

Our Ref: 217504\_LET\_014

14 March 2022

Narromine Shire Council  
PO Box 115,  
Narromine NSW 2821

Attention: Mick Bell – Manager Community Facilities

## **ENVIRONMENTAL MONITORING OF NARROMINE WASTE DEPOT**

Premise Australia Pty Ltd (Premise) has completed quarterly environmental monitoring at Narromine Waste Depot, located at 156 Gainsborough Road, Narromine. Monitoring was completed per the requirements of Environment Protection Licence (EPL) 6055.

### **Groundwater Levels**

Groundwater was gauged at three (3) groundwater monitoring wells to the north-east of the site on 2 March 2022. Groundwater gauging data is included in **Table 1** (attached). Observations were as follows:

- Monitoring points Bore 1, Bore 2 and Bore 3 to the north-east of the site were monitored via access through the NSW Department of Primary Industries.
- Depths to groundwater ranged from 28.72 metres below ground level (mbgl) at Bore 1, to 29.92 mbgl at Bore 3. Groundwater levels have fallen at all bores since December 2021.
- Monitoring point Bore 4, in the south-west corner of the site, was dry at 24 metres below ground level (mbgl). A groundwater sample could not be collected at Bore 4.
- Monitoring point Bore 5, to the south of the site, is equipped with a pump and tap, and depth to groundwater could not be gauged during the sampling event.
- Monitoring point Bore 6, to the west of the site, is located on private property and access was unable to be obtained during the sampling event.
- Inference of corrected groundwater elevations and flow direction was not possible from the available data. Surrounding topography of the region is relatively flat and groundwater connectivity with local drainage features is considered to be unlikely.
- The groundwater level measurements are illustrated in **Figure 1**.



**Figure 1 – Narromine Waste Depot Groundwater Level Measurements**

### Groundwater Quality

Groundwater samples were able to be collected from wells Bore 1, Bore 2, Bore 3 and Bore 5. Samples were couriered to SGS Laboratories in Alexandria, NSW, who are NATA accredited to perform the scheduled analysis. Results of analysis are included in **Table 2** (attached), and laboratory certificates have also been appended to this letter.

Groundwater quality has been assessed by comparison to criteria (where available) adopted from Australian and New Zealand Environment and Conservation Council (ANZECC) Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 – Primary Industries: Water quality for irrigation and general water use.

- Laboratory measured pH ranged from 6.3 at Bore 2 and Bore 5, to 6.7 at Bore 1. Groundwater was within the guideline range considered suitable for pumping, irrigation and stock watering (6.0 to 8.5 pH units).
- Total suspended solid (TSS) concentrations ranged from below the laboratory LOR of 5 mg/L at Bore 2, Bore 3 and Bore 5, to 930 mg/L at Bore 1.
- Total alkalinity in groundwater ranged from 150 mg/L at Bore 2 to 240 mg/L at Bore 1. Groundwater alkalinity did not exceed the guideline hardness value for potential fouling of waters (350 mg/L).
- Groundwater chloride concentrations ranged from 88 mg/L at Bore 3 to 310 mg/L at Bore 5. All concentrations were below the guideline value for protection of moderately sensitive crops (350 mg/L).

