ROTTNEST ISLAND AUTHORITY

GOVERNMENT OF WESTERN AUSTRALIA

PROGRAMMED

Quarterly Drinking Water Report to the Department of Health

1 July – 30 September 2024

Contents

1. Water Provider Information

Rottnest Island Authority Contact Details	
Name of Company	Rottnest Island Authority
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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. A total of 35,855 ferry visitor numbers were recorded for July 2024 and 38,389 for August 2024. Arrival numbers were not available for September 2024 at the time of reporting.

The number of beds on Rottnest Island for guests is approximately 4,362 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 July 2024 were 13,361 kL, with 13,520 kL in August 2024 and 14,863 kL in September 2024.

Rottnest Island has a combined storage capacity of 14,000 kL, which provides approximately 18 days of potable water storage at full capacity, however, water security is targeted at a minimum of seven days storage during peak periods. At the time of reporting two trains in the desalination plant are nearing the end of life. Trains 1 and 2 are being refurbished and with the new Train 4 in operation the three RO trains are capable of producing 910 kL of potable water per day. The RIA has appointed a contractor to upgrade the existing desalination plant with two new 500 m3/day Sea Water Reverse Osmosis desalination trains. The design of the new desal plant has commenced and it is anticipated the construction phase will be completed by the end of 2025, in time for the start of the summer peak period on the island.

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 July - September 2024			
Parameters	**No. of Analyses**	**No. of Analyses Complying with ADWG**	**No. of ADWG exceedance events**
Microbial			
Bacterial (*E. coli*)	61[1]	61	0
Amoeba (Thermophilic *Naegleria)*	25[2]	25	0
Chemical & Physical			
Health	315[3]	311	4
Aesthetic	380[4]	265	115
Radiological[5]			
Gross Alpha	0	NA	NA
Gross Beta	0	NA	NA
PFAS			
PFOS & PFHxS	0	NA	NA
PFOA	0	NA	NA

[1] This number does not include Tank 7

[2] Ibid

[3] Ibid

[4] Ibid

[5] Not taken this reporting period

3. Microbial Performance

During the July - September 2024 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 July - September 2024				
Microbial Characteristic	**Memorandum of Understanding Compliance Criteria**	**No. of Analyses**	**No. of Analyses Complying with Memorandum of Understanding**	**% Compliance**
Bacterial				
E. coli	Non-Detect	61	61	100%
Amoeba				
Thermophilic *Naegleria*	Non-Detect	25	25	100%

4. Chemical: Health Related Performance

During the July - September 2024 reporting period there were four Bromate results reported as exceeding the chemical health parameters outlined in the ADWG in the potable water distribution system, the details of which are outlined in Section 4.2 and a detailed exceedance explanation provided in section 4.3

Section 4.1 provides an overall compliance summary for all Chemical health related sample analysis.

4.1 Chemical: Health Related – Compliance Summary

Rottnest Island Distribution System July - September 2024					
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	33	33	100%	< 0.001
Bromate ($BrO3^-$)	0.02	106	102	96%	0.080
Chlorine Total (Cl2) *(in house testing Total Residual)*	5	104	104	100%	1.73
Copper (Cu)	2	3	3	100%	0.046
Fluoride (F)	1.5	24	24	100%	0.40
Lead (Pb)	0.01	3	3	100%	< 0.001
Nickel (Ni)	0.02	3	3	100%	< 0.001
Nitrate ($NO3^-$)	50	3	3	100%	0.10
Nitrite ($NO2^-$)	3	10	10	100%	< 0.01
Trihalomethanes (THMs)	0.25	10	10	100%	0.021

4.2 Chemical: Health Related – Exception Notifications

Chemical: Health Related Water Quality Exceptions July - September 2024						
Date	**Chemical Characteristic**	**Memorandum of Understanding Alert Level**	**Level reported**	**Sample Location**	**Department of Health Notified**	**Close Out Date**
7 July 2024	Bromate	0.020 mg/L	0.058 mg/L	R12-007 (Geordie Bay)	Yes	13 August 2024
16 July 2024	Bromate	0.020 mg/L	0.059 mg/L	R12-007 (Geordie Bay)	Yes	13 August 2024
23 July 2024	Bromate	0.020 mg/L	0.080 mg/L	R12-007 (Geordie Bay)	Yes	13 August 2024
30 July 2024	Bromate	0.020 mg/L	0.063 mg/L	R12-007 (Geordie Bay)	Yes	13 August 2024

4.3 Chemical: Health Related Incident Specific Information

There were four exceedance events for bromate during the reporting period, all were reported during July 2024 at Geordie Bay sample point R12-007. The Geordie Bay units were not occupied because of renovation works being carried out at the time. The elevated concentrations in bromate at this location during July were likely a result of a significant reduction in water turnover through the pipe work in that location due to the lack of occupancy. Previous investigations into bromate exceedances have concluded that prolonged retention of chlorinated water in distribution pipes increases bromate formation.

