



Quarterly Drinking Water Report to the Department of Health by the Rottnest Island Authority

1 October – 31 December 2023





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1. Water Provider Information

Rottnest Island Authority Contact Details			
Name of Company	Rottnest Island Authority		
Company Address	1 Mews Road, Fremantle WA 6160		
Company Phone	Ph. (08) 9432 9300	Fax	(08) 9432 9301
Company Website	www.rottnestisland.com		
Company Email	enquiries@rottnestisland.com		
Executive Director	Jason Banks		
Director Environment Heritage and Parks	Arvid Hogstrom		
Director Infrastructure	Martin Marerwa		
Manager Environment and Compliance	Rebecca Gabbitus		
Quality and Compliance Officer (PFM)	Jason Vogel		

1.1 System Information

1.1.1 Consumers

The water demand on Wadjemup / Rottnest Island is related to tenancy and is highly seasonal, being low in winter and high in summer. During the 2022-2023 reporting period there were 729,588 visitors to the Island.

During October 2023, a total of 65,767 ferry visitor numbers were recorded with 84,305 in November 2023. Visitor numbers were not available for December 2023 at the time of reporting.

The number of beds on Rottnest Island for guests is approximately 4,320, with the average length of stay being 2 nights. In addition to this, there are approximately 150 permanent residents on Wadjemup / Rottnest Island, which also fluctuates in accordance with high and low seasons.

1.1.2 Distribution System & Water Supply

The Rottnest Island distribution system is relatively small, consisting of approximately 22 km of mains. Water is supplied by six saline (seawater) bores located in the Longreach Borefield. Water abstracted from the saline bores feed into the desalination plant, where reverse osmosis (RO) occurs. Desalinated water is then disinfected through a dual chlorination system, which ensures the provision of safe drinking water to Rottnest Island customers.

The water demand on Rottnest Island is becoming more consistent throughout the year with reduced seasonal variability. Monthly consumption can range from approximately 14,000kL in July to 24,000kL in December.

Consumption levels for October 2023 were 18,635 kL, with 17,849 kL in November 2023 and 20,100 kL in December 2023. During the summer months an additional RO train is used to provide more potable water.

Rottnest Island has a combined storage capacity of 14,000 kL, which provides approximately 22 days of potable water storage at full capacity, however, water security is targeted at a minimum of seven days storage during peak periods. During November 2023 there was a substantial reduction in the volume of potable water stored in all tanks due to the failure of two RO trains at the desalination plant. This is detailed further in section 9.4.2 of this report. At the time of reporting the desalination plant is nearing its end of life with three RO trains operational producing 660 m³ of potable water per day.

Remote locations outside the main settlement, such as the outer island ablutions, Wadjemup Lighthouse and surrounding area, are supplied with water via a tanker. The supplied water in these areas is deemed not suitable for drinking and warning signs are posted accordingly.



Figure 1 Example of Public Signage

1.1.3 Sampling Schedule & Procedure

Potable water sampling is carried out in accordance with the Australian Drinking Water Guidelines (ADWG) and is scheduled in accordance with the Rottnest Island *Drinking Water Quality Risk Management Plan* dated November 2022.

To respond to emerging trends, and to further ensure the safety of the drinking water quality, further monitoring or adjustment of the schedule can occur in response to:

- Risk assessment;
- New information or industry best practice;
- Guidance or specialist recommendations from Government Departments; or
- Post incident.

In addition to the sampling regime presented in the *Drinking Water Quality Risk Management Plan (2022)*, the Rottnest Island Authority (RIA) are additionally testing:

- Tanks 4 and 7, however, the data does not form part of the statistical data required for analysis in this quarterly report.
- Drinking water fountains, as recommended by the Department of Health (DoH) in 2017.

- Bromate, following testing for additional minerals and metals in 2017. Bromate was identified, and weekly sampling occurs to monitor the results.

