



Programmed Facility Management

for the

Rottneast Island Authority

Annual Drinking Water Report
Rottneast Island Authority
July 2020 – June 2021





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Foreword

The Rottnest Island Authority is committed to providing high quality drinking water that consistently meets the Australian Drinking Water Guidelines (ADWG), other regulatory requirements and consumer expectations in a sustainable way. Further details on Rottnest Island Authority's commitment to Drinking Water Quality can be reviewed under [Rottnest Island Drinking Water Quality Policy](#) on the Rottnest Island website.

The [Rottnest Island Management Plan 2020-24](#), Drinking Water Source Protection Plan, and Groundwater Licence Operating Strategy reflect this commitment and contain the strategies, procedures and processes to meet this objective.

Programmed Facility Management (PFM) continues to operate the major facilities and delivers other services on behalf of the Rottnest Island Authority (RIA). Management of the water network is a component of the utilities services performed by PFM, which includes the production, distribution and monitoring of drinking water.

The 2020-2021 Annual Water Quality Report shows that the RIA and PFM have remained consistent with previous years' performance in the management of the Drinking Water supply on Rottnest Island.

Submission Approval

This Annual Report describes Rottnest Island's drinking water quality performance for the 2020-2021 reporting period. The Rottnest Island Authority is committed to being transparent on its performance by providing the public with accurate and representative information in this report. The report aims to demonstrate to island customers and visitors, the ongoing commitment to the sustainable production and supply of high-quality drinking water on Rottnest Island.



Acronyms

ADWG	Australian Drinking Water Guidelines	The Australian Drinking Water Guidelines provides a framework for management of drinking water supply.
DoH	Department of Health	The Department of Health oversee compliance of Western Australia's health system.
DWQMP	Drinking Water Quality Management Plan	The Drinking Water Quality Management Plan describes how the production, distribution and monitoring of drinking water is managed on Rottnest Island.
HU	Hazen Unit	A Hazen unit is a measurement of colour.
kL	Kilolitre	A kilolitre is a unit of volume equivalent to one thousand litres and equal to one cubic metre of water.
km	Kilometre	A kilometre is a unit of length in the metric system, equal to one thousand metres.
mg/L	Milligrams per litre	Milligrams per litre is the mass of a chemical per unit volume of water.
mg-NO ₂ /L	Milligrams of nitrite	Milligrams per litre is the mass of nitrite per unit volume.
mg-NO ₃ /L	Milligrams of nitrate	Milligrams per litre is the mass of nitrate per unit volume.
ML	Megalitre	A megalitre is a unit of volume in the metric system, equal to one million litres.
MoU	Memorandum of Understanding	The memorandum of understanding is an agreement between the RIA and the DoH and demonstrates the agreed commitments to drinking water quality.
NTU	Nephelometric Turbidity Unit	A nephelometric turbidity unit is a measurement of turbidity.
PFM	Programmed Facility Management	Programmed Facility Management (ABN 23001382010) is contracted to manage drinking water supply on Rottnest Island.
RIA	Rottnest Island Authority	Rottnest Island Authority is a statutory body who manage Rottnest Island.
TDS	Total Dissolved Solids	Total Dissolved Solids is a measurement of inorganic salts and organic matter dissolved in water.
ug/L	Micrograms per litre	Micrograms per litre is a unit of volume in the metric system. One microgram is equal to one millionth of a gram.



1. Introduction

Rottneest Island is located 19 km west of Fremantle, Western Australia, and is 11 km long and 4.5 km at its widest point. The total land area measures approximately 1,900 hectares and is managed by the Rottneest Island Authority (RIA). The island is a Class A Reserve and a popular destination for local, interstate and international visitors. Due to the COVID-19 Pandemic, visitation to the island has been reduced from previous reporting periods.

Water production facilities include saline groundwater bores, desalination plant, potable water storage tanks, and distribution system. The distribution and supply to customers is via a reticulated network. Programmed Facility Management is contracted by the Rottneest Island Authority to manage the production, distribution and monitoring of the drinking water supply to customers, Rottneest Island residents, and visitors.

The primary source of drinking water on Rottneest Island processed through the desalination plant is the six saline production bores located within the Longreach Borefield. Historically Wadjemup Borefield has been used for the supply of drinking water, however this ceased in 2017.

1.1 Policy and Commitment

The Rottneest Island Authority (RIA), and workers, are committed to the effective management of the drinking water; providing safe, high quality drinking water supply to consumers on Rottneest Island.

RIA Drinking Water Quality Policy 2018 is to:

- Manage water quality at all points along the delivery chain from source water to the consumer;
 - Use a risk-based approach in which potential threats to water quality are identified and balanced;
 - Integrate the needs and expectations of our consumers, stakeholders, regulator and employees into our planning;
 - Establish regular monitoring of the quality of drinking water and effective reporting mechanisms to provide relevant and timely information, and promote confidence in the water supply and its management;
 - Develop appropriate contingency planning and incident response capability;
 - Continually improve our practices by assessing performance against corporate commitments and stakeholder expectations; and
- Ensure that when contracting parties to provide drinking water services on behalf of Rottneest Island Authority that the parties are contracted to deliver on these policy objectives.

Programmed Facility Management, as the contracted Facilities Manager, is responsible for the safe delivery of drinking water and maintaining effective systems for managing drinking water quality and risks, ensuring compliance requirements are aligned with the documented controls and approved Rottneest Island Authority Drinking Water Quality Risk Management Plan.



1.2 Drinking Water Quality Management

The Drinking Water Quality Risk Management Plan is the principal framework document used by Rottnest Island Authority and Programmed Facility Management to implement the effective management of the drinking water distribution system on Rottnest Island. The Drinking Water Quality Risk Management Plan forms part of the Memorandum of Understanding between the Rottnest Island Authority and the Department of Health and is supported by the drinking water binding protocols. The Drinking Water Quality Risk Management Plan Framework also includes the Drinking Water Incident Response Protocols and other statutory documentation required to ensure compliance with the Australian Drinking Water Guidelines.

A copy of the 2019 [Memorandum of Understanding](#) is available to view on the Rottnest Island Authority website.

The Australian Drinking Water Guidelines are published and updated by the National Health and Medical Research Council, Australia's peak health research body on Australian Drinking Water. The Australian Drinking Water Guidelines are the national standard for Australian Drinking Water; requiring a risk management framework to be established for the effective management of drinking water supplies in Australia.

The Australian Drinking Water Guidelines can be downloaded from:

<https://www.nhmrc.gov.au/guidelines/publications/australian-drinking-water-guidelines>

A key aspect of the Australian Drinking Water Guidelines is a risk management approach. This approach is aimed at ensuring the Australian Drinking Water Guidelines are achieved from the water source, to points of consumption. This ensures, and requires, that there is a monitoring program established with appropriate sampling points throughout the distribution system, whilst providing a robust tool for identifying preventative and corrective actions for the improvement of water quality.

The Australian Drinking Water Guidelines recognise the significance of a preventative, multi-barrier approach for the protection of public health in drinking water supplies and have incorporated a framework for management of drinking water quality. The framework presented in the Australian Drinking Water Guidelines includes twelve elements considered good practice in the systematic management of drinking water supplies.

A Drinking Water Quality Risk Management Plan has been developed for Rottnest Island, utilising the elements within the Australian Drinking Water Guidelines – Framework for the Management of Drinking Water Quality.

The Drinking Water Quality Risk Management Plan is an important requirement of the Memorandum of Understanding, and has included a detailed risk assessment for each element of the system including:

- Longreach (saline) Borefield.
- Desalination Plant
- Storage Tanks
- Treatment System (Chlorination)
- Pumping System
- Distribution and Reticulation system
- Water sampling and monitoring points


To ensure that the production, monitoring, supply and management of Rottnest Island's drinking water supply continues to remain of high quality, the Drinking Water Quality Risk Management Plan is reviewed at set frequencies.

Where changes are made to the Drinking Water Quality Risk Management Plan, these will be presented within subsequent Quarterly and Annual Drinking Water Reports.