- Fluoride concentrations in groundwater were recorded at concentrations ranging from 0.12 mg/L at Bore 1 to 0.24 mg/L at Bore 3. All concentrations were below the guideline value of 1 mg/L for long term irrigation use (up to 100 years).
- Sulfate concentrations in groundwater ranged from 26 mg/L at Bore 1 and Bore 2 to 52 mg/L at Bore 5.
- Calcium concentrations ranged from 23 mg/L at Bore 3 to 66 mg/L at Bore 1.
- Magnesium concentrations ranged from 21 mg/L at Bore 2 and Bore 3 to 44 mg/L at Bore 5.
- Potassium concentrations ranged from 2.5 mg/L at Bore 2 to 4.2 mg/L at Bore 5.
- Concentrations of sodium ranged from 83 mg/L at Bore 2, to 200 mg/L at Bore 5. Sodium concentrations did not exceed the guideline level for irrigation to moderately sensitive crops (<230 mg/L).
- Total organic carbon (TOC) in groundwater ranged from 0.3 mg/L at Bore 5 to 1.3 mg/L at Bore 1.
- Ammonia concentrations in groundwater ranged from below the laboratory limit of reporting (LOR) of 0.01 mgN/L at Bore 5, to 0.13 mgN/L at Bore 1.
- Nitrate concentrations ranged from 0.006 mgN/L at Bore 3 to 3.8 mgN/L at Bore 5.
- Iron concentrations were recorded at below the laboratory LOR of 0.005 mg/L at all monitoring bores, and were below the long-term (up to 100 years) irrigation guideline concentration of 0.2 mg/L.
- Manganese (Mn) concentrations ranged from 0.004 mg/L at Bore 5 to 0.15 mg/L at Bore 3. Manganese concentrations did not exceed the long-term (up to 100 years) irrigation guideline concentration of 0.2 mg/L.
- Total phenols were not recorded at concentrations above the laboratory LOR of 0.01 mg/L at all monitoring bores.

### **Surface Water Quality**

Surface water samples were able to be collected from monitoring points SW7 and SW8 on 2 March 2022. Samples were couriered to SGS Laboratories in Alexandria, NSW, who are NATA accredited to perform the scheduled analysis. Results of analysis are included in **Table 2** (attached), and laboratory certificates have also been appended to this letter.

Surface water quality has been assessed by comparison to criteria (where available) adopted from Australian and New Zealand Environment and Conservation Council (ANZECC) Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 – Primary Industries: Water quality for irrigation and general water use.

- Laboratory measured pH was recorded to range from 6.8 at SW8 to 7.4 at SW7, within the guideline range for pumping, irrigation and stock watering of 6.0 to 8.5 pH units.
- Total suspended solids (TSS) concentrations ranged from 17 mg/L at SW7 to 1500 mg/L at SW8.
- Total alkalinity was recorded to range from 100 mgCaCO<sub>3</sub>/L at SW8 to 190 mgCaCO<sub>3</sub>/L at SW7. The guideline hardness value for potential fouling of waters (350 mgCaCO<sub>3</sub>/L – ANZECC & ARMCANZ, 2000) was not exceeded.

- Chloride concentrations ranged from 34.0 mg/L at SW8 to 38.0 mg/L at SW7. All concentrations were below the guideline value for protection of moderately sensitive crops (350 mg/L).
- Fluoride concentrations ranged from 0.25 mg/L at SW8 to 0.31 mg/L at SW7. Fluoride concentrations did not exceed the guideline value of 1 mg/L for long term irrigation use (up to 100 years).
- Sulphate concentrations were recorded to range from 11.0 mg/L at SW7 to 25.0 mg/L at SW8.
- Calcium concentrations ranged from 21.0 mg/L at SW8 to 36.0 mg/L at SW7.
- Magnesium concentrations ranged from 10.0 mg/L at SW8 to 14.0 mg/L at SW7.
- Potassium concentrations ranged from 18.0 mg/L at SW7 to 20.0 mg/L at SW8.
- Sodium concentrations were recorded to range from 24 mg/L at SW8 to 43 mg/L at SW7. Sodium concentrations were below the guideline level for irrigation to moderately sensitive crops (<230 mg/L).
- Total organic carbon (TOC) was recorded to range from 14 mg/L at SW7 to 62 mg/L at SW8.
- The ammonia concentration was recorded to range from 0.06 mgN/L at SW8 to 0.10 mgN/L at SW7.
- The nitrate concentration was not recorded at a concentration above the laboratory LOR of 0.005 mgN/L at either monitoring point.
- The nitrite concentration was not recorded at a concentration above the laboratory LOR of 0.005 mgN/L at either monitoring point.
- Iron concentrations ranged from 0.037 mg/L at SW7 to 3.8 mg/L at SW8. Iron concentrations exceeded the guideline value of 0.2 mg/L for long term irrigation use (up to 100 years) at SW8.
- Manganese concentrations ranged from 0.012 mg/L at SW7 to 0.71 mg/L at SW8. Manganese concentrations exceeded the guideline value of 0.2 mg/L for long term irrigation use (up to 100 years) at SW8.
- Phenolic compounds were not recorded at concentrations greater than the laboratory LOR of 0.01 mg/L in the samples collected from SW7 and SW8.

