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Report to the Department of Health

by

Lancelin South

for the period

1 April 2023 to 30 June 2023

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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	Blair Shackleton, LSW
DoH Liaison Officer Email	Blair.shackleton@lancelinsouthwater.com.au

1.2 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).

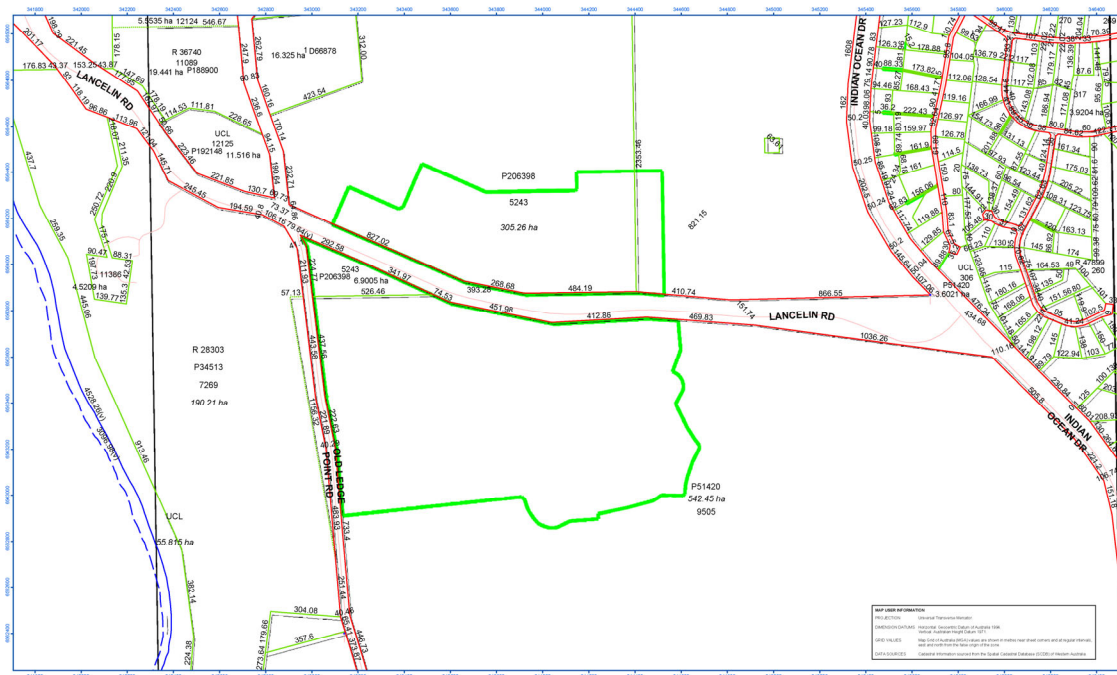


Figure 1: Lancelin South Water Operating Area

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 (DWSP) 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 raw (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/>

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
<p>Micro-organisms & Pathogens</p> <p><i>E. coli</i></p> <p><i>Naegleria</i></p>	<p>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.</p> <p>The most common and widespread health risk to people is associated with drinking water contamination by pathogens.</p> <p>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 <i>Escherichia coli</i> (<i>E. coli</i>) as an indicator of faecal pathogen contamination.</p> <p>Thermophilic <i>Naegleria</i> refers to a group of common water borne amoebae which includes <i>Naegleria fowleri</i>, the organism that causes the serious disease primary amoebic meningoencephalitis (PAM). <i>Naegleria fowleri</i> is an environmental pathogen which naturally lives in fresh warm water.</p>	<p>The ADWG state that thermotolerant coliforms/<i>E. coli</i> should not be present in a minimum 100 mL sample of drinking water.</p> <p>The Department of Health WA has notification protocols in place regarding <i>exception events</i> for pathogens. Lancelin South Water will immediately notify the Department of Health of any confirmed detection of thermotolerant coliforms, <i>E. coli</i> or <i>Naegleria</i> species in any sample for microbiological analysis.</p> <p>Lancelin South Water practice a multi-barrier approach to minimise the risk of microbial contamination.</p>
Turbidity	<p>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.</p> <p>Turbidity is usually reported as Nephelometric Turbidity Units (NTU). It is difficult to see turbidity below about 5 NTU with the naked eye.</p>	<p>The ADWG specify an aesthetic guideline for turbidity of 5 NTU.</p> <p>A turbidity of less than 1 NTU is desirable in drinking water for optimal disinfection.</p> <p>LSW remove turbidity from the water through multiple filtration stages.</p>