1.3 Memorandum of Understanding

April 2012 saw the commencement of a Memorandum of Understanding (MoU) between the Department of Health and Rottnest Island Authority. This commitment to the Memorandum of Understanding by both parties ensures a strong cooperative relationship for the management of drinking water and the protection of public health. The Memorandum of Understanding was updated and re-signed by the Rottnest Island Authority and the Department of Health in December 2019.¹

Another important component of the Memorandum of Understanding is the requirement for the Licensee (Rottnest Island Authority) to notify the Department of Health of the provision of other forms of water supply. That is, the supply of water not intended for drinking purposes. The specific items pertaining to management of this commitment as described within the Memorandum of Understanding, and how these items are complied with on Rottnest Island, are detailed within the table overleaf. Primarily, provision of non-potable water on Rottnest Island occurs for the toilet facilities at the western end of Rottnest Island.

Memorandum of Understanding and the Provision of Non-Drinking Water on Rottnest Island	
MOU	Rottnest Island Authority Provision
Ensure advice is given to customers and their tenants or visitors that this water supply is not to be used for drinking or food preparation.	Where water provided is unsuitable for drinking/food preparation, public signage has been installed. Example provided below. 
Annual requirement by way of written reminders of water quality. Inspections to ensure affected taps are labelled with "non-drinking water".	Water quality is reported annually and quarterly. Points have been labelled where the water provided is unsuitable for drinking.
If the Licensee provides non-drinking water to public open space areas, accessible to general public or via standpipes, then adequate signage advising "not suitable for drinking" is required.	Where non-drinking water is used in public open spaces, and areas accessible to the general public, appropriate signage has been installed clearly stating non-drinking water is in use.

¹The memorandum can be found on the Rottnest Island Authority's website at: <https://ria.wa.gov.au/policy-and-reports/sustainability/environmental-sustainability/utility-reports/water-reports>

2. Water Provider Information

Rottnest Island Authority Contact Details	
Name of Company	Rottnest Island Authority
Company Address	1st Floor E – Shed, Victoria Quay, Fremantle WA 6160
Company Phone	Ph (08) 9432 9300 Fax (08) 9432 9301
Company Website	www.rotnnestisland.com
Company Email	enquiries@rotnnestisland.com
Executive Director	Jason Banks
Director Environment Heritage and Parks	Arvid Hogstrom
A/Manager Environment, Sustainability and Compliance	Rebecca Gabbitus
Island Operations Manager (PFM)	John McManus

2.1 System Information

2.1.1 Consumers

Water demand is highly seasonal and directly related to tenancy and visitation to Rottnest Island. Typically, consumption is low in winter and high in summer.

The number of beds on the island for visitors totals 2,150, with the average length of stay being 3.5 nights. In addition, there are approximately 150 permanent residents on the island, however this value fluctuates with seasonal staffing demands.

In a typical year Rottnest Island experiences an average low season minimum between June-August and an average high season maximum between December – February. Due to the COVID-19 Pandemic only 411,325 visits were made to Rottnest Island for this reporting period, down from 455,031 and 573,585 from the 2019-20 and 2018-19 reporting periods respectively.

The Island has been closed for three COVID-19 lockdowns for the Perth and Peel region during the reporting period. These were from the 31st January – 5th February 2021, 24th – 26th April 2021 and 29th June – 3rd July 2021. During these times only essential Island staff travelled to the Island. The peak visitation period for this reporting year was December 2020 to January 2021 with approximately 63,383 and 84,932 visitors respectively.

The number of beds on Rottnest Island for guests is approximately 2,150, with the average length of stay being 3.5 nights. In addition to this, there are approximately 150 permanent residents on Rottnest Island, which also fluctuates in accordance with high and low seasons.



However, due to the outbreak of the Coronavirus Pandemic the number of staff and permanent residents living on Rottnest Island has reduced.

Reduced number of visitors was the key COVID-19 related impacts with respect to the drinking water quality operations.

2.1.2 Distribution System & Water Supply

The drinking water quality parameters are regularly monitored by the PFM Environment, Quality and Compliance Officer and hydraulic technicians to ensure that drinking water produced on Rottnest Island meets the requirements of the Australian Drinking Water Guidelines. Fluoridation is not part of the treatment process for drinking water on Rottnest Island. A graphical representation of the drinking water distribution system is provided in Figure 1.

During the reporting period, 442,081 kL of saline groundwater were abstracted from the Longreach Borefield. (Ground Water Licence GWL177495(2) – Department of Water 2015-2025) for desalination purposes. No water abstracted from the Wadjemup Borefield was used to supplement the potable water system.

The water demand on Rottnest Island is highly seasonal, with monthly consumption ranging from approximately 14,000 kL in July (low season) to 22,000 kL in January (peak season). During the 2019-20 reporting period, the lowest monthly consumption period was during the Island closure period August and September 2020. The combined storage capacity of the drinking water infrastructure is around 14.5 ML, which provides approximately 22 days' worth of potable water storage at full capacity. Water security is targeted at a minimum of seven days storage during peak periods.

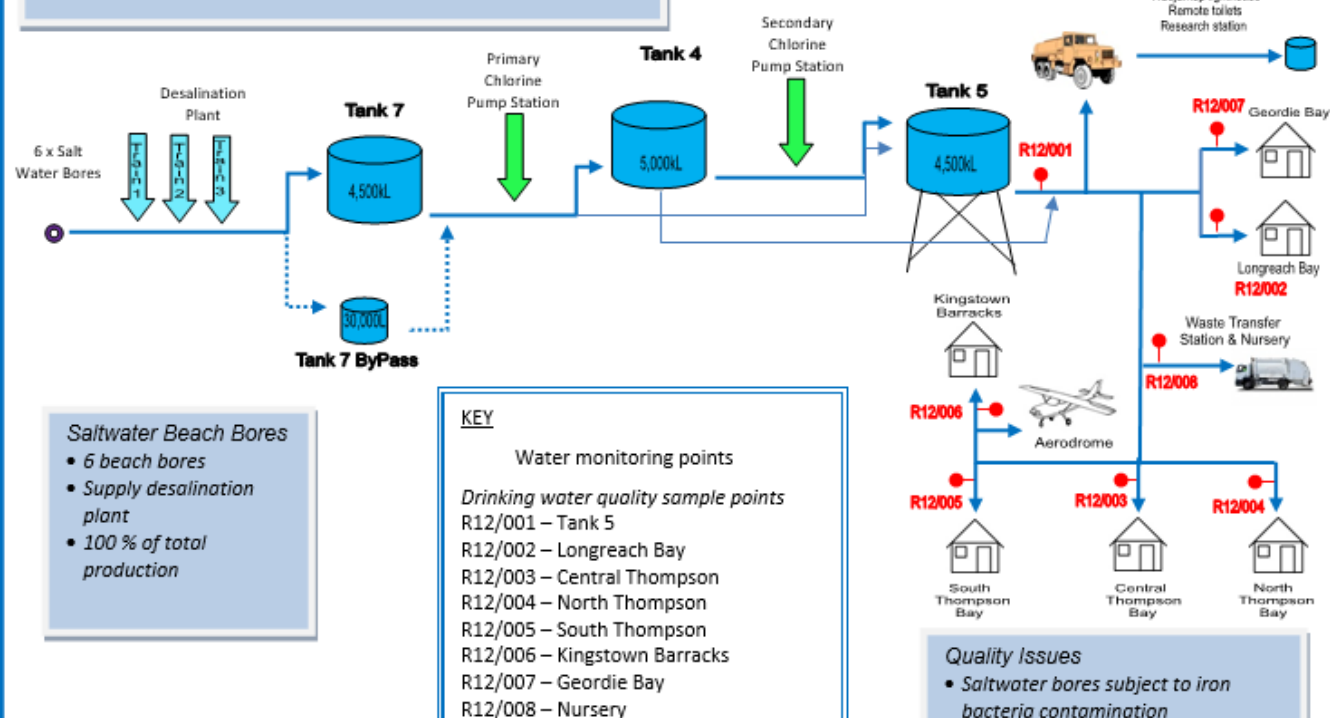
2.1.3 Sampling Schedule & Procedure

The Drinking Water Quality Risk Management Plan details a comprehensive sampling schedule developed by a specialist consultant based on a risk management strategy and adopted by the RIA and PFM. The schedule includes eight nominated sampling points throughout the distribution system. The nominated sample points allow for fair representation of the water supply on Rottnest Island.

