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Report to the Department of Health

by

Lancelin South

for the period

1 July 2021 to 30 September 2021

Contents

1.0	INTRODUCTION	3
1.1	Water Provider Information	3
1.2	Our Water System	3
2.0	UNDERSTANDING WATER QUALITY	6
3.0	PERFORMANCE SUMMARY.....	9
4.0	MICROBIAL PERFORMANCE.....	10
4.1	Microbiological - Exception Notifications	10
4.2	Microbiological - Performance	10
5.0	CHEMICAL - HEALTH RELATED PERFORMANCE	11
5.1	Chemical - Health Related - Exception Notifications	11
5.2	Chemical - Health Related - Performance	11
6.0	CHEMICAL - AESTHETIC PERFORMANCE	15
6.1	Chemical - Aesthetic - Exception Notifications	15
6.2	Chemical – Aesthetic Performance	15
7.0	RADIOLOGICAL PERFORMANCE.....	17
7.1	Radiological - Exception Notifications	17
7.2	Radiological – Performance	17
8.0	SAMPLING PROGRAMME	18
9.0	GENERAL NOTES / OTHER.....	19
	Table 1: Water Provider Contact Details	3
	Table 2: Summary of infrastructure.....	4
	Table 3: Water Quality Terms	6
	Table 4: Water Quality Meeting the Drinking Water Guidelines / Minister of Health’s Directions	9
	Table 5: Microbiological compliance summary.....	10
	Table 6: Summary of chemical - health related - analyses at Consumer SP	11
	Table 7: Summary of chemical - health related - analyses at Treated Water SP.....	13
	Table 8: Summary of chemical - health related - analyses at Source Water SP.....	14
	Table 9: Summary of aesthetic related analyses from consumer sampling point	15
	Table 10: Summary of aesthetic related analyses from Treated Water Tank sampling point	16
	Table 11: Summary of aesthetic related analyses from source sampling point	16
	Table 12: Summary of Radiological related analyses from Source sampling point.....	17
	Table 13: Summary of achieved versus planned sampling	18

1.0 Introduction

1.1 Water Provider Information

Table 1: Water Provider Contact Details

Name of Company	Lancelin South
Company Address	Locked Bag 4, Osborne Park DC, WA 6916
Company Phone	08 9655 1555
Company Email	admin@lancelinsouthwater.com.au
Chief Executive Officer	
CEO Email	
DoH Liaison Officer	Blair Shackleton, GHD
DoH Liaison Officer Email	Blair.shackleton@ghd.com

1.2 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).

