ANNUAL WATER QUALITY REPORT

1 JULY 2020 – 30 JUNE 2021

CONTENTS

INTRODUCTION

Purpose of this document

Our commitment to compliance with health related and non-health related water quality criteria of the Australian Drinking Water Guidelines (ADWG) is firmly established and reinforced through our Memorandum of Understanding (MoU) with the Department of Health. This document, in accordance with Section 11 of the MoU, reports the water quality performance for the period 1 July 2020 to 30 June 2021.

In addition to presenting water quality results and performance against the ADWG, this report describes the processes Lancelin South Water (LSW) uses to collect, treat and distribute drinking water to our customers.

Table 1 Drinking Water Quality Results 1 July 2020 to 30 June 2021 at a glance

Water Quality Incidents	
Incidents reportable to Department of Health	2
Health related characteristics	**Compliance**
Escherichia coli	100%
Naegleria	100%
Chemical	100%
Pesticides	100%
Radiological	100%
Chlorine Disinfection	100%
Non-health characteristics	**Compliance**
Aesthetic characteristics (excluding chlorine)*	90%

Our Drinking Water Quality Policy

Lancelin South Water is committed to ensuring that drinking water supplied to our customers is safe, provided sustainably and meets or exceeds our customer expectations.

Our water is regularly monitored to ensure it meets the health-related criteria set out in the Australian Drinking Water Guidelines.

We will achieve this by:

- Safely managing water quality throughout the treatment process from the source to the consumer taps;
- Using a risk-based approach in our operations, in which potential threats to water quality are identified and managed;
- Undertaking regular water quality monitoring and public reporting of results;
- Robust contingency planning and incident response capabilities;
- Operating and maintaining our treatment plant and infrastructure following best practice principles;
- Continually assessing and upgrading plant and equipment to ensure performance;
- Maintaining communications with stakeholders and regulators;
- Welcoming consumer feedback on water quality;
- Carrying out verification of performance and management systems via external auditing.

INTRODUCTION

Drinking Water Quality Management Framework

Lancelin South Water bases its Drinking Water Quality Management System on the Framework for Management of Drinking Water Quality, within the Australian Drinking Water Guidelines (ADWG) endorsed by the National Health and Medical Research Council. This Framework:

- defines benchmark water quality guidelines and values for drinking water quality management;
- defines a preventative approach to the management and operation of a drinking water system, encompassing all steps in water production from source to consumer.

The WA Department of Health and Lancelin South Water signed a Memorandum of Understanding (MoU) in June 2019, describing the requirements for compliance with microbiological, chemical and radiological drinking water quality criteria. The MoU is publicly available from the Lancelin South Water web site at:

LSW Forms-Documents-Publications

The Lancelin South Water MoU incorporates the preventative water management strategy, from source to consumer, outlined in the ADWG Framework for Management of Drinking Water Quality. The MoU is structured to reflect the 12 guiding elements of the Framework and thereby integrates all facets of the drinking water quality management and assurance system. The MoU covers items such as the agreed monitoring program, management practices and procedures, approved chemicals and material to be used within the drinking water system, data management and reporting mechanisms and the type of incident and emergency responses required.

We report our performance quarterly to the Department of Health. Until replaced with the Annual Water Quality report, quarterly Water Quality reports are publicly available on the Lancelin South web site at:

LSW Forms-Documents-Publications

Lancelin South Water recognises and supports the ongoing work of the Advisory Committee for the Purity of Water[1].

Customer Service

Lancelin South Water operates under Water Services Licence number WL47, issued by the WA Economic Regulation Authority (ERA). We report annually to the ERA and are regularly audited against the Water Services Code of Conduct (Customer Service Standards).

Lancelin South Water can be contacted as follows:

- Phone 08 9655 1555
- Email admin@lancelinsouthwater.com.au

Useful Links

Lancelin South Water
Department of Health - Water Unit
NHMRC Australian Drinking Water Guidelines
Economic Regulation Authority WA - Water
Department of Water and Environmental Regulation – Water

[1] More information on the Advisory Committee for the Purity of Water can be found at: Advisory Committee for the Purity of Water (health.wa.gov.au)

UNDERSTANDING WATER QUALITY

Refer to the Australian Drinking Water Guidelines for more detailed information.