Parameter	Description	Management and Control										
Colour	<p>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.</p> <p>The presence of turbidity in the water may appear as Colour – True Colour is the Colour present after removal of turbidity.</p>	<p>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).</p> <p>LSW remove colour using granular activated carbon and reverse osmosis processes.</p>										
Metals	<p>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.</p> <p>Iron is present in the groundwater from the Leederville aquifer. Whilst not health related, elevated concentrations can discolour the water and can stain laundry.</p> <p>Manganese is also present at low concentration in the groundwater. Manganese can discolour the water and stain laundry.</p>	<p>The ADWG specify an aesthetic guideline value of 0.3 milligrams per litre ⁽¹⁾ (mg/L) for iron.</p> <p>The ADWG specify a health guideline of 0.5 mg/L and an aesthetic guideline value of 0.1 mg/L for manganese.</p> <p>LSW removes most metals from the source water through oxidation with sodium hypochlorite and filtration through catalytic media.</p>										
Total Dissolved Solids	<p>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.</p> <p>TDS includes sodium, potassium, calcium, magnesium, carbonate, bicarbonate, chloride, Sulfate, nitrate, phosphate, silica, dissolved metals, dissolved organic species and other less common elements.</p>	<p>The ADWG provide guidance in the palatability of drinking water according to TDS concentration, as shown below:</p> <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> <p>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.</p>	TDS (mg/L)	Quality	0 – 600	Good	600 – 900	Fair	900 – 1200	Poor	>1200	Unpalatable
TDS (mg/L)	Quality											
0 – 600	Good											
600 – 900	Fair											
900 – 1200	Poor											
>1200	Unpalatable											

Parameter	Description	Management and Control
Radionuclides	<p>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.</p> <p>The radioactivity of radionuclides is reported in units of Becquerels per Litre (Bq/L)</p>	<p>The Australian Drinking Water Guidelines recommend a screening level of 0.5 Becquerels per Litre (Bq/L).</p> <p>LSW regularly monitor to ensure that the treated water is within the ADWG guidelines for radionuclides.</p>
pH	<p>pH is a measure of water acidity - pH 7 is neutral, low pH is acidic and high pH is alkaline.</p> <p>Low pH may cause corrosion to taps, water heaters and other household appliances. High pH may be associated with scaling.</p>	<p>The ADWG specify a lower and upper aesthetic value of 6.5 and 8.5 respectively.</p> <p>LSW source water is within the ADWG guidelines, and no specific pH adjustment is required.</p>
Trihalomethanes	<p>Trihalomethanes (THMs) may be present in drinking water as a by-product of disinfection using chlorination.</p>	<p>The ADWG health guideline for total THM is 0.25 mg/L, expressed as an average long-term exposure.</p> <p>LSW regularly monitor the drinking water to ensure that THM remains below guideline levels.</p>
Pesticides Industrial chemicals	<p>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.</p> <p>Industrial chemicals of significance to water quality include synthetic organic compounds, many of which are, at high enough concentration, toxic to humans.</p>	<p>The ADWG provides health related guidelines for an extensive range of pesticides and industrial chemicals.</p> <p>The LSW groundwater source is protected by a P1 Wellhead protection zone and a Drinking Water Source Protection Plan.</p> <p>LSW regularly monitor the drinking water to ensure that no pesticide or other synthetic organic compound exceeds the respective guideline level.</p>

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: Treated Water Quality Meeting the Drinking Water Guidelines / Minister of Health's Directions

	Number Assessed ⁽¹⁾	Number of Non-Compliant Analyses ⁽²⁾	% Compliance
Microbiological Quality			
<i>E. coli</i>	10	0	100
Amoeba (Thermophilic Naegleria)	3	0	100
Chemical Quality			
Chemical – Health related ⁽³⁾	17	0	100
Chemical – Aesthetic ⁽⁴⁾	82	2 ⁽⁵⁾	97
Radiological	2	0	100

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) 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.

4.0 Microbial Performance

4.1 Microbiological - Exception Notifications

Number of microbiological incidents resulting in exception notification	0
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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
<i>E. coli</i>	Treated Water	3	0	100	100
	Consumer	7	0	100	100
Thermophilic <i>Naegleria</i>	Consumer	3	0	100	100
<i>Naegleria fowleri</i>	Consumer	3	0	100	100

5.0 Chemical - Health Related Performance

5.1 Chemical - Health Related - Exception Notifications

Number of chemical, health related, incidents resulting in exception notification	0
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5.2 Chemical - Health Related - Parameters

Treated Water

Number of field analyses for health-related water quality parameters	14
Number of laboratory analyses for health-related water quality parameters	3

Analyses of samples of treated water taken from the Treated Water Sample Point and the Consumer sample Point are presented in Table 6.

Table 6: Summary of chemical - health related – Treated Water sample points

Parameter	No Analyses	Unit	ADWG Limit (Health)	Maximum value	No of Analyses Non-Compliant	% Compliance
Free Chlorine – Field	14	mg/L	5	0.66	0	100
Copper (Total)	1	mg/L	2	0.01	0	100
Lead (Total)	1	mg/L	0.01	0.002	0	100
Manganese (Total)	1	mg/L	0.5	<0.005	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 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.