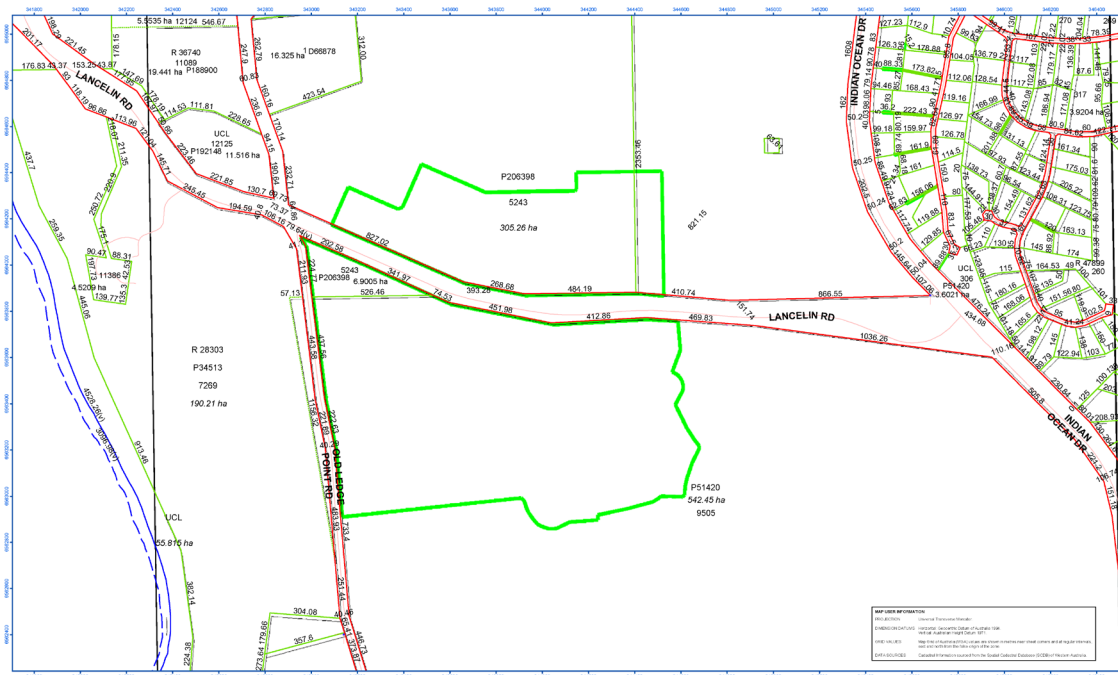


Figure 1: Lancelin South Water Operating Area

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 (June 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

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 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.

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 irrigation water (not for drinking);
2. The irrigation 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.

Lancelin South Water supplies on average 206 L/day of drinking water to 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 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 irrigation 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 <i>E. coli</i> <i>Naegleria</i>	<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 fowleri</i> 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 litre¹ (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, sulphate, 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 border="1" data-bbox="1023 1346 1422 1592"> <thead> <tr> <th>TDS (mg/L)</th> <th>Quality</th> </tr> </thead> <tbody> <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> </tbody> </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 source water is within the ADWG guidelines and no specific treatment is required 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: 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>	11	0	100%
Amoeba (Thermophilic Naegleria)	4	0	100%
Chemical Quality(3)			
Chemical – Health related(4)	58	0	100%
Chemical – Aesthetic(5)	52	0	100%
Radiological	2	0	100%

Notes:

- (1) Number of samples taken for the quarter from the Treated Water Tank Sampling Point and the Consumer Sampling 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.
- (4) Chemicals with ADWG Health guideline;
- (5) Chemicals with ADWG aesthetic guideline value

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

	Sampling Point	Number of Analyses	Number of Non-Compliant Analyses	% Compliance this Quarter	% Compliance 12-month average
<i>E. coli</i>	Treated Water Tank	4	0	100%	100%
	Consumer	7	0	100%	100%
Thermophilic <i>Naegleria</i>	Consumer	4	0	100%	100%
<i>Naegleria fowleri</i> ⁽¹⁾	Consumer	0	0	100%	100%

Notes:

(1) Analysis for *N. fowleri* only required if thermophilic *Naegleria* detected

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 - Performance

Consumer Sample Point

Number of field analyses for health-related water quality parameters 7

Number of laboratory analyses for health-related water quality parameters 43

Table 6: Summary of chemical - health related - analyses at Consumer SP

Parameter	No Samples	No Analyses	Unit	ADWG Limit (Health)	Maximum value	No of Analyses Non-Compliant (1)	% Compliance
Free Chlorine – Field	7	7	mg/L	5	0.79	0	100
Nitrate Nitrogen, NO ₃ as N	1	1	mg/L	11.29	0.21	0	100
Nitrite Nitrogen, NO ₂ as N	1	1	mg/L	3	<0.01	0	100
Fluoride	1	1	mg/L	1.5	0.3	0	100
Total Antimony	1	1	mg/L	0.003	<0.001	0	100
Total Cadmium	1	1	mg/L	0.002	<0.0001	0	100
Total Chromium	1	1	mg/L	0.05	<0.001	0	100
Total Copper	1	1	mg/L	2	0.011	0	100
Total Lead	1	1	mg/L	0.01	0.001	0	100
Total Manganese	1	1	mg/L	0.5	<0.01	0	100
Total Nickel	1	1	mg/L	0.02	0.01	0	100
Phenol	1	1	mg/L		<0.001	0	100
2-Chlorophenol	1	1	mg/L	0.3	<0.001	0	100
2-Methylphenol	1	1	mg/L		<0.001	0	100
3+4-Methylphenol	1	1	mg/L		<0.001	0	100
2-Nitrophenol	1	1	mg/L		<0.001	0	100
2,4-Dimethylphenol	1	1	mg/L		<0.001	0	100

