



WINDY HARBOUR DRINKING WATER SUPPLY

ANNUAL WATER QUALITY REPORT

2018/19

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1.0 Administration

1.1 Water Provider Information

Water Provider Contact Details			
Name of Company	SHIRE OF MANJIMUP		
Company Address	PO BOX 1 MANJIMUP		
Company Phone	97717777	Fax	97717771
Company Email	info@manjimup.wa.gov.au		
Chief Executive Officer	Mr Andrew Campbell		
CEO Email	andrew.campbell@manjimup.wa.gov.au		
Department of Health Liaison Officer	Mr Grayson Hindmarsh		
Department of Health Liason Officer Email	grayson.hindmarsh@manjimup.wa.gov.au		

1.2 Settlement Information

Windy Harbour is a small coastal settlement in an 'A' Class reserve on the southern coast of Western Australia, located in the D'entrecasteaux National Park 60 kilometres south of Pemberton.

The drinking water supply to the settlement is managed by the Shire of Manjimup. The settlement consists of 240 leases, with room to expand this number to 400. The Windy Harbour nature based Caravan Park with a maximum capacity of 140 patrons is ensconced in the settlement and water supply to the communal kitchen and toilet amenities servicing the Caravan Park is drawn from the settlement reticulated water supply.

The settlement's primary use is a seasonal holiday destination and has a peak period November to April. There is no permanent population and leaseholder agreements stipulate the lease holders can occupy the lease for a maximum aggregate of 90 days per annum. During peak periods the settlement supports a populace of 2500 including both the settlement homes and nature based Caravan Park.

1.3 Drinking Water Quality Management and Commitment

The Shire of Manjimup is committed to the effective management of the drinking water, providing safe, high quality drinking water supply to consumers at Windy Harbour.

The Shire of Manjimup was granted an exemption in 2005 pursuant to the *Water Services Licencing Act 1995* for a licence to provide a water service. This exemption was granted due to it's not for profit service and lease holder arrangements at Windy Harbour. Notwithstanding the exemption, approvals and reporting mechanisms must satisfy the Department of Health. This includes

providing a safe water service and provision of a drinking water quality management plan.

The Shire of Manjimup through the *Shire of Manjimup Windy Harbour Drinking Water Quality Management Plan 2016 (DWQMP)* is committed to-

- Managing 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 managed;
- Integrate the needs and expectations of our consumers, stakeholders, regulator and employees into our future planning;
- Establish regular monitoring of the quality of drinking water and effective reporting mechanisms to provide relevant and timely information 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;
- Ensure that all products or contractors that are used on the drinking water system are to deliver on these management plan commitments.

The Shire of Manjimup is committed to implementing the recommendations of the source protection assessment that are within the Shire's area of responsibility.

URL for the Department of Water and Regulation (DWER) document is:
[www.water.wa.gov.au/ data/assets/pdf file/0003/9579/112245.pdf](http://www.water.wa.gov.au/data/assets/pdf_file/0003/9579/112245.pdf)

These recommendations are being addressed as follows-

- *Include the Windy Harbour Water Reserve as a special control area in its local planning scheme. **This will be an inclusion in the new Town Planning Scheme No 5, which is currently under review.***
- *Consider alternative energy sources for powering the bore pumps (i.e. solar) to avoid the risk of storing diesel in the water reserve. **The Shire is investigating options of utilising solar.***
- *Ensure adequate incident response procedures are in place to deal with a contamination event that may affect drinking water quality or availability. **This is adequately addressed in the DWQMP.***
- *Maintain and enhance (where required) the security of the production and monitoring bores. **Security such as tank entry and perimeter fencing is assessed on a daily basis by on site staff at the settlement as per DWQMP.***
- *Erect signs along the boundary of the Windy Harbour Water Reserve to alert people of its location and purpose, including an emergency contact phone number. Guidance on the format can be provided by Department of Water and Environmental Regulation. **The purchase of adequate signage and sign placement will be addressed in the 2020/2021 budget.***

- *Conduct regular water quality and quantity monitoring and reporting to Department of Health as required. **Quarterly and Annual Reports are up to date and incident report protocol has been adequately maintained.***
- *Undertake regular surveillance of the bores, tanks and surrounding water reserve. **Surveillance is undertaken on a daily basis by Shire Staff as per DWQMP.***

1.4 Catchment Details and System Information

The catchment for the Windy Harbour Drinking Water Supply groundwater supply is north west of the settlement and extends approximately 5 kilometres inland from the coast and is 3 kilometres wide. The area of reserve set aside for the settlement is 190 hectares. The settlement and the catchment is entirely contained within the D'entrecasteaux National Park.

