



WINDY HARBOUR DRINKING WATER SUPPLY

ANNUAL WATER QUALITY REPORT

2022/23

CONTENTS

1.0	Administration	2
1.1	Water Provider Information	2
1.2	Settlement Information.....	2
1.3	Drinking Water Quality Management and Commitment.....	2
1.4	Catchment Details and System Information.....	4
1.5	Water Quality Parameters	5
1.6	Units	6
1.7	Performance Summary.....	6
2.0	Microbial Performance	7
2.1	Microbial – Exception Notifications	7
2.2	Microbiological – Compliance	7
2.3	Microbiological - Performance	7
2.4	Microbial Incident Specific Information	7
3.0	Chemical – Health Related Performance	8
3.1	Chemical – Exception Notifications	8
3.2	Chemical - Health – Compliance	8
4.0	Chemical – Aesthetic Related Performance.....	10
4.1	Chemical – Aesthetic - Results.....	10
4.2	Chemical - Aesthetic – Incident Specific Information.....	11
5.0	Radiological Performance.....	12
6.0	Summary	13

1.0 Administration

1.1 Water Provider Information

Water Provider Contact Details			
Name of Company	SHIRE OF MANJIMUP		
Company Address	PO BOX 1 MANJIMUP WA 6258		
Company Phone	97717777	Fax	97717771
Company Email	info@manjimup.wa.gov.au		
Chief Executive Officer	Mr Brian Robinson		
CEO Email	brian.robinson@manjimup.wa.gov.au		
Department of Health Liaison Officer	Mr Grayson Hindmarsh		
Department of Health Liaison Officer Email	health@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 further room for expansion up to a maximum of 400 leases. A licensed nature based caravan park is also located at Windy Harbour and has a maximum capacity of 140 patrons and water supply to the communal kitchen and toilet amenities servicing the caravan park is drawn from the settlement's reticulated water supply.

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

1.3 Drinking Water Quality Management and Commitment

The Shire of Manjimup is committed to the effective management of the water reticulation system and providing safe, high quality drinking water 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 its 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.

In accordance with the 'Shire of Manjimup Windy Harbour Drinking Water Quality Management Plan 2016' (DWQMP), the Shire is committed to-

- Managing water quality at all points along the delivery chain from source water to the consumer;
- Using a risk based approach for identifying and managing potential threats to water quality;
- Integrating the needs and expectations of our consumers, stakeholders, regulator and employees into any future planning;
- Establishing regular monitoring of the drinking water quality and effective reporting mechanisms to ensure relevant and timely information is provided which will promote confidence in the water supply and its management;
- Developing appropriate contingency planning and incident response capability;
- Continually improve our practices by assessing performance against corporate commitments and stakeholder expectations;
- Ensuring that all products used or contractors engaged in servicing the drinking water system are required to deliver on these management plan commitments.

The Shire of Manjimup is also committed to implementing the recommendations contained within Department of Water and Environmental Regulation's [drinking water source protection assessment](#) that are within the Shire's area of responsibility.

A number of 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 Shire of Manjimup's Local Planning Strategy and Scheme which is not yet finalised.

In addition to the Windy Harbour Drinking Water Supply, a signed non-potable camp rainwater tank is situated at the Nature Based Caravan Park, which is not monitored through the DWQMP. The water in this tank is not intended for drinking.

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 reserve set aside for the settlement is 190 hectares in area. 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 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 which stipulates best management practices are applied by the quarry proprietor to protect water quality.

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

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

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

Management of the drinking water quality includes monthly sampling at the nominated points as per the DWQMP for microbiological, chemical health and chemical aesthetic characteristics. Shire staff monitor chlorine, microbial, chemical and radiological properties as per the DWQMP.

The Windy Harbour water supply is monitored by the Shire's Environmental Health Officers and day to day maintenance and supervision of the disinfection system is undertaken by the Shire's operational staff at Windy Harbour. Water is pumped daily during peak season and twice weekly or as required during low seasons.

Sampling and in house monitoring procedures are carried out in accordance with best industry practice and undertaken by Shire staff competent in aseptic technique. The sampling schedule includes 6 nominated sampling points including the source (bore), treated water tanks and throughout the reticulated distribution system allowing for the fair representation of the water supply in Windy Harbour. Water samples are analysed by approved NATA laboratories in Perth in accordance with the requirements of the Department of Health (DoH).

1.5 Water Quality Parameters

The Water Quality analysis undertaken is categorised into three main performance areas being microbiological, chemical - health related values and chemical – aesthetic related values. The results are assessed for compliance in accordance with the Australian Drinking Water Guidelines 2011 (ADWG) as amended.