The sampling locations are shown in Figure 1 – Rottnest Island Water Distribution System and Figure 2 – Map of the Sampling Locations.

Sampling and in-house monitoring procedures are carried out in accordance with best industry practice and executed by qualified hydraulics technicians. Nominated samples in the sampling schedule are analysed by a NATA accredited laboratory in accordance with the requirements of the Department of Health.

Figure 1 - Rottnest Island Water Distribution System



Demand

- 750,000 visitors annually
- Monthly consumption 14,000 – 22,000kL
- Winter demand 250kL/day
- Summer demand 750kL/day

Storage

- Combined total potable operational tank capacity is 14,000 kL
- Treated disinfected water is stored in Tank 5
- KPI to maintain 7 days storage
- Maximum resistance time to maintain residual chlorine level 4.5 days
- Winter actual resistance time 115 days
- Summer actual resistance time 38 days
- Tank 5 must be closely controlled to maintain residual chlorine levels

Distribution System

- Gravity fed from Tank 5
- Bulk cartage to Wadjemup lighthouse tank, remote toilets & UWA house.
- Waste transfer station & Nursery site used for rubbish truck wash down facility and irrigation, is now monitored
- Remote water tanks not suitable for drinking are signed accordingly
- Can bypass Tank 7 through Tank 7 Bypass.
- Potential to feed gravity feed from tank 4



Figure 2 - Map of the Sampling Locations



3. Microbial Performance

The results in Section 3.1 summarise the outcome of microbial characteristics monitored during the 2020-2021 period. 100% compliance was reported at the eight nominated sampling points in 2020-2021 maintaining the compliance rate set in 2019-20.

3.1 Microbial – Compliance Summary

Rottnest Island Distribution System 2020 – 21				
Microbial Characteristic	Memorandum of Understanding Compliance Criteria	No. of Analyses	No. of Analyses Complying with Memorandum of Understanding	% Compliance
Bacterial				
<i>E.coli</i>	Non Detect	233	233	100%
Amoeba				
Thermophilic <i>Naegleria</i>	Non Detect	102	102	100%

3.2 Microbial Incident Specific Information

There were no recorded microbial non-conformances for *E.coli*, thermotolerant coliforms or thermophilic *Naegleria* at the eight nominated sample points during the 2020-2021 reporting period.

4. Chemical: Health Related Performance

The results in Section 4.1 summarise the outcome of health characteristics monitored during the 2020-2021 reporting period.

The health characteristics monitored within the eight nominated sampling points recorded 99% overall compliance with the Australian Drinking Water Guidelines. The reported exceedances were related to the presence of bromate in the drinking water system.

Specific details are described in the below section 4.2 Health Related Incident Specific Information.

4.1 Chemical: Health Related – Compliance Summary

Rottnest Island Distribution System 2020 - 21					
Health Characteristic	Australian Drinking Water Guidelines (mg/L)	No. of Analyses	No. of Analyses Complying with Australian Drinking Water Guidelines	% Compliance with Australian Drinking Water Guidelines	Max Value of Analysis (mg/L)
Antimony (Sb)	0.003	103	103	100%	<0.005
Bromate (BrO ₃ ⁻)	0.02	431	426	99%	0.031
Cadmium (Cd)	0.002	16	16	100%	<0.0002
Chlorine Total (Cl ₂)	5	181	181	100%	1.53
Copper (Cu)	2	14	14	100%	0.007
Fluoride (F)	1.5	95	95	100%	0.6
Lead (Pb)	0.01	14	14	100%	0.002
Manganese (Mn)	0.5	17	17	100%	<0.005
Nickel (Ni)	0.02	14	14	100%	<0.001
Nitrate (NO ₃) (Nitrate as nitrate)	50 mg-NO ₃ /L	14	14	100%	0.04
Nitrite (NO ₂)	3 mg-NO ₂ /L	46	46	100%	<0.02
¹ Trihalomethanes (THM)	0.25	46	46	100%	0.015

Notes:

¹Trihalomethanes can be present in drinking water as a by-product of chlorination or chloramination. Chlorine is the only source of disinfection currently used on Rottnest.

4.2 Chemical: Health Related Incident Specific Information

The health characteristics sampled during the 2020-2021 reporting period returned results in line with those taken during the 2019-2020 period, returning five exceedances of bromate compared with three exceedances in the previous reporting period.

Bromate testing was added to the agreed sampling schedule in the 2017-2018 reporting period. This followed a request from the Department of Health to participate in a voluntary monitoring program for bromate. Rottneest Island Authority and Programmed Facility Management continue to manage bromate formation through proactive and reactive management:

Proactive

- Close monitoring of tank levels, water retention times and their relationship with bromate formation. The holding time in pipes is believed to be a contributing factor in the production of bromate in the drinking water system.
- Avoidance of excessive chlorination and oxidation of bromide to bromate by optimising chlorine levels in the storage tanks before distribution in the water network.
- Regular maintenance and replacement of membranes, which improves the quality of the permeate, in turn lowering bromide levels.

Reactive

- Flushing regime – Flushing of the distribution system when the bromate levels are reported approximately 25% below the limit set out in the Australian Drinking Water Guidelines.

5. Chemical: Aesthetic Related Performance

5.1 Chemical: Aesthetic – Compliance Summary

The following table summarises the outcomes for Rottneast Island Authority Distribution System, for specific aesthetic related characteristics during the 2020-2021 reporting period.

Rottneast Island Distribution System 2020 - 21					
Aesthetic Characteristic	Australian Drinking Water Guidelines (mg/L)	No. of Analyses	No. of Analyses Complying with Australian Drinking Water Guidelines	% Compliance with Australian Drinking Water Guidelines	Max Value of Analysis (mg/L)
Aluminium (Al)	0.2	13	13	100%	<0.05
Ammonia (NH ₃)	0.5	46	46	100%	0.03
Chloride (Cl ⁻)	250	4	4	100%	190
Chlorine (Cl ₂) Free Residual	0.6	181	6	3%	1.30
Colour	15 (HU)	25	25	100%	4.6
Hardness (CaCO ₃)	200	4	4	100%	23
Iron (Fe)	0.3	102	93	91%	0.91
pH	6.5 - 8.5	120	118	98%	8.9
Sodium (Na)	180	414	414	100%	150
Sulphate (SO ₄ ²⁻)	250	4	4	100%	8.3
Hydrogen Sulphide (H ₂ S)	0.05	14	14	100%	<0.05
TDS	600	4	4	100%	380
Turbidity	5 (NTU)	26	26	100%	3
Zinc (Zn)	3	14	14	100%	0.041

5.2 Chemical: Aesthetic Incident Specific Information

Whilst exceedances of aesthetic guidelines can affect consumer experience, it is important to note that exceedances to aesthetic guidelines refer only to palatability to consumers, including appearance, taste and odour.

There were several instances where analytical results exceeded the aesthetic guidelines for chemical and physical properties as follows:

- **Chlorine:** 175 out of 181 samples reported chlorine concentrations above the Australian Drinking Water Guidelines aesthetic value of 0.6 mg/L, with the highest concentration reported at 1.30 mg/L in July 2020. The Australian Drinking Water Guidelines states that chlorine has an aesthetic odour threshold of 0.6 mg/L, however the reported concentrations exceeding this threshold do not pose any health risks, as values are below the specific health guideline value of 5 mg/L.

Whilst impacts to aesthetic quality of drinking water may occur due to greater concentrations of chlorine, it is important to note that adequate disinfection is paramount for the provision of safe drinking water. No complaints were recorded during the year with regards to odour.

- **Iron:** 9 of the 102 samples recorded iron concentrations above the Australian Drinking Water Guidelines aesthetic value of 0.3 mg/L, with the highest concentration reported at 0.91 mg/L at R12/008 in March 2021. All nine of the iron exceedances occurred at R12/008 during the reporting period. Investigation into the cause of the exceedances are still ongoing.

