.80	0.80	(2)	1	✓	2	✓
Wyalkatchem	12	0	0	✓	12	0	✓	2	0.75	0.80	0.78	(2)	1	✓	2	✓
York	78	0	0	✓	78	0	✓	52	0.70	0.95	0.82	(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. (4) Second sample take in operational program.

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Table 12 **Health related variables**

Goldfields and Agricultural Region	Nitrate					Pesticides		Radiological		Trihalomethanes					Other Health Related	
Locality	Samples Taken	Concentration (mg/L)			*Guideline Met	Samples Taken	Guideline Met	Samples Taken	Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Requirement Met
		Min	Max	Mean							Min	Max	Mean			
Ardath	2	<0.2	0.9	0.4	✓	1	✓	0	(1)	2	0.009	0.012	0.011	✓	0	(1)
Avon Hills	2	0.4	0.4	0.4	✓	1	✓	0	(1)	2	0.015	0.023	0.019	✓	0	(1)
Ballidu	2	0.4	0.9	0.9	✓	1	✓	2	✓	2	0.015	0.02	0.018	✓	0	(1)
Beacon	2	1.3	3.5	2.2	✓	1	✓	0	(1)	2	0.008	0.013	0.011	✓	0	(1)
Bencubbin	2	3.1	4.8	4.0	✓	1	✓	0	(1)	2	0.004	0.012	0.008	✓	0	(1)
Beverley	2	0.9	1.8	1.3	✓	1	✓	2	✓	2	0.01	0.014	0.012	✓	0	(1)
Bind Bindi	2	1.3	2.6	1.8	✓	1	✓	0	(1)	2	0.008	0.014	0.011	✓	0	(1)
Broad Arrow	2	2.6	2.6	2.6	✓	1	✓	0	(1)	2	0.1	0.14	0.12	✓	0	(1)
Bruce Rock	2	0.9	0.9	0.9	✓	1	✓	0	(1)	2	0.007	0.012	0.01	✓	0	(1)
Bullfinch	2	4.4	4.8	4.4	✓	1	✓	2	✓	2	0.039	0.11	0.075	✓	0	(1)
Buntine	2	0.9	2.6	1.8	✓	1	✓	0	(1)	2	0.004	0.012	0.008	✓	0	(1)
Cadoux	2	0.4	0.9	0.4	✓	1	✓	0	(1)	2	0.011	0.016	0.014	✓	0	(1)
Coolgardie	2	0.9	4.0	2.2	✓	1	✓	0	(1)	2	0.023	0.036	0.03	✓	0	(1)
Corrigin	2	0.9	1.3	0.9	✓	1	✓	0	(1)	2	0.001	0.015	0.008	✓	0	(1)
Cunderdin	2	0.4	0.4	0.4	✓	1	✓	0	(1)	2	0.014	0.016	0.015	✓	0	(1)
Dalwallinu	2	0.9	1.3	0.9	✓	0	(2)	0	(1)	2	0.011	0.017	0.014	✓	0	(1)
Dowerin	2	0.9	1.8	1.3	✓	1	✓	0	(1)	2	0.012	0.012	0.012	✓	0	(1)
Goomalling	2	0.9	1.3	0.9	✓	1	✓	0	(1)	2	0.018	0.019	0.019	✓	0	(1)
Greater Bodallin	2	0.9	0.9	0.9	✓	1	✓	0	(1)	2	0.01	0.011	0.011	✓	0	(1)
Greater Burracoppin	2	0.4	0.9	0.9	✓	1	✓	0	(1)	2	0.009	0.009	0.009	✓	0	(1)
Greater Doolakine	2	0.4	0.4	0.4	✓	1	✓	0	(1)	2	0.016	0.018	0.017	✓	0	(1)
Greater Meckering	2	0.4	0.9	0.4	✓	1	✓	0	(1)	2	0.015	0.016	0.016	✓	0	(1)
Greenhills	2	0.9	4.4	2.6	✓	2	✓	0	(1)	2	0.01	0.016	0.013	✓	0	(1)
Jennacubbine	2	1.3	4.4	2.6	✓	1	✓	2	✓	2	0.013	0.016	0.015	✓	0	(1)
Kalannie	2	3.5	4.0	4.0	✓	1	✓	0	(1)	2	0.015	0.027	0.021	✓	0	(1)
Kalgoorlie	2	0.9	3.5	2.2	✓	1	✓	0	(1)	2	0.079	0.12	0.1	✓	0	(1)
Kambalda	2	1.3	3.1	2.2	✓	1	✓	2	✓	3	0.1	0.14	0.123	✓	1	✓
Kellerberrin	2	0.9	0.9	0.9	✓	1	✓	2	✓	2	0.018	0.029	0.024	✓	0	(1)
Koolyanobbing	2	0.9	1.3	1.3	✓	1	✓	1	✓	2	0.012	0.015	0.014	✓	0	(1)
Koorda	2	0.9	0.9	0.9	✓	1	✓	0	(1)	2	0.01	0.015	0.013	✓	0	(1)
Kununoppin	2	2.2	2.2	2.2	✓	1	✓	0	(1)	2	0.014	0.019	0.017	✓	0	(1)
Laverton*	10	34.3	43.1	39.2	✓	1	✓	2	✓	2	0.058	0.072	0.065	✓	0	(1)
Leonora*	10	26.8	35.2	30.4	✓	1	✓	2	✓	2	0.002	0.003	0.003	✓	0	(1)
Marvel Loch	2	0.9	2.6	1.8	✓	1	✓	0	(1)	2	0.012	0.027	0.02	✓	0	(1)
Menzies*	3	2.2	3.1	2.6	✓	1	✓	0	(1)	2	0.071	0.13	0.101	✓	0	(1)
Merredin	2	0.9	0.9	0.9	✓	1	✓	2	✓	2	0.005	0.007	0.006	✓	0	(1)
Miling	2	1.3	2.2	1.8	✓	1	✓	2	✓	2	0.015	0.016	0.016	✓	0	(1)
Mukinbudin	2	2.6	3.1	3.1	✓	1	✓	0	(1)	2	0.009	0.018	0.014	✓	0	(1)
Muntadgin	2	0.9	2.2	1.8	✓	1	✓	1	✓	2	0.013	0.037	0.025	✓	0	(1)
Narembeen	2	0.9	1.3	1.3	✓	1	✓	0	(1)	2	<0.001	0.011	0.006	✓	0	(1)
Norseman	2	2.2	4.0	3.1	✓	1	✓	0	(1)	2	0.033	0.053	0.043	✓	1	✓
Northam	2	1.3	2.2	1.8	✓	2	✓	0	(1)	2	0.016	0.023	0.02	✓	1	✓
Nungarin	2	0.9	0.9	0.9	✓	1	✓	0	(1)	2	0.013	0.015	0.014	✓	0	(1)
Ora Banda	2	1.3	3.5	2.6	✓	1	✓	0	(1)	2	0.073	0.11	0.092	✓	0	(1)
Pithara	2	0.9	0.9	0.9	✓	1	✓	0	(1)	2	0.016	0.019	0.018	✓	0	(1)
Quairading	2	1.3	2.6	2.2	✓	1	✓	2	✓	2	0.016	0.041	0.029	✓	0	(1)
Seabrook	2	0.4	0.4	0.4	✓	2	✓	1	✓	2	0.015	0.019	0.017	✓	0	(1)
Shackleton	2	0.9	3.1	1.8	✓	1	✓	0	(1)	2	0.021	0.023	0.022	✓	0	(1)
Southern Cross	2	0.9	0.9	0.9	✓	1	✓	0	(1)	2	0.012	0.013	0.013	✓	0	(1)
Spencers Brook	2	0.4	0.4	0.4	✓	1	✓	2	✓	2	0.016	0.018	0.017	✓	0	(1)
Tammin	2	0.4	0.9	0.4	✓	1	✓	0	(1)	2	0.005	0.009	0.007	✓	0	(1)
Toodyay	2	0.4	0.4	0.4	✓	1	✓	0	(1)	2	0.009	0.011	0.01	✓	0	(1)
Trayning	2	1.8	2.2	2.2	✓	1	✓	0	(1)	2	0.011	0.032	0.022	✓	0	(1)
Warralakin	2	0.9	1.3	0.9	✓	1	✓	0	(1)	2	0.009	0.012	0.011	✓	0	(1)
Westonia	2	1.3	1.3	1.3	✓	1	✓	0	(1)	2	0.01	0.011	0.011	✓	0	(1)
Wiluna*	2	32.6	34.3	33.4	✓	1	✓	2	✓	2	0.005	0.006	0.006	✓	0	(1)
Wongan Hills	2	0.9	1.8	1.3	✓	1	✓	0	(1)	2	0.012	0.11	0.061	✓	0	(1)
Wubin	2	0.9	1.8	1.3	✓	1	✓	0	(1)	2	0.006	0.009	0.008	✓	0	(1)
Wyalkatchem	2	0.9	0.9	0.9	✓	1	✓	0	(1)	2	0.012	0.016	0.014	✓	0	(1)
York	2	0.4	0.4	0.4	✓	1	✓	0	(1)	2	0.016	0.017	0.017	✓	0	(1)

(1) No samples required in this 12 month period. (2) Sample take in operational program - guideline met.
*Wiluna, Laverton, Leonora and Menzies have been granted an exemption from compliance with the infant health nitrate guideline by the Department of Health, however, following treatment or operational intervention these towns have achieved compliance with 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 - for a full list of towns with nitrate exemptions and how we are improving water quality in these towns - please refer to *'Understanding water quality test results - Nitrate'* section of the annual report.

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

Goldfields and Agricultural Region	Alkalinity (as CaCO3)					Aluminium					Chloride					Hardness				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met
		Min Value	Max Value	Mean Value			Min	Max	Mean			Min Value	Max Value	Mean Value			Min	Max	Mean	
Ardath	2	70.0	71.0	70.5	(1)	2	0.012	0.030	0.021	✓	2	170.0	180.0	175.0	✓	2	95	110	103	✓
Avon Hills	2	70.0	76.0	73.0	(1)	2	0.016	0.030	0.023	✓	2	160.0	170.0	165.0	✓	2	90	92	91	✓
Ballidu	2	73.0	73.0	73.0	(1)	2	0.012	0.035	0.024	✓	2	160.0	165.0	162.5	✓	2	95	100	98	✓
Beacon	2	69.0	74.0	71.5	(1)	2	0.020	0.025	0.023	✓	2	160.0	180.0	170.0	✓	2	95	98	97	✓
Bencubbin	2	70.0	76.0	73.0	(1)	2	0.010	0.035	0.023	✓	2	170.0	185.0	177.5	✓	2	98	100	99	✓
Beverley	2	66.0	78.0	72.0	(1)	2	0.014	0.040	0.027	✓	2	165.0	165.0	165.0	✓	2	95	96	96	✓
Bind Bindi	2	70.0	75.0	72.5	(1)	2	0.014	0.045	0.030	✓	2	165.0	165.0	165.0	✓	2	96	98	97	✓
Broad Arrow	2	59.0	66.0	62.5	(1)	2	0.025	0.025	0.025	✓	2	175.0	185.0	180.0	✓	2	100	110	105	✓
Bruce Rock	2	66.0	72.0	69.0	(1)	2	0.020	0.030	0.025	✓	2	165.0	170.0	167.5	✓	2	81	96	89	✓
Bullfinch	2	69.0	70.0	69.5	(1)	2	0.016	0.016	0.016	✓	2	165.0	180.0	172.5	✓	2	89	97	93	✓
Buntine	2	80.0	84.0	82.0	(1)	2	0.020	0.035	0.028	✓	2	175.0	190.0	182.5	✓	2	110	120	115	✓
Cadoux	2	72.0	73.0	72.5	(1)	2	0.030	0.045	0.038	✓	2	165.0	175.0	170.0	✓	2	94	98	96	✓
Coolgardie	2	59.0	66.0	62.5	(1)	2	0.012	0.030	0.021	✓	2	165.0	175.0	170.0	✓	2	93	100	97	✓
Corrigin	2	70.0	75.0	72.5	(1)	2	0.012	0.040	0.026	✓	2	170.0	190.0	180.0	✓	2	92	100	96	✓
Cunderdin	2	69.0	70.0	69.5	(1)	2	0.014	0.035	0.025	✓	2	165.0	175.0	170.0	✓	2	89	98	94	✓
Dalwallinu	2	78.0	97.0	87.5	(1)	2	0.018	0.035	0.027	✓	2	160.0	170.0	165.0	✓	2	100	100	100	✓
Dowerin	2	71.0	80.0	75.5	(1)	2	0.018	0.030	0.024	✓	2	150.0	170.0	160.0	✓	2	87	100	94	✓
Goomalling	2	70.0	77.0	73.5	(1)	2	0.016	0.030	0.023	✓	2	160.0	165.0	162.5	✓	2	91	96	94	✓
Greater Bodallin	2	68.0	74.0	71.0	(1)	2	0.012	0.035	0.024	✓	2	170.0	180.0	175.0	✓	2	91	95	93	✓
Greater Burracoppin	2	66.0	75.0	70.5	(1)	2	0.025	0.030	0.028	✓	2	150.0	170.0	160.0	✓	2	97	100	99	✓
Greater Doolakine	2	67.0	78.0	72.5	(1)	2	0.012	0.030	0.021	✓	2	160.0	165.0	162.5	✓	2	92	98	95	✓
Greater Meckering	2	69.0	70.0	69.5	(1)	2	0.014	0.030	0.022	✓	2	165.0	175.0	170.0	✓	2	90	97	94	✓
Greenhills	2	68.0	71.0	69.5	(1)	2	0.012	0.025	0.019	✓	2	170.0	170.0	170.0	✓	2	87	93	90	✓
Jennacubbine	2	70.0	76.0	73.0	(1)	2	0.016	0.035	0.026	✓	2	170.0	170.0	170.0	✓	2	96	98	97	✓
Kalannie	2	65.0	74.0	69.5	(1)	2	0.014	0.030	0.022	✓	2	160.0	170.0	165.0	✓	2	95	100	98	✓
Kalgoorlie	2	67.0	67.0	67.0	(1)	1	0.014	0.014	0.014	✓	2	170.0	185.0	177.5	✓	2	98	100	99	✓
Kambalda	2	67.0	67.0	67.0	(1)	2	0.012	0.025	0.019	✓	2	170.0	190.0	180.0	✓	2	99	110	105	✓
Kellerberrin	2	71.0	82.0	76.5	(1)	2	0.014	0.025	0.020	✓	2	155.0	170.0	162.5	✓	2	88	93	91	✓
Koolyanobbing	2	67.0	75.0	71.0	(1)	2	0.010	0.035	0.023	✓	2	160.0	170.0	165.0	✓	2	93	97	95	✓
Koorda	2	71.0	73.0	72.0	(1)	2	0.014	0.040	0.027	✓	2	170.0	175.0	172.5	✓	2	96	100	98	✓
Kununoppin	2	68.0	70.0	69.0	(1)	2	0.020	0.025	0.023	✓	2	165.0	170.0	167.5	✓	2	97	110	104	✓
Laverton	6	110.0	120.0	115.0	(1)	2	<0.008	<0.008	<0.008	✓	6	130.0	165.0	152.5	✓	6	100	140	123	✓
Leonora	6	88.0	130.0	111.2	(1)	2	<0.008	<0.008	<0.008	✓	6	130.0	190.0	166.7	✓	6	110	160	142	✓
Marvel Loch	2	63.0	68.0	65.5	(1)	2	0.020	0.035	0.028	✓	2	175.0	175.0	175.0	✓	2	96	98	97	✓
Menzies	3	64.0	65.0	64.7	(1)	1	0.035	0.035	0.035	✓	3	180.0	200.0	193.3	✓	3	100	110	107	✓
Merredin	2	69.0	71.0	70.0	(1)	2	0.010	0.035	0.023	✓	2	165.0	170.0	167.5	✓	2	91	95	93	✓
Miling	2	79.0	84.0	81.5	(1)	2	0.020	0.035	0.028	✓	2	165.0	170.0	167.5	✓	2	100	100	100	✓
Mukinbudin	2	67.0	71.0	69.0	(1)	2	0.025	0.030	0.028	✓	2	160.0	175.0	167.5	✓	2	89	97	93	✓
Muntadgin	2	64.0	70.0	67.0	(1)	2	0.010	0.040	0.025	✓	2	165.0	190.0	177.5	✓	2	92	96	94	✓
Narembeen	2	65.0	73.0	69.0	(1)	2	0.010	0.030	0.020	✓	2	175.0	180.0	177.5	✓	2	97	99	98	✓
Norseman	2	69.0	71.0	70.0	(1)	2	0.014	0.035	0.025	✓	2	175.0	185.0	180.0	✓	2	110	110	110	✓
Northam	2	73.0	76.0	74.5	(1)	2	0.014	0.030	0.022	✓	2	155.0	165.0	160.0	✓	2	86	91	89	✓
Nungarin	2	68.0	75.0	71.5	(1)	2	0.008	0.045	0.027	✓	2	170.0	170.0	170.0	✓	2	91	94	93	✓
Ora Banda	2	73.0	76.0	74.5	(1)	2	0.012	0.020	0.016	✓	2	180.0	190.0	185.0	✓	2	120	120	120	✓
Pithara	2	76.0	79.0	77.5	(1)	2	0.016	0.040	0.028	✓	2	175.0	180.0	177.5	✓	2	99	110	105	✓
Quairading	2	70.0	71.0	70.5	(1)	2	0.010	0.030	0.020	✓	2	155.0	175.0	165.0	✓	2	90	100	95	✓
Seabrook	2	57.0	69.0	63.0	(1)	2	0.012	0.030	0.021	✓	2	165.0	175.0	170.0	✓	2	83	92	88	✓
Shackleton	2	69.0	76.0	72.5	(1)	2	0.010	0.040	0.025	✓	2	165.0	175.0	170.0	✓	2	90	94	92	✓
Southern Cross	2	65.0	75.0	70.0	(1)	2	0.010	0.030	0.020	✓	2	160.0	170.0	165.0	✓	2	91	95	93	✓
Spencers Brook	2	66.0	71.0	68.5	(1)	2	0.014	0.025	0.020	✓	2	160.0	175.0	167.5	✓	2	90	92	91	✓
Tammin	2	71.0	81.0	76.0	(1)	2	0.020	0.025	0.023	✓	2	155.0	170.0	162.5	✓	2	88	97	93	✓
Toodyay	2	68.0	76.0	72.0	(1)	2	0.012	0.035	0.024	✓	2	170.0	170.0	170.0	✓	2	96	99	98	✓
Trayning	2	68.0	71.0	69.5	(1)	2	0.025	0.025	0.025	✓	2	165.0	170.0	167.5	✓	2	95	110	103	✓
Warralakin	2	68.0	69.0	68.5	(1)	2	0.020	0.025	0.023	✓	2	165.0	170.0	167.5	✓	2	99	100	100	✓
Westonia	2	65.0	69.0	67.0	(1)	2	0.020	0.025	0.023	✓	2	165.0	170.0	167.5	✓	2	98	100	99	✓
Wiluna	2	75.0	76.0	75.5	(1)	2	<0.008	<0.008	<0.008	✓	2	65.0	65.0	65.0	✓	2	100	110	105	✓
Wongan Hills	2	72.0	82.0	77.0	(1)	2	0.012	0.040	0.026	✓	2	165.0	170.0	167.5	✓	2	96	100	98	✓
Wubin	2	77.0	81.0	79.0	(1)	2	0.016	0.040	0.028	✓	2	170.0	180.0	175.0	✓	2	110	110	110	✓
Wyalkatchem	2	70.0	71.0	70.5	(1)	2	0.012	0.035	0.024	✓	2	170.0	175.0	172.5	✓	2	89	100	95	✓
York	2	65.0	76.0	70.5	(1)	2	0.010	0.035	0.023	✓	2	165.0	170.0	167.5	✓	2	95	96	96	✓