Report to Department of Health

Lancelin South for Period 1 July 2021 to 30 Sept 2021

Parameter	No Samples	No Analyses	Unit	ADWG Limit (Health)	Maximum value	No of Analyses Non-Compliant (1)	% Compliance
2,4-Dichlorophenol	1	1	mg/L	0.2	<0.001	0	100
2,6-Dichlorophenol	1	1	mg/L		<0.001	0	100
4-Chloro-3-methylphenol	1	1	mg/L		<0.001	0	100
2,4,6-Trichlorophenol	1	1	mg/L	0.02	<0.001	0	100
2,4,5-Trichlorophenol	1	1	mg/L		<0.001	0	100
4-Nitrophenol	1	1	mg/L		<0.001	0	100
2,3,5,6-Tetrachlorophenol	1	1	mg/L		<0.001	0	100
2,3,4,6-Tetrachlorophenol	1	1	mg/L		<0.001	0	100
2,3,4,5-Tetrachlorophenol	1	1	mg/L		<0.001	0	100
2-Methyl-4,6-dinitrophenol	1	1	mg/L		<0.001	0	100
Pentachlorophenol	1	1	mg/L	0.01	<0.001	0	100
Dinoseb	1	1	mg/L		<0.001	0	100
Chloroform	1	1	mg/L		<0.001	0	100
Bromodichloromethane	1	1	mg/L		<0.001	0	100
Dibromochloromethane	1	1	mg/L		0.008	0	100
Bromoform	1	1	mg/L		0.032	0	100
Total THM's	1	1	mg/L	0.25	0.040	0	100
Chloroacetic acid	1	1	mg/L	0.15	<0.002	0	100
Bromoacetic acid	1	1	mg/L		<0.002	0	100
Dichloroacetic acid	1	1	mg/L	0.1	<0.002	0	100
Trichloroacetic acid	1	1	mg/L	0.1	<0.002	0	100
Bromochloroacetic acid	1	1	mg/L		0.003	0	100
Bromodichloroacetic acid	1	1	mg/L		<0.002	0	100
Dibromoacetic acid	1	1	mg/L		0.014	0	100
Dibromochloroacetic acid	1	1	mg/L		<0.005	0	100
Tribromoacetic acid	1	1	mg/L		<0.005	0	100
Chloral Hydrate	1	1	mg/L	0.1	<0.002	0	100

Treated Water Sample Point

Number of field analyses for health-related water quality parameters	7
Number of laboratory analyses for health-related water quality parameters	0

Table 7: Summary of chemical - health related - analyses at Treated Water SP

	No Samples	No Analyses	Unit	ADWG Limit (Health)	Maximum value	No of Analyses Non-Compliant ⁽¹⁾	% Compliance
Free Chlorine – Field	7	7	mg/L	5	0.73	0	100

Source Sampling Point

Number of field analyses for health-related water quality parameters	0
Number of laboratory analyses for health-related water quality parameters	1

Table 8: Summary of chemical - health related - analyses at Source Water SP

	No Samples	No Analyses	Unit	ADWG Limit (Health)	Maximum value	No of Analyses Non-Compliant ⁽¹⁾	% Compliance
Nitrate Nitrogen, NO ₃ as N	1	1	mg/L	11	0.33	0	100

6.0 Chemical - Aesthetic Performance

6.1 Chemical - Aesthetic - Exception Notifications

Number of chemical, aesthetic incidents resulting in exception notification	0
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6.2 Chemical – Aesthetic Performance

Consumer Sampling Point

Number of field analyses for aesthetic water quality parameters	21
Number of laboratory analyses for aesthetic water quality parameters	10

