WINDY HARBOUR DRINKING WATER SUPPLY

ANNUAL WATER QUALITY REPORT

2021/22

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1.0 Administration

1.1 Water Provider Information

Water Provider Contact Details			
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Department of Health Liaison Officer			
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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 are currently under review.

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).

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 *Naegleria* refers to a group of amoeba which includes *Naegleria fowleri*, the organism that causes the waterborne disease primary amoebic meningoencephalitis. *Naegleria fowleri* 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 *Escherichia coli* (*E. coli*).	The Department of Health WA has notification protocols in place regarding *Naegleria*. The Australian Drinking Water Guidelines state that the thermotolerant coliform E. *coli* 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

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

Units:	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 454 samples from the reticulation water supply between July 2021 and June 2022. 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.

Table 2: Summary of total samples during the 2021/22 reporting period

	No Assessed	No Within Guidelines	Variance
Microbial Quality			
E. coli	74	74	0
Thermophilic *Naegleria*	45	45	0
Chemical Quality			
Chemical – Health Related	135	130	5
Chemical – Aesthetic	200	166	32

2.0 Microbial Performance

2.1 Microbial – Exception Notifications

The Shire of Manjimup collected 119 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 2021/22

No. of Bacteria Samples	*E. coli*		No. of Amoeba Samples	Thermophilic *Naegleria*	
	Non Comply	% Comply		Non Comply	% Comply
74	0	100	45	0	100

2.3 Microbiological - Performance

Microbiological results from the nominated sampling points were compliant pursuant to the ADWG Guidelines for the 2021/22 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 2021/22. There have also been no significant or reportable microbiological incidents in this reporting period.

3.0 Chemical – Health Related Performance

3.1 Chemical – Exception Notifications

There were a total of 11 exception notifications (Level 2) submitted to the DoH during the reporting period as follows:

- Monthly sampling undertaken in July, August and September 2021 revealed that turbidity levels exceeded the maximum aesthetic guideline value. The exceedances were reported in samples 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.

  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.

- Monthly sampling undertaken in September, October, December 2021 and January, February 2022 showed that the THM levels at the consumer sample point exceeded the maximum health-related guideline value of 0.25 mg/L. 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 and preparations are underway to appoint a consultant to review the management plan and investigate potential solutions for this issue.

3.2 Chemical - Health – Compliance

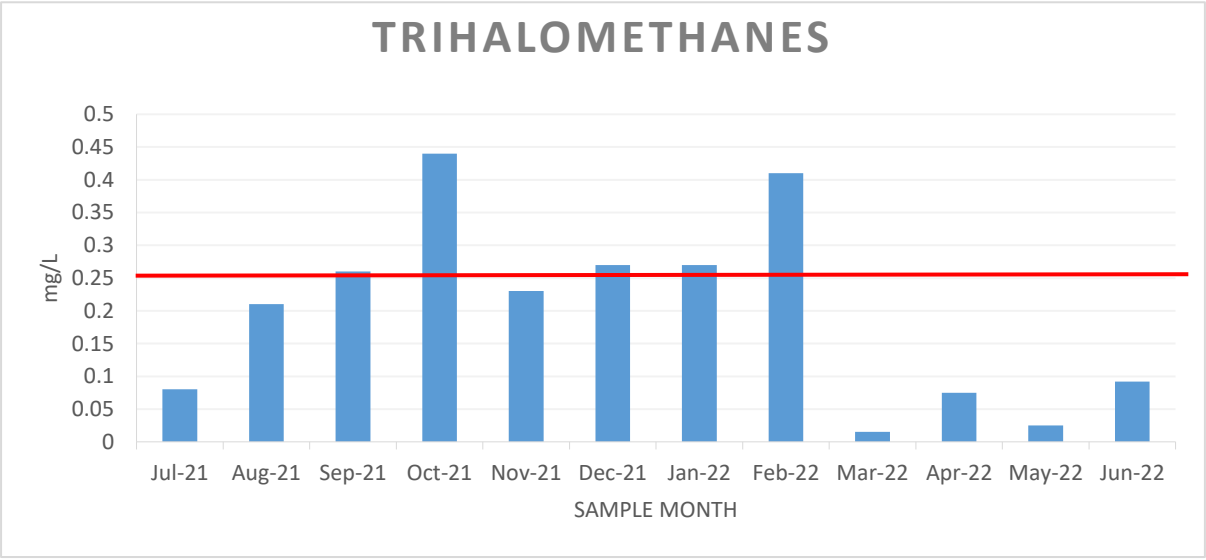
There are many chemical parameters that have a health related guideline value pursuant to the ADWG as shown in Table 4.

Table 4: Summary of heath related values for monthly and annual samples relative to chemical parameters

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	0.018	12	12	100%
	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	0.001	1	1	100%
	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%
Inorganic Chemicals Disinfection Agents & inorganics by-products of disinfection	Trihalomethanes	mg/L	0.25	0.44	12	7	58%
	Chlorine (Free)	mg/L	5	2.06	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%

The Shire achieved compliance with guideline values for all health-related chemical parameters with the exception of five exceedances in THM values. Figure 1 shows THM values for monthly samples obtained during the reporting period.

Figure 1:Total Trihalomethane (THM) values for monthly samples obtained during 2021/22 (mg/L).



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 2021/22

Category	Characteristic	Unit	Aesthetic Guideline Value	Maximum Value of Samples	No Assessed	No Within Guidelines	Compliance
	Hardness	mg/L	200	190	1	1	100%
	pH	pH	6.5-8.5	7.20	62	62	100%
	Total Dissolved Solids	mg/L	600	580	12	12	100%
	True Colour	HU	15	**39**	12	9	75%
	Turbidity	NTU	5	**32**	26	19	73%
Inorganic chemicals, disinfection agents and inorganic by-products of disinfection	Chlorine (Free)	mg/L	0.6	**2.06**	62	52	84%
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 NH4)	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	**2.1**	12	0	0%
	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%
	Toulene	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

Iron levels exceeded the maximum aesthetic guideline value in each month 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 Environmental Health Officers will continue to monitor iron levels in the future.

Chlorine levels also exceeded the aesthetic guideline value on ten occasions however the ADWG state that for some drinking water supplies it may be necessary to exceed

guideline values to ensure an effective disinfectant residual is maintained throughout the system.

True colour exceeded the maximum aesthetic guideline value on three occasions (July and August 2021; May 2022). 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.

Monthly sampling undertaken in April 2022 revealed that turbidity levels exceeded the maximum aesthetic guideline value at the source (bore) sample point. The increased turbidity reading was likely due to the sample being obtained from the incorrect bore which is scheduled for a bore casing replacement. Analysis of a sample obtained at the same time from the distribution sample point, which is representative of the actual bore in use, indicated that the turbidity level was only 1.3 NTU which complies with the ADWG. The Shire will continue to monitor individual and trending results via its monthly sampling program and a turbidity meter has also been purchased which will allow the Shire's operational staff to check turbidity levels on a more regular basis.

5.0 Radiological Performance

Radiological performance sampling is undertaken every 5 years. Results have been satisfactory to date and the next radiological sampling is to be undertaken in 2023.

6.0 Summary

This Annual Report describes the Windy Harbour drinking water quality performance for the period July 2021 to June 2022. 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. The majority of the samples acquired for chemical and physical characteristics were also compliant, with the exception of individual results for trihalomethanes, turbidity, true colour, iron 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.