# Lancelin South Water

Report to the Department of Health

For the period

1 July 2022 to 30 June 2023

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# 1.0 Introduction

## 1.1 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 2022 to 30 June 2023.

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 2022 to 30 June 2023 at a glance*

| Water Quality Incidents | |
|---|---|
| Incidents reportable to Department of Health | 0 |
| **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)(1) | 94% |

Note 1: A target of 1.0 mg/L free chlorine (above ADWG aesthetic-based value of 0.6 mg/L) is set at the outlet of the treated water tank to ensure effective disinfection and maintain microbiological safety of drinking water through the reticulation system and to the customer.

## 1.2 Our Drinking Water 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 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.

## 1.3 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, which runs for 5 years. It describes 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].

[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)

# 2.0 Water Provider Information

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:

| Provider Contact Details | |
|---|---|
| Name of Company | Lancelin South Water |
| Company Phone | 08 9655 1555 |
| Company Email | admin@lancelinsouthwater.com.au |
| Company Address | Suite 2, Ground Floor 233 Adelaide Terrace, Perth WA 6000 |
| Chief Executive Officer / Director | Yi Qiang, Lancelin South Water |
| CEO Email | chetqiang@vimg.com.au |
| DoH Liaison Officer | Blair Shackleton, Lancelin South Water |
| DoH Liaison Officer Email | Blair.shackleton@lancelinsouthwater.com.au |

## 2.1 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

## 2.2 Our Water System

**Location**

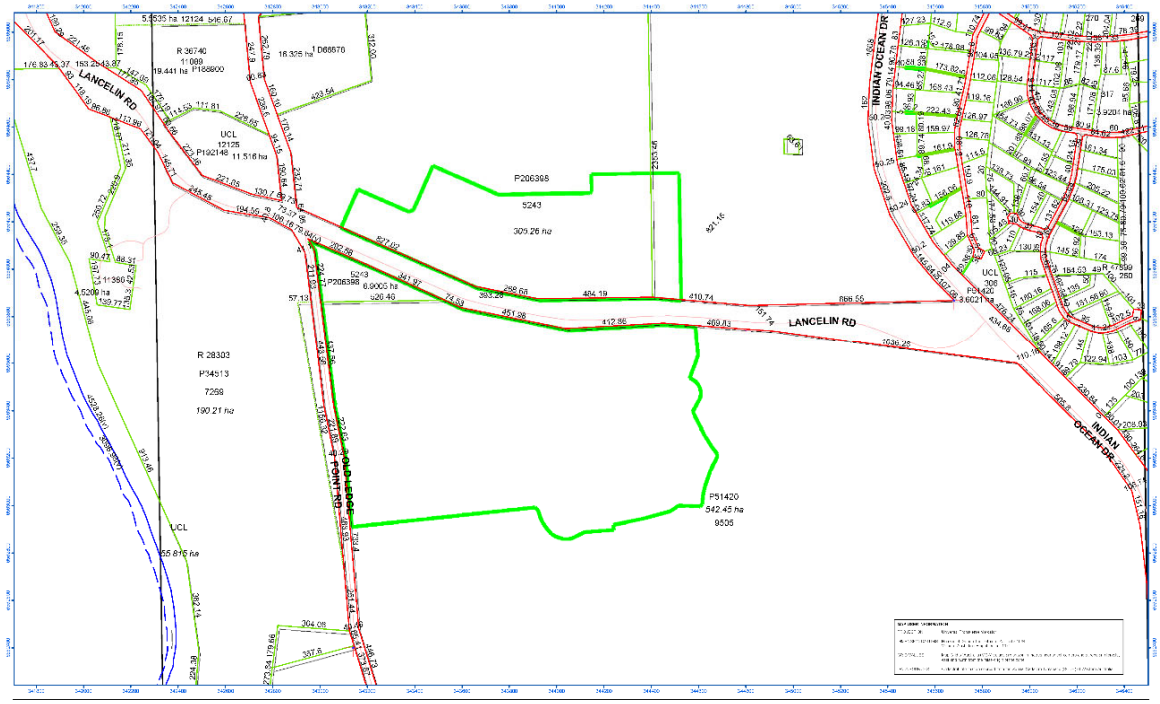
The Lancelin South development is located approximately 130 kilometres north of Perth and 2.2 kilometres southeast of the town of Lancelin, in the Shire of Gingin.