Parameter	Description	Management and Control
Micro-organisms & Pathogens *E. coli* *Naegleria*	Micro-organisms (or microbes) are microscopic living organisms, occurring naturally in our environment – in the air, in the soil and in water bodies. Some are beneficial to life but some can have serious health impacts to humans. Pathogens (pathogenic micro-organisms) are micro-organisms that cause disease or illness. The most common and widespread health risk to people is associated with drinking water contamination by pathogens. Organisms associated with faecal matter from humans or other mammals cause several waterborne diseases. It is impossible to test for the presence of all pathogens that may be present in water. The ADWG recommends testing for the presence of *Escherichia coli* (*E. coli*) as an indicator of faecal pathogen contamination. Thermophilic *Naegleria* refers to a group of common water borne amoebae which includes *Naegleria fowleri*, the organism that causes the serious disease primary amoebic meningoencephalitis (PAM). *Naegleria fowleri* is an environmental pathogen which naturally lives in fresh warm water.	The ADWG state that thermotolerant coliforms / *E. coli* should not be present in a minimum 100 mL sample of drinking water. The Department of Health WA has notification protocols in place regarding *exception events* for pathogens. Lancelin South Water will immediately notify the Department of Health of any confirmed detection of thermotolerant coliforms, *E.coli* or *Naegleria fowleri* in any sample for microbiological analysis. Lancelin South Water practice a multi-barrier approach to minimise the risk of microbial contamination.
Turbidity	Turbidity is the cloudiness sometimes seen in water. It is caused by small solid particles suspended in the water. The presence of particles in the water is an aesthetic problem but also impacts on the ability to adequately disinfect the water. Turbidity is usually reported as Nephelometric Turbidity Units (NTU). It is difficult to see turbidity below about 5 NTU with the naked eye.	The ADWG specify an aesthetic guideline for turbidity of 5 NTU. A turbidity of less than 1 NTU is desirable in drinking water for optimal disinfection. LSW remove turbidity from the water through multiple filtration stages.

<table>
<tr><th>Parameter</th><th>Description</th><th>Management and Control</th></tr>
<tr><td>Colour</td><td>Colour in natural water is due mainly to the presence of dissolved organic matter including humic and fulvic acids, which originate from soil and decaying vegetable matter. Colour can also be caused by high levels of dissolved iron or manganese.

The presence of turbidity in the water may appear as Colour – True Colour is the Colour present after removal of turbidity.</td><td>The ADWG value for colour is based on the colour that is just noticeable in a glass to the naked eye. This is generally accepted as 15 Hazen Units (HU).

LSW remove colour using granular activated carbon and reverse osmosis processes.</td></tr>
<tr><td>Metals</td><td>Metals can be present in natural waters from contact with rocks, soil, pipes and equipment. Many metals in water do not present a health hazard but some do.

Iron is present in the groundwater from the Leederville aquifer. Whilst not health related, elevated concentrations can discolour the water and can stain laundry.

Manganese is also present at low concentration in the groundwater. Manganese can discolour the water and stain laundry.</td><td>The ADWG specify an aesthetic guideline value of 0.3 milligrams per litre[1] (mg/L) for iron.

The ADWG specify a health guideline of 0.5 mg/L and an aesthetic guideline value of 0.1 mg/L for manganese.

LSW removes most metals from the source water through oxidation with sodium hypochlorite and filtration through catalytic media.</td></tr>
<tr><td>Total Dissolved Solids</td><td>Total Dissolved Solids (TDS) consist of inorganic (natural) salts and small amounts of organic matter dissolved in water. Water with low TDS can taste flat, while water with high TDS tastes salty and causes scaling in and corrosion of pipes, fittings and household appliances.

TDS includes: sodium, potassium, calcium, magnesium, carbonate, bicarbonate, chloride, sulphate, nitrate, phosphate, silica, dissolved metals, dissolved organic species and other less common elements.</td><td>The ADWG provide guidance in the palatability of drinking water according to TDS concentration, as shown below:
<table><tr><td>TDS (mg/L)</td><td>Quality</td></tr><tr><td>0 – 600</td><td>Good</td></tr><tr><td>600 – 900</td><td>Fair</td></tr><tr><td>900 – 1200</td><td>Poor</td></tr><tr><td>>1200</td><td>Unpalatable</td></tr></table>Groundwater from our production bore is typically around 800 mg/L - 900 mg/L TDS. LSW desalinate the water using reverse osmosis to provide water to customers at below 500 mg/L.</td></tr>
</table>

Parameter	Description	Management and Control
Radionuclides	There are natural levels of radiation within the environment emanating from rocks and soil. Water from the Leederville aquifer (source for Lancelin South) typically has quite low levels of radionuclides. The radioactivity of radionuclides is reported in units of Becquerels per Litre (Bq/L)	The Australian Drinking Water Guidelines recommend a screening level of 0.5 Becquerels per Litre (Bq/L). LSW source water is within the ADWG guidelines, and no specific treatment is required for radionuclides.
pH	pH is a measure of water acidity - pH 7 is neutral, low pH is acidic and high pH is alkaline. Low pH may cause corrosion to taps, water heaters and other household appliances. High pH may be associated with scaling.	The ADWG specify a lower and upper aesthetic value of 6.5 and 8.5 respectively. LSW source water is within the ADWG guidelines, and no specific pH adjustment is required.
Trihalomethanes	Trihalomethanes (THMs) may be present in drinking water as a by-product of disinfection using chlorination.	The ADWG health guideline for total THM is 0.25 mg/L, expressed as an average long-term exposure. LSW regularly monitor the drinking water to ensure that THM remains below guideline levels.
Pesticides Industrial chemicals	Pesticides are chemical compounds used for the control of 'pests' (including insects, weeds, fungi, rodents, etc). These compounds, when at high enough concentration may be toxic to humans, can enter the drinking water system through over-spray, wind-borne dust, transmission through groundwater and other mechanisms. Industrial chemicals of significance to water quality include synthetic organic compounds, many of which are, at high enough concentration, toxic to humans.	The ADWG provides health related guidelines for an extensive range of pesticides and industrial chemicals. The LSW groundwater source is protected by a P1 Wellhead protection zone and a Drinking Water Source Protection Plan. LSW regularly monitor the drinking water to ensure that no pesticide or other synthetic organic compound exceeds the respective guideline level.