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

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

Goldfields and Agricultural Region	Iron					Manganese					pH					Silica				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Value (pH units)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met
		Min	Max	Mean			Min	Max	Mean			Min	Max	Mean			Min Value	Max Value	Mean Value	
Ardath	2	0.006	0.015	0.011	✓	2	<0.002	<0.002	<0.002	✓	2	8.29	8.79	8.54	(1)	2	3.8	4.4	4.1	✓
Avon Hills	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.12	8.54	8.33	✓	2	3.9	4.7	4.3	✓
Ballidu	2	0.004	0.025	0.015	✓	2	<0.002	<0.002	<0.002	✓	2	8.34	8.73	8.54	(1)	2	4.5	4.5	4.5	✓
Beacon	2	0.004	0.010	0.007	✓	2	<0.002	<0.002	<0.002	✓	2	8.22	8.64	8.43	✓	2	3.8	5.2	4.5	✓
Bencubbin	2	0.010	0.030	0.020	✓	2	<0.002	<0.002	<0.002	✓	2	8.16	8.22	8.19	✓	2	4.4	4.7	4.6	✓
Beverley	2	0.004	0.020	0.012	✓	2	<0.002	<0.002	<0.002	✓	2	8.34	8.68	8.51	(1)	2	4.5	4.6	4.6	✓
Bind Bindi	2	0.004	0.006	0.005	✓	2	<0.002	<0.002	<0.002	✓	2	8.71	8.74	8.73	(1)	2	4.4	4.5	4.5	✓
Broad Arrow	2	0.030	0.060	0.045	✓	2	<0.002	<0.002	<0.002	✓	2	7.62	8.08	7.85	✓	2	3.6	4.9	4.3	✓
Bruce Rock	2	0.006	0.010	0.008	✓	2	<0.002	<0.002	<0.002	✓	2	8.07	8.37	8.22	✓	2	3.8	4.9	4.4	✓
Bullfinch	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.85	8.94	8.90	(1)	2	4.4	5.9	5.2	✓
Buntine	2	0.010	0.140	0.075	✓	2	<0.002	0.005	0.003	✓	2	8.65	8.81	8.73	(1)	2	4.4	5.3	4.9	✓
Cadoux	2	0.006	0.180	0.093	✓	2	<0.002	0.005	0.003	✓	2	8.25	8.49	8.37	✓	2	4.5	5.1	4.8	✓
Coolgardie	2	0.015	0.020	0.018	✓	2	<0.002	<0.002	<0.002	✓	2	7.37	7.67	7.52	✓	2	4.2	4.5	4.4	✓
Corrigin	2	<0.003	0.015	0.008	✓	2	<0.002	<0.002	<0.002	✓	2	8.49	8.64	8.57	(1)	2	4.6	4.6	4.6	✓
Cunderdin	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.05	8.43	8.24	✓	2	4.5	4.6	4.6	✓
Dalwallinu	2	0.004	0.015	0.010	✓	2	<0.002	<0.002	<0.002	✓	2	8.75	8.92	8.84	(1)	2	4.3	5.2	4.8	✓
Dowerin	2	0.004	0.008	0.006	✓	2	<0.002	<0.002	<0.002	✓	2	8.58	8.69	8.64	(1)	2	3.8	5.2	4.5	✓
Goomalling	2	0.004	0.010	0.007	✓	2	<0.002	<0.002	<0.002	✓	2	8.39	8.59	8.49	✓	2	4.0	4.8	4.4	✓
Greater Bodallin	2	<0.003	0.015	0.008	✓	2	<0.002	<0.002	<0.002	✓	2	8.27	8.29	8.28	✓	2	4.1	4.6	4.4	✓
Greater Burracoppin	2	0.004	0.045	0.025	✓	2	<0.002	0.003	<0.002	✓	2	8.10	8.11	8.11	✓	2	4.1	4.6	4.4	✓
Greater Doolakine	2	0.004	0.004	0.004	✓	2	<0.002	<0.002	<0.002	✓	2	8.33	8.53	8.43	✓	2	4.1	4.3	4.2	✓
Greater Meckering	2	<0.003	0.004	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.31	8.37	8.34	✓	2	4.4	4.7	4.6	✓
Greenhills	2	0.008	0.010	0.009	✓	2	<0.002	<0.002	<0.002	✓	2	7.69	8.35	8.02	✓	2	4.1	4.2	4.2	✓
Jennacubbine	2	0.010	0.040	0.025	✓	2	<0.002	0.005	0.003	✓	2	8.67	8.80	8.74	(1)	2	4.1	4.7	4.4	✓
Kalannie	2	0.010	0.015	0.013	✓	2	<0.002	<0.002	<0.002	✓	2	7.84	8.11	7.98	✓	2	4.0	4.9	4.5	✓
Kalgoorlie	2	0.008	0.020	0.014	✓	2	<0.002	<0.002	<0.002	✓	2	7.61	7.82	7.72	✓	2	4.1	4.9	4.5	✓
Kambalda	2	0.008	0.025	0.017	✓	2	<0.002	<0.002	<0.002	✓	2	7.82	8.04	7.93	✓	2	4.5	5.8	5.2	✓
Kellerberrin	2	<0.003	0.020	0.010	✓	2	<0.002	<0.002	<0.002	✓	2	8.26	8.46	8.36	✓	2	4.4	4.9	4.7	✓
Koolyanobbing	2	0.006	0.015	0.011	✓	2	<0.002	<0.002	<0.002	✓	2	8.54	8.58	8.56	(1)	2	4.2	5.1	4.7	✓
Koorda	2	0.008	0.015	0.012	✓	2	<0.002	<0.002	<0.002	✓	2	8.22	8.49	8.36	✓	2	4.5	4.9	4.7	✓
Kununoppin	2	<0.003	0.006	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.31	8.80	8.56	(1)	2	3.7	5.1	4.4	✓
Laverton	6	0.006	0.020	0.013	✓	6	<0.002	<0.002	<0.002	✓	6	7.57	8.07	7.88	✓	6	38.0	46.0	41.2	✓
Leonora	6	<0.003	<0.003	<0.003	✓	6	<0.002	<0.002	<0.002	✓	6	7.48	7.76	7.62	✓	6	26.0	36.0	29.7	✓
Marvel Loch	2	0.004	0.010	0.007	✓	2	<0.002	<0.002	<0.002	✓	2	7.54	7.73	7.64	✓	2	4.4	4.4	4.4	✓
Menzies	3	0.020	0.025	0.023	✓	3	<0.002	<0.002	<0.002	✓	3	7.65	8.09	7.80	✓	3	4.4	4.9	4.6	✓
Merredin	2	0.006	0.015	0.011	✓	2	<0.002	<0.002	<0.002	✓	2	8.23	8.31	8.27	✓	2	4.1	4.6	4.4	✓
Miling	2	<0.003	0.020	0.010	✓	2	<0.002	<0.002	<0.002	✓	2	8.76	8.88	8.82	(1)	2	4.4	5.2	4.8	✓
Mukinbudin	2	0.015	0.020	0.018	✓	2	<0.002	<0.002	<0.002	✓	2	8.04	8.17	8.11	✓	2	4.4	5.6	5.0	✓
Muntadgin	2	0.006	0.010	0.008	✓	2	<0.002	<0.002	<0.002	✓	2	7.79	8.23	8.01	✓	2	4.6	4.9	4.8	✓
Narembeen	2	<0.003	0.015	0.008	✓	2	<0.002	<0.002	<0.002	✓	2	8.19	8.20	8.20	✓	2	4.0	4.6	4.3	✓
Norseman	2	0.004	0.015	0.010	✓	2	<0.002	<0.002	<0.002	✓	2	8.09	8.22	8.16	✓	2	4.9	6.0	5.5	✓
Northam	2	0.006	0.010	0.008	✓	2	<0.002	<0.002	<0.002	✓	2	7.91	8.15	8.03	✓	2	4.2	5.0	4.6	✓
Nungarin	2	<0.003	0.006	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.49	8.54	8.52	(1)	2	4.3	4.6	4.5	✓
Ora Banda	2	0.008	0.010	0.009	✓	2	<0.002	<0.002	<0.002	✓	2	8.29	8.53	8.41	✓	2	5.4	5.7	5.6	✓
Pithara	2	0.035	0.050	0.043	✓	2	<0.002	<0.002	<0.002	✓	2	8.57	8.89	8.73	(1)	2	4.6	4.8	4.7	✓
Quairading	2	0.006	0.008	0.007	✓	2	<0.002	<0.002	<0.002	✓	2	7.89	8.37	8.13	✓	2	4.1	4.8	4.5	✓
Seabrook	2	<0.003	0.004	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.47	8.83	8.65	(1)	2	4.1	4.5	4.3	✓
Shackleton	2	<0.003	0.008	0.004	✓	2	<0.002	<0.002	<0.002	✓	2	8.75	8.77	8.76	(1)	2	4.1	4.8	4.5	✓
Southern Cross	2	0.004	0.010	0.007	✓	2	<0.002	<0.002	<0.002	✓	2	8.22	8.47	8.35	✓	2	4.2	5.0	4.6	✓
Spencers Brook	2	0.008	0.010	0.009	✓	2	<0.002	<0.002	<0.002	✓	2	8.14	8.31	8.23	✓	2	3.9	4.7	4.3	✓
Tammin	2	0.006	0.008	0.007	✓	2	<0.002	<0.002	<0.002	✓	2	8.37	8.55	8.46	✓	2	3.8	4.7	4.3	✓
Toodyay	2	0.010	0.010	0.010	✓	2	<0.002	<0.002	<0.002	✓	2	8.45	8.49	8.47	✓	2	3.9	4.7	4.3	✓
Trayning	2	0.006	0.008	0.007	✓	2	<0.002	<0.002	<0.002	✓	2	8.38	8.83	8.61	(1)	2	3.6	5.1	4.4	✓
Warralakin	2	0.004	0.008	0.006	✓	2	<0.002	<0.002	<0.002	✓	2	8.32	8.51	8.42	✓	2	3.8	5.0	4.4	✓
Westonia	2	<0.003	0.010	0.005	✓	2	<0.002	<0.002	<0.002	✓	2	8.17	8.31	8.24	✓	2	3.8	5.0	4.4	✓
Wiluna	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.78	7.94	7.86	✓	6	85.0	95.0	88.3	(2)
Wongan Hills	2	0.004	0.010	0.007	✓	2	<0.002	<0.002	<0.002	✓	2	8.86	8.92	8.89	(1)	2	3.9	4.5	4.2	✓
Wubin	2	0.010	0.010	0.010	✓	2	<0.002	<0.002	<0.002	✓	2	8.87	9.04	8.96	(1)	2	4.4	4.5	4.5	✓
Wyalkatchem	2	0.004	0.010	0.007	✓	2	<0.002	<0.002	<0.002	✓	2	8.34	8.46	8.40	✓	2	4.3	4.7	4.5	✓
York	2	<0.003	0.006	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.32	8.43	8.38	✓	2	4.2	4.3	4.3	✓