2. Performance Summary

Summary of Water Quality results compared to the ADWG October - December 2023			
Parameters	No. of Analyses	No. of Analyses Complying with ADWG	No. of ADWG exceedance events
Microbial			
Bacterial (<i>E.coli</i>)	57 ¹	57	0
Thermotolerant Coliforms	57 ²	57	0
Thermophilic Amoebae	24 ³	24	0
Amoeba (Thermophilic <i>Naegleria</i>)	24 ⁴	24	0
Chemical & Physical			
Health	294 ⁵	293	1
Aesthetic	368 ⁶	264	104
Radiological			
Gross Alpha	8	8	0
Gross Beta	8	8	0

¹ This number does not include Tank 7

² Ibid

³ Ibid

⁴ Ibid

⁵ Ibid

⁶ Ibid



3. Microbial Performance

During the October to December 2023 reporting period, there were no reported exceedances of microbiological parameters compared against the ADWG in the potable water distribution system.

3.1 Microbial – Compliance Summary

Rottnest Island Distribution System October - December 2023				
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	57	57	100%
Thermotolerant Coliforms	Non-Detect	57	57	100%
Amoeba				
Thermophilic Amoebae	Non-Detect	24	24	100%
Thermophilic <i>Naegleria</i>	Non-Detect	24	24	100%

4. Chemical: Health Related Performance

During the October - December 2023 reporting period there was one result reported in exceedance of the chemical health parameters outlined in the ADWG in the potable water distribution system, the details of which are outlined in Section 4.3.

4.1 Chemical: Health Related – Compliance Summary

Rottneest Island Distribution System October - December 2023					
Health Parameter	ADWG Compliance Criteria (mg/L)	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	Max Value of Analysis (mg/L)
Antimony (Sb)	0.003	24	24	100%	< 0.001
Bromate (BrO ₃ ⁻)	0.02	104	103	99%	0.021
Chlorine Total (Cl ₂) <i>(in house testing Total Residual)</i>	5	104	104	100%	1.76
Copper (Cu)	2	4	4	100%	0.012
Fluoride (F)	1.5	24	24	100%	0.40
Lead (Pb)	0.01	4	4	100%	< 0.001
Nickel (Ni)	0.02	4	4	100%	< 0.001
Nitrate (NO ₃ ⁻)	50	4	4	100%	0.010
Nitrite (NO ₂ ⁻)	3	11	11	100%	< 0.02
Trihalomethanes (THMs)	0.25	11	11	100%	0.069

4.2 Chemical: Health Related – Exception Notifications

Chemical: Health Related Water Quality Exceptions October - December 2023							
Date	Chemical Characteristic	Memorandum of Understanding Alert Level	Level reported	Sample Location	Remedial Action	Department of Health Notified	Close Out Date
3 October 2023	Bromate	0.020 mg/L	0.021 mg/L	R12-007 (Geordie Bay)	<ul style="list-style-type: none"> Flushing at the offending and surrounding sample points. Resampling until bromate was within limit. 	Yes	17 October 2023

4.3 Chemical: Health Related Incident Specific Information

There was one exceedance event noted during this reporting period. Bromate exceeded the routine monitoring parameters set in the Memorandum of Understanding (MOU) and agreed between the RIA and DoH for Rottnest Island on one occasion.

The sample was collected at R12-007 (Geordie Bay) on 3 October 2023. The date of reporting by the laboratory was 9 October 2023 and the date of notification to DoH was 10 October 2023. As per Drinking Water Response Protocol 10 for Chemical Exceedance the following actions took place;

- The sample was verified with the laboratory.
- On 10 October 2023 the water was flushed from a nearby flush point as per the Rottnest Island flushing plan and the Rottnest Island Bromate Remediation Plan.
- Investigation of the water supply line was carried out to determine if water had been sitting in the pipe work for a prolonged period, potentially enabling the formation of bromate.
- Resampling took place on 10 October 2023 at R12-007 and every other distribution sample point as part of the weekly sampling schedule. There were no exceedances of bromate in any of the samples.
- Critical Control Points (Desalination RO membranes and chlorination stations) were then checked and were operating within the prescribed critical control limits.

After being reported the DOH decided to round down to 0.020 mg/L bringing the result within the ADWG limit for bromate.

