



## Certificate of Analysis

<b>Client:</b>	Lotus at Siam.Co.NZ Limited	<b>Lab No:</b>	2119026	DWAPV1
<b>Contact:</b>	Duncan Laing 9 Ernlea Terrace Cashmere Christchurch 8022	<b>Date Received:</b>	04-Feb-2019	
		<b>Date Reported:</b>	11-Feb-2019	
		<b>Quote No:</b>	90913	
		<b>Order No:</b>		
		<b>Client Reference:</b>	Spring Water	
		<b>Submitted By:</b>	Duncan Laing	

### Sample Type: Aqueous

Sample Name:		Lotus Spa 04-Feb-2019 1:30 pm		Guideline Value	Maximum Acceptable Values (MAV)
Lab Number:		2119026.1			
Routine Water Profile					
pH	pH Units	7.8		7.0 - 8.5	-
Total Alkalinity	g/m <sup>3</sup> as CaCO <sub>3</sub>	52		-	-
Free Carbon Dioxide	g/m <sup>3</sup> at 25°C	1.5		-	-
Total Hardness	g/m <sup>3</sup> as CaCO <sub>3</sub>	44		< 200	-
Electrical Conductivity (EC)	mS/m	12.1		-	-
Electrical Conductivity (EC)	µS/cm	121		-	-
Approx Total Dissolved Salts	g/m <sup>3</sup>	81		< 1000	-
Total Boron	g/m <sup>3</sup>	0.0190		-	1.4
Total Calcium	g/m <sup>3</sup>	14.6		-	-
Total Copper	g/m <sup>3</sup>	0.0025		< 1	2
Total Iron	g/m <sup>3</sup>	< 0.021		< 0.2	-
Total Magnesium	g/m <sup>3</sup>	1.96		-	-
Total Manganese	g/m <sup>3</sup>	< 0.00053		< 0.04 (Staining) < 0.10 (Taste)	0.4
Total Potassium	g/m <sup>3</sup>	0.86		-	-
Total Sodium	g/m <sup>3</sup>	7.8		< 200	-
Total Zinc	g/m <sup>3</sup>	0.0098		< 1.5	-
Chloride	g/m <sup>3</sup>	4.0		< 250	-
Nitrate-N	g/m <sup>3</sup>	0.21		-	11.3
Sulphate	g/m <sup>3</sup>	2.9		< 250	-

**Note:** The Guideline Values and Maximum Acceptable Values (MAV) are taken from the publication 'Drinking-water Standards for New Zealand 2005 (Revised 2008)', Ministry of Health. Copies of this publication are available from <http://www.health.govt.nz/publication/drinking-water-standards-new-zealand-2005-revised-2008>

The Maximum Acceptable Values (MAVs) have been defined by the Ministry of Health for parameters of health significance and should not be exceeded. The Guideline Values are the limits for aesthetic determinands that, if exceeded, may render the water unattractive to consumers.

Note that the units g/m<sup>3</sup> are the same as mg/L and ppm.



#### **pH/Alkalinity and Corrosiveness Assessment**

The pH of a water sample is a measure of its acidity or basicity. Waters with a low pH can be corrosive and those with a high pH can promote scale formation in pipes and hot water cylinders.

The guideline level for pH in drinking water is 7.0-8.5. Below this range the water will be corrosive and may cause problems with disinfection if such treatment is used.

The alkalinity of a water is a measure of its acid neutralising capacity and is usually related to the concentration of carbonate, bicarbonate and hydroxide. Low alkalinities ( $25 \text{ g/m}^3$ ) promote corrosion and high alkalinities can cause problems with scale formation in metal pipes and tanks.

The pH of this water is within the NZ Drinking Water Guidelines, the ideal range being 7.0 to 8.0. With the pH and alkalinity levels found, it is unlikely this water will be corrosive towards metal piping and fixtures.

#### **Hardness/Total Dissolved Salts Assessment**

The water contains a very low amount of dissolved solids and would be regarded as being soft.

#### **Nitrate Assessment**

Nitrate-nitrogen at elevated levels is considered undesirable in natural waters as this element can cause a health disorder called methaemaglobinaemia. Very young infants (less than six months old) are especially vulnerable. The Drinking-water Standards for New Zealand 2005 (Revised 2008) suggests a maximum permissible level of  $11.3 \text{ g/m}^3$  as Nitrate-nitrogen ( $50 \text{ g/m}^3$  as Nitrate).

Nitrate-nitrogen was detected in this water but at such a low level to not be of concern.

For household use, it is important that the water is not contaminated with human or animal wastes (e.g. from septic tanks or effluent ponds). Bacteriological analyses may be required if such contamination could exist. For further details, please contact this laboratory.

