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**Report to the Department of Health**

by

# Lancelin South

for the period

## 1 January 2023 to 31 March 2023

# Contents

# 1.0 Introduction

## 1.1 Water Provider Information

**Table 1: Water Provider Contact Details**

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

## 1.2 Our Water System

### Location

The Lancelin South development is located approximately 130 kilometres north of Perth and 2.2 kilometres south east 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).

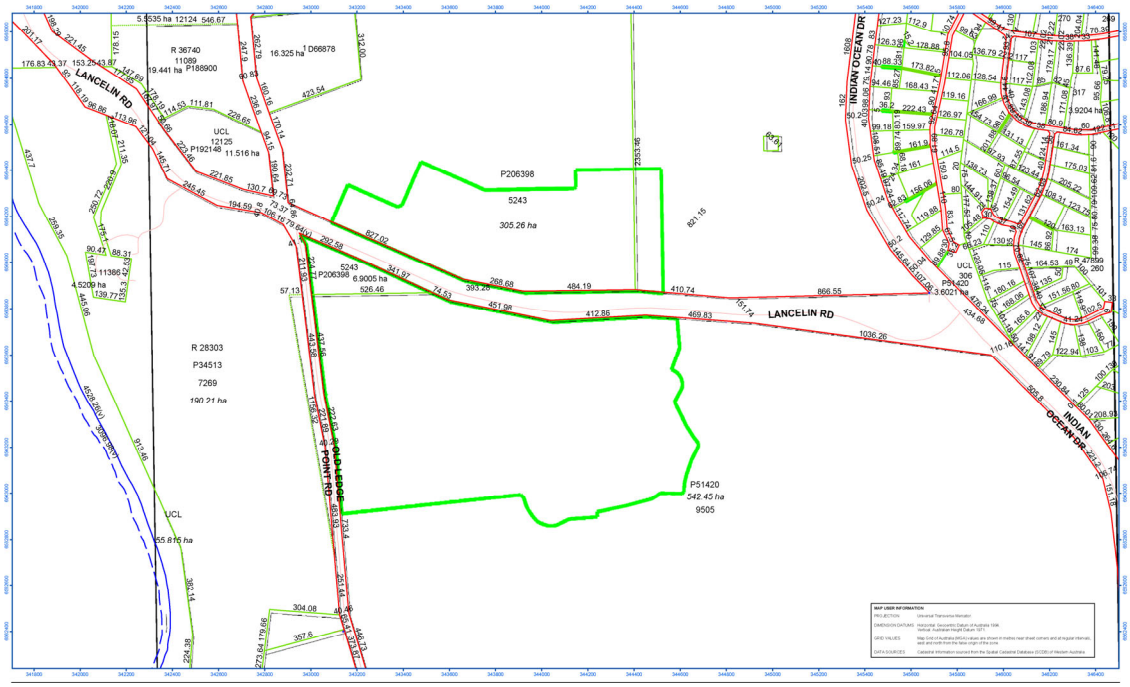


**Figure 1: Lancelin South Water Operating Area**

Lancelin South Water services the Lancelin South residential and commercial areas as indicated in Figure 1 above. 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

**Table 2: Summary of infrastructure**

| | |
|---|---|
| Total number of connections(1) - June 2022 | 22 |
| Number of Customers(2) | 28 |
| Total length of water mains | 1.6 km |
| Number of water quality localities | 1 |
| Chlorine residual target | 0.4 to 0.6 mg/L |

Notes:

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

(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.

## 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 will 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 ML/year of groundwater.

**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 (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. The water at Lancelin South is not fluoridated.

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

**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 water from the source (Source Sample Point), outlet of the treated water tank (Treated Water Sample Point) and from a tap located within the Sales Office in Lancelin South (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/

**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.

# 2.0 Understanding Water Quality

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

**Table 3: Water Quality Terms**

| 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. 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. |

<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.<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>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).<br><br>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>
</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.<br><br>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).<br><br>LSW regularly monitor to ensure that the treated water is within the ADWG guidelines for radionuclides. |
| 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).