Iron has a taste threshold of 0.3 mg/L in water, and becomes objectionable above 3 mg/L.

- **pH:** 2 of 120 samples reported pH values outside the Australian Drinking Water Guidelines aesthetic pH range of 6.5 - 8.5. The exceedances for the 2020-2021 period were at the following locations:

R12/002 in July 2020 and August 2020, reported a pH of 8.9 and 8.7 respectively, 0.4 and 0.2 pH units above the Australian Drinking Water Guideline upper limit respectively.

In May 2021, R12/004, R12/006 and R12/008 were reported as having pH below the lower limit in the Australian Drinking Water Guidelines. Recalibration and retesting by the lab returned results above the lower limit and are therefore no longer reported as exceedances within this report.

To manage reactive upper limit pH values, flushing is implemented at specific flushing points within the potable water distribution line at the instruction of the RIA.

6. Special Interest Performance

6.1 Compliance Summary for Drinking Fountains

The following table summarises the outcomes for the Drinking Water Quality Monitoring Program completed at the Rottnest Island drinking fountains. This program monitors health and aesthetic related characteristics during the 2020-2021 reporting period.

It is important to note that the drinking fountains were isolated and closed to public use on the 24th March 2020 due to the COVID-19 pandemic. Drinking fountains were not sampled monthly until August 2020 when they were reconnected as part of the Island reopening to visitors.

Health - Rottnest Island Drinking Fountain Network 2020 – 21					
Health Characteristic	Australian Drinking Water Guidelines (mg/L)	No. of Analyses	No. of Analyses Complying with Australian Drinking Water Guidelines	% Compliance with Australian Drinking Water Guidelines	Max Value of Analysis (mg/L)
Antimony (Sb)	0.003	166	166	100%	<0.003
Cadmium (Cd)	0.002	166	166	100%	<0.0002
Lead (Pb)	0.01	166	166	100%	0.002
Nickel (Ni)	0.02	166	165	99%	0.034

There was one health exceedance within this reporting period for Nickel at Visitor Centre drinking fountain in August 2020. The source of the exceedance was found to be corroded fittings, which were replaced before the next monitoring round. There were no exceedances following the parts replacement and the drinking fountain was opened for public use in September 2020.

Aesthetic - Rottnest Island Drinking Fountain Network 2020 – 21					
Aesthetic Characteristic	Australian Drinking Water Guidelines (mg/L)	No. of Analyses	No. of Analyses Complying with Australian Drinking Water Guidelines	% Compliance with Australian Drinking Water Guidelines	Max Value of Analysis (mg/L)
Copper (Cu)	1	166	166	100%	0.003
Zinc (Zn)	3	166	166	100%	0.75

As part of the reopening of the drinking fountains to public use in August 2020, the drinking fountains were sampled for microbial characteristics. All drinking fountains returned non-detect results for Total Coliforms, *E.coli* and Faecal Coliforms and were opened for public use in August 2020 (with the exception of the Visitor Centre fountain).

7. Radiological – Performance

Radiological sampling for gross alpha and gross beta is required annually. The results in Section 7.1 summarise the outcome of radiological characteristics monitored during the 2020-2021 reporting period.

7.1 Radiological – Compliance Summary

Annual testing for gross alpha and gross beta occurred in October 2020 at the eight distribution sampling locations. There were no exceedances identified for Gross Alpha and Gross Beta.

Rottnest Island Distribution System 2020-2021					
Radiological Characteristic	Australian Drinking Water Guidelines (Bq/L)	No. of Analyses	No. of Analyses Complying with Australian Drinking Water Guidelines	% Compliance with Australian Drinking Water Guidelines	Max Value of Analysis (Bq/L)
Gross Alpha	0.5	8	8	100%	0.032
Gross Beta	0.5	8	8	100%	0.041

8. Pesticides

As part of Rottnest Island commitment to providing a sustainable environment, pesticide usage is minimised and applied in a controlled manner on Rottnest Island. Pesticide testing was undertaken in February 2021 at R12/001 in line with the Department of Health '*Pesticides Monitoring Exclusion Policy*' (2018) and Binding Protocol 2 from the MOU between RIA and DoH. All pesticide test results complied with the health-related guideline values set out in the Australian Drinking Water Guidelines.

Pesticide	Australian Drinking Water Guidelines (µg/L)	No. of Analyses	No. of Analyses Complying with Australian Drinking Water Guidelines	Max Value of Analysis (µg/L)
Dicamba	0.1	1	1	<0.1
MPCA	0.1	1	1	<0.1
2,4-D	0.1	1	1	<0.1
2,4,5-T	0.1	1	1	<0.1
2,4,6-T	0.1	1	1	<0.1
Picloram	0.2	1	1	<0.2
Fluazifop	0.4	1	1	<0.4
Clopyralid	0.4	1	1	<0.4
Metsulfuron Methyl	0.5	1	1	<0.5
Triclopyr	0.1	1	1	<0.1
Ametryn	0.5	1	1	<0.5
Amitraz	0.1	1	1	<0.1
Atrazine	0.1	1	1	<0.1
Azinphos Methyl	1	1	1	<1
Chlorfenvinphos	0.2	1	1	<0.2
Chlorpyrifos	0.1	1	1	<0.1
Dichlobenil	0.1	1	1	<0.1
Diclofop Methyl	0.1	1	1	<0.1

Pesticide	Australian Drinking Water Guidelines (µg/L)	No. of Analyses	No. of Analyses Complying with Australian Drinking Water Guidelines	Max Value of Analysis (µg/L)
Dimethoate	0.1	1	1	<0.1
Diphenamid	0.1	1	1	<0.1
Diuron	0.5	1	1	<0.5
Endosulfan I	0.1	1	1	<0.1
Endosulfan II	0.1	1	1	<0.1
Endosulfan Sulfate	0.1	1	1	<0.1
Etridiazole	0.2	1	1	<0.2
Fenamiphos	1	1	1	<1
Fenarimol	0.5	1	1	<0.5
Fenitrothion	0.1	1	1	<0.1
Fenthion	0.1	1	1	<0.1
Fluazifop-p-butyl	1	1	1	<1
Fluometuron	0.1	1	1	<0.1
Hexazinone	0.4	1	1	<0.4
Methidathion	0.1	1	1	<0.1
Metolachlor	0.2	1	1	<0.2
Metribuzin	0.5	1	1	<0.5
Mevinphos	0.4	1	1	<0.4
Molinate	0.1	1	1	<0.1
Myclobutanil	0.4	1	1	<0.4
Napropamide	0.2	1	1	<0.2
Pendimethalin	0.4	1	1	<0.4
Pirimiphos methyl	0.1	1	1	<0.1

Pesticide	Australian Drinking Water Guidelines (µg/L)	No. of Analyses	No. of Analyses Complying with Australian Drinking Water Guidelines	Max Value of Analysis (µg/L)
Prometryn	0.1	1	1	<0.1
Propargite	0.3	1	1	<0.3
Propazine	0.1	1	1	<0.1
Propiconazole	0.4	1	1	<0.4
Propyzamide	0.1	1	1	<0.1
Tebuconazole	0.4	1	1	<0.4
Tebuthiuron	5	1	1	<5
Terbuthylazine	0.1	1	1	<0.1
Terbutryn	0.1	1	1	<0.1
Triadimefon	1	1	1	<1
Trifluralin	0.1	1	1	<0.1
Simazine	0.1	1	1	<0.1
Vernolate	0.2	1	1	<0.2
Aldrin	0.001	1	1	<0.001
Alpha-BHC (HCH)	0.001	1	1	<0.001
Beta-BHC (HCH)	0.001	1	1	<0.001
Delta-BHC (HCH)	0.001	1	1	<0.001
Befinthrln	0.05	1	1	<0.05
Bromophos Ethyl	0.005	1	1	<0.005
Chlordane	0.002	1	1	<0.002
Chlorothalonil	0.01	1	1	<0.1
Chlorpyrifos	0.005	1	1	<0.005
Diazinon	0.01	1	1	<0.01

