



**ROTTNEST IS**

**PROGRAMMED**  
*Facility Management*

## Programmed Facility Management

For the

**Rottnest Island Authority**

**Quarterly Drinking Water Report to the  
Department of Health by the Rottnest Island  
Authority  
October – December 2018**





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## 1. Water Provider Information

Rottnest Island Authority Contact Details	
<b>Name of Company</b>	Rottnest Island Authority
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<b>Company Website</b>	<a href="http://www.rotnnestisland.com">www.rotnnestisland.com</a>
<b>Company Email</b>	<a href="mailto:enquiries@rotnnestisland.com">enquiries@rotnnestisland.com</a>
<b>Executive Director</b>	Michelle Reynolds
<b>Manager, Major Contracts</b>	Eamonn Williams
<b>Utilities Manager (PFM)</b>	Orrin Neale
<b>HSE &amp; Risk Manager (PFM)</b>	Krysia Witty

### 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 660,000 visits are typically made to Rottnest Island on a yearly basis, with a low season minimum of 24,200 visitors/month (August) and a high season maximum of 112,050 visitors/month (June 2018).

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 250 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 22km of mains. Water is sourced from 15 freshwater bores located in the Wadjemup bore field and 6 saline (seawater) bores located in the Longreach bore field.

The freshwater bores make up approximately 15% of the water source for Rottnest Island and have not been in use since February 2017, utilised only as a supplementary contingency water supply to the saline production bores.

Water abstracted from the saline bores feed into the desalination plant, where reverse osmosis occurs. The 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 highly seasonal, and the monthly consumption can range from approximately 6,000kL in July to 25,000kL in January.

The combined storage capacity of the drinking water infrastructure on Rottnest Island is 14,000kL, this volume provides approximately 28 days of water storage.

Remote locations outside the main settlement, such as the outer island ablutions, Wadjemup lighthouse and the Research House, 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.



Image 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 and is scheduled as per the Rottnest Island Drinking Water Quality Management Plan.

At times, opportunities for further monitoring is required based on risk assessment, new information, post-incident or as per specialist recommendations. As such, additional testing parameters were suggested by the DoH in November 2017. These additional testing parameters identified the presence of Bromate in the distribution system. Initial levels were found to be well above the Health levels found in the Australian Drinking Water Guidelines.

The findings resulted in the formation of a specialist working group who implemented a series of proposed corrective actions to address and mitigate this issue. As a result of the findings and implemented controls the monitoring for Bromate has now been added to the regular monitoring schedule of Rottnest Island's distribution sample points.

Testing of the Island's drinking fountains was also suggested as an ongoing requirement against defined parameters in the Australian Drinking Water Guidelines, which has now been added to the monthly sampling regime.

Monitoring of Tank 4 and Tank 7 has been added to the sampling regime in recent years and continues to be monitored weekly, however samples collected do not form part of the statistical data provided for analysis in this quarterly report.

## 2. Performance Summary

Water Quality Meeting the <i>Australia Drinking Water Guidelines v.3.5 2018</i>			
October - December 2018			
	<sup>1</sup> No. of Analyses Completed	No. of Analyses Within Guidelines	No. of Non-conformances to Guidelines
<b>Microbial</b>			
Bacterial ( <i>E.coli</i> )	70	70	0
Thermotolerant Coliforms	70	70	0
Thermophilic Amoebae	36	36	0
Amoeba (Thermophilic <i>Naegleria</i> )	36	36	0
<b>Chemical &amp; Physical</b>			
Health	247	247	0
Aesthetic	310	250	60
<b>Radiological</b>			
Gross Alpha		Next Schedule March 2019	
Gross Beta		Next Schedule March 2019	

<sup>1</sup> As screened against respective guideline – health / aesthetic. Results from Tank 4, Tank 7 and Drinking fountains are excluded from this table.

## 3. Microbial Performance

During the October - December 2018 reporting period, there were no reported exceedances of Microbial Health against the Australian Drinking Water Guidelines in the potable water distribution system.