# 3.0 Performance Summary

**Table 4: Water Quality Meeting the Drinking Water Guidelines / Minister of Health's Directions**

| | Number Assessed (1) | Number of Non-Compliant Analyses (2) | % Compliance |
|---|---|---|---|
| Microbiological Quality | | | |
| *E. coli* | 12 | 0 | 100 |
| Amoeba (Thermophilic Naegleria) | 4 | 0 | 100 |
| Chemical Quality | | | |
| Chemical – Health related (3) | 33 | 0 | 100 |
| Chemical – Aesthetic (4) | 52 | 7(5) | 87 |
| Radiological | 0 | 0 | N/A |

Notes:

(1) Number of samples taken for the quarter from the Treated Water Tank Sample Point and the Consumer Sample Point

(2) Number of samples that do not comply with the drinking water guidelines (ADWG).

(3) Chemical performance is based on the results of the quarter, having ADWG Health guideline values

(4) Chemical performance is based on the results of the quarter, having ADWG aesthetic guideline values

(5) In some instances, LSW consider it necessary to exceed the ADWG aesthetic value of 0.6 mg/L for chlorine residual, in order to maintain effective disinfection within the network

# 4.0 Microbial Performance

## 4.1 Microbiological - Exception Notifications

| | |
|---|---|
| Number of microbiological incidents resulting in exception notification | 0 |

## 4.2 Microbiological - Performance

**Table 5: Microbiological compliance summary**

| | Sample Point | Number of Analyses | Number of Non-Compliant Analyses | % Compliance this Quarter | % Compliance 12-month average |
|---|---|---|---|---|---|
| *E. coli* | Treated Water | 4 | 0 | 100 | 100 |
| | Consumer | 8 | 0 | 100 | 100 |
| Thermophilic *Naegleria* | Consumer | 4 | 0 | 100 | 100 |
| *Naegleria fowleri* (1) | Consumer | 4 | 0 | 100 | 100 |

Note:

(1) Analysis for *N. fowleri* is only performed if thermophilic Naegleria are detected. The result for *Naegleria fowleri* reported above was provided by the laboratory for an unknown reason.

# 5.0 Chemical - Health Related Performance

## 5.1 Chemical - Health Related - Exception Notifications

| | |
|---|---|
| Number of chemical, health related, incidents resulting in exception notification | 0 |

## 5.2 Chemical - Health Related - Parameters

### Consumer Sample Point

| | |
|---|---|
| Number of field analyses for health-related water quality parameters | 8 |
| Number of laboratory analyses for health-related water quality parameters | 17 |

**Table 6: Summary of chemical - health related - analyses at Consumer sample point**

| Parameter | No Analyses | Unit | ADWG Limit (Health) | Maximum value | No of Analyses Non-Compliant | % Compliance |
|---|---|---|---|---|---|---|
| Free Chlorine – Field | 8 | mg/L | 5 | 0.9 | 0 | 100 |
| Antimony (Total) | 1 | mg/L | 0.003 | <0.001 | 0 | 100 |
| Cadmium (Total) | 1 | mg/L | 0.002 | <0.0001 | 0 | 100 |
| Chromium (Total) | 1 | mg/L | 0.05 | <0.001 | 0 | 100 |
| Copper (Total) | 1 | mg/L | 2 | 0.009 | 0 | 100 |
| Fluoride | 1 | mg/L | 1.5 | 0.1 | 0 | 100 |
| Lead (Total) | 1 | mg/L | 0.01 | 0.002 | 0 | 100 |
| Nickel (Total) | 1 | mg/L | 0.02 | <0.001 | 0 | 100 |
| Nitrite | 1 | mg/L | 3 | <0.03 | 0 | 100 |
| Nitrate | 1 | mg/L | 50 | 1.107 | 0 | 100 |
| Chloral Hydrate | 1 | mg/L | 0.1 | <0.002 | 0 | 100 |
| Chloroacetic acid | 1 | mg/L | 0.15 | <0.002 | 0 | 100 |
| Dichloroacetic acid | 1 | mg/L | 0.1 | <0.002 | 0 | 100 |
| Pentachlorophenol | 1 | mg/L | 0.01 | <0.01 | 0 | 100 |
| Total THM's | 1 | mg/L | 0.25 | 0.03 | 0 | 100 |
| Trichloroacetic acid | 1 | mg/L | 0.1 | <0.002 | 0 | 100 |
| 2,4-Dichlorophenol | 1 | mg/L | 0.2 | <0.003 | 0 | 100 |
| 2,4,6-Trichlorophenol | 1 | mg/L | 0.02 | <0.01 | 0 | 100 |
| | | | | | | |