Note: 1. Milligram per litre (mg/L) is the commonly used unit for concentration, the mass of a constituent dissolved in 1 litre of water, generally synonymous with "parts per million" (ppm).

OUR WATER SYSTEM

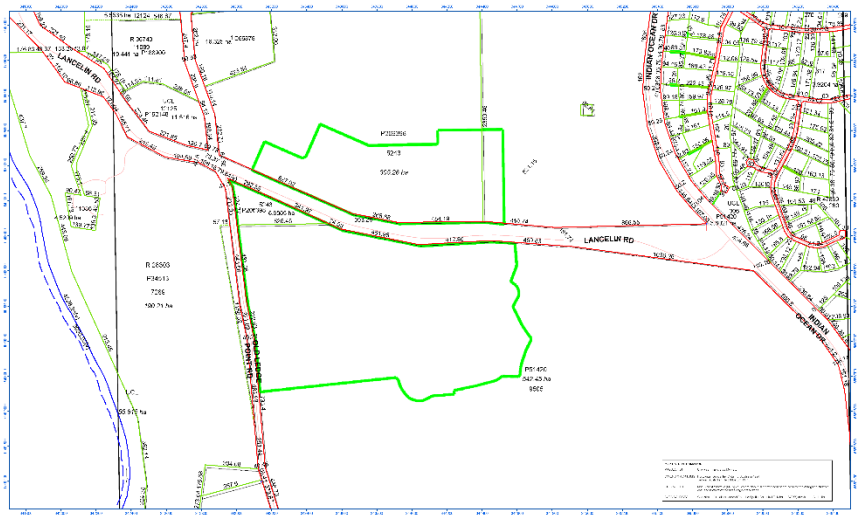
Location

The Lancelin South development is located approximately 130 km north of Perth and 2.2 km south east of the town of Lancelin, in the Shire of Gingin.

Licence Area

Lancelin South Water holds a Water Services Licence (WL47) issued by the Economic Regulation Authority of Western Australia (ERAWA).

Lancelin South Water services the Lancelin South residential and commercial areas as indicated in the map below. Our Water Services Licence is available at the ERA web site at https://www.erawa.com.au/water/water-licensing/licence-holders#L



Our Infrastructure

Total number of connections (July 2021)	22
Number of Customers	28
Total length of water mains	1.6 km
Number of distribution water quality zones	1
Chlorine residual target	0.4 to 0.6 mg/L

Our Water Source

Lancelin South Water sources all water from a production bore tapping the Leederville aquifer within the Perth Basin. Two monitoring bores are installed to allow monitoring of any impacts on or risks to the groundwater source, either from our operation or from other parties.

Lancelin South Water holds a Licence to Take Water (GWL176077(2)) issued by Department of Water and Environmental Regulations (DWER).

Source Protection

A Drinking Water Source Protection Plan (DWSPP) has been developed by Lancelin South Water as required by the DoH as part of the MoU.

The production bore is located within our locked, chain mesh fenced Water Treatment Plant (WTP) compound. To protect our source water, a P1 Wellhead Protection Zone has been proclaimed over the area of the WTP compound.

Abstraction Amounts

Lancelin South Water's Licence to Take Water (GWL176077(2)) allows annual extraction up to 470 megalitres (470 million litres) from the Leederville aquifer using production bore 3/09. Lancelin South Water typically abstract less than 10 ML/year of groundwater.

Table 2 Bore Water Extraction Amounts

Reporting Period	Megalitres (ML)
1 July 2020 to 30 June 2021	5.7
1 July 2019 to 30 June 2020	6.3
1 July 2018 to 30 June 2019	4.3
1 July 2017 to 30 June 2018	9.7

Water Treatment

The Lancelin South water treatment plant incorporates four steps to treat the raw bore water to produce safe drinking water that is supplied to our customers:

1. Raw groundwater abstracted from the production bore is dosed with sodium hypochlorite solution, then filtered through a catalytic filter media, DMI65, to remove dissolved metals. This water is supplied to the Lancelin South residents as non-potable water for garden watering (not for drinking);
2. The non-potable water is further treated by filtration through successively, granular activated carbon to remove dissolved organic contaminants and then 5 µm and 1 µm cartridges to ensure particulate matter in the water is removed;
3. Part of this filtered water is then treated using reverse osmosis desalination to reduce the salinity of the water;
4. The desalinated water and filtered water streams are then blended and stored in the Drinking Water Tank. Water in this tank is continuously recirculated and dosed with sodium hypochlorite solution to maintain a residual chlorine disinfectant concentration.