5. Chemical: Aesthetic Performance

5.1 Chemical: Aesthetic - Compliance Summary

During the October - December 2023 reporting period, there were 107 sample exceedances of chemical aesthetic parameters in the potable water distribution system, the details of which are outlined in Section 5.2.

Rottnest Island Distribution System October - December 2023					
Aesthetic Parameter	ADWG (mg/L unless stated)	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	Max Value of Analysis (mg/L)
Aluminium (Al)	0.2	3	3	100%	< 0.05
Ammonia (NH ₃)	0.5	11	11	100%	0.06
Chloride (Cl ⁻)	250	1	1	100%	110
Chlorine Free Residual (Cl) <i>(in house testing)</i>	0.6	104	1	1%	1.69
Colour	15 (HU)	7	7	100%	< 5
Hardness (CaCO ₃)	200	1	1	100%	43
Hydrogen Sulphide	0.05	4	4	100%	< 0.05
Iron (Fe)	0.3	24	20	80%	1.1
pH	6.5 – 8.5	104	104	100%	7.00, 8.04 ⁷
Sodium (Na)	180	104	104	100%	120
Sulphate	250	1	1	100%	1.10
TDS	600	1	1	100%	260
Turbidity	5 (NTU)	7	7	100%	0.8 (NTU)
Zinc (Zn)	3	4	4	100%	0.028

⁷ The two numbers represent the lowest and the highest pH values measured respectively.

5.2 Chemical: Aesthetic – Incident Specific Information

- **Chlorine (free):** During this reporting period, 103 out of 104 recorded samples were reported with chlorine values above the ADWG aesthetic limit of 0.6 mg/L.

The ADWG state 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 all values are below the specific health guideline value of 5.0 mg/L.

The aesthetic exceedances were reported across multiple distribution sampling points over the three-month period. All results were reported well below the health limit, with the maximum value of 1.69 mg/L reported at one sampling point on 5 December 2023.

Whilst impacts to the 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.

- **Iron:** There were four values in exceedance of the ADWG aesthetic limit of 0.30 mg/L. No health limit is currently available in the ADWG. The exceedances were recorded at the following dates and locations:
 - 24 October 2023: 0.82 mg/L at R12-008
 - 05 December 2023: 0.33 mg/L at R12-005
 - 05 December 2023: 0.86 mg/L at R12-008
 - 19 December 2023: 1.10 mg/L at R12-008



6. Radiological Performance

Date	Radiological Characteristic	No. of Analyses	No. of Analyses Complying with Australian Drinking Water Guidelines	% Compliance with Australian Drinking Water Guidelines	Max Value of Analysis (Bq/L)
24 October 2023	Gross Alpha	8	8	100%	0.041 ±0.03 ⁸
24 October 2023	Gross Beta	8	8	100%	< 0.078

⁸ This number indicates that the primary value of 0.041 is accurate to plus or minus 0.030 Bq/L

7. Planned Sample Summary

7.1 Planned Sample – Compliance Summary

Planned Samples October - December 2023								
Microbial			Chemical			Radiological		
Planned ⁹	Taken ¹⁰	% Taken	Planned	Taken	% Taken	Planned	Taken	% Taken
162	162	100%	670	670	100%	8	8	100%

7.2 Planned Sample - Exception Notifications

Nothing to Report.

⁹ A planned sample is defined as being included in the sampling schedule for this reporting period.

¹⁰ A taken sample in the physical sample taken for this reporting period.



8. Customer Complaints

Nothing to Report.



9. Comments

9.1 Bromate Management

The RIA continues to monitor and manage bromate formation across the distribution network based on the decision from the Quarterly Meeting held between the RIA, PFM and DoH on 26 September 2019. Bromate is tested weekly at locations R12/001 – R12/008, Tank 4 and the Homestead. Bromide is tested weekly at Tank 7.

The ADWG has a health limit of 0.020 mg/L for Bromate. There was one bromate exceedance event at routine sampling locations during this reporting period, which was at R12-007 on 3 October 2023 as outlined in Section 4.3. See Section 9.4 for information on bromate exceedance events at the Homestead.

