



WINDY HARBOUR DRINKING WATER SUPPLY

ANNUAL WATER QUALITY REPORT

2019/20

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 - Health – Compliance	8
4.0	Chemical – Aesthetic Related Performance.....	10
4.1	Chemical – Aesthetic - Results.....	10
4.2	Chemical - Aesthetic – Incident Specific Information	10
5.0	Radiological Performance.....	11
6.0	Summary	12

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 Marius Olsen		
Department of Health Liaison Officer Email	marius.olsen@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 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 has investigated the option of utilising solar however it is not currently considered feasible due to lack of solar capacity, particularly during winter and site constraints. The diesel pumps are essential for operating the water supply system and pumping extracted groundwater to four drinking water storage tanks located 1 km from the bore sites on a hill approximately 60 AHD above the settlement. Adequate incident response procedures are in place to address any contamination events.
- ***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.

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 5 nominated sampling points located 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.

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 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 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
	NTU	Nephelometric Turbidity Units

1.7 Performance Summary

The Shire of Manjimup obtained 381 samples from the reticulation water supply during the 2019/20 year. Of these 108 were for microbiological quality, 172 for health related chemical quality and 101 for chemical aesthetic quality. 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 WA Department of Health as they occur.

Table 2: Summary of total samples during the 2019/20 reporting period

	No Assessed	No Within Guidelines	Variance
Microbial Quality			
<i>E. coli</i>	60	60	0
Thermophilic <i>Naegleria</i>	48	48	0
Chemical Quality			
Chemical – Health Related	172	168	4
Chemical – Aesthetic	101	96	5
Radiological	0	---	---

2.0 Microbial Performance

2.1 Microbial – Exception Notifications

During the reporting period, the Shire of Manjimup collected 108 samples at nominated points in accordance with the DWQMP. Included in this total were an additional 12 bacterial samples obtained over a three week period in April 2020 due to the chlorinator malfunctioning and the requirement for operational staff to undertake hand dosing of chlorine. There were no detections or reportable exceptions of either *Escherichia coli* (*E. coli*) or Thermophilic *Naegleria* species during the reporting period.

2.2 Microbiological – Compliance

Table 3: Summary of microbiological samples obtained during 2019/20

No. of Bacteria Samples	<i>E. coli</i>		No. of Amoeba Samples	Thermophilic <i>Naegleria</i>	
	Non Comply	% Comply		Non Comply	% Comply
60	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 2019/20 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 2019/20. There have also 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 ADWG as shown in the following tables.