**Licence Area**

Lancelin South Water (LSW) 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 Figure 1 below. Our Water Services Licence is available at the ERA web site at https://www.erawa.com.au/water/water-licensing/licence-holders#L

*Figure 1 Lancelin South Operating Area*




## 2.3 Our Infrastructure

*Table 2: Summary of infrastructure*

| Infrastructure Summary | |
|---|---|
| Total number of connections[1] - June 2023 | 25 |
| Number of Customers[2] | 29 |
| Total length of water mains | 1.6 kilometres |
| Number of water quality localities | 1 |
| **Chlorine residual target** | 0.4 to 0.6 mg/L |

Note 1: Number of connections refers to properties connected to services and having regular meter readings collected.

Note 2: The number of customers is determined by the ERA as the number of customer accounts holders, which includes lots sold as well as lots under construction that may have not yet been connected to services.

## 2.4 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. Lancelin South Water work cooperatively with the DoH, as described in the MoU, to ensure the safety of the water supply.

The production bore is located within our locked, chain mesh fenced Water Treatment Plant (WTP) compound. To protect our source water, a 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. Lancelin South Water typically abstract less than 10 megalitres per year of groundwater.

*Table 3 Bore Water Extraction Amounts*

| Reporting Period | Megalitres (ML) |
|---|---|
| 1 July 2022 to 30 June 2023 | 6.9 |
| 1 July 2021 to 30 June 2022 | 5.9 |
| 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 |

## 2.5 Understanding Water Quality

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

| Parameter | Description | Management and Control |
|---|---|---|
| Micro-organisms & Pathogens<br><br>*E. coli*<br><br>*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.<br><br>The most common and widespread health risk to people is associated with drinking water contamination by pathogens.<br><br>Organisms associated with faecal matter from humans or other mammals cause several waterborne diseases.<br><br>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.<br><br>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.<br><br>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* species in any sample for microbiological analysis.<br><br>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.<br><br>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.<br><br>A turbidity of less than 1 NTU is desirable in drinking water for optimal disinfection.<br><br>LSW remove turbidity from the water through multiple filtration stages. |
| Colour | 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 | 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). |

<table>
<tr><th>Parameter</th><th>Description</th><th>Management and Control</th></tr>
<tr><td></td><td>be caused by high levels of dissolved iron or manganese.<br><br>The presence of turbidity in the water may appear as Colour – True Colour is the Colour present after removal of turbidity.</td><td>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.<br><br>Iron is present in the groundwater from the Leederville aquifer. Whilst not health related, elevated concentrations can discolour the water and can stain laundry.<br><br>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.<br><br>The ADWG specify a health guideline of 0.5 mg/L and an aesthetic guideline value of 0.1 mg/L for manganese.<br><br>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.<br><br>TDS includes sodium, potassium, calcium, magnesium, carbonate, bicarbonate, chloride, Sulfate, 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:<br><table><tr><th>TDS (mg/L)</th><th>Quality</th></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>
<tr><td>Radionuclides</td><td>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.<br><br>The radioactivity of radionuclides is reported in units of Becquerels per Litre (Bq/L)</td><td>The Australian Drinking Water Guidelines recommend a screening level of 0.5 Becquerels per Litre (Bq/L).<br><br>LSW regularly monitor to ensure that the treated water is within the ADWG guidelines for radionuclides.</td></tr>
</table>

| Parameter | Description | Management and Control |
|---|---|---|
| pH | pH is a measure of water acidity - pH 7 is neutral, low pH is acidic and high pH is alkaline.<br><br>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.<br><br>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.<br><br>LSW regularly monitor the drinking water to ensure that THM remains below guideline levels. |
| Pesticides<br><br>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.<br><br>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.<br><br>The LSW groundwater source is protected by a P1 Wellhead protection zone and a Drinking Water Source Protection Plan.<br><br>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).

