



## Certificate of Analysis

<b>Client:</b>	New Zealand Artesian Water Limited	<b>Lab No:</b>	2164103	SPv2
<b>Contact:</b>	Mark Gornall C/- New Zealand Artesian Water Limited PO Box 9005 Annesbrook Nelson 7044	<b>Date Received:</b>	18-Apr-2019	
		<b>Date Reported:</b>	01-May-2019	
		<b>Quote No:</b>		
		<b>Order No:</b>		
		<b>Client Reference:</b>	Water Chemical Profile	
		<b>Submitted By:</b>	Mark Gornall	

### Sample Type: Aqueous

Sample Name:		E'stel 1 L 17-Apr-2019 8:09 am			
Lab Number:		2164103.1			
pH	pH Units	9.0	-	-	-
Total Alkalinity	g/m <sup>3</sup> as CaCO <sub>3</sub>	82	-	-	-
Carbonate	g/m <sup>3</sup> at 25°C	4.3	-	-	-
Bicarbonate	g/m <sup>3</sup> at 25°C	90	-	-	-
Total Hardness	g/m <sup>3</sup> as CaCO <sub>3</sub>	5.6	-	-	-
Electrical Conductivity (EC)	mS/m	18.2	-	-	-
Total Dissolved Solids (TDS)	g/m <sup>3</sup>	124	-	-	-
Calcium	g/m <sup>3</sup>	2.2	-	-	-
Dissolved Calcium	g/m <sup>3</sup>	2.2	-	-	-
Magnesium	g/m <sup>3</sup>	0.03	-	-	-
Dissolved Magnesium	g/m <sup>3</sup>	0.03	-	-	-
Potassium	g/m <sup>3</sup>	0.13	-	-	-
Silver	g/m <sup>3</sup>	0.023	-	-	-
Sodium	g/m <sup>3</sup>	42	-	-	-
Bromide	g/m <sup>3</sup>	0.05	-	-	-
Chloride	g/m <sup>3</sup>	6.5	-	-	-
Nitrite-N	g/m <sup>3</sup>	< 0.002	-	-	-
Nitrate-N	g/m <sup>3</sup>	< 0.002	-	-	-
Nitrate-N + Nitrite-N	g/m <sup>3</sup>	< 0.002	-	-	-
Reactive Silica	g/m <sup>3</sup> as SiO <sub>2</sub>	11.3	-	-	-
Sulphate	g/m <sup>3</sup>	1.3	-	-	-

## 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
pH	pH meter. APHA 4500-H+ 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. 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
Carbonate	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



Sample Type: Aqueous			
Test	Method Description	Default Detection Limit	Sample No
Bicarbonate	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. APHA 2510 B 23 <sup>rd</sup> ed. 2017.	0.1 mS/m	1
Total Dissolved Solids (TDS)	Filtration through GF/C (1.2 µm), gravimetric. APHA 2540 C (modified; drying temperature of 103 - 105°C used rather than 180 ± 2°C) 23 <sup>rd</sup> ed. 2017.	10 g/m <sup>3</sup>	1
Filtration for dissolved metals analysis	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B 23 <sup>rd</sup> ed. 2017.	-	1
Calcium	Analysed as received (after acid preservation, if required), ICP-MS, trace level. APHA 3125 B 23 <sup>rd</sup> ed. 2017.	0.05 g/m <sup>3</sup>	1
Dissolved Calcium	Filtered sample, ICP-MS, trace level. APHA 3125 B 23 <sup>rd</sup> ed. 2017.	0.05 g/m <sup>3</sup>	1
Magnesium	Analysed as received (after acid preservation, if required), ICP-MS, trace level. APHA 3125 B 23 <sup>rd</sup> ed. 2017.	0.02 g/m <sup>3</sup>	1
Dissolved Magnesium	Filtered sample, ICP-MS, trace level. APHA 3125 B 23 <sup>rd</sup> ed. 2017.	0.02 g/m <sup>3</sup>	1
Potassium	Analysed as received (after acid preservation, if required), ICP-MS, trace level. APHA 3125 B 23 <sup>rd</sup> ed. 2017.	0.05 g/m <sup>3</sup>	1
Silver	Analysed as received (after acid preservation, if required), ICP-MS, trace level. APHA 3125 B 23 <sup>rd</sup> ed. 2017.	0.00010 g/m <sup>3</sup>	1
Sodium	Analysed as received (after acid preservation, if required), ICP-MS, trace level. APHA 3125 B 23 <sup>rd</sup> ed. 2017.	0.02 g/m <sup>3</sup>	1
Bromide	Filtered sample. Ion Chromatography. APHA 4110 B (modified) 23 <sup>rd</sup> ed. 2017.	0.05 g/m <sup>3</sup>	1
Chloride	Filtered sample. Ion Chromatography. APHA 4110 B (modified) 23 <sup>rd</sup> ed. 2017.	0.5 g/m <sup>3</sup>	1
Nitrite-N	Automated Azo dye colorimetry, Flow injection analyser. APHA 4500-NO <sub>2</sub> <sup>-</sup> I (modified) 23 <sup>rd</sup> ed. 2017.	0.002 g/m <sup>3</sup>	1
Nitrate-N	Calculation: (Nitrate-N + Nitrite-N) - NO <sub>2</sub> N. In-House.	0.0010 g/m <sup>3</sup>	1
Nitrate-N + Nitrite-N	Total oxidised nitrogen. Automated cadmium reduction, flow injection analyser. APHA 4500-NO <sub>3</sub> <sup>-</sup> I (modified) 23 <sup>rd</sup> ed. 2017.	0.002 g/m <sup>3</sup>	1
Reactive Silica	Filtered sample. Heteropoly blue colorimetry. Discrete analyser. APHA 4500-SiO <sub>2</sub> F (modified from flow injection analysis) 23 <sup>rd</sup> ed. 2017.	0.10 g/m <sup>3</sup> as SiO <sub>2</sub>	1
Sulphate	Filtered sample. 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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