### 3.1. Microbial – Compliance Summary

Rottnest Island Distribution System October - December 2018				
Microbial Characteristic	Memorandum of Understanding Compliance Criteria	No. of Analyses	No. of Analyses Complying with Memorandum of Understanding	% Compliance
<b>Bacterial</b>				
<i>E.coli</i>	Non Detect	57	57	100%
Thermotolerant Coliforms	Non-Detect	57	57	100%
<b>Amoeba</b>				
Thermophilic Amoebae	Non Detect	30	30	100%
Thermophilic <i>Naegleria</i>	Non Detect	30	30	100%

### 3.2. Microbial – Exception Notifications

Microbial Water Quality Exceptions October - December 2018						
Population Served	Date	Microbial Characteristic	Memorandum of Understanding Alert Level	Remedial Action	Department of Health Notified	Close Out Date
Nothing to Report						

### 3.3. Microbial Incident Specific Information

There were no reported exceedances for Microbial Health in the potable water distribution system over the period, however, Rottnest Island successfully managed exceedances of Total Coliforms, Thermotolerant Coliforms and *E.coli* detections in Tank 7 during October 2018.

Tank 7 is the first collection and holding tank for potable water before Tank 4 and Tank 5. The disinfection system between Tank 7 and Tank 4 and between Tank 4 and Tank 5 remained in good working order and found to be effective in preventing microbial contamination to Tank 5. All sample results for Tanks 4 and 5 remained within the Australian Drinking Water Guidelines during the October to December 2018 quarter.



Tank 7 reported 2 samples of 4 cfu/100ml for Thermotolerant Coliforms and *E.coli* on 2<sup>nd</sup> October and 2 cfu/100ml for Thermotolerant Coliforms and *E.coli* on 9<sup>th</sup> October. 1 sample of Total Coliforms of 4 cfu/100ml on 9<sup>th</sup> October also presented in Tank 7.

As reported in the July to September Quarterly Report, these exceedances were as a result of rectification works conducted on the Roof of Tank 7 between August and October 2018.

Remaining samples across the distribution network and storage tanks 7, 4 and 5 remained within the Australian Drinking Water Guidelines and Memorandum of Understanding for Microbial monitoring parameters for October to December 2018.

Along with roof rectification works, the transfer/chlorination station replacement works completed in October 2018 have contributed to the reduction in microbial exceedances in Tank 7.

## 4. Chemical: Health Related Performance

During the October to December 2018 reporting period, there were no reported exceedances of Chemical Health parameters in the potable water distribution system. Details are outlined in section 4.3.

### 4.1. Chemical: Health Related - Compliance Summary

Rottnest Island Distribution System October - December 2018					
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	4	4	100%	<0.001
Bromate	0.02	96	96	100%	<0.005
Cadmium (Cd)	0.002	4	4	100%	<0.0001
Chlorine Total (Cl) <i>(in house testing)</i>	5	66	66	100%	1.16
Copper (Cu)	2	4	4	100%	0.017
Fluoride (F)	1.5	1	1	100%	<0.1
Lead (Pb)	0.01	4	4	100%	<0.001
Manganese (Mn)	0.5	32	32	100%	<0.005
Nickel (Ni)	0.02	4	4	100%	<0.001
Nitrate (NO <sub>3</sub> ) (Nitrate as nitrate)	50 mg-NO <sub>3</sub> /L	4	4	100%	<0.5
Nitrite (NO <sub>2</sub> )	3 mg-NO <sub>2</sub> /L	14	14	100%	<0.5
Trihalomethanes (THMs)	0.25	14	14	100%	0.016

<sup>2</sup> As screened against respective guideline – health / aesthetic. Results from Tank 4, Tank 7 and Drinking fountains are excluded from this table.



## 4.2. Chemical: Health Related - Exception Notifications

Chemical: Health Related Water Quality Exceptions October - December 2018						
Population Served	Date	Chemical Characteristic	Memorandum of Understanding Alert Level	Remedial Action	Department of Health Notified	Close Out Date
		Nothing to Report	NTR	NTR		

\*Based on RIA total daily visitors for the period includes Ferry (excluding Island workers) Boats and Planes

## 4.3. Chemical: Health Related Incident Specific Information

No health related incidents for the quarter October – December 2018

## 5. Chemical: Aesthetic Performance

### 5.1. Chemical: Aesthetic – Compliance Summary

During the October - December 2018 reporting period, there were 45 exceedances of Chemical Aesthetic parameters in the potable water distribution system, details are outlined in section 5.2.