#### **Boron Assessment**

Boron may be present in natural waters and if present at high concentrations can be toxic to plants. Boron was found at a low level in this water but would not give any cause for concern.

#### **Metals Assessment**

Iron and manganese are two problem elements that commonly occur in natural waters. These elements may cause unsightly stains and produce a brown/black precipitate. Iron is not toxic but manganese, at concentrations above  $0.5 \text{ g/m}^3$ , may adversely affect health. At concentrations below this it may cause stains on clothing and sanitary ware.

Neither element was detected in this water, which is a pleasing feature. Treatment to remove iron and/or manganese should not be necessary.

#### **Final Assessment**

All parameters tested for meet the guidelines laid down in the publication 'Drinking-water Standards for New Zealand 2005 (Revised 2008)' published by the Ministry of Health for water which is suitable for drinking purposes.

# Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Aqueous			
Test	Method Description	Default Detection Limit	Sample No
Routine Water Profile		-	1
Filtration, Unpreserved	Sample filtration through 0.45µm membrane filter. Performed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch.	-	1
Total Digestion	Nitric acid digestion. APHA 3030 E (modified) 23 <sup>rd</sup> ed. 2017.	-	1
pH	pH meter. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 4500-H <sup>+</sup> B 23 <sup>rd</sup> ed. 2017. Note: It is not possible to achieve the APHA Maximum Storage Recommendation for this test (15 min) when samples are analysed upon receipt at the laboratory, and not in the field. Samples and Standards are analysed at an equivalent laboratory temperature (typically 18 to 22 °C). Temperature compensation is used.	0.1 pH Units	1
Total Alkalinity	Titration to pH 4.5 (M-alkalinity), autotitrator. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 2320 B (modified for Alkalinity <20) 23 <sup>rd</sup> ed. 2017.	1.0 g/m <sup>3</sup> as CaCO <sub>3</sub>	1
Free Carbon Dioxide	Calculation: from alkalinity and pH, valid where TDS is not >500 mg/L and alkalinity is almost entirely due to hydroxides, carbonates or bicarbonates. APHA 4500-CO <sub>2</sub> D 23 <sup>rd</sup> ed. 2017.	1.0 g/m <sup>3</sup> at 25°C	1
Total Hardness	Calculation from Calcium and Magnesium. APHA 2340 B 23 <sup>rd</sup> ed. 2017.	1.0 g/m <sup>3</sup> as CaCO <sub>3</sub>	1
Electrical Conductivity (EC)	Conductivity meter, 25°C. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 2510 B 23 <sup>rd</sup> ed. 2017.	0.1 mS/m	1
Electrical Conductivity (EC)	Conductivity meter, 25°C. APHA 2510 B 23 <sup>rd</sup> ed. 2017.	1 µS/cm	1
Approx Total Dissolved Salts	Calculation: from Electrical Conductivity.	2 g/m <sup>3</sup>	1
Total Boron	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 23 <sup>rd</sup> ed. 2017.	0.0053 g/m <sup>3</sup>	1
Total Calcium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 23 <sup>rd</sup> ed. 2017.	0.053 g/m <sup>3</sup>	1
Total Copper	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 23 <sup>rd</sup> ed. 2017 / US EPA 200.8.	0.00053 g/m <sup>3</sup>	1
Total Iron	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 23 <sup>rd</sup> ed. 2017.	0.021 g/m <sup>3</sup>	1
Total Magnesium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 23 <sup>rd</sup> ed. 2017.	0.021 g/m <sup>3</sup>	1
Total Manganese	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 23 <sup>rd</sup> ed. 2017 / US EPA 200.8.	0.00053 g/m <sup>3</sup>	1
Total Potassium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 23 <sup>rd</sup> ed. 2017.	0.053 g/m <sup>3</sup>	1
Total Sodium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 23 <sup>rd</sup> ed. 2017.	0.021 g/m <sup>3</sup>	1
Total Zinc	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 23 <sup>rd</sup> ed. 2017 / US EPA 200.8.	0.0011 g/m <sup>3</sup>	1
Chloride	Filtered sample from Christchurch. Ion Chromatography. APHA 4110 B (modified) 23 <sup>rd</sup> ed. 2017.	0.5 g/m <sup>3</sup>	1
Nitrate-N	Filtered sample from Christchurch. Ion Chromatography. APHA 4110 B (modified) 23 <sup>rd</sup> ed. 2017.	0.05 g/m <sup>3</sup>	1
Sulphate	Filtered sample from Christchurch. Ion Chromatography. APHA 4110 B (modified) 23 <sup>rd</sup> ed. 2017.	0.5 g/m <sup>3</sup>	1

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.



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