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

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

Goldfields and Agricultural Region	Sodium					TDS					True Colour					Turbidity				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Value (TCU)			Guideline Met	Samples Taken	Value (NTU)			Guideline Met
		Min Value	Max Value	Mean Value			Min	Max	Mean			Min	Max	Mean			Min	Max	Mean	
Ardath	2	99.0	115.0	107.0	✓	2	426	457	442	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Avon Hills	2	100.0	105.0	102.5	✓	2	415	437	426	✓	2	<1	<1	<1	✓	2	<0.1	0.5	0.3	✓
Ballidu	2	95.0	110.0	102.5	✓	2	420	436	428	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Beacon	2	95.0	110.0	102.5	✓	2	414	450	432	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Bencubbin	2	105.0	105.0	105.0	✓	2	447	454	451	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Beverley	2	96.0	105.0	100.5	✓	2	413	440	427	✓	2	<1	<1	<1	✓	2	<0.1	0.3	0.2	✓
Bind Bindi	2	99.0	105.0	102.0	✓	2	428	431	430	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Broad Arrow	2	100.0	105.0	102.5	✓	2	429	453	441	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Bruce Rock	2	100.0	100.0	100.0	✓	2	410	432	421	✓	2	<1	<1	<1	✓	2	<0.1	0.8	0.4	✓
Bullfinch	2	98.0	110.0	104.0	✓	2	420	452	436	✓	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Buntine	2	105.0	115.0	110.0	✓	2	454	478	466	✓	2	<1	<1	<1	✓	2	0.2	0.5	0.4	✓
Cadoux	2	96.0	105.0	100.5	✓	2	421	443	432	✓	2	<1	<1	<1	✓	2	<0.1	0.8	0.4	✓
Coolgardie	2	97.0	100.0	98.5	✓	2	407	439	423	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Corrigin	2	105.0	105.0	105.0	✓	2	436	453	445	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Cunderdin	2	95.0	105.0	100.0	✓	2	415	438	427	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Dalwallinu	2	98.0	105.0	101.5	✓	2	428	462	445	✓	2	<1	<1	<1	✓	2	<0.1	0.4	0.2	✓
Dowerin	2	88.0	105.0	96.5	✓	2	387	447	417	✓	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Goomalling	2	96.0	105.0	100.5	✓	2	409	435	422	✓	2	<1	<1	<1	✓	2	0.1	0.1	0.1	✓
Greater Bodallin	2	100.0	105.0	102.5	✓	2	426	440	433	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Greater Burracoppin	2	110.0	110.0	110.0	✓	2	415	446	431	✓	2	<1	<1	<1	✓	2	<0.1	0.7	0.4	✓
Greater Doolakine	2	100.0	110.0	105.0	✓	2	419	434	427	✓	2	<1	<1	<1	✓	2	<0.1	0.3	0.2	✓
Greater Meckering	2	96.0	105.0	100.5	✓	2	417	435	426	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Greenhills	2	97.0	100.0	98.5	✓	2	415	430	423	✓	2	<1	<1	<1	✓	2	<0.1	0.3	0.2	✓
Jennacubbine	2	100.0	105.0	102.5	✓	2	429	444	437	✓	2	<1	<1	<1	✓	2	0.3	0.3	0.3	✓
Kalannie	2	105.0	115.0	110.0	✓	2	420	452	436	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Kalgoorlie	2	96.0	105.0	100.5	✓	2	419	450	435	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Kambalda	2	100.0	110.0	105.0	✓	2	427	462	445	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Kellerberrin	2	97.0	105.0	101.0	✓	2	406	442	424	✓	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Koolyanobbing	2	97.0	105.0	101.0	✓	2	411	437	424	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Koorda	2	95.0	110.0	102.5	✓	2	422	450	436	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Kununoppin	2	100.0	115.0	107.5	✓	2	424	446	435	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Laverton	6	115.0	135.0	126.7	✓	6	551	651	612	(1)	6	<1	<1	<1	✓	6	<0.1	0.3	0.2	✓
Leonora	6	105.0	140.0	125.0	✓	6	501	702	618	(1)	6	<1	<1	<1	✓	6	<0.1	2.6	0.6	✓
Marvel Loch	2	105.0	105.0	105.0	✓	2	432	438	435	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Menzies	3	100.0	115.0	110.0	✓	3	439	476	463	✓	3	<1	<1	<1	✓	3	0.2	0.2	0.2	✓
Merredin	2	100.0	105.0	102.5	✓	2	420	427	424	✓	2	<1	<1	<1	✓	3	0.1	0.2	0.2	✓
Miling	2	100.0	105.0	102.5	✓	2	442	445	444	✓	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Mukinbudin	2	93.0	105.0	99.0	✓	2	407	447	427	✓	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Muntadgin	2	100.0	110.0	105.0	✓	2	419	458	439	✓	2	<1	<1	<1	✓	2	<0.1	0.3	0.2	✓
Narembeen	2	105.0	110.0	107.5	✓	2	443	445	444	✓	2	<1	<1	<1	✓	2	<0.1	0.7	0.4	✓
Norseman	2	98.0	105.0	101.5	✓	2	439	463	451	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Northam	2	96.0	105.0	100.5	✓	2	407	434	421	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Nungarin	2	97.0	100.0	98.5	✓	2	414	438	426	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Ora Banda	2	105.0	105.0	105.0	✓	2	463	469	466	✓	2	<1	<1	<1	✓	2	0.1	0.1	0.1	✓
Pithara	2	100.0	110.0	105.0	✓	2	442	457	450	✓	2	<1	<1	<1	✓	2	0.3	0.4	0.4	✓
Quairading	2	94.0	105.0	99.5	✓	2	402	446	424	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Seabrook	2	99.0	99.0	99.0	✓	2	400	426	413	✓	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Shackleton	2	100.0	105.0	102.5	✓	2	429	434	432	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Southern Cross	2	96.0	105.0	100.5	✓	2	405	436	421	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Spencers Brook	2	99.0	100.0	99.5	✓	2	408	429	419	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Tammin	2	97.0	110.0	103.5	✓	2	422	436	429	✓	2	<1	<1	<1	✓	2	0.1	0.1	0.1	✓
Toodyay	2	105.0	105.0	105.0	✓	2	432	438	435	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Trayning	2	100.0	105.0	102.5	✓	2	420	437	429	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Warralakin	2	105.0	110.0	107.5	✓	2	426	440	433	✓	2	<1	<1	<1	✓	2	0.1	0.4	0.3	✓
Westonia	2	105.0	105.0	105.0	✓	2	425	436	431	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Wiluna	2	50.0	51.0	50.5	✓	2	403	434	419	✓	2	<1	<1	<1	✓	2	0.1	0.3	0.2	✓
Wongan Hills	2	99.0	100.0	99.5	✓	2	431	432	432	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Wubin	2	100.0	110.0	105.0	✓	2	445	459	452	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Wyalkatchem	2	105.0	110.0	107.5	✓	2	425	443	434	✓	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
York	2	105.0	105.0	105.0	✓	2	424	439	432	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓

(1) Elevated TDS associted with source supplying these localities. Experience shows that TDS at this level is not objectionable to our customers.

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Table 16 **Health related variables**

South West Region	*E. coli*				Thermophilic *Naegleria*			Fluoride					Hydrocarbons		Metals	
Locality	Samples Taken	Samples >0 cfu/100mL	Max cfu/100mL	Requirement Met	Samples Taken	Samples with Thermophilic Naegleria	Requirement Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Guideline Met	Samples Taken	Guideline Met
									Min	Max	Mean					
Allanson	13	0	0	✓	8	0	✓	4	0.75	1.00	0.88	(2)	0	(1)	2	✓
Augusta	65	0	0	✓	44	0	✓	2	0.20	0.20	0.20	✓	0	(1)	2	✓
Australind	117	0	0	✓	117	0	✓	41	0.20	0.85	0.74	(2)	0	(1)	3	✓
Balingup	13	0	0	✓	7	0	✓	2	0.10	0.10	0.10	✓	0	(1)	2	✓
Binningup	52	0	0	✓	24	0	✓	4	0.80	0.85	0.81	(2)	0	(1)	2	✓
Boyanup	52	0	0	✓	12	0	✓	1	0.15	0.15	0.15	✓	2	✓	2	✓
Boyup Brook	52	0	0	✓	19	0	✓	2	0.10	0.10	0.10	✓	2	✓	2	✓
Bridgetown	65	0	0	✓	33	0	✓	2	0.10	0.15	0.13	✓	0	(1)	2	✓
Brunswick Junction	52	0	0	✓	19	0	✓	2	0.75	0.75	0.75	✓	0	(1)	2	✓
Capel	52	0	0	✓	39	0	✓	2	0.20	0.20	0.20	✓	0	(1)	2	✓
Collie	78	0	0	✓	42	0	✓	52	0.65	1.00	0.85	(2)	0	(1)	4	✓
Cowaramup	52	0	0	✓	9	0	✓	2	0.25	0.25	0.25	✓	0	(1)	2	✓
Dalyellup	65	0	0	✓	39	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Dardanup	26	0	0	✓	26	0	✓	2	<0.1	<0.1	<0.1	✓	1	✓	2	✓
Darkan	13	0	0	✓	7	0	✓	4	0.70	0.90	0.83	(2)	0	(1)	2	✓
Donnybrook	52	0	0	✓	34	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	5	✓
Dunsborough	91	0	0	✓	91	0	✓	56	0.75	0.95	0.86	(3)	2	✓	2	✓
Eaton	78	0	0	✓	78	0	✓	39	0.20	0.90	0.73	✓	0	(1)	2	✓
Greenbushes	26	0	0	✓	13	0	✓	2	0.15	0.15	0.15	✓	0	(1)	2	✓
Harvey	52	0	0	✓	52	0	✓	52	0.50	0.95	0.82	(2)	0	(1)	2	✓
Hester TWS	13	0	0	✓	7	0	✓	2	0.10	0.15	0.13	✓	0	(1)	2	✓
Kirup	13	0	0	✓	7	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Logue Brook	12	0	0	✓	7	0	✓	2	0.50	0.65	0.58	(2)	0	(1)	2	✓
Manjimup	65	0	0	✓	33	0	✓	53	0.70	0.85	0.80	(2)	0	(1)	2	✓
Margaret River	78	0	0	✓	47	0	✓	2	0.20	0.25	0.23	✓	0	(1)	2	✓
Mullalyup	13	0	0	✓	6	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Myalup	13	0	0	✓	13	0	✓	2	0.50	0.85	0.68	(2)	0	(1)	2	✓
Nannup	52	0	0	✓	15	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Northcliffe	13	0	0	✓	7	0	✓	2	0.50	0.65	0.58	✓	0	(1)	2	✓
Pemberton	52	0	0	✓	12	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Peppermint Grove	52	0	0	✓	10	0	✓	2	0.25	0.25	0.25	✓	2	✓	2	✓
Preston Beach	52	0	0	✓	19	0	✓	2	0.10	0.10	0.10	✓	0	(1)	2	✓
Quinninup	12	0	0	✓	6	0	✓	2	0.70	0.70	0.70	✓	0	(1)	2	✓
Waroona	52	1	2	✓	52	0	✓	52	0.50	0.90	0.82	(2)	0	(1)	2	✓
Yarloop	13	0	0	✓	8	0	✓	2	0.75	0.80	0.78	(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

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Table 17 **Health related variables**

South West Region	Nitrate					Pesticides		Radiological		Trihalomethanes					Other Health Related	
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Guideline Met	Samples Taken	Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Requirement Met
		Min	Max	Mean							Min	Max	Mean			
Allanson	2	<0.2	<0.2	<0.2	✓	1	✓	0	✓	2	0.032	0.034	0.033	✓	0	(1)
Augusta	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	0.015	0.017	0.016	✓	0	(1)
Australind	7	<0.2	<0.2	<0.2	✓	2	✓	4	✓	3	0.008	0.050	0.034	✓	0	(1)
Balingup	2	0.4	0.9	0.9	✓	1	✓	0	(1)	2	0.062	0.090	0.076	✓	0	(1)
Binningup	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	3	0.001	0.003	0.002	✓	0	(1)
Boyanup	2	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	2	<0.001	<0.001	<0.001	✓	2	✓
Boyup Brook	2	0.4	0.9	0.4	✓	2	✓	2	✓	2	0.060	0.100	0.080	✓	2	✓
Bridgetown	4	0.4	0.9	0.4	✓	1	✓	0	(1)	2	0.044	0.061	0.053	✓	0	(1)
Brunswick Junction	2	<0.2	0.4	<0.2	✓	1	✓	2	✓	2	0.016	0.021	0.019	✓	0	(1)
Capel	4	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	<0.001	<0.001	<0.001	✓	0	(1)
Collie	8	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	4	0.017	0.050	0.028	✓	0	(1)
Cowaramup	4	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	4	0.100	0.190	0.135	✓	0	(1)
Dalyellup	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	0.043	0.079	0.061	✓	0	(1)
Dardanup	2	0.4	0.4	0.4	✓	2	✓	0	(1)	2	0.001	0.004	0.003	✓	2	✓
Darkan	2	<0.2	0.4	<0.2	✓	2	✓	2	✓	5	0.098	0.150	0.132	✓	0	(1)
Donnybrook	3	11.0	12.3	11.9	✓	1	✓	1	✓	2	0.007	0.013	0.010	✓	1	✓
Dunsborough	2	<0.2	0.4	<0.2	✓	2	✓	1	✓	2	0.020	0.028	0.024	✓	0	(1)
Eaton	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	0.008	0.014	0.011	✓	0	(1)
Greenbushes	2	0.9	0.9	0.9	✓	1	✓	2	✓	2	0.047	0.058	0.053	✓	2	✓
Harvey	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	0.003	0.005	0.004	✓	0	(1)
Hester TWS	4	<0.2	0.9	0.4	✓	1	✓	2	✓	2	0.089	0.110	0.100	✓	0	(1)
Kirup	4	2.2	11.4	9.2	✓	1	✓	0	(1)	2	0.006	0.012	0.009	✓	0	(1)
Logue Brook	2	1.8	4.4	3.1	✓	1	✓	2	✓	2	<0.001	0.006	0.003	✓	1	✓
Manjimup	2	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	2	0.080	0.089	0.085	✓	0	(1)
Margaret River	4	<0.2	0.4	<0.2	✓	1	✓	1	✓	2	0.100	0.180	0.140	✓	0	(1)
Mullalyup	4	4.0	12.3	10.1	✓	1	✓	0	(1)	2	0.008	0.012	0.010	✓	0	(1)
Myalup	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	0.004	0.013	0.009	✓	0	(1)
Nannup	2	0.4	0.4	0.4	✓	1	✓	0	(1)	2	0.033	0.066	0.050	✓	0	(1)
Northcliffe	2	0.4	1.3	0.9	✓	1	✓	0	(1)	2	0.075	0.083	0.079	✓	0	(1)
Pemberton	2	1.3	1.3	1.3	✓	4	✓	0	(1)	2	0.120	0.120	0.120	✓	2	✓
Peppermint Grove	2	<0.2	<0.2	<0.2	✓	2	✓	2	✓	2	<0.001	<0.001	<0.001	✓	2	✓
Preston Beach	4	3.1	4.4	4.0	✓	1	✓	2	✓	4	0.120	0.150	0.138	✓	2	✓
Quinninup	2	<0.2	0.4	<0.2	✓	1	✓	0	(1)	2	0.086	0.130	0.108	✓	0	(1)
Waroona	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	0.014	0.033	0.024	✓	0	(1)
Yarloop	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	<0.001	0.005	0.003	✓	0	(1)