Source Water

Number of field analyses for health-related water quality parameters	0
Number of laboratory analyses for health-related water quality parameters	11

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

	No Analyses	Unit	ADWG Limit (Health)	Maximum value	No of Analyses Non-Compliant	% Compliance
Arsenic (Total)	1	mg/L	0.01	<0.001	0	100
Barium (Filtered)	1	mg/L	2	0.16	0	100
Beryllium (Filtered)	1	mg/L	0.06	<0.001	0	100
Boron (Filtered)	1	mg/L	4	0.06	0	100
Manganese (Total)	1	mg/L	0.5	<0.0001	0	100
Mercury (Total)	1	mg/L	0.001	<0.001	0	100
Nickel (Total)	1	mg/L	0.02	<0.001	0	100
Nitrate Nitrogen	1	mg/L NO ₃	11	0.22	0	100
Selenium (Total)	1	mg/L	0.01	<0.001	0	100
Silver (Total)	1	mg/L	0.1	<0.001	0	100
Uranium (Total)	1	mg/L	0.017	<0.001	0	100

6.0 Chemical - Aesthetic Performance

6.1. Chemical – Aesthetic Water Quality Parameters

Treated Water

Number of field analyses for aesthetic water quality parameters	70
Number of laboratory analyses for aesthetic water quality parameters	12

Analyses of samples of treated water taken from the Treated Water Sample Point and the Consumer sample Point are presented in Table 8.

Table 8: Summary of aesthetic related analyses from Treated Water sample points

Parameter	No Analyses	Unit	ADWG Limit (Aesthetic)	Maximum value	No of Analyses Non-Compliant	% Compliance
pH	15 ⁽¹⁾	pH Units	6.5-8.5	6.2 – 8.0	1	88
Aluminium (Total)	1	mg/L	0.2	<0.05	0	100
Ammonia	1	mg/L	0.5	0.02	0	100
Chloride	1	mg/L	250	210	0	100
Colour (True)	1	HU	15	5	0	100
Copper (Total)	1	mg/L	1	0.01	0	100
Free Chlorine	14 ⁽²⁾	mg/L	0.6	0.66	1	93
Iron (Total)	1	mg/L	0.3	0.01	0	100
Sodium (Total)	1	mg/L	180	130	0	100
Sulfate	1	mg/L	250	17	0	100
Total Hardness by Calculation	1	mg CaCO ₃ /L	200	170	0	100
Turbidity	15 ⁽³⁾	NTU	5	1.8	0	100
Total Dissolved Solids	15 ⁽⁴⁾	mg/L	<600	549	0	100
Temperature	14 ⁽⁵⁾	Deg C	No Guideline	24.6	N/A	N/A

Notes:

- (1) pH measurements, 14 field, 1 laboratory.
- (2) Free chlorine measurements, 14 field, 0 laboratory.
- (3) Turbidity measurements, 14 field, 1 laboratory.
- (4) TDS - 14 calculated from field measurement of conductivity, 1 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.

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.

Free chlorine measured at the consumer sample point ranged from 0.28 mg/L to 0.60 mg/L in the April to June 2023 period.

Source Water

Number of field analyses for aesthetic water quality parameters	21
Number of laboratory analyses for aesthetic water quality parameters	1

Table 9: Summary of aesthetic related analyses from Source sample point

Parameter	No Analyses	Unit	ADWG Limit (Aesthetic)	Maximum value	Outside of ADWG range ⁽¹⁾
pH	7 ⁽²⁾	pH Units	6.5-8.5	6.30 to 7.33	1
Silica (soluble)	1	mg/L	80	18	0
Total Dissolved Solids	7 ⁽³⁾	mg/L	600	800	7
Temperature	7 ⁽⁴⁾	Deg C	No Guideline	26.6	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
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7.2 Radiological – Performance

Number of laboratory analyses of radiological parameters	4
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Samples for radiological analysis were taken from the source (SSP) and treated water tank sample points (TWTSP).

Table 10: Summary of Radiological related analyses

	No Analyses	Unit	ADWG Screening Level	Maximum value	No of Analyses Above ADWG screening value
SSP - Gross Alpha	1	Bq/L	0.5	0.267 \pm 0.058	0
SSP - Gross Beta	1	Bq/L	0.5	0.146 \pm 0.053	0
TWT - Gross Alpha	1	Bq/L	0.5	0.137 \pm 0.038	0
TWT - Gross Beta	1	Bq/L	0.5	0.075 \pm 0.044	0

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

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.

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 April to June 2023.

9.0 Sampling Programme

The achieved sampling compared against planned sampling is summarised in Table 11.

Table 11: Summary of achieved versus planned sampling

		Planned	Taken	% Taken
Microbiological	Treated Water	10	10	100
Chemical	Source Water	33	33	100
	Treated Water	99	99	100
Radiological	Source Water	2	2	100
	Treated Water	2	2	100

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.