## 2.6 Water Treatment

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

- Source water 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 (not for drinking);
- The non-potable water is further treated by filtration through granular activated carbon to remove dissolved organic contaminants and then 5 micrometre and 1 micrometre cartridges to ensure particulate matter in the water is removed;
- Part of the additionally filtered water is then treated using reverse osmosis desalination to reduce the salinity of the water;


- 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.
- The water at Lancelin South is not fluoridated.

Lancelin South Water supplies on average 156 kilolitre per property of drinking water each year.

## 2.7 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 Polyvinyl Chlorine (PVC) and High Density Polyethylene (HDPE), approved under Australian Standard AS/NZS 4020 (Testing of Products for Use in Contact with Drinking Water) or

complying with the Department of Health document Materials and Substances in Contact with Drinking Water requirements or as scheduled in the MoU with the Department of Health.

Lancelin South Water samples the source water (Source Sample Point) and treated water; treated water is sampled at the outlet of the treated water tank (Treated Water Sample Point) and from a sample tap located within the Lancelin South residential area (Consumer Sample Point).

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/

## 2.8 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.

## 2.9 Incident Response

Whilst Lancelin South Water makes all effort to prevent incidents from occurring, there will inevitably be equipment malfunctions, human errors, extreme weather conditions or unforeseen events that adversely affect our operations. Lancelin South Water has plans in place to respond to and manage such events such that water quality impacts are minimised.

During the year, a mock incident exercise, considering the impact of a bush fire, was held jointly with Lancelin South Water and Department of Health representatives. Attendees at the exercise considered availability of Lancelin South personnel and contractors, access to the area, ability to obtain bottled water if the plant could not operate, and the ability to obtain parts and materials to implement any necessary repairs. The exercise identified some minor items resulting in improvements to the Lancelin South Water incident response plans.

## 2.10 System Operation

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

*Table 4: History of Customer Complaints*

| Period | Number of Customer Complaints Regarding Water Quality |
|---|---|
| 1 July 2022 – 30 June 2023 | Nil |
| 1 July 2021 – 30 June 2022 | 1 |
| 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 |

There have been no (0) customer complaints regarding water quality for the period 1 July 2022 to 30 June. Lancelin South Water Annual and recent Quarterly Water Quality reports are publicly available from the Lancelin South Water website Reports page.

## 2.11 Notifiable incidents

During the period 1 July 2022 to 30 June 2023 there were no (0) water quality incidents that were reportable to the Department of Health.

## 2.12 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.

## 2.13 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[2] 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.


[2] NATA – National Association of Testing Authorities

# 3.0 Performance Summary

*Table 5 Performance Summary 1 July 2022 to 30 September 2023*

| Compliance from 1 July 2022 to 30 September 2023 | | | | |
|---|---|---|---|---|
| | | **Total Number of samples** (1) | **Number of samples compliant** | **Percent of samples compliant** |
| **Microbiological** | *Escherichia coli (E.Coli)* | 40 | 40 | 100 |
| | Thermophilic *Naegleria* | 13 | 13 | 100 |
| | *Naegleria Fowleri* | 13 | 13 | 100 |
| **Chemical** | Health related | 95 | 95 | 100 |
| **Radiological** | Health related | 4 | 4 | 100 |

Note 1: Number of samples taken for the period from the Treated Water Tank Sample Point and the Consumer Sample Point.

Section 2.5 Understanding Water Quality in this report describes the Water Quality parameters that are measured by Lancelin South Water, the reasons that they are measured and how to interpret the results.

# 4.0 Microbial Performance

## 4.1 Treated Water Microbial Water Quality

Microbiological samples are collected from the Treated Water and Consumer sample point (fortnightly) and summarised in Table 6 below.

Samples were analysed for thermotolerant coliforms, *E. coli*, Thermophilic *Naegleria* and *Naegleria fowleri* during the 1 July 2022 to 30 June 2023 period. No microbial activity in relation to these parameters was detected during the twelve months at either of the sample locations.