The next routine monitoring is scheduled for May 2022. Please do not hesitate to contact us with any questions or comments you may have regarding this report.

Yours sincerely



**BRENDAN STUART**

Senior Environmental Scientist

No. of Attachments – 4:

Environmental Monitoring Point Locations  
Table 1 – Groundwater Level Results  
Table 2 – Results of Laboratory Analyses  
SGS Laboratories Analytical Reports – March 2022

# Narromine Waste Depot Monitoring Points

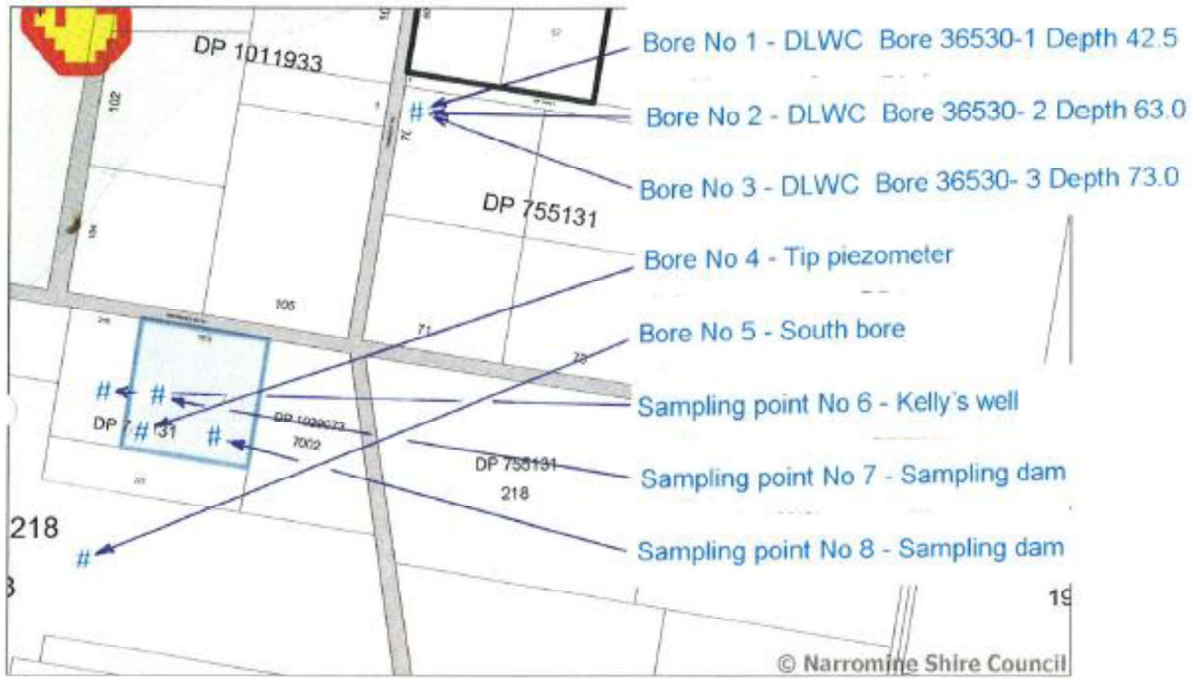
Narromine Shire Council  
 124 Dandaleo Street  
 PO Box 115  
 NARROMINE NSW 2821  
 Ph: (02) 6889 9999  
 Fax: (02) 6889 9998  
 Email: mail@narromine.nsw.gov.au

## NARROMINE WASTE DEPOT

### Water Sampling Locations

Created on Tuesday, 27 January 2009 by planning

LEGEND # - Sampling Location



Map Scale: 1:12,750 Map Zoom: 2228 m

### SITE - Property Information

CAD ID	Parcel No	Lot No	Sec No	Plan No	Pt Lot	Area	Area UOM
102644860	1881	195		DP755131	N	12.14	H