Land use in the catchment is predominantly natural vegetation, other than the water production infrastructure itself. Given the catchment land use is almost entirely national park, the level of catchment protection is high and the potential for threats to water quality to arise is low.

A limestone quarry partially falls within the western boundary of the Windy Harbour Water Reserve. The quarry has Department of Water and Environmental Regulation (DWER) approval. The DWER approval stipulates best management practices are applied by the quarry proprietor to protect water quality.

The water demand is highly seasonal and directly proportional to tenancy of the individual leaseholders' properties (dwellings) and visitors to the nature based Caravan Park.

The water scheme comprises of two bores and a Smartaflow chlorinating disinfection system using sodium hypochlorite. The chlorination system is the only disinfection system within the drinking water system. It is the single most important barrier in protecting the consumer against waterborne pathogens. The infrastructure for the bore and the chlorinator are fenced and locked in secure bore compounds.

The treated water is pumped approximately one kilometre up hill to a secure tank compound. The water is gravity fed to the reticulated water supply servicing the settlement, including the kitchen, toilets and amenities servicing the nature based Caravan Park on demand.

Management of the drinking water quality includes monthly sampling at the nominated points as per the 2016 DWQMP for microbiological, chemical health and chemical aesthetic characteristics. The Shire's Officers monitor, chlorine, microbial, chemical and radiological properties as per the *Shire of Manjimup Windy Harbour Drinking Water Quality Management Plan 2016 (DWQMP)*

The Windy Harbour water supply is monitored by the Shire's Environmental Health Officers. Day to day maintenance and disinfection system supervision is

undertaken by Shire of Manjimup operational staff at Windy Harbour. Water is pumped daily during peak season, and twice weekly or as required during low seasons. The operational staff monitor chlorine levels from several points around the settlement on a daily basis.

Sampling and in house monitoring procedures are carried out in accordance with best industry practice and undertaken by qualified technicians versed in aseptic technique. The sampling schedule includes 4 nominated sampling points through the reticulated distribution system allowing for the fair representation of the water supply in Windy Harbour. Water samples in the sampling schedule are analysed by approved NATA laboratories in Perth in accordance with the requirements of the Department of Health.

1.5 Water Quality Parameters

The Water Quality analysis undertaken is categorized into three main performance areas being Microbiological, Chemical and Chemical Aesthetic. The results are assessed for compliance pursuant to the requirements of the (ADWG) Australian Drinking Water Guidelines.

Table 1 Water quality parameters adopted from the Australian Drinking Water Guidelines (ADWG).

Turbidity	Turbidity is the cloudy appearance of water caused by the presence of suspended matter.	The Australian Drinking Water Guidelines specify an aesthetic guideline of 5 NTU. If disinfection is required, the turbidity of less than 1 NTU is desirable at the point of disinfection.
Colour	Colour in water originates mainly from natural drainage through soil and vegetation in a catchment.	The Australian Drinking Water Guidelines value for colour is based on the colour that is noticeable in a glass. This is generally accepted as 15 HU.
Iron	Iron occurs naturally in water as a result of contact with soil or rock in the catchment. Iron in the water does not present a health hazard.	The Australian Drinking Water Guidelines recommend that based on aesthetic consideration, the concentration of iron should not exceed 0.3 mg/l.
Hydrogen Sulfide	Hydrogen sulfide is formed in drinking water by the hydrolysis of soluble sulfides, or through the reduction of sulfate by the action of microorganisms. Hydrogen sulfide has an obnoxious 'rotten egg' odour.	Based on aesthetic considerations, the concentration of hydrogen sulfide in drinking water should not exceed 0.05 mg/l. No health based guideline has been set.
Total dissolved solids	Total dissolved solids (TDS) consist of inorganic (natural) salts and small amounts of organic matter dissolved in water. Total dissolved solids comprise sodium, potassium, calcium, magnesium, chloride, sulphate, bicarbonate, carbonate, silicon, organic matter, fluoride, iron, manganese, nitrate and phosphate.	Treated water quality containing TDS levels of below 500mg/l is classified as good.
Microbial Pathogens	<p>Thermophilic <i>Naegleria</i> refers to a group of amoeba which includes <i>Naegleria fowleri</i>, the organism that causes the waterborne disease primary amoebic meningoencephalitis. <i>Naegleria fowleri</i> is an environmental pathogen which naturally lives in fresh warm water.</p> <p>The most common and widespread health risk associated with drinking water is contamination by microorganisms. Organisms associated with the gut of humans and mammals cause the usual waterborne diseases. Tests are undertaken for <i>Escherichia coli</i> (<i>E. coli</i>).</p>	<p>The Department of Health WA has notification protocols in place regarding <i>Naegleria</i>.</p> <p>The Australian Drinking Water Guidelines state that the thermotolerant coliform <i>E. coli</i> should not be present in a 100mL sample.</p>
pH	pH is a measure of how acidic/basic water is. The range goes from 0 – 14, with 7 being neutral. pH is the measure of free hydrogen ion concentrations in the water.	The suggested aesthetic pH target from the Australian Drinking Water Guidelines is 6.5 to 8.5.
(THM's)Trihalomethanes	Refers to the total sum of a group of chemicals predominantly, chloroform, bromodichloromethane and bromoform along with other disinfection by-products.	The Australian Drinking Water Guidelines recommended maximum value is 0.25mg/L