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

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

South West Region	Alkalinity (as CaCO3)					Aluminium					Chloride					Hardness				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met
		Min Value	Max Value	Mean Value			Min	Max	Mean			Min Value	Max Value	Mean Value			Min	Max	Mean	
Allanson	2	6.0	6.0	6.0	(1)	2	0.020	0.020	0.020	✓	2	60.0	65.0	62.5	✓	2	24	25	25	✓
Augusta	2	50.0	65.0	57.5	(1)	2	<0.008	<0.008	<0.008	✓	2	130.0	150.0	140.0	✓	2	86	88	87	✓
Australind	7	130.0	140.0	138.6	(1)	7	<0.008	<0.008	<0.008	✓	7	150.0	175.0	162.9	✓	7	76	110	91	✓
Balingup	2	95.0	110.0	102.5	(1)	2	0.018	0.018	0.018	✓	2	100.0	100.0	100.0	✓	2	110	120	115	✓
Binningup	2	49.0	53.0	51.0	(1)	2	0.035	0.045	0.040	✓	2	33.0	50.0	41.5	✓	2	49	53	51	✓
Boyanup	2	110.0	110.0	110.0	(1)	2	<0.008	<0.008	<0.008	✓	2	100.0	105.0	102.5	✓	2	99	100	100	✓
Boyup Brook	2	95.0	98.0	96.5	(1)	2	0.012	0.016	0.014	✓	2	95.0	105.0	100.0	✓	2	120	120	120	✓
Bridgetown	4	86.0	97.0	92.8	(1)	4	<0.008	0.050	0.025	✓	4	95.0	105.0	101.3	✓	4	100	120	110	✓
Brunswick Junction	2	130.0	140.0	135.0	(1)	2	<0.008	<0.008	<0.008	✓	2	170.0	170.0	170.0	✓	2	77	81	79	✓
Capel	4	74.0	81.0	78.0	(1)	4	<0.008	<0.008	<0.008	✓	4	60.0	60.0	60.0	✓	4	47	49	48	✓
Collie	8	3.0	15.0	7.9	(1)	8	0.012	0.025	0.017	✓	8	60.0	95.0	70.0	✓	8	24	46	30	✓
Cowaramup	4	32.0	43.0	37.8	(1)	4	0.010	0.030	0.023	✓	4	90.0	95.0	91.3	✓	4	39	43	41	✓
Dalyellup	2	140.0	150.0	145.0	(1)	2	<0.008	<0.008	<0.008	✓	2	95.0	180.0	137.5	✓	2	75	95	85	✓
Dardanup	2	65.0	65.0	65.0	(1)	2	<0.008	<0.008	<0.008	✓	2	85.0	85.0	85.0	✓	2	26	26	26	✓
Darkan	2	12.0	17.0	14.5	(1)	2	0.018	0.020	0.019	✓	2	60.0	85.0	72.5	✓	2	36	46	41	✓
Donnybrook	3	69.0	90.0	82.3	(1)	3	0.055	0.440	0.198	✓	3	180.0	240.0	216.7	✓	3	76	100	91	✓
Dunsborough	2	170.0	170.0	170.0	(1)	2	<0.008	<0.008	<0.008	✓	2	80.0	150.0	115.0	✓	2	62	71	67	✓
Eaton	2	100.0	110.0	105.0	(1)	2	<0.008	<0.008	<0.008	✓	2	125.0	130.0	127.5	✓	2	110	110	110	✓
Greenbushes	2	99.0	110.0	104.5	(1)	2	<0.008	0.020	0.010	✓	2	95.0	105.0	100.0	✓	2	110	120	115	✓
Harvey	2	46.0	52.0	49.0	(1)	2	0.030	0.030	0.030	✓	2	33.0	40.0	36.5	✓	2	47	52	50	✓
Hester TWS	4	96.0	110.0	101.5	(1)	4	<0.008	0.030	0.013	✓	4	95.0	115.0	103.8	✓	4	100	130	120	✓
Kirup	4	64.0	100.0	83.8	(1)	4	0.040	0.310	0.164	✓	4	160.0	245.0	208.8	✓	4	61	110	89	✓
Logue Brook	2	58.0	63.0	60.5	(1)	2	0.030	0.130	0.080	✓	2	70.0	125.0	97.5	✓	2	62	69	66	✓
Manjimup	2	73.0	80.0	76.5	(1)	2	0.012	0.035	0.024	✓	2	80.0	90.0	85.0	✓	2	100	110	105	✓
Margaret River	4	33.0	44.0	37.8	(1)	4	0.010	0.030	0.024	✓	4	90.0	100.0	95.0	✓	4	37	42	40	✓
Mullalyup	4	80.0	120.0	99.0	(1)	4	0.070	0.160	0.113	✓	4	190.0	245.0	218.8	✓	4	80	110	96	✓
Myalup	2	54.0	65.0	59.5	(1)	2	<0.008	0.035	0.018	✓	2	30.0	65.0	47.5	✓	2	53	83	68	✓
Nannup	2	17.0	28.0	22.5	(1)	2	<0.008	0.020	0.010	✓	2	70.0	75.0	72.5	✓	2	80	85	83	✓
Northcliffe	2	45.0	58.0	51.5	(1)	2	0.020	0.030	0.025	✓	2	85.0	100.0	92.5	✓	2	78	83	81	✓
Pemberton	2	23.0	28.0	25.5	(1)	2	0.012	0.016	0.014	✓	2	85.0	90.0	87.5	✓	2	52	54	53	✓
Peppermint Grove	2	82.0	88.0	85.0	(1)	2	<0.008	<0.008	<0.008	✓	2	60.0	60.0	60.0	✓	2	53	56	55	✓
Preston Beach	4	260.0	300.0	280.0	(1)	4	<0.008	<0.008	<0.008	✓	4	175.0	245.0	202.5	✓	4	310	320	318	(2)
Quinninup	2	64.0	74.0	69.0	(1)	2	0.014	0.030	0.022	✓	2	85.0	90.0	87.5	✓	2	93	98	96	✓
Waroona	2	47.0	55.0	51.0	(1)	1	0.120	0.120	0.120	✓	2	40.0	41.0	40.5	✓	2	54	55	55	✓
Yarloop	2	53.0	55.0	54.0	(1)	2	0.012	0.035	0.024	✓	2	34.0	42.0	38.0	✓	2	52	57	55	✓

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

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

South West Region	Iron					Manganese					pH					Silicon				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Value (pH units)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met
		Min	Max	Mean			Min	Max	Mean			Min	Max	Mean			Min Value	Max Value	Mean Value	
Allanson	2	0.035	0.040	0.038	✓	2	<0.002	0.006	0.003	✓	2	6.39	6.76	6.58	✓	2	5.2	5.5	5.4	✓
Augusta	2	0.070	0.420	0.245	✓	2	0.005	0.014	0.010	✓	2	7.20	7.42	7.31	✓	2	13.0	15.0	14.0	✓
Australind	7	0.020	0.100	0.071	✓	7	<0.002	0.007	0.003	✓	7	7.07	8.26	7.66	✓	7	22.0	60.0	41.6	✓
Balingup	2	0.015	0.020	0.018	✓	2	<0.002	0.004	<0.002	✓	2	8.47	8.54	8.51	(1)	2	3.4	5.3	4.4	✓
Binningup	2	0.008	0.010	0.009	✓	2	<0.002	<0.002	<0.002	✓	2	8.19	8.19	8.19	✓	2	0.9	1.0	1.0	✓
Boyanup	2	0.008	0.020	0.014	✓	2	<0.002	<0.002	<0.002	✓	2	7.42	7.98	7.70	✓	2	19.0	19.0	19.0	✓
Boyup Brook	2	0.020	0.020	0.020	✓	2	<0.002	0.003	<0.002	✓	2	7.81	8.18	8.00	✓	2	3.5	5.4	4.5	✓
Bridgetown	4	0.010	0.025	0.019	✓	4	<0.002	0.003	<0.002	✓	4	7.48	8.05	7.78	✓	4	3.6	4.9	4.3	✓
Brunswick Junction	2	0.090	0.100	0.095	✓	2	0.008	0.008	0.008	✓	2	7.84	7.91	7.88	✓	2	50.0	55.0	52.5	✓
Capel	4	0.060	0.070	0.065	✓	4	<0.002	<0.002	<0.002	✓	4	6.61	6.77	6.71	✓	4	14.0	16.0	14.8	✓
Collie	8	0.035	0.080	0.060	✓	8	<0.002	0.030	0.010	✓	8	6.29	6.68	6.55	✓	8	1.6	5.5	4.3	✓
Cowaramup	4	0.060	0.240	0.175	✓	4	0.005	0.007	0.006	✓	4	7.33	7.57	7.49	✓	4	7.2	8.7	8.2	✓
Dalyellup	2	0.070	0.070	0.070	✓	2	0.012	0.016	0.014	✓	2	7.99	8.29	8.14	✓	2	14.0	17.0	15.5	✓
Dardanup	2	0.010	0.015	0.013	✓	2	<0.002	<0.002	<0.002	✓	2	7.35	7.42	7.39	✓	2	20.0	21.0	20.5	✓
Darkan	2	0.060	0.070	0.065	✓	2	0.002	0.018	0.010	✓	2	7.25	8.68	7.97	✓	2	3.3	3.8	3.6	✓
Donnybrook	3	0.015	0.080	0.048	✓	3	0.002	0.008	0.005	✓	3	6.82	7.57	7.32	✓	3	10.0	13.0	11.3	✓
Dunsborough	2	0.004	0.006	0.005	✓	2	<0.002	<0.002	<0.002	✓	2	8.37	8.43	8.40	✓	2	17.0	18.0	17.5	✓
Eaton	2	0.080	0.080	0.080	✓	2	<0.002	<0.002	<0.002	✓	2	7.38	7.51	7.45	✓	2	27.0	29.0	28.0	✓
Greenbushes	2	0.020	0.020	0.020	✓	2	<0.002	0.004	<0.002	✓	2	7.99	8.11	8.05	✓	2	3.7	6.6	5.2	✓
Harvey	2	0.006	0.020	0.013	✓	2	<0.002	<0.002	<0.002	✓	2	8.32	8.65	8.49	✓	2	0.8	0.9	0.9	✓
Hester TWS	4	0.015	0.040	0.024	✓	4	<0.002	0.010	0.003	✓	4	7.93	8.54	8.30	✓	4	2.0	6.5	4.4	✓
Kirup	4	0.006	0.015	0.009	✓	4	0.002	0.020	0.008	✓	4	7.53	7.90	7.71	✓	4	9.5	19.0	13.4	✓
Logue Brook	2	0.010	0.010	0.010	✓	2	<0.002	<0.002	<0.002	✓	3	7.69	7.95	7.83	✓	2	4.7	5.1	4.9	✓
Manjimup	2	0.035	0.100	0.068	✓	2	0.002	0.016	0.009	✓	2	8.11	8.17	8.14	✓	2	7.1	9.2	8.2	✓
Margaret River	4	0.070	0.260	0.183	✓	4	0.004	0.007	0.006	✓	4	7.15	7.69	7.35	✓	4	7.0	8.7	8.1	✓
Mullalyup	4	<0.003	0.035	0.009	✓	4	<0.002	0.020	0.005	✓	4	8.04	8.25	8.14	✓	4	11.0	17.0	12.8	✓
Myalup	2	0.004	0.015	0.010	✓	2	<0.002	0.016	0.008	✓	2	7.77	8.69	8.23	✓	2	1.3	4.2	2.8	✓
Nannup	2	0.015	0.020	0.018	✓	2	<0.002	<0.002	<0.002	✓	2	7.42	7.51	7.47	✓	2	3.2	5.8	4.5	✓
Northcliffe	2	0.030	0.040	0.035	✓	2	0.010	0.020	0.015	✓	2	7.94	8.04	7.99	✓	2	6.1	7.1	6.6	✓
Pemberton	2	0.015	0.015	0.015	✓	2	<0.002	0.007	0.004	✓	2	7.36	7.59	7.48	✓	2	5.0	5.4	5.2	✓
Peppermint Grove	2	0.030	0.040	0.035	✓	2	<0.002	<0.002	<0.002	✓	2	7.42	7.56	7.49	✓	2	15.0	15.0	15.0	✓
Preston Beach	4	0.004	0.010	0.007	✓	4	<0.002	<0.002	<0.002	✓	4	8.29	8.49	8.41	✓	4	15.0	18.0	16.5	✓
Quinninup	2	0.030	0.070	0.050	✓	2	0.005	0.006	0.006	✓	2	8.23	8.35	8.29	✓	2	6.2	7.4	6.8	✓
Waroona	2	0.004	0.004	0.004	✓	2	<0.002	<0.002	<0.002	✓	2	8.42	8.97	8.70	(2)	2	1.5	1.8	1.7	✓
Yarloop	2	0.006	0.010	0.008	✓	2	<0.002	<0.002	<0.002	✓	2	7.75	7.83	7.79	✓	2	0.9	0.9	0.9	✓

(1) 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. (2) Characteristic of the source spplying the town

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

South West Region	Sodium					TDS					True Colour					Turbidity				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Value (TCU)			Guideline Met	Samples Taken	Value (NTU)			Guideline Met
		Min Value	Max Value	Mean Value			Min	Max	Mean			Min	Max	Mean			Min	Max	Mean	
Allanson	2	32.0	34.0	33.0	✓	2	125	130	128	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Augusta	2	66.0	75.0	70.5	✓	2	342	353	348	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Australind	7	95.0	125.0	112.9	✓	7	518	568	545	✓	7	<1	1	<1	✓	7	0.1	0.4	0.2	✓
Balingup	2	47.0	52.0	49.5	✓	2	329	361	345	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Binningup	2	19.0	30.0	24.5	✓	2	134	169	152	✓	2	<1	<1	<1	✓	2	<0.1	0.3	0.2	✓
Boyanup	2	60.0	61.0	60.5	✓	2	374	386	380	✓	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Boyup Brook	2	50.0	54.0	52.0	✓	2	334	349	342	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Bridgetown	4	49.0	54.0	50.5	✓	4	323	342	332	✓	4	<1	<1	<1	✓	4	<0.1	0.3	<0.1	✓
Brunswick Junction	2	125.0	125.0	125.0	✓	2	552	567	560	✓	2	<1	<1	<1	✓	2	0.2	0.4	0.3	✓
Capel	4	45.0	47.0	45.8	✓	4	260	266	264	✓	4	<1	<1	<1	✓	4	<0.1	0.2	0.2	✓
Collie	8	31.0	48.0	37.0	✓	8	120	206	148	✓	8	<1	<1	<1	✓	8	0.2	0.6	0.3	✓
Cowaramup	4	48.0	52.0	49.8	✓	4	232	252	241	✓	4	<1	5	3	✓	4	0.3	0.9	0.5	✓
Dalyellup	2	77.0	140.0	108.5	✓	2	421	588	505	✓	2	<1	<1	<1	✓	2	0.3	0.3	0.3	✓
Dardanup	2	64.0	66.0	65.0	✓	2	267	273	270	✓	2	<1	<1	<1	✓	2	0.1	0.1	0.1	✓
Darkan	2	33.0	45.0	39.0	✓	2	140	193	167	✓	2	<1	<1	<1	✓	2	0.2	0.5	0.4	✓
Donnybrook	3	130.0	150.0	140.0	✓	3	478	562	525	✓	3	<1	<1	<1	✓	3	0.2	0.4	0.3	✓
Dunsborough	2	105.0	135.0	120.0	✓	2	451	574	513	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Eaton	2	68.0	73.0	70.5	✓	2	410	437	424	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Greenbushes	2	51.0	52.0	51.5	✓	2	340	352	346	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Harvey	2	19.0	26.0	22.5	✓	2	129	152	141	✓	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Hester TWS	4	50.0	57.0	52.3	✓	4	344	359	352	✓	4	<1	2	<1	✓	4	0.1	0.2	0.2	✓
Kirup	4	120.0	155.0	140.0	✓	4	455	597	519	✓	4	<1	<1	<1	✓	4	<0.1	0.3	0.2	✓
Logue Brook	2	41.0	74.0	57.5	✓	2	219	318	269	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Manjimup	2	45.0	50.0	47.5	✓	2	292	311	302	✓	2	<1	2	<1	✓	2	0.2	0.4	0.3	✓
Margaret River	4	49.0	54.0	51.0	✓	4	231	258	245	✓	4	<1	5	3	✓	4	0.3	1.3	0.8	✓
Mullalyup	4	135.0	160.0	145.0	✓	4	518	610	551	✓	4	<1	<1	<1	✓	4	<0.1	0.4	0.2	✓
Myalup	2	19.0	35.0	27.0	✓	2	137	227	182	✓	2	<1	<1	<1	✓	2	<0.1	0.3	0.2	✓
Nannup	2	55.0	62.0	58.5	✓	2	283	298	291	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Northcliffe	2	53.0	58.0	55.5	✓	2	287	292	290	✓	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Pemberton	2	60.0	62.0	61.0	✓	2	258	259	259	✓	2	<1	<1	<1	✓	2	0.1	0.1	0.1	✓
Peppermint Grove	2	47.0	48.0	47.5	✓	2	275	280	278	✓	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Preston Beach	4	89.0	140.0	110.3	✓	4	792	864	818	(1)	4	<1	<1	<1	✓	4	<0.1	0.2	<0.1	✓
Quinninup	2	46.0	53.0	49.5	✓	2	290	295	293	✓	2	<1	<1	<1	✓	2	0.2	0.4	0.3	✓
Waroona	2	24.0	27.0	25.5	✓	2	147	157	152	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Yarloop	2	20.0	27.0	23.5	✓	2	144	160	152	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓