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 500 mg/L is classified as good.
Microbial Pathogens	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. 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>).	The Department of Health WA has notification protocols in place regarding <i>Naegleria</i> . The Australian Drinking Water Guidelines state that the thermotolerant coliform <i>E. coli</i> should not be present in a 100 mL sample.
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.
(THMs)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 0.25 mg/L
Radiological Gross Alpha	Bq/LRefers to Becquerel per litre	The Australian Drinking Water Guidelines recommended maximum value is 0.5 Bq/L
Radiological Gross Beta	Bq/LRefers to Becquerel per litre	The Australian Drinking Water Guidelines recommended maximum value is 0.5 Bq/L

The 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

<u>Units:</u>	mg/L	Milligrams per Litre
	CFU/100mL	Colony Forming Units per 100 millilitres
	HU	Hazen Units (a unit of colour)
	NTU	Nephelometric Turbidity Units (a unit of turbidity)
	ug/L	Micrograms per Litre

1.7 Performance Summary

The Shire of Manjimup obtained 468 samples from the reticulation water supply between July 2022 and June 2023. All samples were assessed pursuant to the ADWG.

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 recommended guideline values in microbiological or chemical parameters are forwarded to the DoH as they occur.

Radiological samples were undertaken in June 2023 as per sampling schedule. The next sampling will be due in 2028.

Table 2: Summary of total samples during the 2022/23 reporting period

	No Assessed	No Within Guidelines	Variance
Microbial Quality			
<i>E. coli</i>	85	85	0
Thermophilic <i>Naegleria</i>	79	79	0
Chemical Quality			
Chemical – Health Related	122	105	17
Chemical – Aesthetic	180	148	32
Radiological Quality			
Gross Alpha	1	1	0
Gross Beta	1	1	0

2.0 Microbial Performance

2.1 Microbial – Exception Notifications

The Shire of Manjimup collected 164 samples at nominated points in accordance with the DWQMP. There were no detections or reportable exceptions of either *E. coli* or Thermophilic *Naegleria* species during the reporting period.

2.2 Microbiological – Compliance

Table 3: Summary of microbiological samples obtained during 2022/23

No. of Bacteria Samples	<i>E. coli</i>		No. of Amoeba Samples	Thermophilic <i>Naegleria</i>	
	Non Comply	% Comply		Non Comply	% Comply
85	0	100	79	0	100

2.3 Microbiological - Performance

Microbiological results from the nominated sampling points were compliant pursuant to the ADWG Guidelines for the 2022/23 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 nominated sample points during 2022/23. There have also been no significant or reportable microbiological incidents in this reporting period.

In the Windy Harbour drinking water system, free chlorine residuals provide the sole barrier to pathogens that may enter the system which reinforces the importance of microbiological sampling for Windy Harbour's drinking water supply. The Shire can report that all *E.coli* samples collected during this period were compliant with the ADWG. Furthermore, the control of free chlorine residuals throughout the distribution system is maintained by Shire staff via routine monitoring and adjustment of chlorine dosing rates as required. Staff also carried out additional flushing of the system during this period. The flushing regime draws chlorinated water through the system displacing stagnant water which can be an issue when there are low occupancy levels within the settlement, particularly during the winter months.

3.0 Chemical – Health Related Performance

3.1 Chemical – Exception Notifications

There were a total of seventeen (17) exception notifications (Level 2) submitted to the DoH during the reporting period as follows:

- Trihalomethanes (THM's) exceeded the recommended guideline value on ten (10) occasions. Monthly sampling undertaken in every month exceeded the guideline value with the exception of January and June 2023. THMs are disinfection by-products and are indicative of the natural organic matter in the water prior to disinfection. The Shire continues to monitor individual and trending results via its monthly sampling program.
- The disinfection by-product, Trichloroacetic Acid exceeded the guideline value on six (6) occasions. This included July, September, November and December 2022 and February and March 2023 respectively. The presence of this by product is indicative of the level of natural organic matter in the source water prior to disinfection.
- Nickel exceeded the recommended value in November 2022. The presence of nickel is a consequence of dissolution from ore bearing rocks in ground water. This was investigated, however found to be of no significance.
- Monthly sampling undertaken during the 2022/2023 reporting period revealed that turbidity levels did not exceed the maximum aesthetic guideline value. The samples are obtained at various points in the distribution system. Water passing through a distribution system can sometimes lead to an increase in turbidity, generally as a result of the resuspension of fine sediments settled over a long period of time, or from the breakdown of pipe materials or biofilms lining the walls of the pipes. The associated health risk is generally minimal however some biofilms can harbour pathogens (ADWG 2011). High turbidity levels can also reduce the effectiveness of treatment processes such as chlorination.