As per Drinking Water Response Protocol 10 for Chemical Exceedance, the following actions took place after all four bromate exceedance events:

- The sample was verified with the laboratory.
- A do not drink notification was sent out to all relevant staff undertaking renovation works at Geordie Bay.
- Remedial flushing was initiated in accordance with the Rottnest Island Flushing Plan and the Island's Bromate Remediation Plan (PFM, 2018). For each exceedance event, the nearby flush point was flushed for 24 hours. Flushing then occurred weekly until bromate results were below the ADWG limit of 0.020 mg/L for two consecutive samples.
- An investigation of the water supply line was carried out which determined that water had been sitting in the pipe work for a prolonged period, enabling the formation of bromate.
- Resampling took place from the sample location where the exceedance was reported and at every other distribution sample point as part of the weekly sampling schedule.

- Critical Control Points (Desalination RO membranes and chlorination stations) were then checked and confirmed to be operating within the prescribed critical control limits (pH, chlorine, and turbidity sensors).
- Prior to commissioning and re-occupancy of the buildings on 18 September, samples were collected from five units across the Geordie Bay network in accordance with Incident Protocol #12 (Recommissioning of Buildings). Samples were taken on 23 August 2024, 4 September 2024 and 10 September 2024. The samples reported within the ADWG health limits and the event was closed out. No further bromate exceedance were reported.

5. Chemical: Aesthetic Performance

5.1 Chemical: Aesthetic - Compliance Summary

During the July - September 2024 reporting period, there were 115 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 2024					
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	2	67%	6.50
Ammonia (NH3)	0.5	10	10	100%	0.04
Chloride (Cl^-)	250	1	1	100%	140
Chlorine Free Residual (Cl) *(in house testing)*	0.6	104	0	0%	1.72
Colour	15 (HU)	6	6	100%	< 5
Hardness (CaCO3)	200	1	1	100%	18
Hydrogen Sulphide	0.05	3	3	100%	< 0.05
Iron (Fe)	0.3	35	25	71%	5.50
pH	6.5 – 8.5	104	104	100%	6.90, 8.41[6]
Sodium (Na)	180	105	105	100%	89
Sulphate	250	1	1	100%	2.40
TDS	600	1	1	100%	260
Turbidity	5 (NTU)	6	6	100%	1 (NTU)
Zinc (Zn)	3	0[7]	NA	NA	NA

[6] The two numbers represent the lowest and the highest pH values measured respectively.

[7] No analysis of zinc was carried out during the reporting period due to a scheduling oversight.

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 0.6 mg/L.
  The ADWG 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 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 1.72 mg/L reported at R12-008 (Nursery) on 30 July 2024.

  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 10 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:

  - 2 July 2024: 0.31 mg/L at R12-004
  - 2 July 2024: 1.20 mg/L at R12-007
  - 2 July 2024: 0.49 mg/L at R12-008
  - 30 July 2024: 5.50 mg/L at R12-005
  - 30 July 2024: 0.48 mg/L at R12-007
  - 30 July 2024: 0.42 mg/L at R12-008
  - 27 August 2024: 0.66 mg/L at R12-007
  - 27 August 2024: 1.80 mg/L at R12-008
  - 10 September 2024: 1.30 mg/L at R12-008
  - 24 September 2024: 0.61 mg/L at R12-005.

  Previous investigations into iron exceedances within the drinking water distribution system have ascertained that aging galvanised iron pipes remaining in sections throughout the distribution system can leach iron into water, especially where there is reduced throughput and longer residence times. This is especially evident at R12-008, which is located further away from the settlement. For each of the ten exceedance events detailed above;

  - A flushing procedure was initiated at implicated sample points. The procedure sets out how long the flush should occur at dedicated flushing points to ensure the section has been replenished with potable water that is within the ADWGs.
  - Repeat sampling was undertaken until iron levels returned laboratory results below the ADWG. For example, R12-008 reported iron at 0.03 mg/Lin a sample taken on 24 September.

- **Aluminium:** There was 1 value that exceeded the ADWG aesthetic limit of 0.20 mg/L. The exceedance was recorded at the following date and location:
    - 16 July 2024: 6.5 mg/L at R12-001

  Unfortunately, the high aluminium sample result on 16 July was not identified on the report provided by the laboratory, nor was it identified when the result was transferred to an internal water quality tracker. Therefore, timely investigation and remedial action was not taken in response to this exceedance. Once the oversight was detected on 23 October, a review of the event was undertaken including the following actions;

  - The water quality tracker was modified to more reliably flag exceedances of any analyte, including aesthetic triggers.
  - Previous data for more than six years was examined, which showed that R12-001 does not have a recent history of aluminium exceedances, with the highest reading in that time being 0.09 mg/L.
  - No operational anomalies at the time of sampling were identified that could account for elevated aluminium levels. Given its anomalous nature and lack of identifiable source, it is possible that the sample was contaminated during sampling although this cannot be confirmed.
  - Subsequent monthly samples taken from R12-001 on 13 August, 10 September and 8 October have been reviewed and were all well below the ADWG and below the LoR of <0.05.