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

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Table 21 Health related variables

Great Southern Region	*E. coli*				Thermophilic *Naegleria*			Fluoride					Hydrocarbons		Metals	
Locality	Samples Taken	Samples >0 cfu/100mL	Max cfu/100mL	Requirement Met	Samples Taken	Samples with Thermophilic Naegleria	Requirement Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Guideline Met	Samples Taken	Guideline Met
									Min	Max	Mean					
Albany	169	0	0	✓	169	0	✓	52	0.65	0.85	0.76	(2)	2	✓	8	✓
Boddington	53	0	0	✓	53	0	✓	4	0.80	0.95	0.86	(2)	2	✓	2	✓
Borden	12	0	0	✓	8	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Bremer Bay	51	0	0	✓	34	0	✓	4	0.50	0.55	0.51	✓	2	✓	2	✓
Brookton	52	0	0	✓	52	0	✓	5	0.70	0.95	0.82	(2)	2	✓	2	✓
Broomehill	12	0	0	✓	12	0	✓	4	0.80	1.00	0.89	(2)	0	(1)	2	✓
Bullaring	12	0	0	✓	12	0	✓	4	0.75	0.95	0.85	(2)	2	✓	2	✓
Condingup	12	0	0	✓	8	0	✓	2	0.25	0.30	0.28	✓	0	(1)	2	✓
Cranbrook	12	0	0	✓	8	0	✓	2	<0.1	0.75	0.38	✓	0	(1)	2	✓
Cuballing	12	0	0	✓	12	0	✓	4	0.75	0.90	0.84	(2)	2	✓	2	✓
Denmark	65	0	0	✓	42	0	✓	2	<0.1	<0.1	<0.1	✓	2	✓	2	✓
Dudinin TWS	12	0	0	✓	12	0	✓	4	0.70	0.90	0.83	(2)	0	(1)	2	✓
Dumbleyung	12	0	0	✓	12	0	✓	4	0.70	0.95	0.83	(2)	2	✓	2	✓
Esperance	91	0	0	✓	61	0	✓	52	0.50	0.85	0.76	(2)	0	(1)	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	0.35	0.35	✓	2	✓	2	✓
Gnowangerup	52	0	0	✓	52	0	✓	4	0.80	1.00	0.90	(2)	0	(1)	2	✓
Grass Patch	12	0	0	✓	8	0	✓	4	0.70	0.90	0.79	(2)	0	(1)	2	✓
Harrismith TWS	12	0	0	✓	12	0	✓	4	0.75	0.95	0.85	(2)	2	✓	2	✓
Highbury	12	0	0	✓	12	0	✓	4	0.75	0.95	0.86	(2)	2	✓	2	✓
Hopetoun	52	0	0	✓	34	0	✓	2	<0.1	<0.1	<0.1	✓	1	✓	2	✓
Hyden	12	0	0	✓	12	0	✓	4	0.70	0.95	0.86	(2)	0	(1)	2	✓
Jerramungup	12	0	0	✓	8	0	✓	2	<0.1	0.55	0.28	✓	2	✓	2	✓
Karlgarin	12	0	0	✓	12	0	✓	4	0.70	0.90	0.83	(2)	2	✓	2	✓
Katanning	65	0	0	✓	65	0	✓	52	0.70	1.00	0.86	(2)	0	(1)	2	✓
Kendenup	12	0	0	✓	7	0	✓	4	0.75	0.80	0.76	(2)	0	(1)	2	✓
Kojonup	52	0	0	✓	52	0	✓	5	0.80	1.00	0.87	(2)	2	✓	2	✓
Kondinin	12	0	0	✓	12	0	✓	4	0.70	1.00	0.86	(2)	0	(1)	2	✓
Kukerin	12	0	0	✓	12	0	✓	5	0.70	0.95	0.82	(2)	2	✓	2	✓
Kulin	12	0	0	✓	12	0	✓	4	0.70	0.95	0.83	(2)	1	✓	2	✓
Lake Grace	52	0	0	✓	52	0	✓	4	0.70	0.95	0.86	(2)	0	(1)	2	✓
Lake King	12	0	0	✓	12	0	✓	4	0.70	0.95	0.83	(2)	0	(1)	2	✓
Mt Barker	52	0	0	✓	34	0	✓	52	0.70	0.80	0.77	(2)	0	(1)	2	✓
Munglinup	12	0	0	✓	8	0	✓	3	0.75	0.80	0.77	✓	0	(1)	2	✓
Muradup	12	0	0	✓	12	0	✓	4	0.80	1.00	0.88	(2)	2	✓	2	✓
Narrikup	12	0	0	✓	8	0	✓	4	0.75	0.80	0.79	(2)	0	(1)	2	✓
Narrogin	65	0	0	✓	65	0	✓	52	0.70	0.95	0.84	(2)	2	✓	2	✓
Newdegate	12	0	0	✓	12	0	✓	4	0.70	0.95	0.85	(2)	0	(1)	2	✓
Nyabing	12	0	0	✓	12	0	✓	4	0.80	0.95	0.86	(2)	0	(1)	2	✓
Ongerup	12	0	0	✓	8	0	✓	2	0.75	0.90	0.83	✓	0	(1)	2	✓
Pingaring	12	0	0	✓	12	0	✓	4	0.75	0.90	0.85	(2)	2	✓	2	✓
Pingelly	52	0	0	✓	52	0	✓	5	0.75	0.95	0.85	(2)	2	✓	2	✓
Pingrup	12	0	0	✓	12	0	✓	4	0.70	1.00	0.86	(2)	0	(1)	2	✓
Popanyinning	12	0	0	✓	12	0	✓	4	0.75	0.90	0.83	(2)	2	✓	2	✓
Ravensthorpe	12	0	0	✓	8	0	✓	2	<0.1	0.15	<0.1	✓	0	(1)	2	✓
Rocky Gully	12	0	0	✓	8	0	✓	4	0.75	0.80	0.76	(2)	0	(1)	2	✓
Salmon Gums	12	0	0	✓	12	0	✓	2	0.70	0.80	0.75	✓	1	✓	2	✓
Tambellup	12	0	0	✓	12	0	✓	4	0.80	0.95	0.88	(2)	0	(1)	2	✓
Tincurrin TWS	12	0	0	✓	12	0	✓	4	0.70	0.85	0.80	(2)	2	✓	2	✓
Varley	12	0	0	✓	12	0	✓	4	0.75	0.95	0.85	(2)	0	(1)	2	✓
Wagin	52	0	0	✓	52	0	✓	4	0.75	0.95	0.85	(2)	2	✓	2	✓
Walpole	52	0	0	✓	34	0	✓	2	<0.1	<0.1	<0.1	✓	0	(1)	2	✓
Wandering	12	0	0	✓	12	0	✓	4	0.75	0.90	0.85	(2)	0	(1)	2	✓
Wellstead	12	0	0	✓	8	0	✓	2	0.75	0.75	0.75	(2)	2	✓	2	✓
Wickepin TWS	12	0	0	✓	12	0	✓	4	0.75	0.95	0.85	(2)	2	✓	2	✓
Williams	12	0	0	✓	12	0	✓	4	0.75	0.90	0.81	(2)	2	✓	2	✓
Woodanilling	12	0	0	✓	12	0	✓	4	0.75	0.90	0.83	(2)	0	(1)	2	✓
Yealering	12	0	0	✓	12	0	✓	4	0.75	0.95	0.84	(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

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Table 22 Health related variables

Great Southern Region	Nitrate					Pesticides		Radiological		Trihalomethanes					Other Health Related	
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Guideline Met	Samples Taken	Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Requirement Met
		Min	Max	Mean							Min	Max	Mean			
Albany	16	0.9	1.3	0.9	✓	5	✓	0	(1)	16	0.088	0.190	0.134	✓	2	✓
Boddington	2	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	5	0.017	0.140	0.058	✓	2	✓
Borden	2	0.4	0.9	0.9	✓	1	✓	0	(1)	2	0.049	0.083	0.066	✓	1	✓
Bremer Bay	4	26.4	29.9	28.6	✓	2	✓	0	(1)	2	0.093	0.093	0.093	✓	1	✓
Brookton	2	<0.2	<0.2	<0.2	✓	2	✓	2	✓	5	0.027	0.075	0.043	✓	2	✓
Broomehill	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	4	0.053	0.110	0.088	✓	0	(1)
Bullaring	4	0.4	0.4	0.4	✓	2	✓	0	(1)	4	0.063	0.140	0.099	✓	2	✓
Condingup	4	1.8	2.2	1.8	✓	1	✓	0	(1)	2	0.008	0.014	0.011	✓	0	(1)
Cranbrook	2	<0.2	0.9	0.4	✓	1	✓	2	✓	4	0.090	0.180	0.130	✓	1	✓
Cuballing	2	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	4	0.033	0.097	0.059	✓	2	✓
Denmark	5	<0.2	0.9	0.4	✓	2	✓	0	(1)	5	0.014	0.061	0.038	✓	0	(1)
Dudinin TWS	4	<0.2	0.4	<0.2	✓	1	✓	0	(1)	4	0.040	0.120	0.076	✓	2	✓
Dumbleyung	2	0.4	0.4	0.4	✓	2	✓	0	(1)	4	0.040	0.110	0.075	✓	2	✓
Esperance	9	6.2	16.7	11.9	✓	2	✓	4	✓	5	0.007	0.018	0.013	✓	1	✓
Frankland	4	<0.2	0.4	<0.2	✓	1	✓	1	✓	3	0.059	0.083	0.070	✓	0	(1)
Gibson	4	11.0	12.8	11.9	✓	2	✓	1	✓	2	0.044	0.120	0.082	✓	2	✓
Gnowangerup	4	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	4	0.027	0.055	0.039	✓	0	(1)
Grass Patch	4	4.0	14.1	10.1	✓	1	✓	0	(1)	2	0.054	0.055	0.055	✓	1	✓
Harrismith TWS	4	<0.2	<0.2	<0.2	✓	2	✓	1	✓	4	0.140	0.220	0.165	✓	0	✓
Highbury	4	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	4	0.025	0.070	0.048	✓	1	✓
Hopetoun	4	1.3	3.1	2.2	✓	2	✓	2	✓	2	0.011	0.018	0.015	✓	0	✓
Hyden	4	<0.2	0.4	<0.2	✓	1	✓	1	✓	4	0.092	0.190	0.122	✓	2	(1)
Jerramungup	4	0.4	22.9	6.2	✓	2	✓	2	✓	2	0.100	0.130	0.115	✓	2	✓
Karlgarin	2	<0.2	0.4	<0.2	✓	2	✓	0	(1)	4	0.080	0.150	0.109	✓	2	✓
Katanning	4	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	4	0.044	0.064	0.054	✓	1	✓
Kendenup	4	0.9	1.3	0.9	✓	1	✓	2	✓	4	0.110	0.170	0.140	✓	0	(1)
Kojonup	2	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	5	0.057	0.097	0.077	✓	2	✓
Kondinin	4	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	4	0.110	0.210	0.140	✓	2	✓
Kukerin	5	0.4	0.4	0.4	✓	2	✓	0	(1)	5	0.050	0.150	0.086	✓	2	✓
Kulin	4	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	4	0.110	0.190	0.143	✓	2	✓
Lake Grace	4	<0.2	0.4	<0.2	✓	1	✓	0	(1)	4	0.073	0.190	0.111	✓	0	(1)
Lake King	2	<0.2	0.4	<0.2	✓	1	✓	0	(1)	2	0.047	0.071	0.059	✓	1	✓
Mt Barker	4	0.9	0.9	0.9	✓	1	✓	2	✓	4	0.100	0.140	0.125	✓	1	✓
Munglinup	3	1.8	12.8	7.5	✓	1	✓	0	(1)	2	0.053	0.062	0.058	✓	0	(1)
Muradup	2	<0.2	0.4	<0.2	✓	2	✓	0	(1)	4	0.066	0.100	0.080	✓	2	✓
Narrikup	4	0.9	1.3	0.9	✓	1	✓	2	✓	4	0.090	0.160	0.130	✓	0	(1)
Narrogin	5	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	2	0.040	0.047	0.044	✓	2	✓
Newdegate	2	<0.2	0.4	<0.2	✓	1	✓	0	(1)	4	0.079	0.120	0.092	✓	0	(1)
Nyabing	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	0.062	0.100	0.081	✓	0	(1)
Ongerup	2	0.9	0.9	0.9	✓	1	✓	0	(1)	2	0.086	0.110	0.098	✓	0	(1)
Pingaring	4	<0.2	0.4	<0.2	✓	2	✓	0	(1)	4	0.130	0.220	0.158	✓	2	✓
Pingelly	2	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	5	0.023	0.110	0.062	✓	2	✓
Pingrup	2	<0.2	0.4	<0.2	✓	1	✓	0	(1)	4	0.037	0.084	0.054	✓	0	(1)
Popanyinning	2	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	4	0.068	0.120	0.092	✓	2	✓
Ravensthorpe	4	<0.2	12.3	3.5	✓	4	✓	2	✓	4	0.063	0.120	0.103	✓	0	(1)
Rocky Gully	4	0.9	0.9	0.9	✓	1	✓	2	✓	2	0.096	0.099	0.098	✓	1	✓
Salmon Gums	3	8.8	11.9	10.6	✓	1	✓	2	✓	2	0.061	0.110	0.086	✓	1	✓
Tambellup	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	4	0.034	0.088	0.053	✓	0	(1)
Tincurrin TWS	4	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	4	0.090	0.140	0.115	✓	2	✓
Varley	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	0.038	0.042	0.040	✓	0	(1)
Wagin	2	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	4	0.044	0.160	0.084	✓	2	✓
Walpole	4	<0.2	2.6	1.8	✓	1	✓	0	(1)	4	0.075	0.160	0.108	✓	0	(1)
Wandering	2	<0.2	0.4	<0.2	✓	1	✓	0	(1)	4	0.055	0.140	0.085	✓	0	(1)
Wellstead	2	0.9	0.9	0.9	✓	2	✓	2	✓	2	0.094	0.150	0.122	✓	1	✓
Wickepin TWS	4	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	4	0.026	0.130	0.060	✓	1	✓
Williams	2	<0.2	<0.2	<0.2	✓	2	✓	0	(1)	4	0.031	0.076	0.049	✓	2	✓
Woodanilling	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	4	0.048	0.130	0.102	✓	0	(1)
Yealering	4	<0.2	0.4	<0.2	✓	2	✓	0	(1)	4	0.036	0.100	0.071	✓	2	✓