Pesticide	Australian Drinking Water Guidelines (µg/L)	No. of Analyses	No. of Analyses Complying with Australian Drinking Water Guidelines	Max Value of Analysis (µg/L)
Dieldrin	0.001	1	1	<0.001
Endosulfan I	0.001	1	1	<0.001
Endosulfan II	0.001	1	1	<0.001
Endosulfan Sulfate	0.001	1	1	<0.001
Endrin	0.01	1	1	<0.01
Ethion	0.01	1	1	<0.01
Fenitrothion	0.01	1	1	<0.01
Fipronil	0.02	1	1	<0.02
Hexachlorobenzene (HCB)	0.001	1	1	<0.001
Heptachlor Epoxide	0.001	1	1	<0.001
Heptachlor	0.001	1	1	<0.001
Lindane	0.001	1	1	<0.001
Malathion	0.01	1	1	<0.01
Methoxychlor	0.02	1	1	<0.02
o,p-DDT	0.001	1	1	<0.001
Oxychlordane	0.001	1	1	<0.001
p,p-DDD	0.001	1	1	<0.001
p,p-DDE	0.001	1	1	<0.001
p,p-DDT	0.001	1	1	<0.001
Parathion Ethyl	0.02	1	1	<0.02
Parathion Methyl	0.02	1	1	<0.02
Trifluralin	0.01	1	1	<0.01

Pesticide	Australian Drinking Water Guidelines (µg/L)	No. of Analyses	No. of Analyses Complying with Australian Drinking Water Guidelines	Max Value of Analysis (µg/L)
Vinclozolin	0.02	1	1	<0.02
Alphamethrin	0.05	1	1	<0.05
Cyfluthrin	0.05	1	1	<0.05
Cyhalothrin	0.05	1	1	<0.05
Cypermethrin	0.05	1	1	<0.05
Deltamethrin	1	1	1	<1
Fenvalerate	0.05	1	1	<0.05
Permethrin	0.05	1	1	<0.05
Asulam	1	1	1	<1
Bioresmethrin	5	1	1	<5
Chlorantraniliprole	5	1	1	<5
Chloroxuron	0.4	1	1	<0.4
Chlorpropham	2	1	1	<2
Cyprodinil	1	1	1	<1
Dichlorprop	25	1	1	<25
Diflubenzuron	1	1	1	<1
Disulfoton	1	1	1	<1
Fenamiphos	0.1	1	1	<0.1
Flupropanate	3	1	1	<3
Fosamine	0.1	1	1	<0.1
Imazapyr	1	1	1	<1
Norflurazon	1	1	1	<1
Omethoate	0.1	1	1	<0.1

Pesticide	Australian Drinking Water Guidelines (µg/L)	No. of Analyses	No. of Analyses Complying with Australian Drinking Water Guidelines	Max Value of Analysis (µg/L)
Oryzalin	5	1	1	<5
Piperonyl butoxide	1	1	1	<1
Pirimicarb	0.1	1	1	<0.1
Polihexanide	100	1	1	<100
Pyrasulfotole	5	1	1	<5
Pyroxsulam	1	1	1	<1
Temephos	25	1	1	<25
Terbacil	1	1	1	<1
Thidiazuron	0.4	1	1	<0.4
Thiobencarb	0.4	1	1	<0.4
Thiophanate	1	1	1	<1
Thiram	2	1	1	<2
Toltrazuril	1	1	1	<1
Paraquat	1	1	1	<1
Diquat	1	1	1	<1
Amitrole	1	1	1	<1
Glyphosate	1	1	1	<1
Chlorsulfuron	1	1	1	<1

9. Customer Service & Notifiable Incidents

9.1 Customer Service Charter

The Rottnest Island Authority Customer Service Charter sets out the principal terms and conditions upon which the Rottnest Island Authority intends to provide water services to its customers, in accordance with the license issued by the Economic Regulation Authority under the *Water Services Act 2012*.

The charter informs the customers of Rottnest Island of their rights in accordance with the provisions of the license, including service interruptions, levels of service, and complaint procedures.

A copy of the operating license is available on request from the RIA or from the Economic Regulation Authority.

9.2 Customer Complaints

The RIA and PFM are committed to handling complaints and enquiries in a courteous and efficient manner. The customer complaints procedure is available to view on the RIA website www.ria.wa.gov.au.

Complaints are managed centrally by the Rottnest Island Authority and each complaint is assigned a unique identification number and delegated to an appropriate Rottnest Island Authority representative to resolve. Complaints received are continuously monitored to identify any trends and areas for improvement.

Where the Rottnest Island Authority is in receipt of complaints, the issue is investigated immediately to determine the best process for resolution and rectification of the concern.

There were no complaints related to water quality reported during the 2020-2021 reporting period.

9.3 Notifiable Incidents

During the 2020-2021 reporting period there were five health exceedance samples out of 431 samples for bromate reportable to the Department of Health concerning the drinking water distribution system.

There were nine iron exceedances within the 2020-2021 reporting period that were reported to the Department of Health.

Microbial detections associated with non – disinfected water in Tank 7 were reported to the Department of Health on four occasions in the 2020-2021 period.

Improvements

Due to ongoing issues with existing infrastructure there were several microbial detections in Tank 7. In the short term, Tank 7 is being managed under the *2020 Interim Microbial Exceedance Management Plan for Tank 7* (accepted by DoH). The RIA has secured federal funding to be used on new and existing water infrastructure, where part of this funding will be allocated to upgrading Tank 7. The RIA have capital funding to undertake works on Tank 7.

10. Comments

PFAS testing

Following the Drinking Water Quarterly Meeting held on 5 June 2019, the Department of Health recommended a one-off sampling for PFAS to take place at two locations along the potable water distribution line. From this point onwards, PFAS has been tested on an annual basis. Samples for this reporting period were taken 1st June 2021 and were taken at R12/003 and R12/006.

Per- and poly-fluoroalkyl substances (PFAS) are manufactured chemicals that do not occur naturally in the environment. PFAS chemicals include perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) and perfluorohexane sulfonate (PFHxS) amongst a large group of other compounds. PFAS are persistent in the environment, show the potential for bioaccumulation and biomagnification, and are toxic in animal studies (potential developmental, reproductive and systemic toxicity). They have been used in a wide range of consumer products including surface treatments such as non-stick cookware, and notably in aqueous film forming foam used to extinguish fires.

Results are presented in the below table.

Rottneest Island Distribution System 2020-2021					
Health Characteristic	Australian Drinking Water Guidelines (ug/L)	No. of Analyses	No. of Analyses Complying with Australian Drinking Water Guidelines	% Compliance with Australian Drinking Water Guidelines	Max Value of Analysis (ug/L)
Sum of Perfluorooctane sulfonate (PFOS) and perfluorohexane sulfonate (PFHxS)	0.07	2	2	100%	<0.01
Perfluorooctanoic acid PFOA	0.56	2	2	100%	<0.01

Ten Commandments for Safe Drinking Water

The Ten Commandments for Safe Drinking Water stand behind all internal drinking water operations on Island. To remind all workers of the RIA's commitments to public health and safety relating to drinking water, the Ten Commandments for Safe Drinking Water have been installed in all pump stations and operational areas of the desalination plant (Figure 3 and 4).



Figure 3 and 4: Ten Commandments for Safe Drinking Water at the Rottne Island Desalination Plant.