Table 9: Summary of aesthetic related analyses from consumer sampling point

Parameter	No Samples	No Analyses	Unit	ADWG Limit (Aesthetic)	Maximum value	No of Analyses Non-Compliant	% Compliance
pH	7 ⁽¹⁾	7 ⁽¹⁾	pH Units	6.5-8.5	8.0	0	100
Free Chlorine- Field	7 ⁽²⁾	7 ⁽²⁾	mg/L	0.6	0.79	3	57
Turbidity	7 ⁽³⁾	7 ⁽³⁾	NTU	5	0.04	0	100
Chloride	1	1	mg/L	250	190	0	100
Sulphate, SO ₄	1	1	mg/L	250	11	0	100
Ammonia	1	1	mg/L	0.5	0.02	0	100
Sodium	1	1	mg/L	180	80	0	100
Total Hardness	1	1	mg/L as CaCO ₃	200	100	0	100
Total Aluminium	1	1	mg/L	0.2	<0.01	0	100
Total Copper	1	1	mg/L	1	0.011	0	100
Total Iron, Fe	1	1	mg/L	0.3	0.002	0	100
Total Manganese	1	1	mg/L	0.1	0.001	0	100
Total Zinc	1	1	mg/L	3	0.2	0	100
Temperature ⁽⁴⁾	7	7	Deg C	N/A	18.4	N/A	N/A

Notes:

- (1) 7 field pH measurements, 0 laboratory pH measurement
- (2) 7 field free chlorine measurements; minimum value 0.23 mg/L
- (3) 7 field turbidity measurements, 0 laboratory turbidity measurement
- (4) Important water quality criteria but no guideline value in ADWG; operational target to be less than 25 degrees C.

Treated Water Tank Sampling 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 Treated Water Tank sampling point

	No Samples	No Analyses	Unit	ADWG Limit (Aesthetic)	Maximum value	No of Analyses Non-Compliant	% Compliance
pH	7	7	pH	6.5-8.5	8.0	0	100%
Turbidity	7	7	NTU	5	0.21	0	100
<i>Free Chlorine- Field⁽¹⁾</i>	7	7	mg/L	0.6	0.73	N/A	N/A
<i>Temperature⁽²⁾</i>	7	7	Deg C	N/A	19.2	N/A	N/A

Notes:

- (1) 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.
- (2) Important water quality criteria but no guideline value in ADWG; operational target to be less than 25 degrees C.

Source Sampling Point

Number of field analyses for aesthetic water quality parameters	7
Number of laboratory analyses for aesthetic water quality parameters	0

Table 11: Summary of aesthetic related analyses from source sampling point

	No Samples	No Analyses	Unit	ADWG Limit (Aesthetic)	Maximum value	No of Analyses Non-Compliant	% Compliance
pH – field	7	7	pH	6.5-8.5	7.5	0	100
<i>Temperature⁽¹⁾</i>	7	7	Deg C	N/A	25.9	N/A	N/A

Notes:

- (1) 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 samples collected for laboratory analysis of radiological parameters	2
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Table 12: Summary of Radiological related analyses from Source sampling point

	No Samples	No Analyses	Unit	ADWG Limit (Aesthetic)	Maximum value	No of Analyses Non-Compliant	% Compliance
Gross Alpha	1	1	Bq/L	0.5	<0.09	0	100
Gross Beta	1	1	Bq/L	0.5	0.28±0.05	0	100

8.0 Sampling Programme

The achieved sampling compared against planned sampling is summarised in Table 13.

Table 13: Summary of achieved versus planned sampling

		Planned	Taken	% Taken
Microbiological	Treated Water SP	3	4	100
	Consumer SP	9	11	100
Chemical	Source SP	8	8	100
	Treated Water SP	21	21	100
	Consumer SP	52	81	100
Radiological	Source SP	2	2	100
	Treated Water SP	0	0	N/A
	Consumer SP	0	0	N/A

9.0 General Notes / Other

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