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

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

Great Southern Region	Alkalinity (as CaCO3)					Aluminium					Chloride					Hardness				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met
		Min Value	Max Value	Mean Value			Min	Max	Mean			Min Value	Max Value	Mean Value			Min	Max	Mean	
Albany	16	210.0	220.0	213.1	(1)	16	<0.008	<0.008	<0.008	✓	16	115.0	135.0	125.9	✓	16	240	270	258	(3)
Boddington	2	7.0	8.0	7.5	(1)	2	0.018	0.020	0.019	✓	2	60.0	65.0	62.5	✓	2	29	31	30	✓
Borden	2	29.0	31.0	30.0	(1)	2	0.045	0.065	0.055	✓	2	25.0	25.0	25.0	✓	2	31	33	32	✓
Bremer Bay	4	270.0	290.0	275.0	(1)	4	<0.008	<0.008	<0.008	✓	4	165.0	175.0	167.5	✓	4	220	230	223	(3)
Brookton	2	11.0	12.0	11.5	(1)	2	0.025	0.030	0.028	✓	2	75.0	85.0	80.0	✓	2	41	45	43	✓
Broomehill	2	10.0	16.0	13.0	(1)	2	0.020	0.020	0.020	✓	2	80.0	90.0	85.0	✓	2	44	53	49	✓
Bullaring	4	22.0	30.0	25.5	(1)	4	0.008	0.025	0.019	✓	4	75.0	100.0	81.3	✓	4	53	68	58	✓
Condingup	4	120.0	140.0	130.0	(1)	4	<0.008	<0.008	<0.008	✓	4	355.0	400.0	377.5	(2)	4	75	79	77	✓
Cranbrook	2	9.0	210.0	109.5	(1)	2	<0.008	0.025	0.013	✓	2	25.0	120.0	72.5	✓	2	16	250	133	✓
Cuballing	2	4.0	6.0	5.0	(1)	2	0.018	0.020	0.019	✓	2	70.0	80.0	75.0	✓	2	31	36	34	✓
Denmark	5	4.0	12.0	6.8	(1)	5	0.010	0.014	0.012	✓	5	190.0	270.0	228.0	✓	5	63	100	81	✓
Dudinin TWS	4	16.0	29.0	21.3	(1)	4	<0.008	0.020	0.012	✓	4	75.0	100.0	82.5	✓	4	52	61	56	✓
Dumbleyung	2	21.0	25.0	23.0	(1)	2	0.012	0.016	0.014	✓	2	75.0	90.0	82.5	✓	2	49	59	54	✓
Esperance	9	260.0	280.0	273.3	(1)	9	<0.008	<0.008	<0.008	✓	9	185.0	215.0	195.6	✓	9	330	370	349	(3)
Frankland	4	3.0	5.0	3.5	(1)	4	<0.008	0.025	<0.008	✓	4	14.0	16.0	15.0	✓	4	10	14	12	✓
Gibson	4	67.0	75.0	71.8	(1)	4	<0.008	<0.008	<0.008	✓	4	205.0	235.0	218.8	✓	4	41	46	44	✓
Gnowangerup	4	15.0	21.0	17.3	(1)	4	0.020	0.040	0.029	✓	4	80.0	110.0	93.8	✓	4	51	63	57	✓
Grass Patch	4	120.0	280.0	235.0	(1)	4	<0.008	0.035	0.009	✓	4	190.0	245.0	212.5	✓	4	160	350	300	(3)
Harrismith TWS	4	16.0	22.0	18.8	(1)	4	0.012	0.020	0.014	✓	4	70.0	105.0	80.0	✓	4	43	62	49	✓
Highbury	4	6.0	8.0	7.0	(1)	4	0.012	0.020	0.015	✓	4	70.0	90.0	76.3	✓	4	31	42	35	✓
Hopetoun	4	84.0	130.0	113.5	(1)	4	<0.008	<0.008	<0.008	✓	4	230.0	325.0	271.3	(2)	4	73	170	126	✓
Hyden	4	14.0	17.0	15.8	(1)	4	0.020	0.040	0.031	✓	4	75.0	105.0	82.5	✓	4	47	60	51	✓
Jerramungup	4	9.0	250.0	70.5	(1)	4	<0.008	0.025	0.018	✓	4	55.0	160.0	85.0	✓	4	24	200	70	✓
Karlgarin	2	17.0	17.0	17.0	(1)	2	0.014	0.020	0.017	✓	2	75.0	105.0	90.0	✓	2	47	61	54	✓
Katanning	4	10.0	15.0	12.3	(1)	4	0.014	0.030	0.022	✓	4	80.0	100.0	86.3	✓	4	42	55	46	✓
Kendenup	4	210.0	220.0	215.0	(1)	4	<0.008	<0.008	<0.008	✓	4	115.0	130.0	122.5	✓	4	250	290	268	(3)
Kojonup	2	13.0	21.0	17.0	(1)	2	0.025	0.030	0.028	✓	2	80.0	105.0	92.5	✓	2	47	63	55	✓
Kondinin	4	15.0	18.0	16.5	(1)	4	0.014	0.025	0.020	✓	4	75.0	110.0	83.8	✓	4	45	60	50	✓
Kukerin	5	18.0	23.0	19.2	(1)	5	0.010	0.020	0.014	✓	5	70.0	100.0	78.0	✓	5	48	62	52	✓
Kulin	4	14.0	17.0	15.5	(1)	4	0.012	0.030	0.018	✓	4	70.0	105.0	80.0	✓	4	43	60	48	✓
Lake Grace	4	20.0	25.0	22.5	(1)	4	0.014	0.050	0.031	✓	4	65.0	100.0	80.0	✓	4	48	60	52	✓
Lake King	2	11.0	14.0	12.5	(1)	2	0.018	0.020	0.019	✓	2	70.0	100.0	85.0	✓	2	36	55	46	✓
Mt Barker	4	210.0	220.0	212.5	(1)	4	<0.008	<0.008	<0.008	✓	4	120.0	130.0	122.5	✓	4	250	270	260	(3)
Munglinup	3	260.0	280.0	266.7	(1)	3	<0.008	<0.008	<0.008	✓	3	210.0	220.0	213.3	✓	3	330	370	350	(3)
Muradup	2	17.0	20.0	18.5	(1)	2	0.020	0.025	0.023	✓	2	90.0	115.0	102.5	✓	2	52	64	58	✓
Narrikup	4	210.0	220.0	212.5	(1)	4	<0.008	<0.008	<0.008	✓	4	120.0	130.0	125.0	✓	4	250	250	250	(3)
Narrogin	5	4.0	11.0	5.4	(1)	5	0.010	0.016	0.013	✓	5	65.0	100.0	75.0	✓	5	29	46	33	✓
Newdegate	2	21.0	24.0	22.5	(1)	2	0.020	0.030	0.025	✓	2	70.0	105.0	87.5	✓	2	50	64	57	✓
Nyabing	2	9.0	13.0	11.0	(1)	2	0.014	0.018	0.016	✓	2	80.0	105.0	92.5	✓	2	43	56	50	✓
Ongerup	2	120.0	130.0	125.0	(1)	2	0.014	0.025	0.020	✓	2	105.0	115.0	110.0	✓	2	150	160	155	✓
Pingaring	4	22.0	29.0	26.3	(1)	4	0.014	0.035	0.024	✓	4	75.0	110.0	86.3	✓	4	54	68	60	✓
Pingelly	2	5.0	7.0	6.0	(1)	2	0.018	0.025	0.022	✓	2	70.0	75.0	72.5	✓	2	36	37	37	✓
Pingrup	2	9.0	27.0	18.0	(1)	2	0.010	0.018	0.014	✓	2	85.0	105.0	95.0	✓	2	41	69	55	✓
Popanyinning	2	4.0	6.0	5.0	(1)	2	0.012	0.014	0.013	✓	2	70.0	75.0	72.5	✓	2	32	34	33	✓
Ravensthorpe	4	28.0	270.0	96.5	(1)	4	<0.008	0.045	0.025	✓	4	35.0	210.0	91.3	✓	4	20	360	117	✓
Rocky Gully	4	200.0	220.0	210.0	(1)	4	<0.008	<0.008	<0.008	✓	4	115.0	130.0	123.8	✓	4	250	260	255	(3)
Salmon Gums	3	220.0	270.0	250.0	(1)	3	<0.008	0.012	<0.008	✓	3	190.0	200.0	193.3	✓	3	270	360	327	(3)
Tambellup	2	16.0	17.0	16.5	(1)	2	0.025	0.030	0.028	✓	2	85.0	110.0	97.5	✓	2	52	68	60	✓
Tincurrin TWS	4	11.0	15.0	13.0	(1)	4	0.016	0.035	0.025	✓	4	75.0	90.0	81.3	✓	4	41	48	45	✓
Varley	2	12.0	13.0	12.5	(1)	2	0.016	0.018	0.017	✓	2	75.0	80.0	77.5	✓	2	43	45	44	✓
Wagin	2	5.0	5.0	5.0	(1)	2	0.018	0.020	0.019	✓	2	70.0	70.0	70.0	✓	2	21	34	28	✓
Walpole	4	27.0	130.0	57.0	(1)	4	<0.008	0.014	<0.008	✓	4	105.0	175.0	150.0	✓	4	48	180	90	✓
Wandering	2	7.0	9.0	8.0	(1)	2	0.018	0.040	0.029	✓	2	65.0	65.0	65.0	✓	2	30	34	32	✓
Wellstead	2	210.0	210.0	210.0	(1)	2	<0.008	<0.008	<0.008	✓	2	115.0	140.0	127.5	✓	2	240	260	250	(3)
Wickepin TWS	4	4.0	13.0	7.0	(1)	4	0.012	0.020	0.016	✓	4	70.0	100.0	77.5	✓	4	29	45	35	✓
Williams	2	5.0	6.0	5.5	(1)	2	0.018	0.018	0.018	✓	2	60.0	65.0	62.5	✓	2	25	27	26	✓
Woodanilling	2	7.0	13.0	10.0	(1)	2	0.035	0.045	0.040	✓	2	75.0	75.0	75.0	✓	2	38	41	40	✓
Yealering	4	15.0	28.0	20.5	(1)	4	0.016	0.025	0.022	✓	4	70.0	100.0	80.0	✓	4	42	57	47	✓

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

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Table 24 **Aesthetic (Non-health related) Variables**