3.2 Chemical - Health – Compliance

There are many chemical parameters that have a health-related guideline value pursuant to the ADWG as shown in Table 4 including the forementioned exceedances.

Figure 1 shows THM values for monthly samples obtained during the reporting period.

Figure 1: Total Trihalomethane (THM) values for monthly samples obtained during 2022/23 (mg/L).

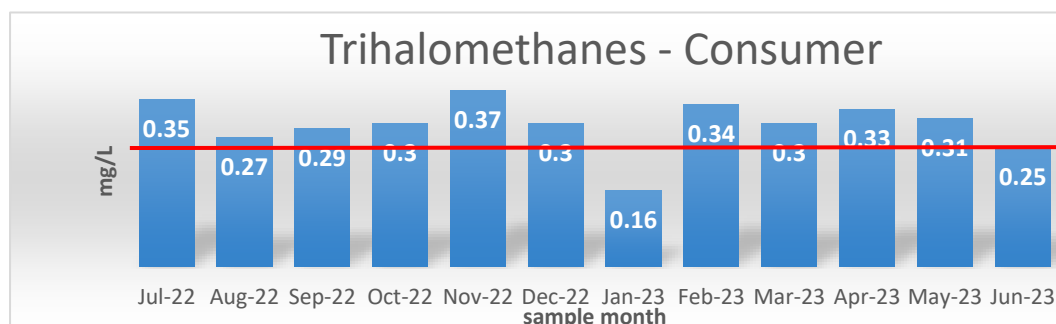


Table 4: Summary of health related values for monthly and annual samples relative to chemical parameter

Category	Chemical	Unit	Health Guideline Value	Max Value of Samples	No Assessed	No Within Guidelines	Compliance
Organic Chemicals Disinfection by-products	Chloroacetic Acid	mg/L	0.15	0.022	12	12	100%
	Dichloroacetic Acid	mg/L	0.1	0.083	12	12	100%
	Trichloroacetic Acid	mg/L	0.1	0.20	12	6	50%
	2-Chlorophenol	mg/L	0.3	<0.001	2	2	100%
	2,4-dichlorophenol	mg/L	0.2	<0.001	2	2	100%
	2,4,6-trichlorophenol	mg/L	0.02	<0.001	2	2	100%
	Trichloroacetaldehyde	mg/L	0.1	0.0094	12	12	100%
Other Inorganic Chemicals	Arsenic - Total	mg/L	0.01	<0.001	1	1	100%
	Barium - Total	mg/L	2	0.05	1	1	100%
	Boron - Total	mg/L	4	<0.05	1	1	100%
	Cadmium - Total	mg/L	0.002	<0.0001	1	1	100%
	Mercury - Total	mg/L	0.001	<0.0001	1	1	100%
	Molybdenum - Total	mg/L	0.05	<0.001	1	1	100%
	Nickel - Total	mg/L	0.02	0.023	1	0	0%
	Selenium - Total	mg/L	0.01	<0.001	1	1	100%
	Manganese - Total	mg/L	0.5	0.02	1	1	100%
	Lead - Total	mg/L	0.01	<0.001	1	1	100%
	Fluoride	mg/L	1.5	<0.10	1	1	100%
Inorganic Chemicals Disinfection Agents & inorganics by-products of disinfection	Trihalomethanes	mg/L	0.25	0.37	12	2	24%
	Chlorine (Free)	mg/L	5	0.7	62	62	100%
Organic Compounds: industrial hydrocarbons (other than disinfection by-products)	Benzene	mg/L	0.001	<0.0005	1	1	100%
	Ethylbenzene	mg/L	0.3	<0.0005	1	1	100%

4.0 Chemical – Aesthetic Related Performance

4.1 Chemical – Aesthetic - Results

Table 5 summarises the results for the aesthetic characteristics during the reporting period. Whilst exceedances of aesthetic guidelines can affect consumer experience, it is important to note that exceedances do not pose a health risk to consumers.