Drinking water supplied by Lancelin South Water is not fluoridated.

Lancelin South Water supplies on average 206 L/day of drinking water to each customer connection.

Distribution Network

Lancelin South Water's distribution network delivers drinking water to customers within the Lancelin South area. The network operates as one interconnected system. Materials used in the reticulation network are predominantly PVC and HDPE, approved either under Australian Standard AS/NZS 4020: 2005 (Testing of Products for Use in Contact with Drinking Water) or as scheduled in the MoU with the Department of Health.

A separate distribution network supplies non-potable water (not for drinking) to Lancelin South customers. This water supply is identified using 'purple pipes', including a separate purple water meter, and is marked as "Not for Drinking". A 'Non-potable Water – Household Guide' is available from the Lancelin South Water web site at http://www.lancelinsouthwater.com.au/forms-documents-and-publications/

Our Team

Employees and contractors involved with the Lancelin South Water drinking water system have appropriate training and experience to be demonstrably competent with the treatment, supply and monitoring of drinking water.

SYSTEM OPERATION

Customer Service

Lancelin South Water are committed to ensuring our customers are satisfied with the quality of water they receive.

Table 3: History of Customer Complaints

Period	Number of Customer Complaints Regarding Water Quality
1 July 2020 – 30 June 2021	1
1 July 2019 – 30 June 2020	Nil
1 July 2018 – 30 June 2019	Nil
1 July 2017 – 30 June 2018	Nil

One customer complaint regarding water taste was received in October 2020. The complaint occurred at a time when the chlorine monitor at the WTP had malfunctioned, allowing higher than target chlorine dosing into the drinking water, outside aesthetic but within health related guidelines. The issue was completely resolved within a few days.

Lancelin South Water Annual and recent Quarterly Water Quality reports are publicly available from the Lancelin South Water website Reports page.

Notifiable incidents

During the period 1 July 2020 to 30 June 2021 there were two (2) water quality incidents that were reportable to the Department of Health.

A sample of water taken at the Consumer Sample Point on 14 August 2020 returned a positive result for Thermophilic amoeba. Additional sampling and testing was immediately carried out and the chlorine dosing rate was increased. The follow-up sampling did not detect any thermophilic amoeba, thermophilic *Naegleria* or *Naegleria fowleri*.

A sample of water taken at the Consumer Sample Point on 8 April 2021 returned a result for thermotolerant coliforms of 11 CFU/100 mL[2]. On receipt of this result, Lancelin South Water immediately arranged for a re-sample and flushed the potable water pipeline. The second sample, taken on 13 April 2021, returned a result for thermotolerant coliforms of <1 CFU/100mL. A subsequent sample taken on 22 April 2021 also returned a result for thermotolerant coliforms of <1 CFU/100mL. Analysis for *E. coli* in all three of these samples returned results of <1 CFU/100 mL.

[2] CFU = colony-forming unit, the number of viable organisms

Improvements

Lancelin South Water are committed to carrying out regular servicing and maintenance of equipment and infrastructure to ensure that drinking water quality is not compromised at any time. We implement system and management improvements as required to maintain reliability of service and minimise risk to quality of water supplied to customers.

In January 2021, Lancelin South Water undertook a mock incident response exercise, involving the Department of Health, as required by our Memorandum of Understanding.

Water Monitoring

Lancelin South Water monitoring of water quality occurs at 3 levels:

1. Continuous monitoring by on-line instrumentation with out-of-specification values raising an alarm, relayed automatically to service personnel;
2. Periodic monitoring by personnel in the field using hand held analytical equipment;
3. Periodic sampling with analysis by NATA[3] registered laboratories.

Sampling and field monitoring are performed in accordance with industry standards. All microbial, detailed chemical and radiological analysis is carried out by a laboratory accredited by NATA for the required analyses.

[3] NATA – National Association of Testing Authorities

DRINKING WATER QUALITY RESULTS

Drinking Water Compliance - Microbiological

There were two (2) reportable events relating to microbiological results recorded during the 1 July 2020 to 30 June 2021 reporting period.

Thermophilic amoeba was detected during routine sampling on 14 August 2020. Additional sampling and testing was immediately carried out and the chlorine dosing rate was increased. The follow-up sampling did not detect any thermophilic amoeba, thermophilic *Naegleria* or *Naegleria fowleri*.

On 8 April 2021 a sample of water taken at the Consumer Sample Point returned a result for thermotolerant coliforms of 11 CFU/100 mL. On receipt of this result, Lancelin South Water immediately arranged for a re-sample and flushed the potable water pipeline. The second sample, taken on 13 April 2021, returned a result for thermotolerant coliforms of <1 CFU/100 mL. A subsequent sample taken on 22 April 2021 also returned a result for thermotolerant coliforms of <1 CFU/100 mL. Analysis for *E. coli* in all three of these samples returned results of <1 CFU/100 mL.