Rottnest Island Distribution System October - December 2018					
Aesthetic Characteristic	Australian Drinking Water Guidelines (mg/L unless stated)	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	4	4	100%	<0.01
Ammonia (NH <sub>3</sub> )	0.5	14	14	100%	<0.005
Chloride (Cl <sup>-</sup> )	250	1	0	0%	270
Chlorine Free (Cl) <i>(in house testing)</i>	0.6	66	13	20%	1.08
Colour	15 (HU)	6	6	100%	<5
Copper (Cu)	>1	4	4	100%	0.017
Hardness (CaCO <sub>3</sub> )	200	1	1	100%	13
Iron (Fe)	0.3	32	28	88%	0.41
Manganese (Mn)	0.1	32	32	100%	<0.005
pH	6.5 – 8.5	29	27	93%	9
Sodium (Na)	180	105	105	100%	160
Sulphate	250	1	1	100%	4
Sulphide (H <sub>2</sub> S)	0.05	4	4	100%	<0.01
TDS	600	1	1	100%	450
Turbidity	5 (NTU)	6	6	100%	0.3
Zinc (Zn)	3	4	4	100%	0.029

<sup>2</sup> As screened against respective guideline – health / aesthetic. Results from Tank 4, Tank 7, investigative samples and Drinking fountains are excluded from this table.

## 5.2. Chemical: Aesthetic - Incident Specific Information

There were 45 instances where analytical results exceeded the aesthetic guidelines for chemical and physical properties, these are summarised below:

**Iron:** There were 4 recorded exceedances of iron in the distribution system over the quarter. As iron has a taste threshold of approximately 0.3 mg/L in water; this may cause taste and odour problems.

All Iron exceedances were at location R12/008, no customer complaints have been received.

The first exceedance was recorded on the 2<sup>nd</sup> October with a reading of 0.34mg/L.

The second exceedance was recorded on the 16<sup>th</sup> October with a reading of 0.41mg/L.

The third exceedance was recorded on the 30<sup>th</sup> October with a reading of 0.36mg/L.

The fourth exceedance was recorded on the 27<sup>th</sup> November with a reading of 0.35mg/L.

**Chlorine (free):** During the quarter, 38 out of 66 recorded samples were reported with chlorine values above the Australian Drinking Water Guidelines Aesthetic limit of 0.6mg/L. These results were found across all distribution sampling points over the 3 month period.

Whilst some monitoring locations reported analytic concentrations outside of the guideline values for aesthetic water quality, it is important to note that these results remain well below the Health limit of 5mg/L, with a maximum value of 1.16mg/L reported at R12-005 on 20<sup>th</sup> November 2018.

The Australian Drinking Water Guidelines 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 values are generally below the specific health guideline value of 5.0mg/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.

**Chloride:** This quarters monitoring sample for chloride has a reading of 270mg/L. Australian Drinking Water Guidelines recommended limited for aesthetic Chloride levels is 250mg/L.

**pH:** There were 2 instances of pH reported outside the Australian Drinking Water Guidelines range (6.5 to 8.5).

A pH level of 9 recorded on 30<sup>th</sup> October at R12/002 and a pH level of 8.6 on 27<sup>th</sup> November. Subsequent pH analysis of R12/002 returned results within Australian Drinking Water Guidelines parameters.

A higher pH can be due to longer retention times in the water main and can also be a characteristic of distribution systems that are constructed partly of concrete tanks and cement-mortar lined pipes; typical of the Rottneest Island distribution system. The Australian Drinking Water Guidelines indicate that pipes constructed of these materials can significantly increase pH, which may be tolerated, provided monitoring indicates no deterioration in microbial quality.

## 6. Radiological Performance

No radiological samples were required during the reporting period. The next round of radiological samples are due in March 2019 and will be reported during the appropriate reporting cycle.