Lancelin South Water remains fully compliant with the Australian Drinking Water Guidelines (ADWG) and the Memorandum of Understanding with the Department of Health in respect *to E. coli* and *N. fowleri.*

*Table 6 Microbial Water Quality 1 July 2022 to 30 June 2023*

| Period | *Escherichia coli (E.Coli)* | | | | Thermophilic *Naegleria* | | | *Naegleria Fowleri* | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No of Samples | No of non conforming samples | Maximum Individual Value | Compliance | No of Samples | Detected | Compliance | No of Samples | Detected | Compliance |
| 1 July 22 to 30 June 23 | 40 | 0 | est <1 | 100% | 13 | 0 | 100% | 13 | 0 | 100% |

# 5.0 Chemical – Health Related Performance

The results of water samples collected from the source water (bore water) and the treated water sample points (Treated Water Tank and Consumer Sample point) during the period are summarised in Table 7 below. The results show that the water supply provided by Lancelin South Water is fully compliant with ADWG guidelines, our MoU with the DoH and licence requirements with the ERA.

## 5.1 Chemical – Health Related – Results

*Table 7 Chemical Health summary 1 July 2022 to 30 June 2023*

| Type | Unit | ADWG Guideline (mg/L) | Lab Limit of Reporting (mg/L) | Source Water (bore) | | Distribution Water | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Number Assessed | Maximum Individual Value | Number Assessed | Number Complying with ADWG Guideline | Maximum Individual Value (mg/L) | % Compliance |
| Antimony (Total) | mg/L | 0.003 | 0.001 | NR | | 2 | 2 | <0.001 | 100 |
| Arsenic (Filtered) | mg/L | 0.01 | 0.001 | 1 | 0.001 | NR | | | |
| Arsenic (Total) | mg/L | 0.01 | 0.001 | 2 | 0.001 | NR | | | |
| Barium (Filtered) | mg/L | 2 | 0.01 | 3 | 0.19 | NR | | | |
| Beryllium (Filtered) | mg/L | 0.06 | 0.001 | 2 | 0.001 | NR | | | |
| Boron (Filtered) | mg/L | 4 | 0.05 | 3 | 0.16 | NR | | | |
| Cadmium (Total) | mg/L | 0.002 | 0.0002 | NR | | 2 | 2 | <0.0001 | 100 |
| Chloral Hydrate | mg/L | 0.1 | 0.002 | NR | | 2 | 2 | <0.002 | 100 |
| Chloroacetic acid | mg/L | 0.15 | 0.002 | NR | | 2 | 2 | <0.002 | 100 |
| Chromium (Total) | mg/L | 0.05 | 0.001 | NR | | 2 | 2 | <0.001 | 100 |
| Copper (Total) | mg/L | 2 | 0.001 | NR | | 4 | 4 | 0.01 | 100 |
| Dichloroacetic acid | mg/L | 0.1 | 0.002 | NR | | 2 | 2 | <0.002 | 100 |
| Fluoride, F | mg/L | 1.5 | 0.1 | NR | | 2 | 2 | 0.2 | 100 |
| Lead (Total) | mg/L | 0.01 | 0.001 | NR | | 4 | 4 | 0.002 | 100 |
| Manganese (Filtered) | mg/L | 0.5 | 0.005 | 1 | 0.073 | NR | | | |
| Manganese (Total) | mg/L | 0.5 | 0.005 | 2 | 0.049 | 2 | 2 | <0.005 | 100 |
| Mercury (Filtered) | mg/L | 0.001 | 0.0001 | 1 | 0.0001 | NR | | | |
| Mercury (Total) | mg/L | 0.001 | 0.0001 | 2 | 0.001 | NR | | | |
| Molybdenum (Filtered) | mg/L | 0.05 | 0.001 | 1 | 0.001 | NR | | | |
| Molybdenum (Total) | mg/L | 0.05 | 0.001 | 1 | 0.001 | NR | | | |