Great Southern Region	Iron					Manganese					pH					Silicon				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Value (pH units)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met
		Min	Max	Mean			Min	Max	Mean			Min	Max	Mean			Min Value	Max Value	Mean Value	
Albany	16	0.030	0.220	0.100	✓	16	<0.002	<0.002	<0.002	✓	16	7.52	7.90	7.67	✓	16	12.0	23.0	17.3	✓
Boddington	2	0.030	0.045	0.038	✓	2	0.002	0.005	0.004	✓	2	7.11	7.27	7.19	✓	2	4.3	4.8	4.6	✓
Borden	2	0.015	0.020	0.018	✓	2	<0.002	<0.002	<0.002	✓	2	7.30	7.32	7.31	✓	2	0.9	1.0	1.0	✓
Bremer Bay	4	<0.003	0.006	<0.003	✓	4	<0.002	<0.002	<0.002	✓	4	7.91	8.26	8.07	✓	4	49.0	55.0	52.3	✓
Brookton	2	0.070	0.140	0.105	✓	2	0.005	0.005	0.005	✓	2	8.32	8.41	8.37	✓	2	2.9	3.4	3.2	✓
Broomehill	2	0.090	0.120	0.105	✓	2	0.003	0.004	0.004	✓	2	7.54	7.83	7.69	✓	2	1.3	2.5	1.9	✓
Bullaring	4	0.040	0.090	0.073	✓	4	<0.002	0.007	0.003	✓	4	7.19	7.94	7.60	✓	4	2.8	4.4	3.7	✓
Condingup	4	0.025	0.035	0.029	✓	4	<0.002	<0.002	<0.002	✓	4	6.45	6.86	6.73	✓	4	60.0	65.0	63.8	✓
Cranbrook	2	0.050	0.140	0.095	✓	2	<0.002	0.007	0.004	✓	2	6.69	7.81	7.25	✓	2	2.3	16.0	9.2	✓
Cuballing	2	0.140	0.180	0.160	✓	2	0.012	0.020	0.016	✓	2	6.58	6.71	6.65	✓	2	3.0	3.6	3.3	✓
Denmark	5	0.010	0.010	0.010	✓	5	<0.002	<0.002	<0.002	✓	5	6.91	7.39	7.09	✓	5	1.4	4.9	3.6	✓
Dudinin TWS	4	0.090	0.120	0.108	✓	4	0.002	0.006	0.004	✓	4	8.90	10.20	9.52	(1)	4	2.5	4.5	3.6	✓
Dumbleyung	2	0.030	0.140	0.085	✓	2	<0.002	0.007	0.004	✓	2	8.66	8.97	8.82	✓	2	2.4	3.4	2.9	✓
Esperance	9	<0.003	0.004	<0.003	✓	9	<0.002	<0.002	<0.002	✓	9	7.48	7.87	7.62	✓	9	10.0	12.0	11.1	✓
Frankland	4	0.015	0.025	0.021	✓	4	<0.002	<0.002	<0.002	✓	4	6.45	7.23	6.71	✓	4	1.2	1.5	1.4	✓
Gibson	4	0.050	0.080	0.063	✓	4	<0.002	<0.002	<0.002	✓	4	6.56	6.88	6.76	✓	4	43.0	49.0	46.3	✓
Gnowangerup	4	0.100	0.160	0.125	✓	4	0.005	0.007	0.006	✓	4	7.56	7.83	7.70	✓	4	1.5	2.9	2.3	✓
Grass Patch	4	<0.003	0.010	0.005	✓	4	<0.002	<0.002	<0.002	✓	4	8.14	8.38	8.23	✓	4	5.5	12.0	9.6	✓
Harrismith TWS	4	0.090	0.140	0.108	✓	4	0.003	0.012	0.005	✓	4	9.17	9.87	9.67	(1)	4	1.9	4.7	3.6	✓
Highbury	4	0.120	0.400	0.215	✓	4	0.006	0.018	0.011	✓	4	6.74	6.89	6.81	✓	4	2.4	4.3	3.5	✓
Hopetoun	4	0.004	0.008	0.007	✓	4	<0.002	<0.002	<0.002	✓	4	6.96	7.53	7.28	✓	4	25.0	37.0	29.8	✓
Hyden	4	0.050	0.120	0.093	✓	4	<0.002	0.010	0.004	✓	4	7.55	8.24	7.90	✓	4	2.5	4.2	3.3	✓
Jerramungup	4	0.015	0.045	0.028	✓	4	<0.002	<0.002	<0.002	✓	4	7.01	8.16	7.38	✓	4	3.3	41.0	13.5	✓
Karlgarin	2	0.060	0.080	0.070	✓	2	<0.002	0.003	<0.002	✓	2	8.12	8.38	8.25	✓	2	2.4	3.3	2.9	✓
Katanning	4	0.080	0.320	0.168	✓	4	0.004	0.016	0.009	✓	4	7.08	7.25	7.16	✓	4	0.6	2.1	1.5	✓
Kendenup	4	0.020	0.040	0.031	✓	4	<0.002	<0.002	<0.002	✓	4	7.79	8.25	7.94	✓	4	12.0	17.0	14.8	✓
Kojonup	2	0.090	0.180	0.135	✓	2	0.003	0.005	0.004	✓	2	7.33	7.57	7.45	✓	2	1.2	1.8	1.5	✓
Kondinin	4	0.070	0.120	0.090	✓	4	0.003	0.005	0.004	✓	4	7.76	8.28	8.04	✓	4	2.6	4.5	3.6	✓
Kukerin	5	0.030	0.080	0.056	✓	5	<0.002	0.002	<0.002	✓	5	8.10	9.16	8.50	✓	5	3.0	3.7	3.3	✓
Kulin	4	0.070	0.160	0.103	✓	4	<0.002	0.025	0.008	✓	4	8.28	8.59	8.44	✓	4	2.0	4.2	3.4	✓
Lake Grace	4	0.060	0.090	0.080	✓	4	0.002	0.007	0.004	✓	4	7.94	9.10	8.72	✓	4	2.4	4.6	3.5	✓
Lake King	2	0.090	0.100	0.095	✓	2	0.003	0.012	0.008	✓	2	7.19	7.23	7.21	✓	2	2.0	3.7	2.9	✓
Mt Barker	4	0.060	0.100	0.070	✓	4	<0.002	<0.002	<0.002	✓	4	7.66	8.04	7.84	✓	4	15.0	19.0	16.3	✓
Munglinup	3	0.004	0.006	0.005	✓	3	<0.002	<0.002	<0.002	✓	3	8.12	8.24	8.17	✓	3	10.0	12.0	10.7	✓
Muradup	2	0.100	0.220	0.160	✓	2	0.004	0.005	0.005	✓	2	7.73	7.74	7.74	✓	2	1.4	2.6	2.0	✓
Narrikup	4	0.025	0.080	0.050	✓	4	<0.002	<0.002	<0.002	✓	4	7.57	7.96	7.70	✓	4	12.0	16.0	14.3	✓
Narrogin	5	0.080	0.160	0.114	✓	5	0.003	0.016	0.008	✓	5	6.63	7.17	6.81	✓	5	1.9	4.4	3.7	✓
Newdegate	2	0.060	0.100	0.080	✓	2	0.002	0.003	0.003	✓	2	7.73	8.46	8.10	✓	2	2.6	3.4	3.0	✓
Nyabing	2	0.070	0.160	0.115	✓	2	0.003	0.005	0.004	✓	2	6.89	7.26	7.08	✓	2	0.7	2.1	1.4	✓
Ongerup	2	0.070	0.090	0.080	✓	2	0.003	0.003	0.003	✓	2	8.01	8.22	8.12	✓	2	8.2	8.4	8.3	✓
Pingaring	4	0.040	0.100	0.078	✓	4	<0.002	0.004	<0.002	✓	4	8.75	9.97	9.55	(1)	4	2.6	3.7	3.1	✓
Pingelly	2	0.090	0.160	0.125	✓	2	0.005	0.009	0.007	✓	2	6.73	7.38	7.06	✓	2	3.8	4.3	4.1	✓
Pingrup	2	0.100	0.160	0.130	✓	2	0.004	0.004	0.004	✓	2	6.92	7.24	7.08	✓	2	1.6	2.0	1.8	✓
Popanyinning	2	0.100	0.140	0.120	✓	2	0.004	0.005	0.005	✓	2	6.99	7.10	7.05	✓	2	4.0	4.1	4.1	✓
Ravensthorpe	4	<0.003	0.010	0.005	✓	4	<0.002	<0.002	<0.002	✓	4	7.35	7.89	7.57	✓	4	1.8	12.0	5.5	✓
Rocky Gully	4	0.025	0.050	0.040	✓	4	<0.002	<0.002	<0.002	✓	4	8.11	8.31	8.21	✓	4	14.0	17.0	15.5	✓
Salmon Gums	3	<0.003	0.004	<0.003	✓	3	<0.002	<0.002	<0.002	✓	3	8.04	8.38	8.19	✓	3	7.3	12.0	9.8	✓
Tambellup	2	0.100	0.180	0.140	✓	2	0.006	0.008	0.007	✓	2	7.97	8.27	8.12	✓	2	1.6	2.7	2.2	✓
Tincurrin TWS	4	0.200	0.360	0.245	✓	4	0.005	0.018	0.011	✓	4	7.18	8.72	7.67	✓	4	2.5	3.9	3.3	✓
Varley	2	0.050	0.100	0.075	✓	2	0.002	0.003	0.003	✓	2	7.30	7.43	7.37	✓	2	3.6	4.1	3.9	✓
Wagin	2	0.140	0.180	0.160	✓	2	0.002	0.010	0.006	✓	2	7.20	7.20	7.20	✓	2	3.9	4.4	4.2	✓
Walpole	4	0.004	0.030	0.012	✓	4	<0.002	0.004	<0.002	✓	4	7.40	7.92	7.68	✓	4	6.5	13.0	9.8	✓
Wandering	2	0.080	0.160	0.120	✓	2	0.008	0.025	0.017	✓	2	7.22	7.24	7.23	✓	2	4.7	5.1	4.9	✓
Wellstead	2	0.070	0.100	0.085	✓	2	<0.002	0.003	<0.002	✓	2	7.87	8.33	8.10	✓	2	15.0	18.0	16.5	✓
Wickepin TWS	4	0.080	0.140	0.105	✓	4	0.005	0.016	0.009	✓	4	6.86	7.03	6.94	✓	4	1.8	4.5	3.5	✓
Williams	2	0.035	0.060	0.048	✓	2	0.002	0.009	0.006	✓	2	6.67	6.69	6.68	✓	2	5.0	5.3	5.2	✓
Woodanilling	2	0.060	0.070	0.065	✓	2	0.002	0.005	0.004	✓	2	7.89	8.79	8.34	✓	2	3.1	3.6	3.4	✓
Yealering	4	0.045	0.120	0.084	✓	4	<0.002	0.003	<0.002	✓	4	7.16	7.82	7.52	✓	4	2.4	4.4	3.6	✓

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

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

Great Southern Region	Sodium					TDS					True Colour					Turbidity				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Value (TCU)			Guideline Met	Samples Taken	Value (NTU)			Guideline Met
		Min Value	Max Value	Mean Value			Min	Max	Mean			Min	Max	Mean			Min	Max	Mean	
Albany	16	61.0	72.0	65.8	✓	16	577	616	595	✓	16	<1	<1	<1	✓	16	0.2	1.3	0.5	✓
Boddington	2	33.0	34.0	33.5	✓	2	133	140	137	✓	2	<1	<1	<1	✓	2	0.4	0.4	0.4	✓
Borden	2	14.0	15.0	14.5	✓	2	98	103	101	✓	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Bremer Bay	4	140.0	150.0	143.8	✓	4	816	860	834	(2)	4	<1	<1	<1	✓	4	<0.1	0.2	<0.1	✓
Brookton	2	35.0	39.0	37.0	✓	2	158	175	167	✓	2	<1	1	<1	✓	2	0.2	0.6	0.4	✓
Broomehill	2	39.0	44.0	41.5	✓	2	170	193	182	✓	2	<1	<1	<1	✓	2	0.2	0.6	0.4	✓
Bullaring	4	36.0	49.0	40.0	✓	4	176	236	195	✓	4	<1	<1	<1	✓	4	0.2	0.3	0.3	✓
Condingup	4	295.0	315.0	301.3	(1)	4	967	1054	1003	(2)	4	<1	<1	<1	✓	4	<0.1	0.1	<0.1	✓
Cranbrook	2	14.0	60.0	37.0	✓	2	79	572	326	✓	2	<1	3	2	✓	2	0.2	0.7	0.5	✓
Cuballing	2	36.0	40.0	38.0	✓	2	139	160	150	✓	2	<1	<1	<1	✓	2	0.4	0.4	0.4	✓
Denmark	5	100.0	150.0	122.0	✓	5	340	501	422	✓	5	<1	<1	<1	✓	5	<0.1	0.2	<0.1	✓
Dudinin TWS	4	36.0	45.0	38.8	✓	4	169	214	185	✓	4	<1	<1	<1	✓	4	0.2	0.4	0.3	✓
Dumbleyung	2	36.0	45.0	40.5	✓	2	170	205	188	✓	2	<1	<1	<1	✓	2	<0.1	0.4	0.2	✓
Esperance	9	98.0	115.0	107.0	✓	9	795	844	820	(2)	9	<1	<1	<1	✓	9	<0.1	<0.1	<0.1	✓
Frankland	4	5.5	6.5	6.1	✓	4	38	42	40	✓	4	<1	<1	<1	✓	4	<0.1	0.1	<0.1	✓
Gibson	4	185.0	200.0	192.5	(1)	4	630	678	653	(2)	4	<1	<1	<1	✓	4	0.2	0.3	0.2	✓
Gnowangerup	4	41.0	52.0	45.5	✓	4	182	228	204	✓	4	<1	3	2	✓	4	0.5	1.2	0.9	✓
Grass Patch	4	105.0	120.0	112.5	✓	4	578	884	773	(2)	4	<1	<1	<1	✓	4	<0.1	0.2	<0.1	✓
Harrismith TWS	4	34.0	51.0	38.0	✓	4	158	232	176	✓	4	<1	2	<1	✓	4	0.2	0.5	0.3	✓
Highbury	4	36.0	46.0	39.3	✓	4	143	186	157	✓	4	<1	2	<1	✓	4	0.3	1.2	0.7	✓
Hopetoun	4	140.0	225.0	175.0	✓	4	652	760	698	(2)	4	<1	<1	<1	✓	4	<0.1	0.2	<0.1	✓
Hyden	4	36.0	48.0	39.5	✓	4	167	222	181	✓	4	<1	1	<1	✓	4	0.1	0.4	0.3	✓
Jerramungup	4	27.0	135.0	57.3	✓	4	115	758	288	✓	4	<1	<1	<1	✓	4	<0.1	0.3	0.2	✓
Karlgarin	2	36.0	47.0	41.5	✓	2	168	219	194	✓	2	<1	2	<1	✓	2	0.2	0.4	0.3	✓
Katanning	4	38.0	51.0	42.8	✓	4	162	215	181	✓	4	1	4	2	✓	4	0.2	2.0	1.1	(3)
Kendenup	4	61.0	66.0	64.3	✓	4	582	604	593	✓	4	<1	<1	<1	✓	4	<0.1	0.2	0.2	✓
Kojonup	2	37.0	48.0	42.5	✓	2	172	228	200	✓	2	1	4	3	✓	2	0.3	0.4	0.4	✓
Kondinin	4	36.0	50.0	40.0	✓	4	165	228	182	✓	4	<1	3	<1	✓	4	0.2	0.6	0.3	✓
Kukerin	5	35.0	48.0	39.2	✓	5	160	223	178	✓	5	<1	<1	<1	✓	5	0.2	0.3	0.2	✓
Kulin	4	36.0	51.0	39.8	✓	4	161	226	178	✓	4	<1	2	<1	✓	4	0.1	0.8	0.4	✓
Lake Grace	4	34.0	48.0	39.0	✓	4	167	227	185	✓	4	<1	1	<1	✓	4	0.2	0.4	0.3	✓
Lake King	2	34.0	50.0	42.0	✓	2	152	212	182	✓	2	<1	<1	<1	✓	2	0.2	0.4	0.3	✓
Mt Barker	4	61.0	68.0	64.0	✓	4	587	594	589	✓	4	<1	<1	<1	✓	4	0.3	0.6	0.4	✓
Munglinup	3	105.0	115.0	110.0	✓	3	798	838	823	(2)	3	<1	<1	<1	✓	3	<0.1	0.4	0.2	✓
Muradup	2	43.0	52.0	47.5	✓	2	191	238	215	✓	2	2	4	3	✓	2	0.4	0.5	0.5	✓
Narrikup	4	61.0	64.0	62.5	✓	4	574	586	582	✓	4	<1	<1	<1	✓	4	<0.1	0.5	0.3	✓
Narrogin	5	35.0	47.0	38.2	✓	5	137	202	152	✓	5	<1	2	<1	✓	5	0.2	0.4	0.3	✓
Newdegate	2	35.0	49.0	42.0	✓	2	170	231	201	✓	2	1	1	1	✓	2	<0.1	0.3	0.2	✓
Nyabing	2	39.0	52.0	45.5	✓	2	168	214	191	✓	2	1	4	3	✓	2	0.2	0.7	0.5	✓
Ongerup	2	52.0	63.0	57.5	✓	2	390	434	412	✓	2	<1	<1	<1	✓	2	0.2	0.4	0.3	✓
Pingaring	4	36.0	51.0	40.8	✓	4	169	242	197	✓	4	<1	2	<1	✓	4	0.2	0.5	0.3	✓
Pingelly	2	37.0	37.0	37.0	✓	2	148	152	150	✓	2	<1	2	<1	✓	2	0.3	0.6	0.5	✓
Pingrup	2	37.0	51.0	44.0	✓	2	165	234	200	✓	2	2	4	3	✓	2	0.4	0.9	0.7	✓
Popanyinning	2	36.0	37.0	36.5	✓	2	145	146	146	✓	2	<1	<1	<1	✓	2	0.2	0.4	0.3	✓
Ravensthorpe	4	29.0	115.0	55.3	✓	4	130	844	341	✓	4	<1	<1	<1	✓	4	0.1	0.2	0.2	✓
Rocky Gully	4	59.0	69.0	65.0	✓	4	566	601	582	✓	4	<1	<1	<1	✓	4	0.2	0.3	0.2	✓
Salmon Gums	3	105.0	110.0	108.3	✓	3	725	821	781	(2)	3	<1	<1	<1	✓	3	<0.1	<0.1	<0.1	✓
Tambellup	2	39.0	49.0	44.0	✓	2	184	230	207	✓	2	1	4	3	✓	2	0.7	0.8	0.8	✓
Tincurrin TWS	4	36.0	41.0	38.3	✓	4	158	184	172	✓	4	<1	4	2	✓	4	0.4	0.7	0.5	✓
Varley	2	38.0	38.0	38.0	✓	2	165	165	165	✓	2	<1	1	<1	✓	2	0.1	0.3	0.2	✓
Wagin	2	37.0	42.0	39.5	✓	2	147	148	148	✓	2	<1	2	<1	✓	2	0.3	0.4	0.4	✓
Walpole	4	76.0	105.0	91.8	✓	4	303	506	393	✓	4	<1	<1	<1	✓	4	<0.1	0.2	<0.1	✓
Wandering	2	35.0	35.0	35.0	✓	2	139	145	142	✓	2	<1	<1	<1	✓	2	0.3	0.9	0.6	✓
Wellstead	2	63.0	67.0	65.0	✓	2	579	602	591	✓	2	<1	<1	<1	✓	2	0.4	0.5	0.5	✓
Wickepin TWS	4	34.0	47.0	38.5	✓	4	140	202	157	✓	4	<1	<1	<1	✓	4	0.2	0.6	0.4	✓
Williams	2	33.0	35.0	34.0	✓	2	127	133	130	✓	2	<1	<1	<1	✓	2	0.5	0.7	0.6	✓
Woodanilling	2	37.0	37.0	37.0	✓	2	152	160	156	✓	2	<1	<1	<1	✓	2	0.3	0.3	0.3	✓
Yealering	4	37.0	50.0	40.5	✓	4	162	230	183	✓	4	<1	1	<1	✓	4	0.2	0.5	0.3	✓