## Treated Water Sample Point

| | |
|---|---|
| Number of field analyses for health-related water quality parameters | 8 |
| Number of laboratory analyses for health-related water quality parameters | 0 |

**Table 7: Summary of chemical - health related - analyses at Treated Water sample point**

| | No Analyses | Unit | ADWG Limit (Health) | Maximum value | No of Analyses Non-Compliant | % Compliance |
|---|---|---|---|---|---|---|
| Free Chlorine – Field | 8 | mg/L | 5 | 1.1 | 0 | 100 |

A target of 1.0 mg/L free chlorine (above ADWG aesthetic-based value of 0.6 mg/L) is set at the treated water sample point to account for chlorine decay during residence time in the pipeline network.

## Source Sample Point

| | |
|---|---|
| Number of field analyses for health-related water quality parameters | 0 |
| Number of laboratory analyses for health-related water quality parameters | 0 |

# 6.0 Chemical - Aesthetic Performance

## 6.1 Chemical - Aesthetic - Exception Notifications

| | |
|---|---|
| Number of chemical, aesthetic incidents resulting in exception notification | 0 |

## 6.2 Chemical – Aesthetic Water Quality Parameters

### Consumer Sample Point

| | |
|---|---|
| Number of field analyses for aesthetic water quality parameters | 30 |
| Number of laboratory analyses for aesthetic water quality parameters | 0 |

**Table 8: Summary of aesthetic related analyses from Consumer sample point**

| Parameter | No Analyses | Unit | ADWG Limit (Aesthetic) | Maximum value | No of Analyses Non-Compliant | % Compliance |
|---|---|---|---|---|---|---|
| pH | 7 (1) | pH Units | 6.5-8.5 | 8.2 | 0 | 100 |
| Free Chlorine | 8 (2) | mg/L | 0.6 | 0.92 | 7 | 13 |
| Turbidity | 8 (3) | NTU | 5 | 0.6 | 0 | 100 |
| Total Dissolved Solids | 7 (4) | mg/L | <600 | 511 | 0 | 100 |
| *Temperature* | *7*(5) | *Deg C* | *N/A* | *26.4* | *N/A* | *N/A* |

Notes:

(1) pH measurements, 7 field, 0 laboratory.
(2) Free chlorine measurements, 8 field, 0 laboratory.
(3) Turbidity measurements, 8 field, 0 laboratory.
(4) TDS - 7 calculated from field measurement of conductivity, 0 laboratory gravimetric measurement.
(5) Important water quality criteria but no guideline value in ADWG; operational target to be less than 25 degrees C.
(6) If parameters have been reported for this period in the summary table of Health-related analyses and were below the health guideline levels they will not be reported in the table above.

Free chlorine measured at the consumer sample point ranged from 0.59 to 0.92 in the January to March 2023 period.

### Treated Water Sample Point

| | |
|---|---|
| Number of field analyses for aesthetic water quality parameters | 22 |
| Number of laboratory analyses for aesthetic water quality parameters | 0 |

**Table 9: Summary of aesthetic related analyses from Treated Water sample point**

| | No Analyses | Unit | ADWG Limit (Aesthetic) | Maximum value | No of Analyses Non-Compliant | % Compliance |
|---|---|---|---|---|---|---|
| pH | 7 (1) | pH | 6.5-8.5 | 8.2 | 0 | 100 |
| Turbidity | 8 (2) | NTU | 5 | 1.3 | 0 | 100 |
| Total Dissolved Solids | 7 (3) | mg/L | 600 | 569 | 0 | 100 |
| *Free Chlorine* | *8* (4)(5) | *mg/L* | *0.6* | *1.12* | *N/A* | *N/A* |
| *Temperature* | *7* (6) | *Deg C* | *N/A* | *26.7* | *N/A* | *N/A* |

Notes:

(1) pH measurements, 7 field, 0 laboratory.

(2) Turbidity measurements, 8 field, 0 laboratory.

(3) TDS -7 calculated from field measurement of conductivity; 0 laboratory gravimetric measurement.

(4) Free chlorine measurements, 8 field, 0 laboratory.

(5) ADWG aesthetic value not applicable to this sample point – operational target of 0.8 – 1.0 mg/L to achieve 0.2 – 0.6 mg/L at consumer point.