The Australian Drinking Water Guidelines (ADWG) are produced by the National Health and Medical Research Council (NHMRC) and are available from the NHMRC website at <http://nhmrc.gov.au/about-us/publications/australian-drinking-water-guidelines>

1.6 Units

The following is an explanation of the units presented in this report

Units:	mg/L	Milligrams per Litre
	CFU/100mL	Colony Forming Units per 100 millilitres
	HU	Hazen Units
	NTU	Nephelometric Turbidity Units

1.7 Performance Summary

The Shire of Manjimup obtained 333 samples from the reticulation water supply during the 2018/19 year. Of these 96 were for microbiological quality, 139 for health related chemical quality and 98 for chemical aesthetic analysis and assessed pursuant to the Australian Drinking Water Guidelines (ADWG). Radiological sampling is undertaken every 5 years and not due for this reporting period, therefore omitted from this report.

There have been no public complaints received concerning the quality of the water during this reporting period. Results of any anomalies or exceedances with the Guidelines in Microbiological or Chemical Analysis are forwarded to the Department of Health as they occur.

Table 2 Summary of total samples taken from the Windy Harbour Reticulated Water Supply 2018/19

Water Quality Results Summary Compliance with Australian Drinking Water Guidelines (NHMRC)			
	No Assessed	No Within Guidelines	Variance
Microbial Quality			
<i>E. coli</i>	48	48	0
Thermophilic <i>Naegleria</i>	48	48	0
Chemical Quality			
Chemical – Health Related	137	133	4
Chemical – Aesthetic	98	84	14
Radiological	0	---	---

2.0 Microbial Performance

2.1 Microbial – Exception Notifications

The Shire of Manjimup collected 96 samples at nominated points as per the 2016 DWQMP during the reporting period with 100 percent compliance. There were no detections or reportable exceptions of either *Escherichia coli* (*E. coli*) or Thermophilic *Naegleria* species.

2.2 Microbiological - Compliance

Table 3 Summary of microbiological samples taken from the Windy Harbour Drinking Water Scheme meeting compliance.

No. of Bacteria Samples	<i>E. coli</i>		No. of Amoeba Samples	Thermophilic <i>Naegleria</i>	
	Non Comply	% Comply		Non Comply	% Comply
48	0	100%	48	0	100

2.3 Microbiological - Performance

Microbiological results from the nominated sampling points were compliant pursuant to the ADWG Guidelines for the 2018/19 reporting period.

2.4 Microbial Incident Specific Information

There were no recorded microbial non-conforming results for *E. coli*, Thermotolerant Coliforms or Thermophilic *Naegleria* at the 4 nominated sample points during 2018/19. There have been no significant or reportable microbiological incidents in this reporting period.

3.0 Chemical – Health Related Performance

3.1 Chemical - Health - Compliance

There are many chemical parameters that have a health related guideline value pursuant to the Australian Drinking Water Guidelines. The Shire of Manjimup achieved compliance with all these requirements with the exception of Total Trihalomethanes (THM's), which have exceeded the guideline value on 4 occasions out of the 12 monthly sampling regime samples As depicted in Figure 1.

These disinfection by-products are indicative of the natural organic matter in the water prior to disinfection which is being closely monitored. Chlorination is the most commonly used process for disinfection and endorsed by the National Health and Medical Research Council. The ADWG states that *“In some supplies it may be necessary to exceed guideline values in order to maintain an effective disinfectant residual throughout the system”*.