Table 5: Summary of aesthetic values for monthly and annual samples (chemical) obtained during 2022/23

Category	Characteristic	Unit	Aesthetic Guideline Value	Maximum Value of Samples	No Assessed	No Within Guidelines	Compliance
Grouped	Hardness	mg/L	200	190	1	1	100%
	pH	pH	6.5-8.5	7.80	62	62	100%
	Total Dissolved Solids	mg/L	600	580	12	12	100%
	True Colour	HU	15	27	12	6	50%
	Turbidity (source)	NTU	5	4.4	12	12	100%
	Turbidity (distribution)	NTU	1	2	12	10	83%
Inorganic chemicals, disinfection agents and inorganic by-products of disinfection	Chlorine (Free)	mg/L	0.6	0.7	62	62	100%
Organic chemicals disinfection by-products	2-Chlorophenol	mg/L	0.0001	<0.001	1	2	100%
	2,4-dichlorophenol	mg/L	0.0003	<0.001	1	2	100%
	2,4,6-trichlorophenol	mg/L	0.002	<0.001	1	2	100%
Other inorganic Chemicals	Ammonia (as NH ₄)	mg/L	0.5	<0.02	1	1	100%
	Chloride	mg/L	250	170	1	1	100%
	Hydrogen Sulfide	mg/L	0.05	<0.05	1	1	100%
	Iron	mg/L	0.3	0.99	12	5	43%
	Manganese	mg/L	0.1	0.02	1	1	100%
	Sodium	mg/L	180	95	1	1	100%
	Sulfate	mg/L	250	3.5	1	1	100%
Organic Compounds: industrial hydrocarbons (other disinfection by-products)	Ethylbenzene	mg/L	0.003	<0.0005	1	1	100%
	Toluene	mg/L	0.025	<0.0005	1	1	100%
	Xylenes (Total)	mg/L	0.02	<0.003	1	1	100%

4.2 Chemical - Aesthetic – Incident Specific Information

Analysis of water samples obtained from the distribution and consumer sample points showed aesthetic values not being compliant with guidelines for nineteen (19) samples of the 209 in total.

Raw water extracted from the bore(s) at Windy Harbour is typically characterised by naturally elevated levels of both total dissolved solids (>500 mg/L) and iron (> 0.3 mg/L), and there is no pre-treatment process (filtration) in place to minimise these characteristics prior to chlorination.

Chlorine levels also exceeded the aesthetic guideline value on five (5) occasions. It also fell below it during the reporting period at distribution points. This value is based on a taste threshold and there have been no public complaints received. It is important to note that adequate disinfection is paramount for the provision of safe drinking water and free chlorine levels must be maintained.

Iron levels exceeded the maximum aesthetic guideline value on seven (7) occasions. Exceedances occurred in July, August, Sep in 2022 and February, March, April and May 2023 during the reporting period. This guideline value is based on a taste threshold and there have been no public complaints received concerning the aesthetic quality of water during this period. The Shire's Health Team will continue to monitor iron levels in the future.

True colour exceeded the maximum aesthetic guideline value on six (6) occasions. The exceedances were in July and September 2022 and April, May and June in 2023. True colour represents the colour that remains after any suspended particles have been removed and can influence the appearance of water. Although it is not necessarily harmful to human health, the water will not be as appealing to consumers.

Turbidity exceeded the guideline value on two (2) occasions. Monthly sampling undertaken in April and May 2023 revealed that turbidity levels exceeded the maximum aesthetic guideline value at the distribution sample point.

5.0 Radiological Performance

Radiological performance sampling was undertaken in June 2023 and as per sampling protocol every 5 years. The results were compliant, the next radiological sampling is to be undertaken in 2028.

Table 6: Summary of Radiological testing water sampling results

Category	Characteristic	Unit	ADWG Radiological Screening Value	Maximum Value of Samples	No Assessed	No Within Guidelines	Compliance
Radiological	Gross Alpha	Bq/L	0.5	0.104	1	1	100%
Radiological	Gross Beta	Bq/L	0.5	0.111	1	1	100%

6.0 Summary

This Annual Report describes the Windy Harbour drinking water quality performance for the period July 2022 to June 2023. Sampling and in house monitoring procedures are carried out in accordance with best industry practice and undertaken by Shire staff competent in aseptic technique.

The sampling program comprises of 6 compliance monitoring points which includes the source water (bore), treated water tanks and various locations at the extremities of the 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 DoH.

The report demonstrates that all samples obtained for microbiological analysis were within the parameters determined by the ADWG. Most of the samples acquired for chemical and physical characteristics were also compliant, with the exception of individual results for trihalomethanes, turbidity, true colour, iron, nickel and chlorine. 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. The Shire's Environmental Health Officers will continue to monitor chemical analysis results going forward.

The Shire of Manjimup is also committed to being transparent on its performance by providing the public with accurate and representative information in this report. This 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.

Any further enquiries or information regarding this report or any other matter pertaining to the Windy Harbour Drinking Water Supply can be obtained by emailing the Shire's Environmental Health Services Team at info@manjimup.wa.gov.au or by telephoning (08) 9771 7777.