(6) Important water quality criteria but no guideline value in ADWG; operational target to be less than 25 degrees C.

## Source Sample Point

| | |
|---|---|
| Number of field analyses for aesthetic water quality parameters | 14 |
| Number of laboratory analyses for aesthetic water quality parameters | 0 |

**Table 10: Summary of aesthetic related analyses from Source sample point**

| Parameter | No Analyses | Unit | ADWG Limit (Aesthetic) | Maximum value | No of Analyses Above ADWG value (1) |
|---|---|---|---|---|---|
| pH | 7 (2) | pH Units | 6.5-8.5 | 7.18 | 0 |
| Total Dissolved Solids | 7 (3) | mg/L | 600 | 948 | 7 |
| *Temperature* | *7* (4) | *Deg C* | *N/A* | *27.1* | *N/A* |

Notes:

(1) Source water is treated to ensure parameters above ADWG aesthetic-based value are addressed

(2) pH measurements, 7 field, 0 laboratory.

(3) TDS - 7 calculated from field measurement of conductivity, 0 laboratory gravimetric measurement.

(4) Important water quality criteria but no guideline value in ADWG; operational target to be less than 25 degrees C.

# 7.0 Radiological Performance

## 7.1 Radiological - Exception Notifications

| | |
|---|---|
| Number of radiological water quality analyses resulting in exception notification | 0 |

## 7.2 Radiological – Performance

| | |
|---|---|
| Number of laboratory analyses of radiological parameters | 4 |

Samples for radiological analysis were taken from the source (SP) and consumer sample points (CSP).

**Table 11: Summary of Radiological related analyses**

| | No Analyses | Unit | ADWG Screening Level | Maximum value | No of Analyses Above ADWG screening value |
|---|---|---|---|---|---|
| SP - Gross Alpha | 1 | Bq/L | 0.5 | 0.296±0.069 | 0 |
| SP - Gross Beta | 1 | Bq/L | 0.5 | 0.616±0.098 | 1 |
| CSP - Gross Alpha | 1 | Bq/L | 0.5 | 0.084±0.033 | 0 |
| CSP - Gross Beta | 1 | Bq/L | 0.5 | 0.245±0.056 | 0 |

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

The gross beta result in the source water sample is slightly above the ADWG screening value of 0.5 Bq/L. However, the annual dose, calculated in accordance with ADWG (v3.7), is 0.4 mSv/year, well below the reference level of 1 mSv/year. It is noted that the source water is partially treated by reverse osmosis which will remove the radioactive materials from the water prior to supply to consumers. During the period Jan to March 2023 additional sampling at the CSP was undertaken with both gross alpha and beta below the ADWG screening value.

# 8.0 PFAS Performance

No sampling of the source water or the consumer sample point was carried out for Per- and polyfluoroalkyl substances (PFAS) over the period January to December 2023.

# 9.0 Sampling Programme

The achieved sampling compared against planned sampling is summarised in Table 12.

**Table 12: Summary of achieved versus planned sampling**

| | | Planned | Taken | % Taken |
|---|---|---|---|---|
| Microbiological | Treated Water SP | 4 | 4 | 100 |
| | Consumer SP | 7 | 8 | >100 |
| Chemical | Source SP | 14 | 14 | 100 |
| | Treated Water SP | 30 | 30 | 100 |
| | Consumer SP | 53 | 55 | >100 |
| Radiological | Source SP | 2 | 2 | 100 |
| | Treated Water SP | 0 | 0 | N/A |
| | Consumer SP | 2 | 2 | 100 |

Additional sampling at the consumer SP was undertaken during the period January to March 2023 due to a potable water pipe failure at a residential property followed by a faulty bore pump between 23rd to 25th March 2023.

## 10.0 General Notes / Other

Regular fortnightly checks of pH, chlorine, turbidity and water temperature using handheld instrumentation at the WTP (Source and Treated Water sample points) and the Lancelin South sales office (Consumer sample point) are carried out by Urbaqua on behalf of Lancelin South Water.

During the January to March 2023 period a leak was detected in the potable water main at a residential property (23 to 25th March). During this same period the bore pump developed a fault and water carting to the site was required. Normal operation at WTP recommenced on the 25th March 2023.