| Type | Unit | ADWG Guideline (mg/L) | Lab Limit of Reporting (mg/L) | Source Water (bore) | | Distribution Water | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Number Assessed | Maximum Individual Value | Number Assessed | Number Complying with ADWG Guideline | Maximum Individual Value (mg/L) | % Compliance |
| Nickel (Filtered) | mg/L | 0.02 | 0.001 | 1 | 0.001 | NR | | | |
| Nickel (Total) | mg/L | 0.02 | 0.001 | 2 | 0.001 | 2 | 2 | <0.001 | 100 |
| Nitrate | mg/L | 50 | 0.044 | 4 | 1.51 | 2 | 2 | 0.97 | 100 |
| Nitrite | mg/L | 3 | 0.033 | NR | | 2 | 2 | 0.033 | 100 |
| Pentachlorophenol | mg/L | 0.01 | 0.001 | NR | | 2 | 2 | <0.01 | 100 |
| Selenium (Total) | mg/L | 0.01 | 0.001 | 2 | 0.001 | NR | | | |
| Silver (Total) | mg/L | 0.1 | 0.001 | 2 | 0.001 | NR | | | |
| Total THM's | mg/L | 0.25 | 0.001 | NR | | 2 | 2 | 0.031 | 100 |
| Trichloroacetic acid | mg/L | 0.1 | 0.002 | NR | | 2 | 2 | <0.002 | 100 |
| Triclopyr | mg/L | 0.02 | 0.0001 | NR | | NR | | | |
| Uranium (Total) | mg/L | 0.02 | 0.001 | 2 | 0.001 | NR | | | |
| 2,4,6-Trichlorophenol | mg/L | 0.02 | 0.001 | NR | | 2 | 2 | <0.01 | 100 |
| 2,4-Dichlorophenol | mg/L | 0.2 | 0.001 | NR | | 2 | 2 | <0.003 | 100 |
| 2-Chlorophenol | mg/L | 0.3 | 0.001 | NR | | 1 | 1 | <0.001 | 100 |
| Free Chlorine[(1)(2)] | mg/L | 5 | - | NR | | 54 | 54 | 1.12 | 100 |

Note 1: Chlorine analysis is an on-site test. All others are results from NATA accredited laboratory.

Note 2 A target of 1.0 mg/L free chlorine (above ADWG aesthetic-based value of 0.6 mg/L) is set at the outlet of the treated water tank to ensure effective disinfection and maintain microbiological safety of drinking water through the reticulation system and to the customer. Free chlorine measured at the consumer sample point ranged from 0.28 mg/L to 0.92 mg/L in the 1 July 2022 to 30 September 2023 period.

| | | | |
|---|---|---|---|
| Australian Drinking Water Guidelines | ADWG | Not Detected | ND |
| Becquerels per Litre | Bq/L | Not Required | NR |
| Colony Forming Units | CFU | Nephelometric Turbidity Units | NTU |
| Hazen Units | HU | Acidity/basicity | pH |
| Milligrams per Litre | mg/L | Micro Siemens per centimetre | µS/cm |
| Not Applicable | NA | | |

## 5.2 Chemical – Health Pesticides – Results

All samples for pesticide analysis from the source water in the 1 July 2022 to 30 June 2023 returned values less than the ADWG health-related guideline values, except for Fenamiphos, Parathion Methyl and Terbufos. These pesticides have Levels of Reporting values above the ADWG health related guideline values. However, the source water is treated such that the concentration of these compounds will be reduced and hence are unlikely to be present in the treated water at levels above health-related guideline values.

