



Quarterly Drinking Water Report to WA Health by the Rottnest Island Authority

1 July – 30 September 2023





Contents

1. Water Provider Information	3
1.1 System Information.....	3
1.1.1 Consumers	3
1.1.2 Distribution System & Water Supply	3
1.1.3 Sampling Schedule & Procedure	4
2. Performance Summary	5
3. Microbial Performance	6
3.1 Microbial – Compliance Summary	6
3.2 Microbial – Exception Notifications.....	6
3.3 Microbial Incident Specific Information.....	6
4. Chemical: Health Related Performance.....	8
4.1 Chemical: Health Related – Compliance Summary	8
4.2 Chemical: Health Related – Exception Notifications	9
4.3 Chemical: Health Related Incident Specific Information.....	9
5. Chemical: Aesthetic Performance	11
5.1 Chemical: Aesthetic - Compliance Summary	11
5.2 Chemical: Aesthetic – Incident Specific Information	12
6. Radiological Performance	13
7. Planned Sample Summary	14
7.1 Planned Sample – Compliance Summary.....	14
7.2 Planned Sample - Exception Notifications	14
8. Customer Complaints.....	15
9. Comments.....	16
9.1 Bromate Management.....	16
9.2 Drinking Fountain Monitoring Initiative.....	16
9.2.1 Drink Fountain Exemption Notifications.....	18
9.3 Ad Hoc Monitoring	18
9.4 Other Sampling.....	19



1. Water Provider Information

Rottnest Island Authority Contact Details			
Name of Company	Rottnest Island Authority		
Company Address	1 Mews Road, Fremantle WA 6160		
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Company Email	enquiries@rotnnestisland.com		
Executive Director	Jason Banks		
Director Environment Heritage and Parks	Arvid Hogstrom		
Director Infrastructure	Martin Marerwa		
Environment and Compliance Manager (RIA)	Rebecca Gabbitus		
Quality and Compliance Officer (PFM)	Jason Vogel		

1.1 System Information

1.1.1 Consumers

The water demand on Rottnest Island is related to tenancy and is highly seasonal, being low in winter and high in summer. Historical data indicates that over 500,000 visits are typically made to Rottnest Island on a yearly basis.

During July 2023, a total of 32,353 ferry visitor numbers were recorded with 36,829 in August 2023. Visitor numbers were not available for September 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 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.

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 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 during this reporting period were 15,664kL in July 2023, 16,226kL in August 2023 and 15,521kL in September 2023.

Rottnest Island has a combined storage capacity of 14,000kL, 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.

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 (WAHealth) 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 July - September 2023			
Parameters	No. of Analyses	No. of Analyses Complying with ADWG	No. of ADWG exceedance events
Microbial			
Bacterial (<i>E.coli</i>)	59 ¹	59	0
Thermotolerant Coliforms	59 ²	59	0
Thermophilic Amoebae	27 ³	27	0
Amoeba (Thermophilic <i>Naegleria</i>)	27 ⁴	27	0
Chemical & Physical			
Health	215 ⁵	213	2
Aesthetic	379 ⁶	273	106
Radiological			
Gross Alpha	0	0	0
Gross Beta	0	0	0

¹ This number does not include Tank 7

² Ibid

³ Ibid

⁴ Ibid

⁵ Ibid

⁶ Ibid

3. Microbial Performance

During the July to September 2023 reporting period, there were no reported exceedances of microbiological parameters compared against the ADWG in the potable water distribution system, although Tank 5 reported a microbial exceedance on 19 September 2023, which is discussed in Section 3.2 and 3.3.

3.1 Microbial – Compliance Summary

Rottnest Island Distribution System July - September 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	59	59	100%
Thermotolerant Coliforms	Non-Detect	59	59	100%
Amoeba				
Thermophilic Amoebae	Non-Detect	27	27	100%
Thermophilic <i>Naegleria</i>	Non-Detect	27	27	100%

3.2 Microbial – Exception Notifications

Date	Microbial Characteristic	Memorandum of Understanding Alert Level	Remedial Action	Department of Health Notified	Close Out Date
19 September 2023	Heterotrophic Plate Count (HPC)	NA	Ensure that free chlorine concentration at sample point is > 0.5 mg/L and continued monitoring of HPC.	Yes	26/09/23

3.3 Microbial Incident Specific Information

The RIA undertakes testing of HPC within the distribution system as a measure of the cleanliness of the system. Under the ADWG there is no assessment level for HPC, and it is only used as an indicator to prompt further investigation where the presence of increased concentrations of HPC are identified and persists.