9.2 Drinking Fountain Monitoring Initiative

The RIA commenced a drinking fountain monitoring initiative in December 2017 following a recommendation from DoH. Results obtained from the sampling program supported the island's drinking fountain replacement project, which included the replacement of all existing drinking fountains and the addition of new amenities around the settlement. There are currently 11 drinking fountains on the island with one new fountain installed at Longreach in November 2023.

The drinking fountain monitoring program and sampling results are reported separately to the distribution system or network. The drinking fountain results are represented in the below table for the October – December 2023 quarter. Drinking fountain sampling occurs once every four weeks. There was one exceedance event during this reporting period as discussed in section 9.2.1.

Rottneest Island Drinking Fountain October - December 2023					
Health Characteristic	ADWG (mg/L)	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	Max Value of Analysis (mg/L)
Antimony (Sb)	0.003	62	62	100%	< 0.001
Cadmium (Cd)	0.002	62	62	100%	< 0.0001
Copper (Cu)	2	62	62	100%	0.110
Lead (Pb)	0.010	62	62	100%	0.003
Nickel (Ni)	0.02	62	61	98%	0.024
Aesthetic Characteristic	ADWG (mg/L)	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	Max Value of Analysis (mg/L)
Zinc (Zn)	3	62	62	100%	0.150

9.2.1 Drink Fountain Exemption Notifications

There was one exceedance event during this reporting period for nickel at the Campground drink fountain in a sample taken on 17 October 2023. The result was reported by the laboratory on 26 October 2023. In line with the Drinking Water Response Protocols the following actions took place in response:

- The sample was verified with the laboratory.
- Investigation of the drink fountain components for corrosion or if they need replacement, however this is unlikely given this fountain was installed in July 2023.
- Investigation into the properties of the fountain components commenced to see if they met the Watermark standard.
- No re-sampling was carried out as the second flush returned a nickel concentration of 0.0020 mg/L, well below the ADWG limit of 0.02 mg/L.
- Nickel was not detected anywhere in the distribution network in the next routine samples taken on 21 November 2023.
- The manufacturer of the drinking fountains confirmed that the components meet the Watermark standard, contain no nickel and were not corroded.
- Critical Control Points (Desalination RO membranes and chlorination stations) were then checked and were operating within the prescribed critical control limits.

9.3 Ad Hoc Monitoring

There was one ad hoc sample taken from the newly installed drink fountain at Longreach, testing for heavy metals before being made accessible to the public. The results are presented below, with no exceedances reported.

Client Sample ID			Longreach Fountain 1	Longreach Fountain 2
Sample Matrix			Water	Water
Eurofins Sample No.			L23- No0016511	L23- No0016512
Date Sampled			Nov 07, 2023	Nov 07, 2023
Test/Reference	LOR	Unit		
Heavy Metals				
Antimony	0.001	mg/L	< 0.001	< 0.001
Cadmium	0.0001	mg/L	< 0.0001	< 0.0001
Copper	0.001	mg/L	< 0.001	< 0.001
Lead	0.001	mg/L	< 0.001	< 0.001
Nickel	0.001	mg/L	< 0.001	0.001
Zinc	0.005	mg/L	0.020	0.030

Note – Longreach Fountain 1 is the first flush sample and Longreach Fountain 2 is the second flush sample.

9.4 Other Sampling

9.4.1 Homestead

PFM commenced monthly sampling of a potable water storage tank installed at the Rottnest Island Homestead shortly after its installation in November 2022. Currently the Homestead water tank is sampled weekly for bromate and monthly for microbiological parameters.

During the reporting period there were six bromate exceedances reported at the Homestead Water storage tank. In accordance with the Rottnest Island Flushing Plan and the Drinking Water Emergency Response Protocol 10, the following actions took place after every exceedance event was reported:

- The tank was flushed until empty upon receiving the laboratory report.
- Monitoring of weekly samples continued.
- CCPs were checked. The reverse osmosis and chlorination stations were all performing within desired limits.