### 6.1. Radiological – Compliance Summary

Rottnest Island Distribution System October - December 2018				
Radiological Characteristic	Memorandum of Understanding Compliance Criteria	No. of Analyses	No. of Analyses Complying with Memorandum of Understanding	% Compliance
Gross Alpha	< 0.5 Bq/L	Not required	Not required	Not required
Gross Beta	< 0.5 Bq/L	Not required	Not required	Not required

## 7. Planned Sample Summary

### 7.1. Planned Sample – Compliance Summary

Planned Samples <sup>1</sup> October - December 2018								
Microbial			Chemical			Radiological		
Planned <sup>1</sup>	Taken <sup>2</sup>	% Taken	Planned <sup>1</sup>	Taken <sup>2,3</sup>	% Taken	Planned	Taken	% Taken
88	87	97%	418	455	109%	NR	NR	NR

<sup>1</sup> A planned sample is defined as being included in the Sampling Schedule for this period.

<sup>2</sup> Physical number of samples taken for this period.

<sup>3</sup> Results from Tank 4, Tank 7, and Drinking fountains are excluded from this table.

### 7.2. Planned Sample - Exception Notifications

Planned Sample Exceptions October - December 2018			
Sampling Point	Date Due	Characteristic	Reason for Missing Sample
R12-006	2/10/18	Total Coliforms, Thermotolerant Coliforms, <i>E.coli</i>	Laboratory claim to have received an empty bottle, yet provided results for TA and TN as Non detects. Resampled for TA and TN on 16/10/18.
R12-001	06/11/18	Total Coliforms, Thermotolerant Coliforms, <i>E.coli</i>	Microbial samples were not selected on the CoC, only HPC. Field team took collection samples anyway as it's the standard weekly test. LAB only provided results for HPC. Resampling under taken for the remaining quarter as per schedule.

## 8. Customer Complaints

There were no complaints received for the October to December 2018 reporting period.

## 9. Comments

### Bromate management

Bromate testing is usually required in a disinfection systems that utilises ultra violet technologies, however this process is not undertaken in the production of drinking water on Rottneast Island. As such, the requirement for routine Bromate analysis was not identified when developing the drinking water monitoring schedule.

It is believed that Bromate may be introduced to a drinking water system through its disinfection methodology, such as chemical compounds found in disinfectants (hypochlorites), or may be formed



as a result of physical parameters such as heat, aeration and stagnation where source water is high in Bromide. Bromide may react under suitable conditions to form Bromate.

The Bromate working group continues to implement the bromate action plan drafted in January 2018

Bromate levels in the distribution system remain within the limits as set out in the Australian Drinking Water Guidelines with no exceedances for the quarter.

The flushing regime initiated in January 2018 has been placed on-hold due to the increase in potable consumption over the peak season.

## Drinking Fountain Monitoring Initiative

The Rottnest Island Authority commenced a drinking fountain monitoring initiative in December 2017, following a recommendation from the Department of Health. Early 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 final drinking fountain installation was completed in October 2018.

Rottnest Island Drinking Fountain October - December 2018					
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	42	42	100%	<0.001
Cadmium (Cd)	0.002	42	42	100%	<0.0001
Copper (Cu)	2	42	42	100%	0.096
Lead (Pb)	0.01	42	39	93%	0.022
Nickel (Ni)	0.02	42	42	100%	0.002
Aesthetic Characteristic	ADWG Guideline (mg/L)	No. of Analyses	No. of Analyses Complying with ADWG	% Compliance with ADWG	Max Value of Analysis (mg/L)
Copper (Cu)	1	42	42	100%	0.096
Zinc (Zn)	3	42	42	100%	0.49

The reporting of the drinking fountain results has purposefully been excluded from the distribution system (Tables 3.1, 4.1 and 5.1), as localised events at these locations are not indicative of the distribution system.

Several isolated instances were identified during the quarter:

- Three Lead exceedances were recorded - two at the Basin drinking fountain on the 16<sup>th</sup> October 2018 with a sample reading of 0.012mg/L on the 1<sup>st</sup> Flush and again on the 13<sup>th</sup> November 2018 with a sample reading of 0.022mg/L on the 1<sup>st</sup> Flush.

The final exceedance was located at the Army Jetty drinking fountain on 12<sup>th</sup> December 2018, with a sample reading of 0.016mg/L on the 1<sup>st</sup> Flush.

All 2<sup>nd</sup> flush samples at both drinking fountain locations returned readings within the Australian Drinking Water Guidelines.



Investigations are underway to determine why Lead is in higher concentrations on the 1<sup>st</sup> Flush sample and within range on the 2<sup>nd</sup> Flush samples.