Results for the period are included in Table 4 below.

Table 4 Microbiological Samples 1 July 2020 to 30 June 2021 (From Consumer Sample Point)

Characteristic	Number of Samples Analysed	Unit	ADWG Limit	Number of Samples NOT meeting ADWG limit	% Compliance
Escherichia coli	42	CFU / 100 mL	0	0	100
Thermophilic *Naegleria*	14	organisms / 250 mL	ND (1)	0	100
Naegleria fowleri	1 (2)	organisms / 250 mL	ND (1)	0	100

Notes:

(1) ND = Not detected
(2) Analysis for *Naegleria fowleri* is only performed when a test for Thermophilic *Naegleria* returns a positive result.

Drinking Water Compliance - Chemical - Health Related

All samples collected (104) at the Consumer Sample Point during the 1 July 2019 to 30 June 2020 reporting period were compliant with ADWG Health related guideline.

The results for the period are included in Table 5 below.

Table 5 Chemical – Health Related – Compliance Summary 1 July 2020 to 30 June 2021 (from Consumer Sample Point)

Characteristic	Number of Samples Analysed	Unit	ADWG Health Limit	Maximum Value	Number of Samples NOT meeting ADWG limit	% Compliance
Free Chlorine	24	mg/L	5	2.5	0	100
Fluoride	2	mg/L	1.5	0.3	0	100
Nitrite Nitrogen, as NO_2	2	mg/L	3	0.03	0	100
Nitrate Nitrogen, as NO_3	2	mg/L	50	1.02	0	100
Antimony	2	mg/L	0.003	<0.001	0	100
Cadmium	2	mg/L	0.002	<0.002	0	100
Chromium	2	mg/L	0.05	<0.01	0	100
Copper	2	mg/L	2	<0.01	0	100
Lead	2	mg/L	0.01	<0.01	0	100
Manganese	3	mg/L	0.5	<0.01	0	100
Nickel	2	mg/L	0.02	<0.01	0	100
2-Chlorophenol	3	mg/L	0.3	<0.001	0	100

Characteristic	Number of Samples Analysed	Unit	ADWG Health Limit	Maximum Value	Number of Samples NOT meeting ADWG limit	% Compliance
2,4-Dichlorophenol	3	mg/L	0.2	<0.001	0	100
2,4,6-Trichlorophenol	3	mg/L	0.02	<0.001	0	100
Pentachlorophenol	3	mg/L	0.01	<0.001	0	100
Total THM's	2	mg/L	0.25	0.1	0	100
Chloral Hydrate	2	mg/L	0.1	<0.002	0	100
Chloroacetic acid	2	mg/L	0.15	<0.002	0	100
Dichloroacetic acid	2	mg/L	0.1	<0.002	0	100
Trichloroacetic acid	2	mg/L	0.1	<0.002	0	100

Table 6 Chemical / Pesticide– Health Related – Compliance Summary 1 July 2020 to 30 June 2021 (from Consumer Sample Point)

Characteristic	Number of Samples Analysed	Unit	ADWG Health Limit	Maximum Value	Number of Samples NOT meeting ADWG limit	% Compliance
2,4,5-T	1	mg/L	0.1	<0.0001	0	100
2,4-D	1	mg/L	0.03	<0.0001	0	100
Aldrin	1	mg/L	0.0003	<0.000001	0	100

Characteristic	Number of Samples Analysed	Unit	ADWG Health Limit	Maximum Value	Number of Samples NOT meeting ADWG limit	% Compliance
Amitraz	1	mg/L	0.009	<0.0001	0	100
Amitrole	1	mg/L	0.009	<0.001	0	100
Atrazine	1	mg/L	0.02	<0.0001	0	100
Azinphos Methyl	1	mg/L	0.03	<0.001	0	100
Bromophos Ethyl	1	mg/L	0.01	<0.000005	0	100
Chlordane	1	mg/L	0.002	<0.000002	0	100
Chlorfenvinphos	1	mg/L	0.002	<0.0002	0	100
Chlorothalonil	1	mg/L	0.05	<0.00001	0	100
Chlorpyrifos	2	mg/L	0.01	<0.0001	0	100
Clopyralid	1	mg/L	2	<0.0004	0	100
Diazinon	1	mg/L	0.004	<0.00001	0	100
Dicamba	1	mg/L	0.1	<0.0001	0	100
Diclofop Methyl	1	mg/L	0.005	<0.0001	0	100
Dieldrin	1	mg/L	0.0003	<0.000001	0	100
Dimethoate	1	mg/L	0.007	<0.0001	0	100
Diquat	1	mg/L	0.007	<0.001	0	100