(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

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Table 26 **Health related variables**

North West Region	*E. coli*				Thermophilic *Naegleria*			Fluoride					Hydrocarbons		Metals	
Locality	Samples Taken	Samples >0 cfu/100mL	Max cfu/100mL	Requirement Met	Samples Taken	Samples with Thermophilic Naegleria	Requirement Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Guideline Met	Samples Taken	Guideline Met
									Min	Max	Mean					
Broome	104	0	0	✓	78	0	✓	52	0.55	0.75	0.66	✓	1	(1)	2	✓
Burrup	24	0	0	✓	24	0	✓	2	0.60	0.65	0.63	(2)	0	(1)	2	✓
Camballin	12	0	0	✓	12	0	✓	2	0.25	0.25	0.25	✓	0	(1)	8	✓
Cape Lambert TWS	12	0	0	✓	12	0	✓	2	0.55	0.70	0.63	(2)	0	(1)	2	✓
Derby	66	0	0	✓	66	0	✓	53	0.55	0.65	0.61	✓	0	(1)	2	✓
Fitzroy Crossing	12	0	0	✓	12	0	✓	2	0.25	0.25	0.25	✓	0	(1)	2	✓
Halls Creek	50	0	0	✓	50	0	✓	2	0.55	0.65	0.60	✓	2	(1)	0	(3)
Hedland	104	0	0	✓	78	0	✓	52	0.55	0.80	0.69	✓	0	(1)	3	✓
Karratha	117	0	0	✓	117	0	✓	52	0.55	0.85	0.68	✓	0	(1)	2	✓
Kununurra	67	0	0	✓	54	0	✓	53	0.45	0.65	0.57	✓	2	(1)	2	✓
Marble Bar	12	0	0	✓	12	0	✓	2	0.60	0.70	0.65	✓	1	(1)	2	✓
Newman	65	0	0	✓	52	0	✓	2	0.20	0.20	0.20	✓	0	(1)	2	✓
Nullagine	12	0	0	✓	12	0	✓	2	0.45	0.50	0.48	✓	0	✓	2	✓
Onslow TWS	52	0	0	✓	26	0	✓	2	0.65	0.75	0.70	✓	0	(1)	4	✓
Point Samson	12	0	0	✓	12	0	✓	2	0.55	0.65	0.60	(2)	0	(1)	2	✓
Roebourne	52	0	0	✓	52	0	✓	2	0.65	0.70	0.68	✓	0	(1)	2	✓
Wickham	52	0	0	✓	52	0	✓	2	0.65	0.65	0.65	✓	1	(1)	2	✓
Wyndham	49	0	0	✓	49	0	✓	2	<0.1	<0.1	<0.1	✓	0	✓	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) Sample scheduled outside of reporting year.

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Table 27 **Health related variables**

North West Region	Nitrate					Pesticides		Radiological		Trihalomethanes					Other Health Related	
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Guideline Met	Samples Taken	Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Requirement Met
		Min	Max	Mean							Min	Max	Mean			
Broome	2	22.9	25.1	24.2	✓	2	✓	2	✓	2	<0.001	0.003	0.002	✓	0	(1)
Burrup	2	5.7	6.6	6.2	✓	1	✓	1	✓	1	0.003	0.003	0.003	✓	0	(1)
Camballin	2	<0.2	<0.2	<0.2	✓	1	✓	0	(1)	2	<0.001	<0.001	<0.001	✓	0	(1)
Cape Lambert TWS	2	6.2	7.0	6.6	✓	1	✓	0	(1)	2	0.004	0.090	0.047	✓	0	(1)
Derby	2	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	0.004	0.006	0.005	✓	1	✓
Fitzroy Crossing	2	4.0	4.4	4.0	✓	1	✓	2	✓	2	<0.001	<0.001	<0.001	✓	0	(1)
Halls Creek	3	4.4	4.8	4.4	✓	2	✓	2	✓	2	0.001	0.002	0.002	✓	0	(1)
Hedland	3	3.5	4.0	3.5	✓	1	✓	0	(1)	2	<0.001	0.006	0.003	✓	1	✓
Karratha	2	0.4	6.6	3.5	✓	1	✓	0	(1)	2	<0.001	0.009	0.005	✓	0	(1)
Kununurra	4	<0.2	<0.2	<0.2	✓	1	✓	2	✓	2	0.018	0.027	0.023	✓	0	(1)
Marble Bar	2	5.7	5.7	5.7	✓	1	✓	2	✓	2	0.005	0.028	0.017	✓	2	✓
Newman	10	0.9	1.3	0.9	✓	1	✓	2	✓	2	0.002	0.003	0.003	✓	1	✓
Nullagine	2	4.8	4.8	4.8	✓	1	✓	1	✓	2	<0.001	0.006	0.003	✓	0	(1)
Onslow TWS	2	1.3	1.8	1.8	✓	1	✓	0	(1)	2	0.002	0.006	0.004	✓	1	✓
Point Samson	2	6.2	6.6	6.6	✓	1	✓	1	✓	2	0.002	0.005	0.004	✓	0	(1)
Roebourne	2	1.8	6.2	4.0	✓	1	✓	2	✓	2	0.120	0.120	0.120	✓	0	(1)
Wickham	2	1.8	6.2	4.0	✓	1	✓	1	✓	2	0.002	0.054	0.028	✓	0	(1)
Wyndham	3	0.4	0.4	0.4	✓	1	✓	2	✓	2	0.059	0.060	0.060	✓	0	(1)

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

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Table 28 **Aesthetic (Non-health related) Variables**

North West Region	Alkalinity (as CaCO3)					Aluminium					Chloride					Hardness				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met
		Min Value	Max Value	Mean Value			Min	Max	Mean			Min Value	Max Value	Mean Value			Min	Max	Mean	
Broome	2	74.0	75.0	74.5	(1)	2	<0.008	<0.008	<0.008	✓	2	95.0	105.0	100.0	✓	2	52	53	53	✓
Burrup	2	160.0	210.0	185.0	(1)	2	<0.008	<0.008	<0.008	✓	2	65.0	110.0	87.5	✓	2	180	260	220	(2)
Camballin	2	57.0	61.0	59.0	(1)	2	<0.008	<0.008	<0.008	✓	2	35.0	55.0	45.0	✓	2	42	52	47	✓
Cape Lambert TWS	2	220.0	220.0	220.0	(1)	2	<0.008	<0.008	<0.008	✓	2	80.0	105.0	92.5	✓	2	240	270	255	(2)
Derby	2	130.0	150.0	140.0	(1)	2	<0.008	<0.008	<0.008	✓	2	90.0	95.0	92.5	✓	2	17	19	18	✓
Fitzroy Crossing	2	170.0	190.0	180.0	(1)	2	<0.008	<0.008	<0.008	✓	2	35.0	45.0	40.0	✓	2	150	160	155	✓
Halls Creek	3	330.0	370.0	353.3	(1)	3	<0.008	<0.008	<0.008	✓	3	160.0	170.0	165.0	✓	3	300	340	323	(2)
Hedland	3	160.0	200.0	183.3	(1)	3	<0.008	<0.008	<0.008	✓	3	110.0	160.0	136.7	✓	3	180	240	210	(2)
Karratha	2	120.0	210.0	165.0	(1)	2	<0.008	<0.008	<0.008	✓	2	50.0	90.0	70.0	✓	2	130	250	190	✓
Kununurra	4	190.0	220.0	207.5	(1)	4	<0.008	<0.008	<0.008	✓	4	17.0	18.0	17.8	✓	4	160	170	168	✓
Marble Bar	2	360.0	370.0	365.0	(1)	2	<0.008	<0.008	<0.008	✓	2	180.0	180.0	180.0	✓	2	260	260	260	(2)
Newman	10	130.0	150.0	139.0	(1)	10	<0.008	<0.008	<0.008	✓	10	60.0	85.0	72.0	✓	10	140	160	153	✓
Nullagine	2	120.0	150.0	135.0	(1)	2	<0.008	<0.008	<0.008	✓	2	75.0	95.0	85.0	✓	2	160	210	185	✓
Onslow TWS	2	160.0	180.0	170.0	(1)	2	<0.008	<0.008	<0.008	✓	2	70.0	110.0	90.0	✓	2	170	180	175	✓
Point Samson	2	210.0	220.0	215.0	(1)	2	<0.008	<0.008	<0.008	✓	2	85.0	105.0	95.0	✓	2	250	270	260	(3)
Roebourne	2	120.0	200.0	160.0	(1)	2	<0.008	<0.008	<0.008	✓	2	48.0	100.0	74.0	✓	2	120	250	185	✓
Wickham	2	120.0	210.0	165.0	(1)	2	<0.008	<0.008	<0.008	✓	2	48.0	100.0	74.0	✓	2	130	250	190	✓
Wyndham	3	43.0	51.0	47.7	(1)	3	0.014	0.018	0.016	✓	3	32.0	35.0	34.0	✓	3	40	46	44	✓

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

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Table 29 **Aesthetic (Non-health related) Variables**

North West Region	Iron					Manganese					pH					Silicon				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Value (pH units)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met
		Min	Max	Mean			Min	Max	Mean			Min	Max	Mean			Min Value	Max Value	Mean Value	
Broome	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.91	8.34	8.13	✓	2	90.0	100.0	95.0	(1)
Burrup	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.11	8.22	8.17	✓	2	55.0	55.0	55.0	✓
Camballin	2	0.008	0.015	0.012	✓	2	<0.002	<0.002	<0.002	✓	2	7.18	7.24	7.21	✓	2	23.0	25.0	24.0	✓
Cape Lambert TWS	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.03	8.10	8.07	✓	2	50.0	55.0	52.5	✓
Derby	2	0.006	0.008	0.007	✓	2	<0.002	<0.002	<0.002	✓	2	7.64	7.86	7.75	✓	2	16.0	17.0	16.5	✓
Fitzroy Crossing	2	<0.003	0.015	0.008	✓	2	<0.002	<0.002	<0.002	✓	2	7.34	7.35	7.35	✓	2	21.0	22.0	21.5	✓
Halls Creek	3	<0.003	<0.003	<0.003	✓	3	<0.002	<0.002	<0.002	✓	3	7.78	7.87	7.84	✓	3	45.0	50.0	48.0	✓
Hedland	3	<0.003	<0.003	<0.003	✓	3	<0.002	<0.002	<0.002	✓	3	7.78	8.12	7.99	✓	3	50.0	55.0	53.3	✓
Karratha	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.04	8.10	8.07	✓	2	21.0	55.0	38.0	✓
Kununurra	4	<0.003	<0.003	<0.003	✓	4	0.003	0.014	0.009	✓	4	7.54	7.92	7.66	✓	4	55.0	55.0	55.0	✓
Marble Bar	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.39	7.67	7.53	✓	2	42.0	44.0	43.0	✓
Newman	10	<0.003	0.008	<0.003	✓	10	<0.002	<0.002	<0.002	✓	10	6.80	7.28	7.02	✓	10	17.0	19.0	18.1	✓
Nullagine	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.14	7.18	7.16	✓	2	32.0	34.0	33.0	✓
Onslow TWS	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.99	8.22	8.11	✓	2	70.0	75.0	72.5	✓
Point Samson	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	8.13	8.20	8.17	✓	2	50.0	55.0	52.5	✓
Roebourne	2	<0.003	0.015	0.008	✓	2	<0.002	0.004	<0.002	✓	2	7.73	7.90	7.82	✓	2	25.0	55.0	40.0	✓
Wickham	2	<0.003	<0.003	<0.003	✓	2	<0.002	<0.002	<0.002	✓	2	7.98	8.23	8.11	✓	2	24.0	55.0	39.5	✓
Wyndham	3	<0.003	0.004	<0.003	✓	3	<0.002	<0.002	<0.002	✓	3	7.88	8.12	7.99	✓	3	7.0	8.0	7.6	✓

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

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

North West Region	Sodium					TDS					True Colour					Turbidity				
Locality	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Concentration (mg/L)			Guideline Met	Samples Taken	Value (TCU)			Guideline Met	Samples Taken	Value (NTU)			Guideline Met
		Min Value	Max Value	Mean Value			Min	Max	Mean			Min	Max	Mean			Min	Max	Mean	
Broome	2	78.0	80.0	79.0	✓	2	399	417	408	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Burrup	2	39.0	56.0	47.5	✓	2	444	626	535	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Camballin	2	36.0	40.0	38.0	✓	2	231	257	244	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Cape Lambert TWS	2	48.0	58.0	53.0	✓	2	580	636	608	(1)	2	<1	<1	<1	✓	2	0.1	0.2	0.2	✓
Derby	2	99.0	105.0	102.0	✓	2	392	407	400	✓	2	<1	<1	<1	✓	2	<0.1	0.2	<0.1	✓
Fitzroy Crossing	2	32.0	39.0	35.5	✓	2	358	404	381	✓	2	<1	<1	<1	✓	2	0.1	0.1	0.1	✓
Halls Creek	3	135.0	145.0	140.0	✓	3	936	955	946	(1)	3	<1	<1	<1	✓	3	<0.1	0.3	<0.1	✓
Hedland	3	69.0	97.0	83.3	✓	3	513	656	593	✓	3	<1	<1	<1	✓	3	<0.1	0.2	<0.1	✓
Karratha	2	40.0	50.0	45.0	✓	2	338	587	463	✓	2	<1	<1	<1	✓	2	0.1	0.1	0.1	✓
Kununurra	4	27.0	29.0	28.0	✓	4	399	434	415	✓	4	<1	<1	<1	✓	4	<0.1	0.2	<0.1	✓
Marble Bar	2	170.0	185.0	177.5	✓	2	974	1016	995	(1)	2	<1	<1	<1	✓	2	<0.1	0.3	0.2	✓
Newman	10	47.0	55.0	51.2	✓	10	368	418	394	✓	10	<1	<1	<1	✓	10	<0.1	0.2	<0.1	✓
Nullagine	2	47.0	67.0	57.0	✓	2	404	511	458	✓	2	<1	<1	<1	✓	2	0.1	0.1	0.1	✓
Onslow TWS	2	30.0	50.0	40.0	✓	2	439	538	489	✓	2	<1	<1	<1	✓	2	0.2	0.2	0.2	✓
Point Samson	2	51.0	58.0	54.5	✓	2	580	634	607	(1)	2	<1	<1	<1	✓	2	0.2	0.3	0.3	✓
Roebourne	2	38.0	51.0	44.5	✓	2	333	593	463	✓	2	<1	<1	<1	✓	2	<0.1	0.1	<0.1	✓
Wickham	2	40.0	52.0	46.0	✓	2	338	604	471	✓	2	<1	<1	<1	✓	2	<0.1	<0.1	<0.1	✓
Wyndham	3	21.0	22.0	21.3	✓	3	136	149	142	✓	3	<1	<1	<1	✓	3	0.1	0.3	0.2	✓

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