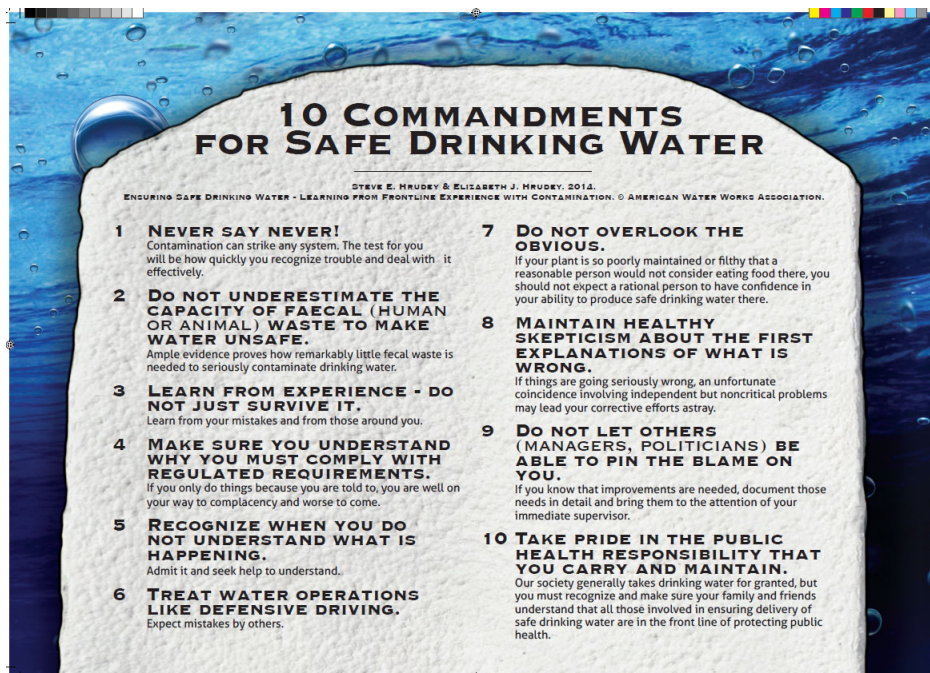


Figure 5: The Ten Commandments for Safe Drinking Water (Hrudehy SE & Hrudehy EJ, 2014)

Mock Incident Scenario

The Rottneest Island Mock Incident Scenario occurred in June 2021 and was based on a cross connection of the sewer network with the drinking water distribution. The scenario highlighted the need for an escalation and communication process to different parts of the company in relation to drinking water, and the need for formal documentation of the actions taken in an incident in case of a resulting court case.

In addition, it highlighted the need for better familiarisation with the developed Incident Response Protocols. The RIA has committed to addressing these findings through further review and greater communications regarding the Incident Response Protocols.

11. References

Hrudey S E, Hrudey E J, *Ten Commandments For Safe Drinking Water* Canadian Water Network 2020, and American Water and Wastewater Association, 2014

12. Acknowledgements

The Rottnest Island Authority acknowledges the work of Programmed Facility Management in managing Drinking Water Quality at Rottnest Island, and the assistance of the Department of Health throughout the year.

The Rottnest Island Authority recognises and supports the ongoing work of the Advisory Committee for the Purity of Water².

13. Enquiries

To request further information, or to seek clarification on information provided within this Rottnest Island Annual Drinking Water Report, please contact the Rottnest Island Authority Administration by phone at (08) 9432 9300 (8:30 am to 5:00 pm, Monday to Friday). Alternatively, enquiries may also be sent by e-mail to rotnnest.compliance@dbca.wa.gov.au.

² More information on the Advisory Committee for the Purity of Water can be found at: http://ww2.health.wa.gov.au/Articles/A_E/Advisory-Committee-for-the-Purity-of-Water

14. Appendices

14.1 Annual Data Summary

		July-September 2020				October-December 2020				January-March 2021				April-June 2021				2020-21 Summary			
Health Characteristic	Australian Drinking Water Guidelines (mg/L)	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	Max Value of Analysis (mg/L)	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	Max Value of Analysis (mg/L)	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	Max Value of Analysis (mg/L)	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	Max Value of Analysis (mg/L)	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	Max Value of Analysis (mg/L)
Antimony	0.003	32	32	100%	<0.003	24	24	100%	<0.005	24	24	100%	<0.003	23	23	100%	<0.003	103	103	100%	<0.003
Bromate	0.02	104	104	100%	0.019	104	104	100%	0.02	103	99	96%	0.031	120	120	100%	0.02	431	427	99%	0.031
Cadmium	0.002	9	9	100%	<0.0002	0	0	-	NA	7	7	100%	<0.0002	0	0	-	NA	16	16	100%	<0.0002
Chlorine (Total Residual)	5	46	46	100%	1.53	45	45	100%	1.3	45	45	100%	1.18	45	45	100%	1.16	181	181	100%	1.53
Copper	2	3	3	100%	0.01	4	4	100%	0.01	3	3	100%	0.015	4	4	100%	0.007	14	14	100%	0.015
Fluoride	1.5	24	24	100%	<0.5	24	24	100%	0.6	31	31	100%	1	16	16	100%	<0.5	95	95	100%	1
Lead	0.01	3	3	100%	<0.001	4	4	100%	0.002	3	3	100%	0.001	4	4	100%	0.002	14	14	100%	0.002
Manganese	0.5	9	9	100%	<0.005	0	0	-	NA	8	8	100%	<0.005	0	0	-	NA	17	17	100%	<0.005
Nickel	0.02	3	3	100%	<0.001	4	4	100%	<0.001	3	3	100%	<0.001	4	4	100%	<0.001	14	14	100%	<0.001
Nitrate (as NO3-)	50	3	3	100%	<0.02	4	4	100%	0.04	3	3	100%	<0.02	4	4	100%	0.04	14	14	100%	0.04
Nitrite (as NO2-)	3	11	11	100%	<0.02	10	10	100%	<0.02	14	14	100%	<0.02	11	11	100%	<0.02	46	46	100%	<0.02
Total THM	0.25	11	11	100%	0.015	10	10	100%	0.012	14	14	100%	0.009	11	11	100%	0.01	46	46	100%	0.015

		July-September 2020				October-December 2020				January-March 2021				April-June 2021				2020-21 Summary			
Aesthetic Characteristic	Australian Drinking Water Guidelines (mg/L)	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	Max Value of Analysis (mg/L)	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	Max Value of Analysis (mg/L)	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	Max Value of Analysis (mg/L)	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	Max Value of Analysis (mg/L)	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	Max Value of Analysis (mg/L)
Aluminium	0.2	3	3	100%	<0.05	3	3	100%	<0.05	4	4	100%	<0.05	3	3	100%	<0.05	13	13	100%	<0.05
Ammonia	0.5	11	11	100%	0.01	10	10	100%	0.03	14	14	100%	0.01	11	11	100%	0.03	46	46	100%	0.03
Chloride	250	1	1	100%	120	1	1	100%	190	1	1	100%	130	1	1	100%	120	4	4	100%	190
Chlorine (Free Residual)	0.6	46	3	6%	1.3	45	0	0%	1.24	45	0	0%	1.15	45	3	7%	0.98	181	6	3%	1.3
True Colour	15HU	7	7	100%	<2	7	7	100%	<2	4	4	100%	4.6	7	7	100%	3.8	25	25	100%	4.6
Hardness	200	1	1	100%	23	1	1	100%	18	1	1	100%	16	1	1	100%	11	4	4	100%	23
Iron	0.3	27	26	96%	0.32	24	21	88%	0.67	28	25	89%	0.91	23	21	91%	0.64	102	93	91%	0.91
pH	6.5-8.5	30	28	93%	8.9	32	32	100%	8	27	27	100%	8.1	31	31	100%	7.9	120	118	98%	8.9
Sodium	180	104	104	100%	100	104	104	100%	150	103	103	100%	99	103	103	100%	93	414	414	100%	150
Sulphate	250	1	1	100%	5.4	1	1	100%	8.3	1	1	100%	<5	1	1	100%	<5	4	4	100%	8.3
Sulphide	0.05	3	3	100%	<0.05	4	4	100%	<0.05	3	3	100%	<0.05	4	4	100%	<0.05	14	14	100%	<0.05
TDS	600	1	1	100%	220	1	1	100%	380	1	1	100%	220	1	1	100%	210	4	4	100%	380
Turbidity	5NTU	8	8	100%	1.7	7	7	100%	1.1	4	4	100%	3	7	7	100%	<1	26	26	100%	3
Zinc	3	3	3	100%	0.028	4	4	100%	0.025	3	3	100%	0.028	4	4	100%	0.041	14	14	100%	0.041