Characteristic	Number of Samples Analysed	Unit	ADWG Health Limit	Maximum Value	Number of Samples NOT meeting ADWG limit	% Compliance
Diuron	1	mg/L	0.02	<0.0005	0	100
Endosulfan I	2	mg/L	0.02	<0.0001	0	100
Endosulfan II	2	mg/L	0.02	<0.0001	0	100
Endosulfan Sulfate	2	mg/L	0.02	<0.0001	0	100
Ethion	1	mg/L	0.004	<0.000001	0	100
Fenamiphos	1	mg/L	0.0005	<0.0001	0	100
Fenitrothion	2	mg/L	0.007	<0.0001	0	100
Fipronil	1	mg/L	0.0007	<0.00002	0	100
Fluometuron	1	mg/L	0.07	<0.0001	0	100
Fosamine	1	mg/L	0.03	<0.0001	0	100
Heptachlor	1	mg/L	0.0003	<0.000001	0	100
Hexazinone	1	mg/L	0.4	<0.0004	0	100
Lindane	1	mg/L	0.01	<0.000001	0	100
Malathion	1	mg/L	0.07	<0.00001	0	100
MCPA	1	mg/L	0.04	<0.0001	0	100
Methoxychlor	1	mg/L	0.3	<0.00002	0	100

Characteristic	Number of Samples Analysed	Unit	ADWG Health Limit	Maximum Value	Number of Samples NOT meeting ADWG limit	% Compliance
Metolachlor	1	mg/L	0.3	<0.0002	0	100
Metsulfuron Methyl	1	mg/L	0.04	<0.0005	0	100
Molinate	1	mg/L	0.004	<0.0001	0	100
o,p-DDT	1	mg/L	0.009	<0.000001	0	100
p,p-DDT	1	mg/L	0.009	<0.000001	0	100
Paraquat	1	mg/L	0.02	<0.001	0	100
Parathion Ethyl	1	mg/L	0.02	<0.00002	0	100
Parathion Methyl	1	mg/L	0.0007	<0.00002	0	100
Picloram	1	mg/L	0.3	<0.0002	0	100
Propazine	1	mg/L	0.05	<0.0001	0	100
Propiconazole	1	mg/L	0.1	<0.0004	0	100
Simazine	1	mg/L	0.02	<0.0001	0	100
Terbutryn	1	mg/L	0.4	<0.0001	0	100
Triclopyr	1	mg/L	0.02	<0.0001	0	100
Trifluralin	2	mg/L	0.09	<0.0001	0	100

Drinking Water Compliance - Chemical - Aesthetic

During the 1 July 2020 to 30 June 2021 reporting period, samples taken from the Consumer Sample Point not meeting the ADWG aesthetic guideline included:

- One (1) sample of a total of twenty eight 28 samples (4%) for pH was above the ADWG aesthetic limit of 8.5
- Nine (9) samples of a total of twenty-four (24) samples (38%) indicated Free Chlorine concentration above the ADWG Aesthetic related guideline of 0.6 mg/L.
- One (1) of three (3) samples (33%) indicated Chloride concentration above the ADWG Aesthetic related guideline of 250 mg/L.

The laboratory limit of reporting for 2-chlorophenol and for 2,4-dichlorophenol of 0.001 mg/L is above the ADWG aesthetic limit for these compounds of 0.0001 mg/L and 0.0003 mg/L respectively. Three samples each of these two disinfectant by-products from the Consumer Sample Point taken during the 1 July 2020 to 30 June 2021 reporting period are reported therefore as non-compliant with the ADWG aesthetic guideline.

Table 7 Chemical – Aesthetic Related – Compliance Summary 1 July 2020 to 30 June 2021 (from Consumer Sample Point)

Characteristic	Number of Samples Analysed	Unit	ADWG Aesthetic Limit	Maximum Value	Number of Samples NOT meeting ADWG limit	% Compliance
pH	28	pH Units	6.5-8.5	9.07	1	96
Total Dissolved Solids Dried	3	mg/L	600	520	0	100
Turbidity	5	NTU	5	0.3	0	100
Colour (True)	3	PCU	15	<5	0	100
Free Chlorine	24	mg/L	0.6	2.5	9	62
Chloride	3	mg/L	250	290	1	67
Sulfate, as SO_4	3	mg/L	250	42	0	100

Characteristic	Number of Samples Analysed	Unit	ADWG Aesthetic Limit	Maximum Value	Number of Samples NOT meeting ADWG limit	% Compliance
Ammonia Nitrogen, as N	3	mg/L	0.5	<0.02	0	100
Sodium	3	mg/L	180	120	0	100
Total Hardness by Calculation	3	mg $CaCO_3$/L	200	200	0	100
Aluminium	3	mg/L	0.2	<0.1	0	100
Copper	3	mg/L	1	0.005	0	100
Iron	4	mg/L	0.3	0.02	0	100
Manganese	4	mg/L	0.1	<0.01	0	100
Zinc	3	mg/L	3	0.031	0	100
2-Chlorophenol (1)	3	mg/L	0.0001	<0.001	3	0
2,4-Dichlorophenol (1)	3	mg/L	0.0003	<0.001	3	0
2,4,6-Trichlorophenol	3	mg/L	0.002	<0.001	0	100

Notes:

(1) The laboratory limit of reporting (LOR) is 0.001 mg/L, which is above the ADWG guideline value and hence, the analysis is reported as non-compliant.