During the reporting period, on 19 September 2023 the HPC at R12-001 (Tank 5) reported at 1,700 CFU/100ml. All other samples including Tank 4 and Tank 5 reported microbiological results below the laboratory limit of reporting. In line with the Drinking Water Response Protocols the following actions took place:

- Free chlorine concentration was confirmed to be 1.48 mg/L at the time of sampling, as measured by a chlorine sensor at the Tank 5 Pump House.
- Historical free chlorine levels were checked and confirmed to have been persistently above 0.5 mg/L at Tank 5 and the surrounding sample points.
- Subsequent monitoring on 26 September 2023 reported a HPC concentration at Tank 5 below the limit of reporting of 20 CFU/100mL.
- Further HPC detections were not recorded and the incident was closed out on 26 September 2023.

4. Chemical: Health Related Performance

During the July - September 2023 reporting period there were two results 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

Rottnest Island Distribution System July - September 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	102	98%	0.025
Chlorine Total (Cl ₂) <i>(in house testing Total Residual)</i>	5	104	104	100%	1.65
Copper (Cu)	2	8	8	100%	0.009
Fluoride (F)	1.5	24	24	100%	0.2
Lead (Pb)	0.01	8	8	100%	< 0.001
Nickel (Ni)	0.02	8	8	100%	< 0.001
Nitrate (NO ₃ ⁻)	50	3	3	100%	< 0.02
Nitrite (NO ₂ ⁻)	3	6	6	100%	< 0.02
Trihalomethanes (THMs)	0.25	10	10	100%	0.015

4.2 Chemical: Health Related – Exception Notifications

Chemical: Health Related Water Quality Exceptions July – September 2023							
Date	Chemical Characteristic	Memorandum of Understanding Alert Level	Level reported	Sample Location	Remedial Action	Department of Health Notified	Close Out Date
1 August 2023	Bromate	0.02 mg/L	0.025 mg/L	R12-005 (South Thompson)	<ul style="list-style-type: none"> Flushing at the offending and surrounding sample points. Resampling until bromate was within limit. 	Yes	8 August 2023
15 August 2023	Bromate	0.02 mg/L	0.022 mg/L	R12-005 (South Thompson)	<ul style="list-style-type: none"> Flushing at the offending and surrounding sample points. Resampling until bromate was within limit. 	Yes	22 August 2023

4.3 Chemical: Health Related Incident Specific Information

There were two exceedance events noted during this reporting period. Bromate exceeded the routine monitoring parameters set in the Memorandum of Understanding (MOU) and agreed between the RIA and WAHealth for Rottnest Island on two occasions.

One sample was collected at R12-005 (South Thompson) on 1 August 2023. The date of reporting by the laboratory was 8 August 2023 and the date of notification to WAHealth was 8 August 2023. As per the Drinking Water Response Protocols the following actions took place;

- The sample was verified with the laboratory.
- On 9 August 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 the pipe work for a prolonged period, potentially enabling the formation of bromate.
- Resampling took place on 8 August 2023 at R12-005 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.



The other sample was also collected at R12/005 (South Thompson) on 15 August 2023. The date of reporting by the laboratory was 24 August 2023 and the date of notification to WAHealth was 24 August 2023. As per the Drinking Water Response Protocols the following actions took place.

- The sample was verified with the laboratory.
- On 25 August 2023 the water was flushed from a nearby flush point as per the Rottneest Island flushing plan and the Rottneest 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. This is done by reviewing the water flow rates coming from the water main that feeds all dwellings near sample R12-005 using an online monitoring platform. At the time of the bromate detection the flow rates were consistent with previous weeks, indicating that water had not spent a prolonged period of time in the pipe work.
- Resampling took place on 22 August 2023 at R12-005 and every other distribution sample point as part of the weekly sampling schedule. There were no exceedances of bromate in any of the samples.
- Further weekly sampling on 29 August 2023 also reported no exceedances in bromate.
- Critical Control Points (Desalination RO membranes and chlorination stations) were then checked and were operating within the prescribed critical control limits.