*Table 8 Chemical Health (Pesticide) summary 1 July 2022 to 30 June 2023*

| Type | Unit | ADWG Guideline (mg/L) | Lab Limit of Reporting (mg/L) | Source Water (Bore) | | Distribution Water | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Number Assessed | Maximum Individual Value | Number Assessed | Number Complying with ADWG Guideline | Maximum Individual Value (mg/L) | % Compliance |
| Aldrin | mg/L | 0.0003 | 0.000001 | 2 | <0.00001 | | | | |
| Aldrin + Dieldrin (total) | mg/L | 0.0003 | 0.000001 | 1 | <0.00001 | | | | |
| Amitraz | mg/L | 0.009 | 0.0001 | 1 | <0.0001 | | | | |
| Atrazine | mg/L | 0.02 | 0.0001 | 1 | <0.0001 | | | | |
| Azinphos Methyl | mg/L | 0.03 | 0.001 | 1 | <0.001 | | | | |
| Bromophos Ethyl | mg/L | 0.01 | 0.000005 | 1 | <0.000005 | | | | |
| Chlordane | mg/L | 0.002 | 0.000002 | 2 | <0.00001 | | | | |
| Chlorofenvinphos | mg/L | 0.002 | 0.001 | 1 | <0.001 | | | | |
| Chlorothalonil | mg/L | 0.05 | 0.00001 | 1 | <0.0001 | | | | |
| Chlorpyrifos | mg/L | 0.01 | 0.000005 | 1 | <0.001 | | | | |
| Diazinon | mg/L | 0.004 | 0.00001 | 2 | <0.001 | | | | |
| Dichlorvos | mg/L | 0.005 | 0.001 | 1 | <0.001 | | | | |
| Diclofop Methyl | mg/L | 0.005 | 0.0001 | 1 | <0.0001 | | | | |
| Dieldrin | mg/L | 0.0003 | 0.000001 | 2 | <0.00001 | | | | |
| Dimethoate | mg/L | 0.007 | 0.0001 | 2 | <0.001 | | | | |
| Diuron | mg/L | 0.02 | 0.0005 | 1 | <0.0005 | | | | |
| Endosulfan I | mg/L | 0.02 | 0.000001 | 2 | <0.0001 | | | | |
| Endosulfan II | mg/L | 0.02 | 0.000001 | 3 | <0.00001 | | | | |
| Endosulfan Sulfate | mg/L | 0.02 | 0.000001 | 2 | <0.00001 | | | | |
| Ethion | mg/L | 0.004 | 0.00001 | 2 | <0.001 | | | | |
| Fenamiphos[(1)] | mg/L | 0.0005 | 0.001 | 1 | 0.001 | | | | |
| Fenitrothion | mg/L | 0.007 | 0.001 | 2 | <0.001 | | | | |
| Fensulfothion | mg/L | 0.01 | 0.001 | 1 | <0.001 | | | | |
| Fenthion | mg/L | 0.007 | 0.001 | 1 | <0.001 | | | | |
| Fipronil | mg/L | 0.0007 | 0.00002 | 1 | <0.00002 | | | | |

| Type | Unit | ADWG Guideline (mg/L) | Lab Limit of Reporting (mg/L) | Source Water (Bore) | | Distribution Water | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Number Assessed | Maximum Individual Value | Number Assessed | Number Complying with ADWG Guideline | Maximum Individual Value (mg/L) | % Compliance |
| Fluometuron | mg/L | 0.07 | 0.0001 | 1 | <0.0001 | | | | |
| Fosamine | mg/L | 0.03 | 0.01 | 1 | <0.01 | | | | |
| Heptachlor | mg/L | 0.0003 | 0.000001 | 2 | <0.00001 | | | | |
| Hexazinone | mg/L | 0.4 | 0.0004 | 1 | <0.0004 | | | | |
| Lindane | mg/L | 0.01 | 0.000001 | 2 | <0.00001 | | | | |
| Malathion | mg/L | 0.07 | 0.00001 | 2 | <0.001 | | | | |
| Methoxychlor | mg/L | 0.3 | 0.00002 | 2 | <0.00002 | | | | |
| Metolachlor | mg/L | 0.3 | 0.0002 | 1 | <0.0002 | | | | |
| Mevinphos | mg/L | 0.005 | 0.001 | 1 | <0.001 | | | | |
| Molinate | mg/L | 0.004 | 0.0001 | 1 | <0.0001 | | | | |
| Monocrotophos | mg/L | 0.002 | 0.001 | 1 | <0.001 | | | | |
| o,p-DDT | mg/L | 0.009 | 0.000001 | 1 | <0.000001 | | | | |
| Omethoate | mg/L | 0.001 | 0.001 | 1 | <0.001 | | | | |
| Paraquat | mg/L | 0.02 | 0.001 | 1 | <0.0001 | | | | |
| Parathion Methyl[(2)] | mg/L | 0.0007 | 0.001 | 2 | <0.001 | | | | |
| Pirimiphos Methyl | mg/L | 0.09 | 0.01 | 1 | <0.01 | | | | |
| Propazine | mg/L | 0.05 | 0.0001 | 1 | <0.0001 | | | | |
| Propiconazole | mg/L | 0.1 | 0.0004 | 1 | <0.0004 | | | | |
| Pyrazophos | mg/L | 0.02 | 0.001 | 1 | <0.001 | | | | |
| Simazine | mg/L | 0.02 | 0.0001 | 1 | <0.0001 | | | | |
| Temephos | mg/L | 0.4 | 0.025 | 1 | <0.025 | | | | |
| Terbufos[(1)] | mg/L | 0.0009 | 0.001 | 1 | <0.001 | | | | |
| Terbutryn | mg/L | 0.4 | 0.0001 | 1 | <0.0001 | | | | |
| Tetrachlorovinphos | mg/L | 0.1 | 0.001 | 1 | <0.001 | | | | |
| Trifluralin | mg/L | 0.09 | 0.00001 | 1 | <0.0001 | | | | |