Figure 1 Total Trihalomethanes values monthly sampling results over the 2018/19 period in mg/L.

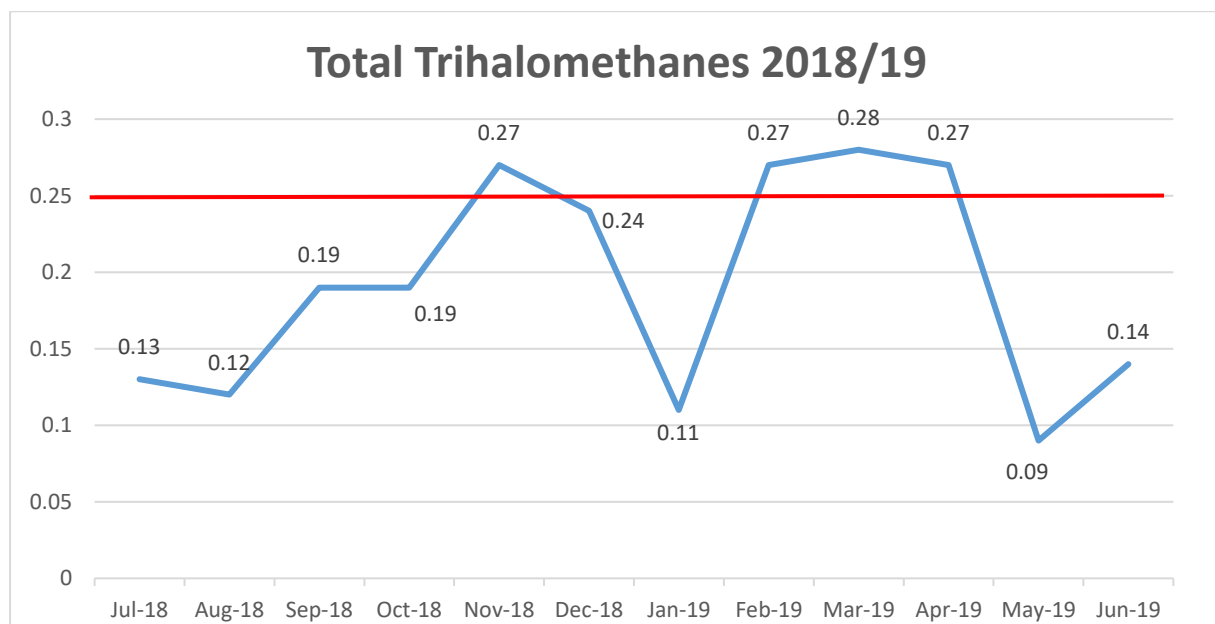


Table 4 Individual Trihalomethanes chemical analysis value annual and 6 monthly

Disinfectant Agents and By products (Trihalomethanes)	Chemical	Unit	Health Guideline Value	Max Value of Samples	No Assessed	No Within Guidelines	Compliance
	Chloroform	mg/L		0.56	2	2	100%
	Bromodichloromethane	mg/L		0.42	2	2	100%
	Dibromochloromethane	mg/L		0.13	2	2	100%
	Bromoform	mg/L		<0.01	2	2	100%
	Surrogate Dibromoflourometha	mg/L	0.14	0.094	2	2	100%
	Surrogate toluene-d8	mg/L	0.14	0.095	2	2	100%
	Surrogate 4-BFB	mg/L	0.14	0.099	2	2	100%
Comparative Total Trihalomethanes	THMs	mg/L	0.25	0.24	2	2	100%

Table 5 summary of collaborative 2 yearly, Annual, 6 monthly and monthly chemical samples taken from the Windy Harbour Drinking Water Scheme for 2018/19