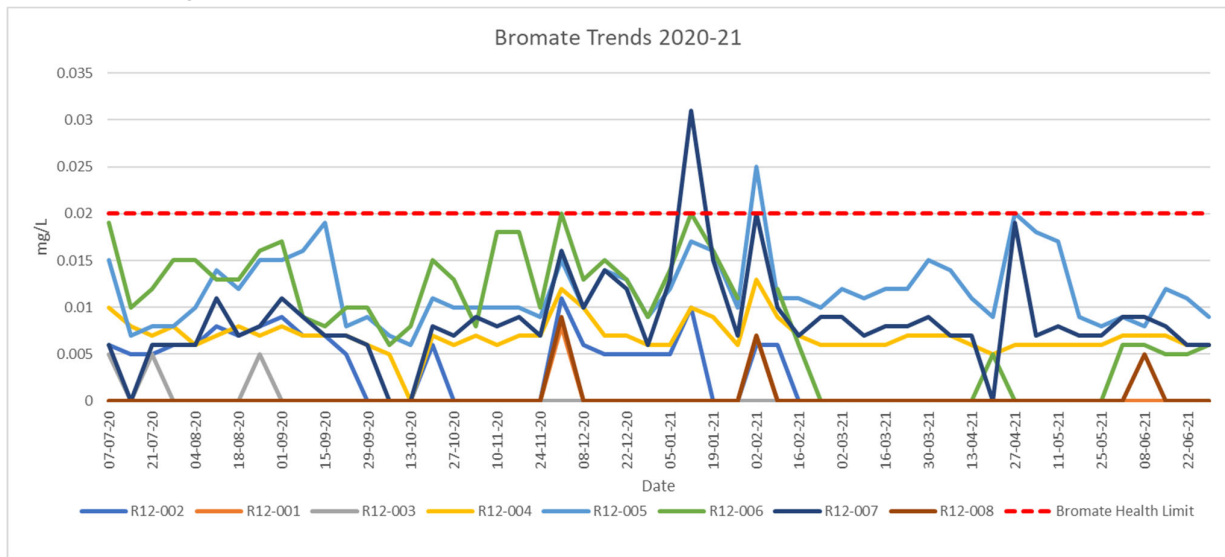
		July-September 2020			October-December 2020			January-March 2021			April-June 2021			2020-21 Summary		
Microbial Characteristic	Memorandum of Understanding Compliance Criteria	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG
Bacterial																
<i>E.coli</i>	Non Detect	59	59	100%	58	58	100%	58	58	100%	58	58	100%	233	233	100%
Amoeba																
Thermophilic <i>Naegleria</i>	Non Detect	27	27	100%	24	24	100%	28	28	100%	23	23	100%	102	102	100%

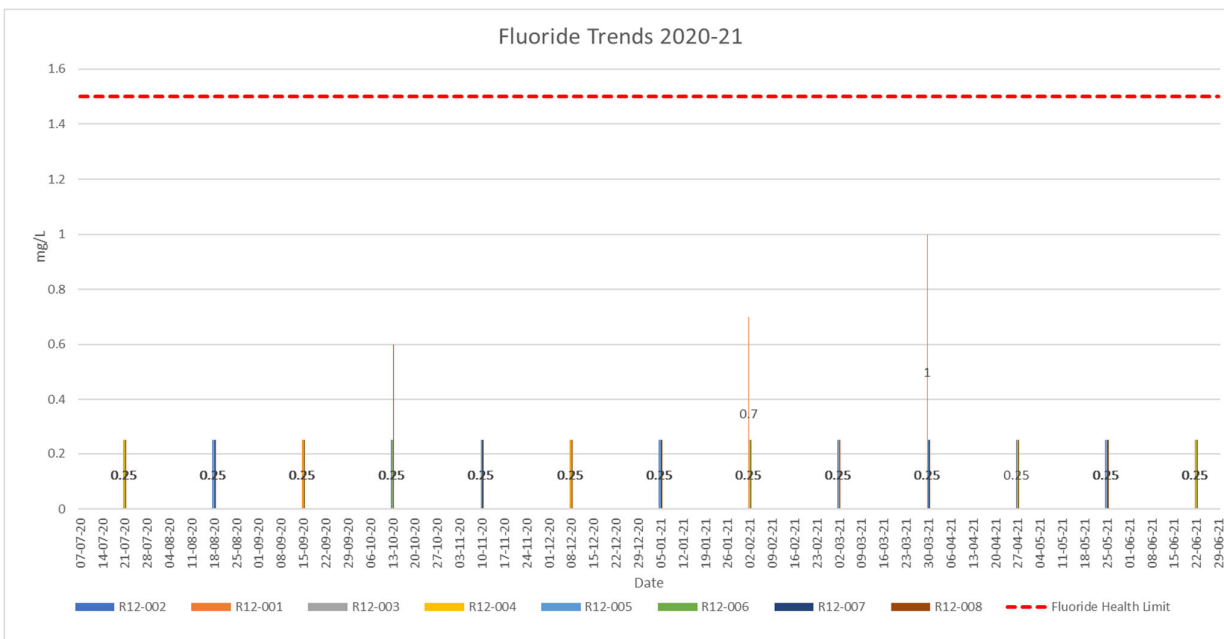
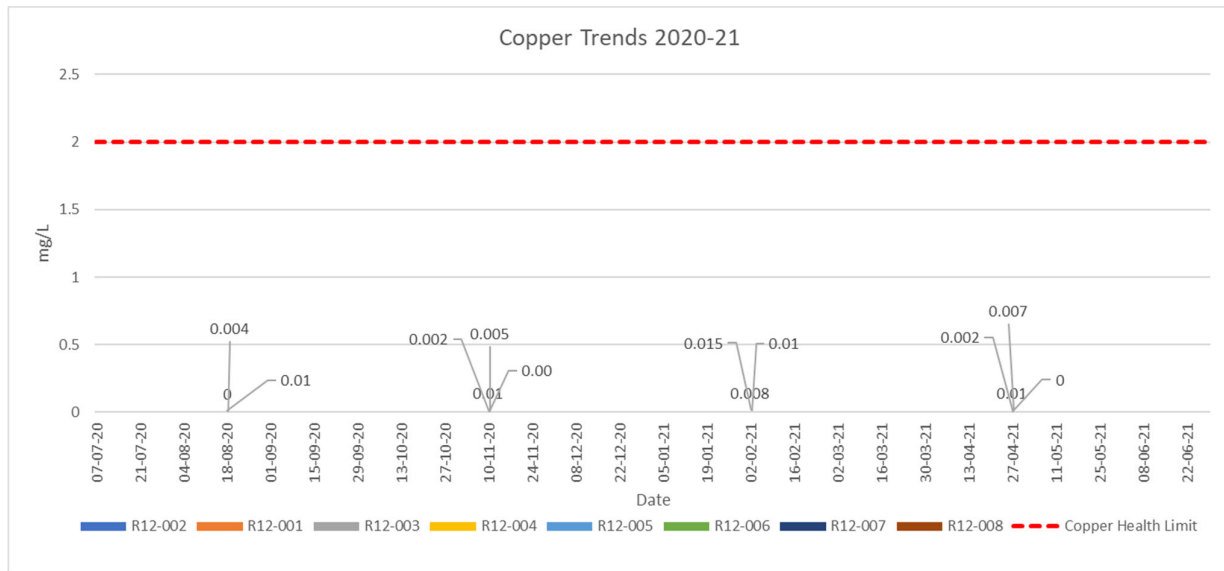
		July-September 2020				October-December 2020				January-March 2021				April-June 2021				2020-21 Summary			
Drinking Fountain Analytes	Australian Drinking Water Guidelines (mg/L)	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	Max Value of Analysis (mg/L)	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	Max Value of Analysis (mg/L)	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	Max Value of Analysis (mg/L)	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	Max Value of Analysis (mg/L)	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	Max Value of Analysis (mg/L)
Health Characteristics																					
Antimony	0.003	28	28	100%	<0.005	42	42	100%	<0.003	42	42	100%	<0.003	54	54	100%	<0.003	166	166	100%	<0.005
Cadmium	0.002	28	28	100%	<0.0002	42	42	100%	<0.0002	42	42	100%	<0.0002	54	54	100%	<0.0002	166	166	100%	<0.0002
Lead	0.01	28	28	100%	0.001	42	42	100%	0.002	42	42	100%	0.002	54	54	100%	0.002	166	166	100%	0.002
Nickel	0.02	28	27	96%	0.034	42	42	100%	0.002	42	42	100%	0.002	54	54	100%	<0.001	166	165	99%	0.034
Aesthetic Characteristics																					
Copper	1	28	28	100%	<0.001	42	42	100%	0.003	42	42	100%	<0.001	54	54	100%	0.003	166	166	100%	0.003
Zinc	3	28	28	100%	0.45	42	42	100%	0.28	42	42	100%	0.37	54	54	100%	0.17	166	166	100%	0.45