Note 1: The laboratory limit of reporting (LOR) for Fenamiphos and Terbufos is 0.001 mg/L, which is above the respective ADWG health related guideline values for these compounds and hence, the samples may not be compliant with the ADWG health related guidelines.

Note 2: Parathion Methyl analysis was completed as part of the annual production bore sampling with an LOR of 0.001mg/L (above respective ADWG guidelines), then analysed again as part of the regular water quality monitoring with a result of <0.00002 mg/L and a LOR of 0.00002 mg/L.

## 5.3 Chemical – Health PFAS Performance

Per and polyfluoroalkyl substances (PFAS) are manufactured chemicals that do not occur naturally in the environment. PFAS are persistent in the environment, show the potential for bioaccumulation and biomagnification, and are toxic in animal studies. They have been used in a wide range of consumer products including surface treatments such as non-stick cookware, and notably in aqueous film forming foam used to extinguish fires.

Lancelin South Water has assessed the risk of PFAS presence in the source water as being negligible and no sampling of the source water or the consumer sample point was carried out over the period 1 July 2022 to 30 June 2023.

# 6.0 Physical and Chemical – Aesthetic Performance

The results of water samples collected from the source water (bore water) and the treated water sample points (Treated Water Tank and Consumer Sample point) during the period are summarised in Table 9 below.

## 6.1 Physical and Chemical – Aesthetic – Results

*Table 9 Aesthetic summary 1 July 2022 to 30 June 2023*

| Type | Unit | ADWG Guideline (mg/L) | Lab Limit of Reporting (mg/L) | Source Water (Bore) | | Distribution Water | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Number Assessed | Maximum Individual Value | Number Assessed | Number Complying with ADWG Guideline | Maximum Individual Value (mg/L) | % Compliance |
| Aluminium (Total) | mg/L | 0.2 | 0.05 | 1 | <0.05 | 2 | 2 | <0.05 | 100 |
| Aluminium (Filtered) | mg/L | 0.2 | 0.05 | 1 | <0.05 | | | | |
| Ammonia | mg/L | 0.5 | 0.02 | 2 | 0.38 | 2 | 2 | 0.02 | 100 |
| Chloride[1] | mg/L | 250 | 1 | 2 | 350 | 2 | 2 | 210 | 100 |
| Colour (True) | PCU | 15 | 5 | 1 | 5 | 2 | 2 | <5 | 100 |
| Free Chlorine [2] [6] | mg/L | 0.6 | - | NR | | 54 | 14 | 1.12 | 26 |
| Iron (Total) | mg/L | 0.3 | 0.01 | 1 | 0.05 | 2 | 2 | <0.01 | 100 |
| Iron (Filtered)[1][3] | mg/L | 0.3 | 0.01 | 1 | 2.7 | | | | |
| pH [6] | pH Units | 6.5-8.5 | 0.1 | 28 | 6.3 - 7.3 | 54 | 53 | 6.2 – 8.2[5] | 98 |
| Sodium | mg/L | 180 | 0.5 | 1 | 96 | 1 | 1 | 130 | 100 |
| Sodium (Filtered) | mg/L | 180 | 0.5 | 1 | 170 | | | | |
| Sulfate | mg/L | 250 | 1 | 2 | 32 | 2 | 2 | 17 | 100 |
| Total Dissolved Solids[1][6] | mg/L | 600 | 5 | 27 | 1007 | 54 | 54 | 569 | 100 |
| Total Hardness[1] | mg CaCO3/L | 200 | 5 | 2 | 310 | 2 | 2 | 170 | 100 |
| Turbidity [6] | NTU | 5 | 0.1 | 1 | 1.7 | 56 | 56 | 1.76 | 100 |
| Zinc (Total) | mg/L | 3 | 0.005 | NR | | 2 | 1 | 0.038 | 100 |
| 2-Chlorophenol [4] | mg/L | 0.0001 | 0.003 | NR | | 1 | 1 | <0.001 | - |
| 2,4-Dichlorophenol[4] | mg/L | 0.0003 | 0.003 | NR | | 1 | 1 | <0.003 | - |
| 2,4,6-Trichlorophenol[4] | mg/L | 0.002 | 0.01 | NR | | 1 | 1 | <0.01 | - |