Previous investigations into bromate exceedances have concluded that prolonged retention of chlorinated water increases bromate concentration. The Homestead is at the furthest limit of the distribution network so the water that arrives there has had a relatively long retention time in the pipework. This is made worse because the Homestead is now the only point of supply on the gravity fed water line since Kingstown was disconnected and connected to the pressure main.

Given the continuation of bromate exceedances reported at the homestead during the reporting period, “Do Not Drink” signs were placed within the Homestead building at all water outlets and a mobile water trailer containing potable water was mobilised to the Homestead to provide drinking water.

The “Do not Drink” signs remain in place until Bromate concentrations return below ADWG concentrations for two consecutive sampling rounds. Investigations into remedial actions to improve the water supply are currently underway.

Other Sampling Exceedances				
October - December 2023				
Date	Location	Parameter	Australian Drinking Water Guideline limit	Result
10 October 2023	Homestead	Bromate	0.020 mg/L	0.025 mg/L
17 October 2023				0.023 mg/L
24 October 2023				0.027 mg/L
12 December 2023				0.034 mg/L
13 December 2023				0.036 mg/L
19 December 2023				0.038 mg/L
27 December 2023				0.025 mg/L

9.4.2 Supplemental Groundwater

From 18 October 2023 to 28 November 2023 groundwater from the Wadjemup Borefield was used to supplement the supply of potable water on the Island due to a failure in two of the desalination treatment trains. Samples were taken on 10, 18 and 27 October 2023 from the Borefield inlet to Tank 7. The results are presented below, with no exceedances detected in any sample. The analytes tested served to gather additional background information on the source water quality, consistent with the risk assessment methodology outlined in the Australian Drinking Water Guidelines V3.8.

Electrical Conductivity (EC), Total dissolved solids, pH and temperature were also measured weekly with hand-held meters in the field. If EC was reported above 1,850 $\mu\text{s}/\text{cm}$, then testing was increased to twice weekly. If EC reported above 2,000 $\mu\text{s}/\text{cm}$ at any bore then abstraction would cease.

Client Sample ID			Borefields
Sample Matrix			Water
Eurofins Sample No.			L23- Oc0021084
Date Sampled			Oct 10, 2023
Test/Reference	LOR	Unit	
Microbiology			
Total Coliforms ^{N19}	1	CFU/100mL	1
Faecal (Thermotolerant) Coliforms ^{N19}	1	CFU/100mL	< 1
E. Coli ^{N19}	1	CFU/100mL	< 1

Client Sample ID			Tank 7 Inlet Water
Sample Matrix			
Eurofins Sample No.			L23-Oc0040908
Date Sampled			Oct 18, 2023
Test/Reference	LOR	Unit	
Conductivity			
	10	uS/cm	1300
pH			
	0.1	pH Units	7.0
Total Dissolved Solids			
	5	mg/L	780
Heavy Metals			
Antimony	0.001	mg/L	< 0.001
Cadmium	0.0001	mg/L	< 0.0001
Copper	0.001	mg/L	0.004
Lead	0.001	mg/L	< 0.001
Nickel	0.001	mg/L	0.002
Zinc	0.005	mg/L	< 0.005
Amoeba			
Thermophilic Amoebae ^{N19}	D/ND	/250mL	Not Detected
Thermophilic Naegleria sp. ^{N19}	D/ND	/250mL	Not Detected
Naegleria fowleri ^{N19}	D/ND	/250mL	Not Detected

Client Sample ID			Tank 7 Inlet Water
Sample Matrix			
Eurofins Sample No.			L23-Oc0066829
Date Sampled			Oct 27, 2023
Test/Reference	LOR	Unit	
Conductivity			
	10	uS/cm	1300
pH			
	0.1	pH Units	8.3
Total Dissolved Solids			
	5	mg/L	630
Amoeba			
Thermophilic Amoebae ^{N19}	D/ND	/250mL	Not Detected
Thermophilic Naegleria sp. ^{N19}	D/ND	/250mL	Not Detected
Naegleria fowleri ^{N19}	D/ND	/250mL	Not Detected