Category	Chemical	Unit	Health Guideline Value	Max Value of Samples	No Assessed	No Within Guidelines	Compliance
Organic Chemicals Disinfection by-products A	Chloroacetic Acid	mg/L	0.15	<0.05	2	2	100%
	Dichloroacetic Acid	mg/L	0.1	0.09	2	2	100%
	Trichloroacetic Acid	mg/L	0.1	0.07	2	2	100%
	2-Chlorophenol	mg/L	0.3	<0.00005	2	2	100%
	2,4-dichlorophenol	mg/L	0.2	<0.0001	2	2	100%
	2,4,6-trichlorophenol	mg/L	0.02	<0.001	2	2	100%
	Trichloroacetaldehyde	mg/L	0.02	<0.02	2	2	100%
Other Inorganic Chemicals	Antimony	mg/L	0.003	<0.001	1	1	100%
	Arsenic	mg/L	0.01	<0.001	1	1	100%
	Barium	mg/L	2	0.045	1	1	100%
	Boron	mg/L	4	0.07	1	1	100%
	Cadmium	mg/L	0.002	<0.0001	1	1	100%
	Chromium (as Cr(VI))	mg/L	0.05	<0.005	1	1	100%
	Copper	mg/L	2	0.13	1	1	100%
	Cyanide	mg/L	0.08	<0.004	1	1	100%
	Fluoride	mg/L	1.5	0.2	1	1	100%
	Lanthanum	mg/L	0.002	<0.001	1	1	100%
	Lead	mg/L	0.01	0.001	1	1	100%
	Manganese	mg/L	0.5	0.024	2	2	100%
	Mercury	mg/L	0.001	<0.00005	1	1	100%
	Molybdenum	mg/L	0.05	<0.001	1	1	100%
	Nickel	mg/L	0.02	<0.001	1	1	100%
	Nitrate	mg/L	50	<0.05	1	1	100%
	Nitrite	mg/L	3	<0.05	1	1	100%
Selenium	mg/L	0.01	<0.001	1	1	100%	
Inorganic Chemicals Disinfection Agents & inorganics by-products of disinfection	Trihalomethanes	mg/L	0.25	0.28	12	8	66%
	Chlorine (Free)	mg/L	5	1.12	48	48	100%
Organic Compounds Treatment Organics	Acrylamide	mg/L	0.0002	<0.0001	1	1	100%
	Carbon tetrachloride	mg/L	0.003	<0.0005	1	1	100%
Organic Compounds Industrial Hydrocarbons	Toluene	mg/L	0.8	0.096	1	1	100%
Organic Compounds	Tetrachloroethene	mg/L	0.05	<0.001	1	1	100%
Pesticides	Aldrin (and Dieldrin)	mg/L	0.0003	<0.00001	1	1	100%
	Amitrole	mg/L	0.009	<0.001	1	1	100%
	Atrazine	mg/L	0.0005	<0.0005	1	1	100%
	Chloradane	mg/L	0.00001	<0.00001	1	1	100%
	Chlorofenvinphos	mg/L	0.01	<0.0005	1	1	100%
	Clopyralid	mg/L	2	<0.0005	1	1	100%
	2,4-D	mg/L	0.03	<0.0001	1	1	100%
	DDT	mg/L	0.000006	<0.00006	1	1	100%
	Dieldrin (and Aldrin)	mg/L	0.00001	<0.00001	1	1	100%
	Diquat	mg/L		<0.01	1	1	100%
	Diuron	mg/L	0.02	<0.005	1	1	100%
	Endosulfan	mg/L	0.0005	<0.0005	1	1	100%
	Fosamine	mg/L	0.03	---	---	---	---
	Glyphosate	mg/L		<0.01	1	1	100%
	Heptachlor	mg/L	0.0003	<0.00005	1	1	100%
	Hexachlorobenzene	mg/L	0.001	<0.0005	1	1	100%
	Hexazinone	mg/L	0.002	<0.002	1	1	100%
	Lindane	mg/L	0.00005	<0.00005	1	1	100%
	Molinate	mg/L	0.0005	<0.0005	1	1	100%
	Paraquat	mg/L		<0.0001	1	1	100%
	Pentachlorophenol	mg/L	0.01	<0.00001	1	1	100%
	Picloram	mg/L	0.3	<0.001	1	1	100%
	Propiconazole	mg/L	0.0001	<0.0001	1	1	100%
	Simazine	mg/L	0.0005	<0.0001	1	1	100%
	Temphos	mg/L	0.3	<0.005	1	1	100%
	Triclopyr	mg/L	0.02	<0.0005	1	1	100%

4.0 Chemical – Aesthetic Related Performance

There were 14 chemical aesthetic exceedances during 2018/19 in total. The two Iron samples taken and all twelve True Colour samples have exceeded the aesthetic guideline and will be closely monitored. The iron has dropped to approximately %50 of the previous year's exceedance, however no inference can be drawn from this difference.

The chemical aesthetics, Turbidity and True Colour were added to the monthly monitoring in addition to total Trihalomethanes from November 2016. Turbidity and True colour are good indicators of organic compounds present in the water supply. Understanding the types and level of organic compounds in the water supply assists in reducing the level of Trihalomethanes. From these results we can infer the make-up and consistency of the natural organic matter and ultimately assist in the reduction of the presence of disinfection by-products (Trihalomethanes).