5. Chemical: Aesthetic Performance

5.1 Chemical: Aesthetic - Compliance Summary

During the July - September 2023 reporting period, there were 106 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 July - September 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	10	10	100%	< 0.05
Ammonia (NH ₃)	0.5	6	6	100%	< 0.02
Chloride (Cl ⁻)	250	1	1	100%	170
Chlorine Free Residual (Cl) <i>(in house testing)</i>	0.6	104	0	0%	1.51
Colour	15 (HU)	6	6	100%	< 5
Hardness (CaCO ₃)	200	1	1	100%	17
Hydrogen Sulphide	0.05	3	3	100%	< 0.05
Iron (Fe)	0.3	24	22	92%	2.40
pH	6.5 – 8.5	104	104	100%	6.47, 8.50 ⁷
Sodium (Na)	180	104	104	100%	110
Sulphate	250	1	1	100%	2.0
TDS	600	1	1	100%	300
Turbidity	5 (NTU)	6	6	100%	0.2 (NTU)
Zinc (Zn)	3	8	8	100%	0.037

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, 104 out of 104 recorded samples were reported with chlorine values above the ADWG aesthetic limit of 0.6mg/L.

The ADWG state that chlorine has an aesthetic odour threshold of 0.6mg/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 5.0mg/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 1.51 mg/L reported at one sampling point on 19 September 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 two 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:
 - 26 September 2023: Two detections, one of 2.40 mg/L at R12-005 and one of 1.00 mg/L at R12-006



6. Radiological Performance

Nothing to report.



7. Planned Sample Summary

7.1 Planned Sample – Compliance Summary

Planned Samples July - September 2023								
Microbial			Chemical			Radiological		
Planned ⁸	Taken ⁹	% Taken	Planned	Taken	% Taken	Planned	Taken	% Taken
172	172	100%	694	694	100%	0	0	NA

7.2 Planned Sample - Exception Notifications

Nothing to Report.

⁸ A planned sample is defined as being included in the sampling schedule for this reporting period.

⁹ 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 WAHealth on 26 September 2019. Bromate is tested weekly at locations R12/001 – R12/008 and Tank 4. Bromide is tested weekly at Tank 7.

The ADWG has a health limit of 0.020 mg/L for Bromate. There were two bromate exceedance events at routine sampling locations during this reporting period. The first was at R12-005 on 1 August 2023, the second was also at R12-005 on 15 August 2023. See Section 9.4 for information on bromate exceedance events at Homestead.

9.2 Drinking Fountain Monitoring Initiative

The RIA commenced a drinking fountain monitoring initiative in December 2017 following a recommendation from WAHealth. 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 10 drinking fountains on the island with two new fountains installed at Kingstown Barracks and at the Campground in July 2023.

The drinking fountain monitoring program and sampling results are reported separately to the distribution system or network, which are represented below. The drinking fountain results are represented in the below table for the July – September 2023 quarter. Drinking fountain sampling occurs once every four weeks. There was one exceedance event during this reporting period for lead at the Pedal and Flipper drink fountain in a sample taken on 25 July 2023. The response is detailed in Section 9.2.1.



Rottneest Island Drinking Fountain July - September 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	48	48	100%	< 0.001
Cadmium (Cd)	0.002	48	48	100%	0.0001
Copper (Cu)	2	48	48	100%	0.24
Lead (Pb)	0.010	48	47	98%	0.012
Nickel (Ni)	0.02	48	48	100%	0.009
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	48	48	100%	0.57



9.2.1 Drink Fountain Exemption Notifications

There was one exceedance event during this reporting period for lead at the Pedal and Flipper drink fountain in a sample taken on 25 July 2023. The result was reported by the laboratory on 1 August 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.
- Investigation into the properties of the fountain components commenced to see if they met the Watermark standard and contained any lead products.
- Resampling took place on 3 August 2023 at the Pedal and Flipper Fountains as well as R12-003 and R12-005 distribution sample points. These locations are the closest ones to that fountain. The samples were taken using the 30MS sampling methodology. There were no exceedances in lead in the samples. The results are presented in Section 9.3.
- The manufacture of the drinking fountains confirmed that the components meet the Watermark standard, contain no lead and were not corroded.
- Sampling at all distribution sample points on 15 August 2023 also returned no exceedances of lead.
- 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 as part of the response to the lead exceedance at the Pedal and Flipper drink fountain as mentioned in Section 9.3. The results are presented below with no exceedances in lead reported.