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

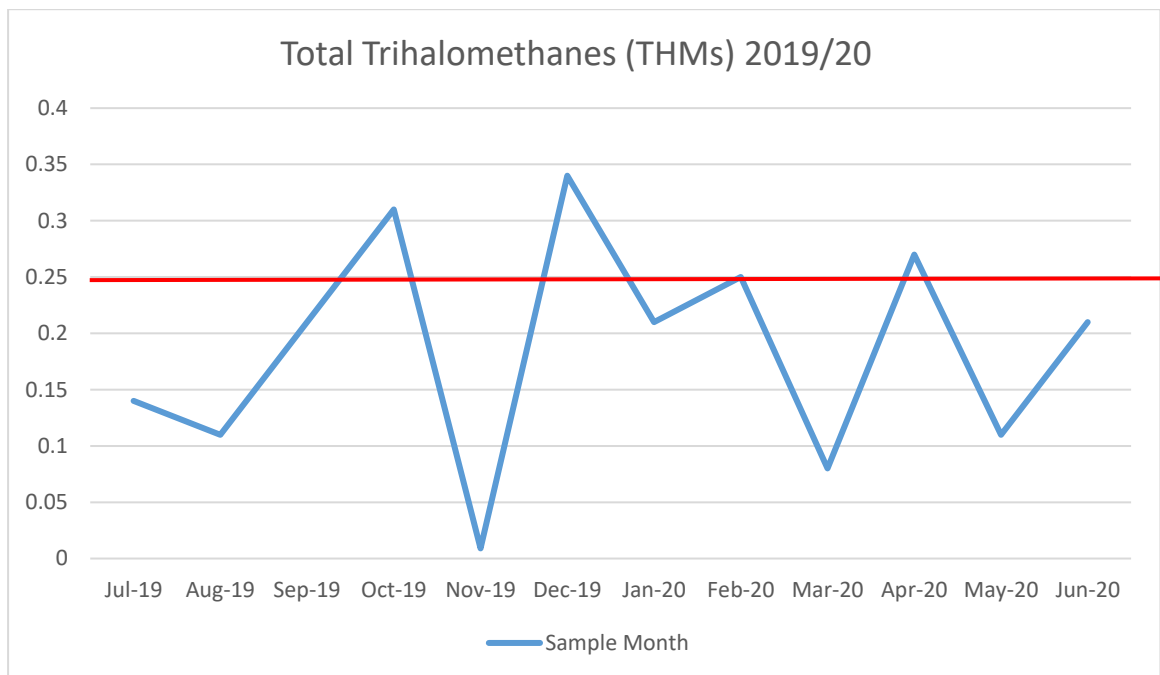
Category	Chemical	Unit	Health Guideline Value	Max Value of Samples	No Assessed	No Within Guidelines	Compliance
Organic Chemicals Disinfection by-products	Chloroacetic Acid	mg/L	0.15	<0.05	1	1	100%
	Dichloroacetic Acid	mg/L	0.1	0.08	1	1	100%
	Trichloroacetic Acid	mg/L	0.1	0.16	1	0	0%
	2-Chlorophenol	mg/L	0.3	<0.00005	1	1	100%
	2,4-dichlorophenol	mg/L	0.2	<0.0001	1	1	100%
	2,4,6-trichlorophenol	mg/L	0.02	<0.001	1	1	100%
	Trichloroacetaldehyde	mg/L	0.1	0.05	1	1	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	0.058	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	0.27	1	1	100%
	Cyanide	mg/L	0.08	<0.004	1	1	100%
	Fluoride	mg/L	1.5	<0.1	1	1	100%
	Lead	mg/L	0.01	0.002	1	1	100%
	Manganese	mg/L	0.5	0.023	1	1	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	<0.5	1	1	100%
Nitrite	mg/L	3	<0.5	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	0.34	12	9	75%
	Chlorine (Free)	mg/L	5	2.50	60	60	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%
Pesticides	Aldrin	mg/L	0.00001	<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	mg/L	0.00001	<0.00001	1	1	100%
	Diquat	mg/L	0.007	<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	<0.1	1	1	100%
	Glyphosate	mg/L	1	<0.01	1	1	100%
	Heptachlor	mg/L	0.00005	<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	0.02	<0.1	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%	
Tricopyr	mg/L	0.02	<0.0005	1	1	100%	

Table 5: Individual Trihalomethane values for monthly samples obtained during 2019/20 (mg/L)

Category	Chemical	Unit	Health Guideline Value	Max Value of Samples	No Assessed	No Within Guidelines	Compliance
Disinfectant Agents and By Products (Trihalomethanes)	Chloroform	mg/L		0.18	12	12	100%
	Bromodichloromethane	mg/L		0.10	12	12	100%
	Dibromochloromethane	mg/L		0.04	12	12	100%
	Bromoform	mg/L		<0.01	12	12	100%
	Surrogate Dibromoflourometha	mg/L	0.14	0.11	12	12	100%
	Surrogate toluene-d8	mg/L	0.14	0.12	12	12	100%
	Surrogate 4-BFB	mg/L	0.14	0.11	12	12	100%
Comparative Total Trihalomethanes	THMs	mg/L	0.25	0.34	12	9	75%

The Shire achieved compliance with guideline values for the majority of chemical (health related) parameters, however there were some exceptions. In particular, Total Trihalomethanes (THMs) exceeded the recommended maximum value on three occasions during the reporting period as shown in Figure 1.

Figure 1: Total Trihalomethane values for monthly samples obtained during 2019/20 (mg/L).



THMs are disinfection by-products and are indicative of the natural organic matter in the water prior to disinfection. Chlorination is the most commonly used process for disinfection and is 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”*.

4.0 Chemical – Aesthetic Related Performance

4.1 Chemical – Aesthetic - Results

The following table 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 to aesthetic guidelines do not pose a health risk to consumers.