Whilst exceedances of aesthetic guidelines can affect consumer experience, it is important to note that exceedances to aesthetic guidelines do not pose a health risk.

4.1 Chemical - Aesthetic - Chart

Table 6 summary of chemical aesthetic and physical related values for 2018/19

Category	Characteristic	Unit	Aesthetic Guideline Value	Maximum Value of Samples	No Assessed	No Within Guidelines	Compliance
Physical Characteristics	Dissolved oxygen	%	>85%		0	---	----
	Hardness	mg/L	200	150	1	1	100%
	pH	pH	6.5-8.5	8.10	48	48	100%
	Temperature	degrees	No Value		---	---	----
	Total Dissolved Solids	mg/L	600	450	1	1	100%
	True Colour	HU	15	36	12	0	0%
	Turbidity	NTU	5	0.9	12	12	100%
Inorganic Chemicals Disinfection by-products A	2-Chlorophenol	mg/L	0.3	<0.00005	2	2	100%
	2,4-dichlorophenol	mg/L	0.2	<0.0001	2	2	100%
	2,4,6-trichlorophenol	mg/L	0.002	<0.001	2	2	100%
Other inorganic Chemicals	Aluminium	mg/L	0.2	0.02	2	2	100%
	Ammonia (as NH4)	mg/L	0.5	<0.040	2	2	100%
	Chloride	mg/L	250	160	1	1	100%
	Copper	mg/L	2	0.13	1	1	100%
	Hydrogen Sulfide	mg/L	0.05	<0.01	1	1	100%
	Iron	mg/L	0.3	0.88	2	0	0%
	Magnesium Dissolved	mg/L	No Value	13	1	1	100%
	Manganese	mg/L	0.1	0.024	2	2	100%
	Sodium	mg/L	180	100	2	2	100%
	Sulfate	mg/L	250	3	2	2	100%
	Zinc	mg/L	3	0.059	1	1	100%

4.2 Chemical Aesthetic – Incident Specific Information

Iron analysis was undertaken in January 2019 and June 2019. Iron exceeded the recommended value on both sample values at 0.88 mg/L, whilst these exceedances are not satisfactory the highest value has dropped to half of the highest value in the previous 12 months.

True Colour analysis is above the aesthetic guideline for each of the 12 months this year sampling was undertaken, see Table 7. The addition of True Colour to the sampling regime was introduced from November 2016. The values exceed recommended values for each month in 2018/19 they will be closely monitored each month for the foreseeable future.

Table 7 exceedance summary of True Colour over 2018/19

True Colour	Guideline Aesthetic Value (HU)	Sample Aesthetic Value (HU)
July 2018	15	36
August 2018	15	26
September 2018	15	26
October 2018	15	31
November 2018	15	22
December 2018	15	23
January 2019	15	33
February 2019	15	23
March 2019	15	19
April 2019	15	16
May 2019	15	33
June 2019	15	38

5.0 Radiological Performance

Past analysis for radiological performance has demonstrated compliance at all times, the next scheduled radiological testing as per DWQMP is every 5 years being November 2020.

6.0 Summary

This annual report describes the Windy Harbour drinking water quality performance for the 2018/19 reporting period. The Shire of Manjimup 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 Windy Harbour residents, visitors, guests and visitors alike, the ongoing commitment to the sustainable production and supply of high quality drinking water at Windy Harbour.

This report demonstrates the microbiological quality is 100% compliant with the Australian Drinking Water Guidelines ADWG. Health related chemical water quality sample values did not comply in particular those salient guideline values pertaining to the disinfection by products. Future chemical analysis results will be closely monitored and incident protocol will be initiated as per the DWQMP, where necessary. Key corrective actions will be undertaken where required.

Although it is standard protocol for the Principal Environmental Health Officer to report exceedances of the Australian Drinking Water Guidelines to the Department of Health, this did not occur for the April disinfection by products sample. Procedures have been reviewed and amended to ensure notification occurs as required.

Furthermore, two of the chemical aesthetic, physical characteristics values did not comply, namely Iron levels and True Colour was raised. True Colour will be monitored into the foreseeable future and it is noted aesthetic values in the ADWG can affect consumer experience. It is important to note the Shire is concerned the True Colour has been exceeded in each monthly sample, however exceedances to aesthetic guidelines do not pose a health risk.

Should you have any further enquiries more information can be obtained by contacting the Environmental Health Services Team at the Shire of Manjimup at info@manjimup.wa.gov.au