#### Property Address (2)(Property)

Property Name	Prefix	Street No	Suffix	Street Name	Locality	State	Postcode
Tip		0		Gainsborough ROAD	NARROMINE	NSW	2821
		156			NARROMINE	NSW	2821

#### Owner Info (1)(Property)

Owner Title	Owner
THE GENERAL MANAGER	NARROMINE SHIRE COUNCIL

#### Rates Info (1)(Property)

Assessment No	Valuation No	Land Value	Rates Cat	Rates Sub_Cat	Rate Levied
1653-00000-8	2674206	120000	BUSINESS		2011.59

#### Postal Info (1)(Property)

Post Name 1	Post Name 2	Post_Add_1	Post_Add_2	Post_PCode	Property_Desc
THE GENERAL MANAGER	NARROMINE SHIRE COUNCIL	PO BOX 115	NARROMINE NSW 2821	2821	LOT 195 DP 755131



#### Disclaimer

This information has been prepared for Council's internal purposes and for no other purpose. No statement is made about the accuracy or suitability of the information for use for any purpose (whether the purpose has been notified to Council or not). While every care is taken to ensure the accuracy of this data, neither the Narromine Shire Council nor the Department of Lands makes any representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which you might incur as a result of the data being inaccurate or incomplete in any way and for any reason. © The State of New South Wales (Department of Lands) 2008, © Narromine Shire Council 2008



**TABLE 1: NARROMINE WASTE DEPOT - GROUNDWATER LEVEL RESULTS**

**Ground Water Levels:** 02-Mar-22

**Piezometer Details:**

	Stickup (m)	Date	Measured (m)	SWL (mBGL)	Well Depth (m)	Well Base (mBGL)	Water Column (m)
Bore 1	1.0	02/03/2022	29.72	28.72	60.0	59.00	30.28
Bore 2	1.0	02/03/2022	30.80	29.80	60.0	59.00	29.20
Bore 3	1.0	02/03/2022	30.92	29.92	70.0	69.00	39.08
Bore 5	TAP	02/03/2022	-	-	-	-	-

**Definitions:**

- Stickup: Height of piezometer pipe above ground surface.
- SWL: Actual depth to groundwater at the piezometer relative to ground level.
- Measured: Depth of groundwater measured from the top of the piezometer pipe.

Date	Bore 1		Bore 2		Bore 3		Bore 5	
	Measured	GWL (mBGL)	Measured	GWL (mBGL)	Measured	GWL (mBGL)	Measured	GWL (mBGL)
23-Jan-18	27.13	26.13	28.72	27.72	29.04	28.04	-	-
28-Mar-18	27.58	26.58	28.79	27.79	29.09	28.09	-	-
27-Jun-18	27.28	26.28	27.73	26.73	28.01	27.01	-	-
19-Sep-18	27.45	26.45	28.91	27.91	29.22	28.22	-	-
17-Dec-18	27.83	26.83	29.74	28.74	30.12	29.12	-	-
26-Mar-19	28.70	27.70	29.99	28.99	30.41	29.41	-	-
12-Jun-19	28.40	27.40	29.06	28.06	29.35	28.35	-	-
25-Oct-19	29.45	28.45	31.88	30.88	32.22	31.22	-	-
15-Jan-20	29.76	28.76	32.82	31.82	33.51	32.51	-	-
25-Mar-20	29.56	28.56	30.78	29.78	30.92	29.92	-	-
25-Jun-20	31.15	30.15	31.22	30.22	31.96	30.96	-	-
15-Sep-20	29.12	28.12	29.42	28.42	29.67	28.67	-	-
16-Dec-20	27.32	26.32	31.00	30.00	31.37	30.37	-	-
04-Mar-21	29.77	28.77	30.78	29.78	30.98	29.98	-	-
25-May-21	29.17	28.17	30.10	29.10	28.79	27.79	-	-
08-Sep-21	29.25	28.25	28.32	27.32	29.46	28.46	-	-
01-Dec-21	29.16	28.16	29.39	28.39	29.43	28.43	-	-
02-Mar-22	29.72	28.72	30.80	29.80	30.92	29.92	-	-