SOURCE WATER QUALITY RESULTS

The source water is not required to meet ADWG. However, where the source water does not meet the ADWG, treatment is applied to make the water suitable for drinking.

Source Water Quality - Chemical - Health Related

No samples from the Source Water Sample Point taken during the 2020 to 2021 reporting period were outside the ADWG health related guidelines (excluding pesticides, see below).

Table 8 Chemical – Health Related – Analysis Summary 1 July 2020 to 30 June 2021 (Source Water Sample Point)

Characteristic	Number of Samples Analysed	Unit	ADWG Health Limit	Maximum Value	Number of Samples NOT meeting ADWG limit
Nitrate Nitrogen, as NO_3	2	mg/L	50	1.7	0
Nickel	2	mg/L	0.02	0.001	0
Manganese	1	mg/L	0.5	0.06	0
Arsenic	2	mg/L	0.01	<0.001	0
Barium	2	mg/L	0.7	0.13	0
Beryllium	2	mg/L	0.06	<0.01	0
Boron	2	mg/L	4	0.06	0
Mercury	2	mg/L	0.001	<0.0001	0
Molybdenum	2	mg/L	0.05	<0.001	0

Characteristic	Number of Samples Analysed	Unit	ADWG Health Limit	Maximum Value	Number of Samples NOT meeting ADWG limit
Selenium	2	mg/L	0.01	<0.001	0
Silver	2	mg/L	0.1	<0.001	0
Uranium	2	mg/L	0.017	<0.001	0
2-Chlorophenol	1	mg/L	0.3	<1	0
2,4-Dimethylphenol	1	mg/L	0.2	<1	0
2,4,6-Trichlorophenol	1	mg/L	0.02	<1	0

Analyses for the pesticides Fenamiphos and Amitrole have Levels of Reporting above the ADWG health related guideline value. Hence, analyses for these two pesticides from the source Water Sample Point taken during the 1 July 2020 to 30 June 2021 reporting period are considered as potentially outside the ADWG health related guideline value.

Table 9 Chemical Pesticides – Health Related – Analysis Summary 1 July 2020 to 30 June 2021 (Source Water Sample Point)

Characteristic	Number of Samples Analysed	Unit	ADWG Health Limit	Maximum Value	Number of Samples NOT meeting ADWG limit
Aldrin	1	mg/L	0.0003	<0.000001	0
Bromophos Ethyl	1	mg/L	0.01	<0.000005	0

Characteristic	Number of Samples Analysed	Unit	ADWG Health Limit	Maximum Value	Number of Samples NOT meeting ADWG limit
Chlordane	1	mg/L	0.002	<0.000002	0
Chlorothalonil	1	mg/L	0.05	<0.00001	0
Chlorpyrifos	1	mg/L	0.01	<0.000005	0
Diazinon	1	mg/L	0.004	<0.00001	0
Dieldrin	1	mg/L	0.0003	<0.000001	0
Endosulfan I	1	mg/L	0.02	<0.000001	0
Endosulfan II	1	mg/L	0.02	<0.000001	0
Endosulfan Sulfate	1	mg/L	0.02	<0.000001	0
Ethion	1	mg/L	0.004	<0.00001	0
Fenitrothion	1	mg/L	0.007	<0.00001	0
Fipronil	1	mg/L	0.0007	<0.00002	0
Heptachlor	1	mg/L	0.0003	<0.000001	0
Lindane	1	mg/L	0.01	<0.000001	0
Malathion	1	mg/L	0.07	<0.00001	0
Methoxychlor	1	mg/L	0.3	<0.00002	0
o,p-DDT	1	mg/L	0.009	<0.000001	0

Characteristic	Number of Samples Analysed	Unit	ADWG Health Limit	Maximum Value	Number of Samples NOT meeting ADWG limit
p,p-DDT	1	mg/L	0.009	<0.000001	0
Parathion Ethyl	1	mg/L	0.02	<0.00002	0
Parathion Methyl	1	mg/L	0.0007	<0.00002	0
Trifluralin	1	mg/L	0.09	<0.00001	0
Diuron	1	mg/L	0.02	<0.0005	0
Molinate	1	mg/L	0.004	<0.0001	0
Fluometuron	1	mg/L	0.07	<0.0001	0
Trifluralin	1	mg/L	0.09	<0.0001	0
Dimethoate	1	mg/L	0.007	<0.0001	0
Simazine	1	mg/L	0.02	<0.0001	0
Atrazine	1	mg/L	0.02	<0.0001	0
Propazine	1	mg/L	0.05	<0.0001	0
Terbutryn	1	mg/L	0.4	<0.0001	0
Fenitrothion	1	mg/L	0.007	<0.0001	0
Chlorpyrifos	1	mg/L	0.01	<0.0001	0
Endosulfan I	1	mg/L	0.02	<0.0001	0