Note 1: Source Water is treated to ensure parameters above ADWG aesthetic based values are addressed.

Note 2: A target of 1.0 mg/L free chlorine (above ADWG aesthetic-based value of 0.6 mg/L) is set at the outlet of the treated water tank to ensure effective disinfection and maintain microbiological safety of drinking water through the reticulation system and to the customer.

Note 3: Filtered results would normally be expected to be less than the total results. However, in this case the analysis was carried out on different samples collected on different days during the monitoring period.

Note 4: The laboratory limit of reporting (LOR) for 2-Chlorophenol, 2,4-Dichlorophenol is 0.003 mg/L, and 2,4,6-Trichlorophenol the LOR 0.01 mg/L which are above the respective ADWG aesthetic related guideline values for these compounds and hence, the samples may not be compliant with the ADWG aesthetic related guidelines.

Note 5: The laboratory reported a low pH of 6.2 on one sample. This result seems anomalous when compared to the field measurements taken at similar times that were all within guidelines.

Note 6: Numbers of on-site test vs NATA accredited laboratory.

| | Source Water - Site analysis | Source Water - Laboratory | Distribution – Site analysis | Distribution - Laboratory |
|---|---|---|---|---|
| pH | 26 | 2 | 52 | 2 |
| TDS | 25 (calculated from Conductivity) | 2 | 52 (calculated from Conductivity) | 2 |
| Free Chlorine | NR | NR | 54 | - |
| Turbidity | NR | 1 | 54 | 2 |

# 7.0 Radiological Performance

The results of samples collected of the source water (bore water) and the distributed water (Treated Water Tank and Consumer Sample Point) during the period 1 July 2022 to 30 June 2023 are summarised in Table 10 below.

One (1) of the four (4) source water samples may have exceeded the ADWG screening value for gross alpha activity and a second (separate) sample of source water exceeded the screening value for gross beta activity, of 0.5 Bq/L. The total estimated annual effective radiological dose from the source water, calculated in accordance with ADWG (v3.7), is well below the Australian national reference level for drinking water of 1 mSv/year.

The source water is partially treated by reverse osmosis which will remove the naturally occurring radioactive materials responsible for alpha and beta activity, prior to supply to consumers. The radiological results from the distributed water supply indicate the water supplied by Lancelin South Water is fully compliant with ADWG.

## 7.1 Radiological - Results

*Table 10 Radiological Summary 1 July 2022 to 30 June 2023*

| Type | Unit | ADWG Screening Value | Source Water (Bore) | | | Distribution Water | | |
|---|---|---|---|---|---|---|---|---|
| | | | Number Assessed | Number Complying with ADWG Screening Value | Maximum Individual Value | Number Assessed | Number Complying with ADWG Screening Value | Maximum Individual Value |
| Gross Alpha | Bq/L | 0.5 | 4 | 3 | 0.58+/-0.12 | 2 | 2 | 0.137+/-0.038 |
| Gross Beta activity – 40K | Bq/L | 0.5 | 4 | 3 | 0.616+/-0.098 | 2 | 2 | 0.245+/-0.056 |