**TABLE 2: NARROMINE WASTE DEPOT - RESULTS OF LABORATORY ANALYSIS  
MARCH 2022**



Group	Analyte	LOR	Units	Criteria	Sample ID	Bore 1	Bore 2	Bore 3	Bore 5	Sample 7	Sample 8
					Sample Date	02/03/2022	02/03/2022	02/03/2022	02/03/2022	02/03/2022	02/03/2022
					PS	PS	PS	PS	PS	PS	PS
Physical Parameters	pH (Lab)	0	No unit	6.0 - 8.5	<b>6.7</b>	<b>6.3</b>	<b>6.5</b>	<b>6.3</b>	<b>7.4</b>	<b>6.8</b>	
	Total Suspended Solids	5	mg/L	-	<b>930</b>	< 5	< 5	< 5	<b>17</b>	<b>1500</b>	
Alkalinity	Total Alkalinity as CaCO3	5	mg/L	350	<b>240</b>	<b>150</b>	<b>190</b>	<b>180</b>	<b>190</b>	<b>100</b>	
Anions	Chloride	1	mg/L	350	<b>160</b>	<b>110</b>	<b>88</b>	<b>310</b>	<b>38</b>	<b>34</b>	
	Fluoride	0.1	mg/L	1	<b>0.12</b>	<b>0.14</b>	<b>0.24</b>	<b>0.19</b>	<b>0.31</b>	<b>0.25</b>	
	Sulfate (SO4)	1	mg/L	-	<b>26</b>	<b>26</b>	<b>30</b>	<b>52</b>	<b>11</b>	<b>25</b>	
Cations	Calcium (Ca)	0.2	mg/L	-	<b>66</b>	<b>32</b>	<b>23</b>	<b>58</b>	<b>36</b>	<b>21</b>	
	Magnesium (Mg)	0.1	mg/L	-	<b>25</b>	<b>21</b>	<b>21</b>	<b>44</b>	<b>14</b>	<b>10</b>	
	Potassium (K)	0.1	mg/L	-	<b>3.3</b>	<b>2.5</b>	<b>3</b>	<b>4.2</b>	<b>18</b>	<b>20</b>	
	Sodium (Na)	0.5	mg/L	230	<b>120</b>	<b>83</b>	<b>110</b>	<b>200</b>	<b>43</b>	<b>24</b>	
Forms of Carbon	Total Organic Carbon	0.2	mg/L	-	<b>1.3</b>	<b>0.6</b>	<b>0.3</b>	<b>0.3</b>	<b>14</b>	<b>62</b>	
Nutrients	Ammonia (NH3) as N	0.01	mg/L	-	<b>0.13</b>	<b>0.02</b>	<b>0.02</b>	< 0.01	<b>0.1</b>	<b>0.06</b>	
	Nitrate (NO3) as N	0.005	mg/L	-	<b>2.3</b>	<b>1.4</b>	<b>0.006</b>	<b>3.8</b>	< 0.005	< 0.005	
	Nitrite (NO2) as N	0.005	mg/L	-	<b>0.008</b>	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
	Total Oxidised Nitrogen, NOx-N	0.005	mg/L	-	<b>2.3</b>	<b>1.4</b>	<b>0.007</b>	<b>3.8</b>	< 0.005	< 0.005	
Trace Metals	Iron (Fe)	0.005	mg/L	0.2	< 0.005	< 0.005	< 0.005	< 0.005	<b>0.037</b>	<b>3.8</b>	
	Manganese (Mn)	0.001	mg/L	0.2	<b>0.13</b>	<b>0.014</b>	<b>0.15</b>	<b>0.004</b>	<b>0.12</b>	<b>0.71</b>	
Phenolics	Total Phenols	0.05	mg/L	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	

mg/L milligrams per litre  
 µg/L micrograms per litre  
 LOR limit of reporting  
 PS primary sample  
 Criteria Criteria adopted from *Australian and New Zealand Environment and Conservation Council (ANZECC) Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) Australian and New Zealand Guidelines for Fresh and Marine Water Quality - 'Primary Industries: Water quality for irrigation and general water use', 2000*  
 within criteria  
 criteria exceeded