Client Sample ID			P & F First Water	P & F Second Water	R12/003 Water	R12/005 Water
Sample Matrix			L23-Au0009426	L23-Au0009427	L23-Au0009428	L23-Au0009429
Eurofins Sample No.			Aug 03, 2023	Aug 03, 2023	Aug 03, 2023	Aug 03, 2023
Date Sampled						
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.001	mg/L	0.006	< 0.001	0.009	0.001

Three ad hoc samples were also taken from the Basin drinking fountain, Basin Ablution Block and the Basin Beach Shower on 28 August 2023 following a detect of lead at 0.005 mg/L in the Basin drinking fountain sample taken on 15 August 2023. No exceedances were reported with the maximum lead concentration of 0.001 mg/L reported. The results are presented below.

Client Sample ID			Basin 1 (New)	Basin 2 (New)	Mall 1	Mall 2
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			L23- Au0039283	L23- Au0039284	L23- Au0039285	L23- Au0039286
Date Sampled			Aug 15, 2023	Aug 15, 2023	Aug 15, 2023	Aug 15, 2023
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Cadmium	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Copper	0.001	mg/L	0.21	0.22	< 0.001	< 0.001
Lead	0.001	mg/L	0.005	0.005	< 0.001	< 0.001
Nickel	0.001	mg/L	0.006	0.007	< 0.001	< 0.001
Zinc	0.005	mg/L	0.32	0.33	0.030	0.030

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

Client Sample ID			Basin DF	Ablution Block Tap	Shower
Sample Matrix			Water	Water	Water
Eurofins Sample No.			L23- Au0070756	L23- Au0070757	L23- Au0070758
Date Sampled			Aug 28, 2023	Aug 28, 2023	Aug 28, 2023
Test/Reference	LOR	Unit			
Heavy Metals					
Lead	0.001	mg/L	< 0.001	0.001	0.001

One ad hoc sample was taken from the Homestead water storage tank on 21 September 2023 in response to an exceedance of bromate at 0.024 mg/L from a sample taken on 12 September 2023 and reported on 20 September 2023. Bromate continued to report in exceedance at 0.024 mg/L. The laboratory report was received on 29 September 2023. The response to this exceedance is detailed in section 9.4.

Ad Hoc Monitoring Exceedances July - September 2023				
Date	Location	Parameter	Australian Drinking Water Guidelines	Result
21 September 2023	Homestead	Bromate	0.020 mg/L	0.024 mg/L

9.4 Other Sampling

PFM commenced monthly sampling of a potable water storage tank installed at the Rottne 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 seven bromate exceedances reported at the Homestead Water storage tank. In accordance with the Rottne 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.

Four activated carbon filters were installed on 16 August 2023 on the water line supplying the Homestead from the water storage tanks. After this, there was an initial decrease in bromate concentration reported at 0.013 mg/L on 22 August 2023, 0.015 mg/L on 29 August 2023 and 0.0180 mg/L on 5 September 2023. However, the filters have proven ineffective at reducing bromate with all subsequent samples for the reporting period reporting above 0.020 mg/L.

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, which can't be avoided. As a preventative measure the tank will be periodically flushed to reduce the retention time of the water within it.

Given the continuation of bromate exceedances reported at the homestead during the reporting period, on 29 September 2023 "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 is currently underway.

Other Sampling Exceedances				
July - September 2023				
Date	Location	Parameter	Australian Drinking Water Guideline limit	Result
25 July 2023	Homestead	Bromate	0.020 mg/L	0.023 mg/L
1 August 2023				0.034 mg/L
8 August 2023				0.039 mg/L
15 August 2023				0.045 mg/L
12 September 2023				0.024 mg/L
19 September 2023				0.025 mg/L
26 September 2023				0.022 mg/L