6. Radiological Performance

No samples were taken during the reporting period. Radiological performance sampling is undertaken once annually and is next due in October 2024.

7. PFAS Performance

No samples were taken during the reporting period. PFAS performance sampling is undertaken once annually and is next due in May 2025.

8. Planned Sample Summary

8.1 Planned Sample – Compliance Summary

Planned Samples July - September 2024								
Microbial			Chemical			Radiological		
Planned[8]	Taken[9]	% Taken	Planned	Taken	% Taken	Planned	Taken	% Taken
172	172	100%	698	695	99%	0	0	NA

8.2 Planned Sample - Exception Notifications

Three samples to test for zinc were missed due to human oversight. They were missing from the planned schedule for the reporting period.

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

[9] A taken sample is the physical sample taken for this reporting period.

9. Customer Complaints

There were no customer complaints relating to drinking water quality performance made during this reporting period. RIA has a Utilities Customer Complaint Procedure, which outlines how complaints can be submitted.

10. Comments

10.1 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.

10.2 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.

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 July - September 2024 quarter. Drinking fountain sampling occurs once every four weeks. There were no exceedance events during the reporting period.

Rottnest Island Drinking Fountain July - September 2024					
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	60	60	100%	< 0.001
Cadmium (Cd)	0.002	60	60	100%	< 0.0001
Copper (Cu)	2	60	60	100%	0.500
Lead (Pb)	0.010	60	60	100%	0.008
Nickel (Ni)	0.020	60	60	100%	0.020
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	60	60	100%	0.350

10.2.1 Drink Fountain Exemption Notifications

There were no exceedance events during the reporting period.

10.3 Ad Hoc Monitoring

There were five ad hoc sampling events during the reporting period, the details are presented in the table below. These relate to additional sampling triggered by Bromate and Iron exceedances discussed in section 4.3 and 5.2 respectively.

Ad hoc samples were also taken from Fays Bay during September but will be added to the regular drinking water sampling program for October onwards and until the water network upgrade had been completed in winter 2025.

Ad Hoc Sampling July – September 2024				
Date	**Chemical Characteristic**	**Memorandum of Understanding Alert Level**	**Level reported**	**Sample Location**
13 August 2024	Iron	0.30 mg/L	0.05 mg/L	R12-005
13 August 2024	Iron	0.30 mg/L	0.05 mg/L	R12-007
13 August 2024	Iron	0.30 mg/L	1.9 mg/L	R12-008
13 August 2024	Bromate	0.020 mg/L	0.009 mg/L	Geordie Bay Cafe
15 August 2024	Bromate	0.020 mg/L	0.007 mg/L	Fays Bay (unit 853)
17 September 2024	E.coli	0 cfu/100ml	<1	Fays Bay
17 September 2024	Thermotolerant Coliforms	0 cfu/100ml	<1	Fays Bay
17 September 2024	Bromate	0.02mg/L	0.005mg/L	Fays Bay
17 September 2024	Sodium (Filtered)	180mg/L	73mg/L	Fays Bay
17 September 2024	Lab Conductivity	~600uS/cm	450uS/cm	Fays Bay
17 September 2024	Total Coliforms	0 cfu/100ml	<1	Fays Bay
24 September 2024	E.coli	0 cfu/100ml	<1	Fays Bay
24 September 2024	Thermotolerant Coliforms	0 cfu/100ml	<1	Fays Bay
24 September 2024	Antimony	0.003mg/L	<0.001mg/L	Fays Bay
24 September 2024	Bromate	0.02mg/L	0.005mg/L	Fays Bay
24 September 2024	Iron	0.3mg/L	0.04mg/L	Fays Bay
24 September 2024	Sodium (Filtered)	180mg/L	70mg/L	Fays Bay
24 September 2024	Lab Conductivity	~600uS/cm	510uS/cm	Fays Bay
24 September 2024	Total Coliforms	0 cfu/100ml	<1	Fays Bay

10.4 Other Sampling

10.4.1 Homestead

PFM commenced monthly sampling of a 3 kL potable water storage tank installed at the Rottnest Island Homestead shortly after its installation in November 2022. In February 2024 that 3 kL tank was replaced with a 50 kL tank which was directly supplied by the pressurised water main. This tank is sampled weekly for bromate and monthly for microbiological indicators.

There were no exceedance events during the reporting period.