Table 6: Summary of aesthetic values for monthly and annual samples (chemical) obtained during 2019/20

Category	Characteristic	Unit	Aesthetic Guideline Value	Maximum Value of Samples	No Assessed	No Within Guidelines	Compliance
Physical Characteristics	Calcium Dissolved	mg/L	No Value	47	1	1	100%
	Hardness	mg/L	200	170	1	1	100%
	pH	pH	6.5-8.5	7.15	60	60	100%
	Total Dissolved Solids	mg/L	600	450	1	1	100%
	True Colour	HU	15	67	12	1	8.3%
	Turbidity	NTU	5	7.2	12	11	92%
Inorganic Chemicals Disinfection by-products A	2-Chlorophenol	mg/L	0.3	<0.00005	1	1	100%
	2,4-dichlorophenol	mg/L	0.2	<0.0001	1	1	100%
	2,4,6-trichlorophenol	mg/L	0.002	<0.001	1	1	100%
Other inorganic Chemicals	Aluminium	mg/L	0.2	0.01	1	1	100%
	Ammonia (as NH ₄)	mg/L	0.5	<0.005	1	1	100%
	Chloride	mg/L	250	170	1	1	100%
	Copper	mg/L	2	0.27	1	1	100%
	Hydrogen Sulphide	mg/L	0.05	<0.01	1	1	100%
	Iron	mg/L	0.3	0.90	1	0	0%
	Magnesium Dissolved	mg/L	No Value	14	1	1	100%
	Manganese	mg/L	0.1	0.024	1	1	100%
	Sodium	mg/L	180	100	1	1	100%
	Sulphate	mg/L	250	3	1	1	100%
	Zinc	mg/L	3	0.067	1	1	100%

4.2 Chemical - Aesthetic – Incident Specific Information

Analysis of iron levels in the water supply was undertaken in December 2019 with the result showing an exceedance of the recommended maximum value. There was also one turbidity exceedance in May 2020. The sample point for this exceedance was not adequately flushed prior to collecting the sample, which may have been a contributing factor. However, *E.coli* samples collected at the same time were satisfactory.

As shown in the following table, results during the reporting period showed true colour values were above the aesthetic guideline value in each month with the exception of November 2019.

Table 7: Summary of True Colour values for monthly samples obtained during 2019/20

True Colour	Guideline Aesthetic Value (HU)	Sample Aesthetic Value (HU)
July 2019	15	35
August 2019	15	37
September 2019	15	23
October 2019	15	27
November 2019	15	<5
December 2019	15	20
January 2020	15	27
February 2020	15	31
March 2020	15	46
April 2020	15	32
May 2020	15	67
June 2020	15	37

True colour represents the colour that remains after any suspended particles have been removed, while turbidity is the cloudiness caused by fine suspended matter in the water. Colour and turbidity can influence the appearance of water and, although not necessarily harmful to human health, the water will not be as appealing to consumers.

Raw water extracted from the bore(s) at Windy Harbour is characterised by naturally elevated levels of turbidity (> 5NTU), colour (< 15 HU) and iron (> 0.3 mg/L), and there is no pre-treatment process (filtration) in place to minimise these characteristics prior to chlorination.

High turbidity levels can also reduce the effectiveness of treatment processes such as chlorination and indicate the potential to harbour pathogens. This reinforces the importance of microbiological sampling for Windy Harbour's drinking water supply. The Shire will continue to closely monitor these results going forward.

5.0 Radiological Performance

Past analysis for radiological performance has demonstrated compliance at all times. The next radiological testing is scheduled to be undertaken within the 2020/21 reporting period.

6.0 Summary

The Shire of Manjimup is committed to performance transparency and providing the public with accurate and representative information. This Annual Report presents the Windy Harbour drinking water quality performance for the 2019/20 reporting period and aims to demonstrate the Shire's ongoing commitment to the sustainable production and supply of high quality drinking water at Windy Harbour.

The report demonstrates that all samples obtained for microbiological analysis were within the recommended guidelines determined by the ADWG. The majority of samples obtained for analysis of chemical and physical characteristics were also compliant, the exception being true colour, turbidity and iron values. While the Shire is concerned that true colour results in particular have exceeded the guideline values every month, with the exception of November 2019, exceedances to aesthetic guidelines do not pose a health risk.

Although it is standard protocol for the Principal Environmental Health Officer to report exceedances of ADWG values to the Department of Health, this did not occur for the disinfection by products sample obtained in December 2019. Trichloroacetic acid, a by-product of chlorination, exceeded the recommended health related guideline value. Procedures have since been reviewed to ensure notification occurs as required. The sampling schedule has also been amended for the 2020/21 reporting period to include analysis of this characteristic on a monthly basis. The ADWG does however stipulate that while action to reduce chloroacetic acids is encouraged, it should not compromise the disinfection process as non-disinfected water presents a greater risk than chloroacetic acids.

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.