Characteristic	Number of Samples Analysed	Unit	ADWG Health Limit	Maximum Value	Number of Samples NOT meeting ADWG limit
Fenamiphos (1)	1	mg/L	0.0005	<0.001	1
Endosulfan II	1	mg/L	0.02	<0.0001	0
Endosulfan Sulfate	1	mg/L	0.02	<0.0001	0
Diclofop Methyl	1	mg/L	0.005	<0.0001	0
Amitraz	1	mg/L	0.009	<0.0001	0
Metolachlor	1	mg/L	0.3	<0.0002	0
Hexazinone	1	mg/L	0.4	<0.0004	0
Azinphos Methyl	1	mg/L	0.03	<0.001	0
Propiconazole	1	mg/L	0.1	<0.0004	0
Chlorfenvinphos	1	mg/L	0.002	<0.002	0
Dicamba	1	mg/L	0.1	<0.0001	0
MCPA	1	mg/L	0.04	<0.0001	0
2,4-D	1	mg/L	0.03	<0.0001	0
2,4,5-T	1	mg/L	0.1	<0.0001	0
Picloram	1	mg/L	0.3	<0.0002	0
Clopyralid	1	mg/L	2	<0.0004	0

Characteristic	Number of Samples Analysed	Unit	ADWG Health Limit	Maximum Value	Number of Samples NOT meeting ADWG limit
Metsulfuron Methyl	1	mg/L	0.04	<0.0005	0
Triclopyr	1	mg/L	0.02	<0.0001	0
Paraquat	1	mg/L	0.02	<0.001	0
Diquat	1	mg/L	0.007	<0.001	0
Amitrole (1)	1	mg/L	0.0009	<0.001	1
Fosamine	1	mg/L	0.03	<0.0001	0
Pentachlorophenol	1	mg/L	0.01	<0.001	0

Notes:

(1) The laboratory limit of reporting (LOR) is 0.001 mg/L, which is above the ADWG health related guideline value and hence, the sample may not be within the ADWG health related guidelines.

Source Water Quality - Chemical - Aesthetic

Samples collected from the Source Water Sample Point during the 1 July 2020 to 30 June 2021 reporting period exceeded the ADWG aesthetic guidelines for total dissolved solids, chloride, total hardness and total iron.

The laboratory limit of reporting for 2-chlorophenol and for 2,4-dichlorophenol of 0.001 mg/L is above the ADWG aesthetic limit for these compounds of 0.0001 mg/L and 0.0003 mg/L respectively. One samples each of these two disinfectant by-products from the Source Sample Point taken during the 1 July 2020 to 30 June 2021 reporting period may therefore be outside the ADWG aesthetic guideline.

The source water is treated prior to supply to consumers in Lancelin South to ensure that these water quality issues are addressed.

The results for the period are included in Table 10 below.

Table 10 Chemical – Aesthetic related – Analysis Summary 1 July 2020 to 30 June 2021 (Source Water Sample Point)

Aesthetic Characteristic	Number of Samples Analysed	Unit	ADWG Aesthetic Limit	Maximum Value	Number of Samples NOT meeting ADWG limit
pH	25	pH Units	6.5-8.5	8.4	0
Total Dissolved Solids	1	mg/L	600	760	1
Turbidity	1	NTU	5	2.6	0
Colour (True)	1	Hazen	15	<5	0
Chloride	1	mg/L	250	350	1
Sulfate, as SO_4	1	mg/L	250	30	0
Ammonia Nitrogen, as N	1	mg/L	0.5	0.38	0
Sodium	1	mg/L	180	110	0
Total Hardness	1	mg $CaCO_3$/L	200	270	1
Aluminium	1	mg/L	0.2	<0.01	0
Iron	1	mg/L	0.3	0.8	1
Manganese	1	mg/L	0.1	0.06	0
2-Chlorophenol (1)	1	mg/L	0.0001	<0.001	1
2,4-Dimethylphenol (1)	1	mg/L	0.0003	<0.001	1
2,4,6-Trichlorophenol	1	mg/L	0.002	<0.001	0

Notes:

(1) The laboratory limit of reporting (LOR) is 0.001 mg/L, which is above the ADWG guideline value and hence, the analysis is reported as non-compliant.

Source Water Quality - Radiological

No samples collected from the Source Water Sample Point during the 1 July 2020 to 30 June 2021 reporting period was outside the ADWG screening level for radiological parameters. The results for the period are included in Table 11 below.

The radioactivity of radionuclides is reported in units of Becquerels per Litre (Bq/L).

Table 11 Radiological – Compliance Summary 1 July 2020 to 30 June 2021 (Source Water Sample Point)

Aesthetic Characteristic	Number of Samples Analysed	Unit	ADWG Radiological screening level	Maximum Value	Number of Samples NOT meeting ADWG limit
Gross Alpha	3	Bq/L	0.5	0.12	0
Gross Beta activity - 40K	3	Bq/L	0.5	0.44	0