CLIENT DETAILS

Contact **Brendan Stuart**  
 Client **PREMISE**  
 Address **LEVEL 1**  
**100 BRUNSWICK STREET**  
**FORTITUDE VALLEY QLD 4006**

Telephone **61 2 6939 5000**  
 Facsimile **(Not specified)**  
 Email **Brendan.stuart@premise.com.au**

Project **217504 - Narromine WD (Quarterly)**  
 Order Number **217504**  
 Samples **6**

LABORATORY DETAILS

Manager **Huong Crawford**  
 Laboratory **SGS Alexandria Environmental**  
 Address **Unit 16, 33 Maddox St**  
**Alexandria NSW 2015**

Telephone **+61 2 8594 0400**  
 Facsimile **+61 2 8594 0499**  
 Email **au.environmental.sydney@sgs.com**

SGS Reference **SE229595 R0**  
 Date Received **04 Mar 2022**  
 Date Reported **10 Mar 2022**

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

SIGNATORIES



**Dong LIANG**  
 Metals/Inorganics Team Leader



**Kamrul AHSAN**  
 Senior Chemist



**Shane MCDERMOTT**  
 Inorganic/Metals Chemist



Parameter	Units	LOR	SE229595.001	SE229595.002	SE229595.003	SE229595.004
Sample Number			SE229595.001	SE229595.002	SE229595.003	SE229595.004
Sample Matrix			Water	Water	Water	Water
Sample Date			02 Mar 2022	02 Mar 2022	02 Mar 2022	02 Mar 2022
Sample Name			Bore 1	Bore 2	Bore 3	Sample 7

**Total Phenolics in Water Method: AN295 Tested: 10/3/2022**

Parameter	Units	LOR	SE229595.001	SE229595.002	SE229595.003	SE229595.004
Total Phenols	mg/L	0.05	<0.05	<0.05	<0.05	<0.05

**Anions by Ion Chromatography in Water Method: AN245 Tested: 4/3/2022**

Parameter	Units	LOR	SE229595.001	SE229595.002	SE229595.003	SE229595.004
Chloride	mg/L	1	160	110	88	38
Sulfate, SO4	mg/L	1	26	26	30	11
Fluoride	mg/L	0.1	0.12	0.14	0.24	0.31
Nitrate Nitrogen, NO3-N	mg/L	0.005	2.3	1.4	0.006	<0.005

**Nitrite in Water Method: AN277 Tested: 4/3/2022**

Parameter	Units	LOR	SE229595.001	SE229595.002	SE229595.003	SE229595.004
Nitrite Nitrogen, NO2 as N	mg/L	0.005	0.008	<0.005	<0.005	<0.005
Total Oxidised Nitrogen, NOx-N	mg/L	0.005	2.3	1.4	0.007	<0.005

**Ammonia Nitrogen by Discrete Analyser Method: AN291 Tested: 4/3/2022**

Parameter	Units	LOR	SE229595.001	SE229595.002	SE229595.003	SE229595.004
Ammonia Nitrogen, NH <sub>3</sub> as N	mg/L	0.01	0.13	0.02	0.02	0.10

**pH in water Method: AN101 Tested: 4/3/2022**

Parameter	Units	LOR	SE229595.001	SE229595.002	SE229595.003	SE229595.004
pH**	No unit	-	6.7	6.3	6.5	7.4

**Total and Volatile Suspended Solids (TSS / VSS) Method: AN114 Tested: 4/3/2022**

Parameter	Units	LOR	SE229595.001	SE229595.002	SE229595.003	SE229595.004
Total Suspended Solids Dried at 103-105°C	mg/L	5	930	<5	<5	17

Parameter	Units	LOR	SE229595.001	SE229595.002	SE229595.003	SE229595.004
Sample Number			SE229595.001	SE229595.002	SE229595.003	SE229595.004
Sample Matrix			Water	Water	Water	Water
Sample Date			02 Mar 2022	02 Mar 2022	02 Mar 2022	02 Mar 2022
Sample Name			Bore 1	Bore 2	Bore 3	Sample 7