14.2 ADWG Sample Point Graph Summaries (Health)

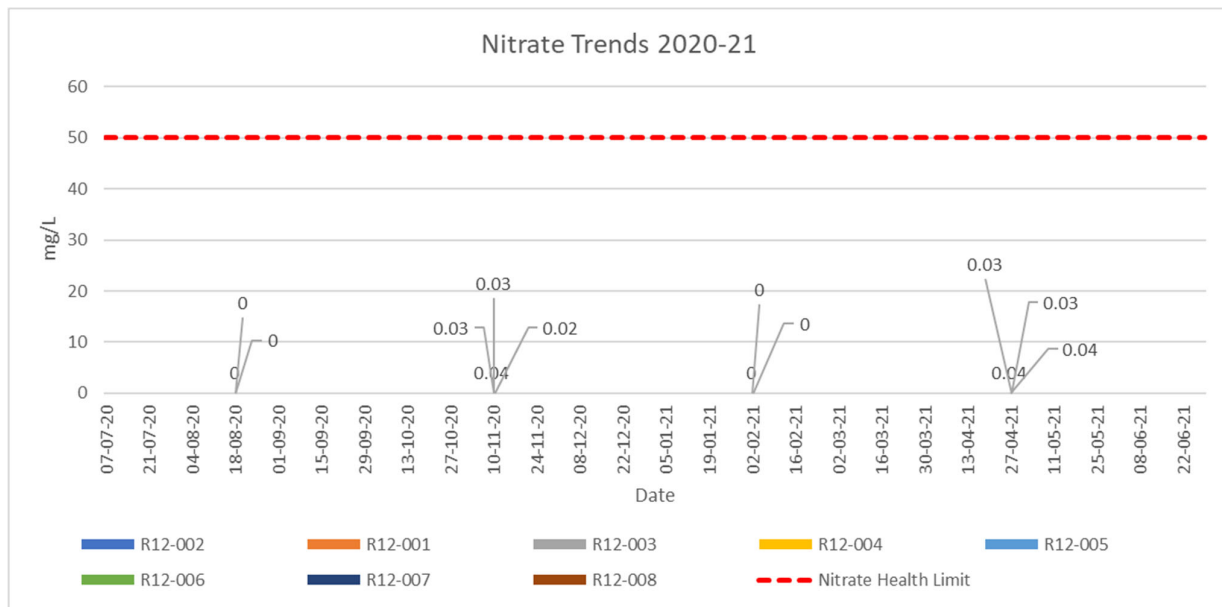
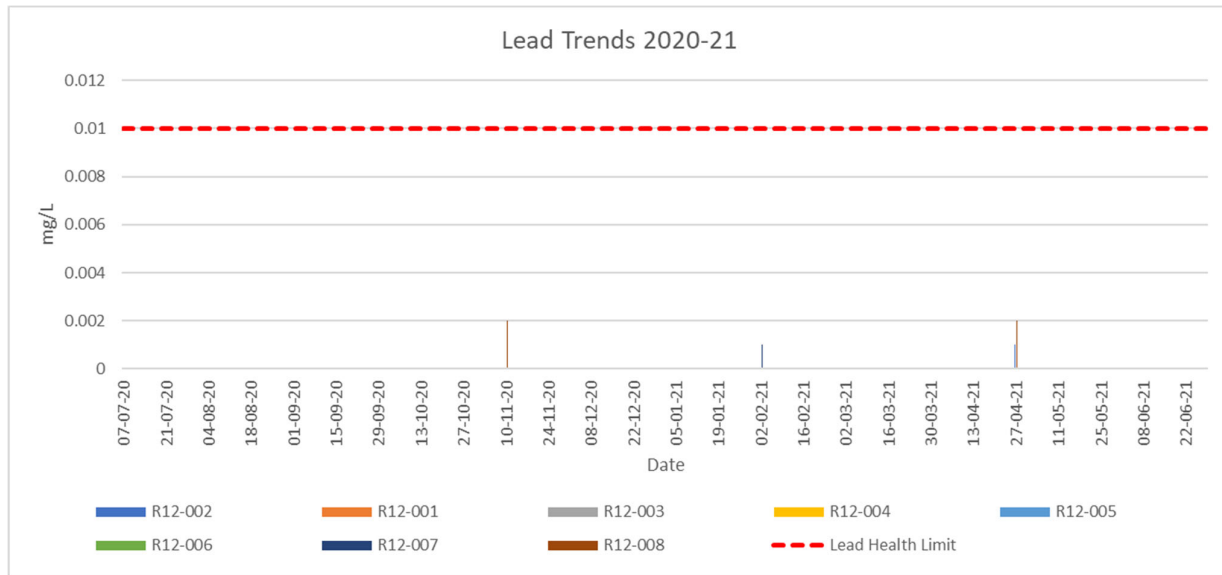
There were no detects for the following analytes during the reporting period, therefore there are no graphs for these analytes.

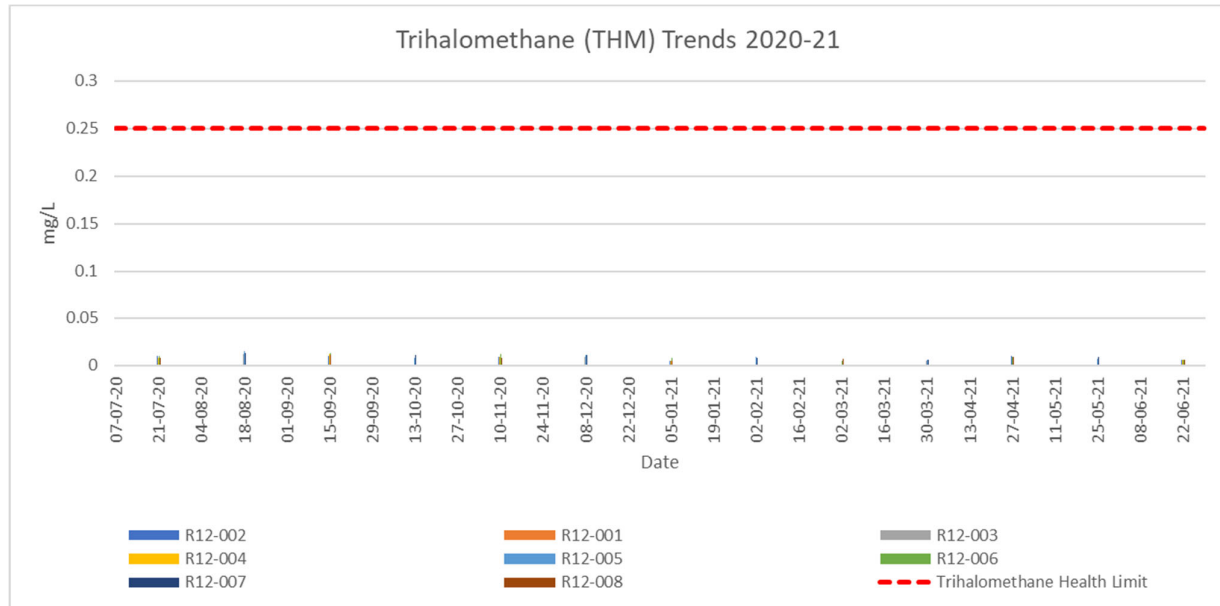
- Antimony,
- Cadmium,
- Manganese,
- Nickel,
- Nitrite





NOTE: Rottnest Island does not have a fluoridated drinking water system.





14.3 ADWG Sample Point Graph Summaries (Aesthetic)

There were no detects for aluminium or sulphide during the reporting period, therefore there are no graphs for these analytes.