**Alkalinity Method: AN135 Tested: 4/3/2022**

Total Alkalinity as CaCO3	mg/L	5	240	150	190	190
---------------------------	------	---	-----	-----	-----	-----

**Forms of Carbon Method: AN190 Tested: 4/3/2022**

Total Organic Carbon as NPOC	mg/L	0.2	1.3	0.6	0.3	14
------------------------------	------	-----	-----	-----	-----	----

**Metals in Water (Dissolved) by ICPOES Method: AN320 Tested: 9/3/2022**

Calcium, Ca	mg/L	0.2	66	32	23	36
Magnesium, Mg	mg/L	0.1	25	21	21	14
Potassium, K	mg/L	0.1	3.3	2.5	3.0	18
Sodium, Na	mg/L	0.5	120	83	110	43

**Trace Metals (Dissolved) in Water by ICPMS Method: AN318 Tested: 9/3/2022**

Iron, Fe	mg/L	0.005	<0.005	<0.005	<0.005	0.037
Manganese, Mn	mg/L	0.001	0.13	0.014	0.15	0.12

	Sample Number	SE229595.005	SE229595.006
	Sample Matrix	Water	Water
	Sample Date	02 Mar 2022	02 Mar 2022
	Sample Name	Sample 8	Bore 5
Parameter	Units	LOR	

**Total Phenolics in Water Method: AN295 Tested: 10/3/2022**

Total Phenols	mg/L	0.05	<0.05	<0.05
---------------	------	------	-------	-------

**Anions by Ion Chromatography in Water Method: AN245 Tested: 4/3/2022**

Chloride	mg/L	1	<b>34</b>	<b>310</b>
Sulfate, SO4	mg/L	1	<b>25</b>	<b>52</b>
Fluoride	mg/L	0.1	<b>0.25</b>	<b>0.19</b>
Nitrate Nitrogen, NO3-N	mg/L	0.005	<0.005	<b>3.8</b>

**Nitrite in Water Method: AN277 Tested: 4/3/2022**

Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005
Total Oxidised Nitrogen, NOx-N	mg/L	0.005	<0.005	<b>3.8</b>

**Ammonia Nitrogen by Discrete Analyser Method: AN291 Tested: 4/3/2022**

Ammonia Nitrogen, NH <sub>3</sub> as N	mg/L	0.01	<b>0.06</b>	<0.01
--	------	------	-------------	-------

**pH in water Method: AN101 Tested: 4/3/2022**

pH**	No unit	-	<b>6.8</b>	<b>6.3</b>
------	---------	---	------------	------------

**Total and Volatile Suspended Solids (TSS / VSS) Method: AN114 Tested: 4/3/2022**

Total Suspended Solids Dried at 103-105°C	mg/L	5	<b>1500</b>	<5
---	------	---	-------------	----

	Sample Number	SE229595.005	SE229595.006
	Sample Matrix	Water	Water
	Sample Date	02 Mar 2022	02 Mar 2022
	Sample Name	Sample 8	Bore 5
Parameter	Units	LOR	

**Alkalinity Method: AN135 Tested: 4/3/2022**

Total Alkalinity as CaCO3	mg/L	5	100	180
---------------------------	------	---	-----	-----

**Forms of Carbon Method: AN190 Tested: 4/3/2022**

Total Organic Carbon as NPOC	mg/L	0.2	62	0.3
------------------------------	------	-----	----	-----

**Metals in Water (Dissolved) by ICPOES Method: AN320 Tested: 9/3/2022**

Calcium, Ca	mg/L	0.2	21	58
Magnesium, Mg	mg/L	0.1	10	44
Potassium, K	mg/L	0.1	20	4.2
Sodium, Na	mg/L	0.5	24	200

**Trace Metals (Dissolved) in Water by ICPMS Method: AN318 Tested: 9/3/2022**

Iron, Fe	mg/L	0.005	3.8	<0.005
Manganese, Mn	mg/L	0.001	0.71	0.004

MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

**Alkalinity Method: ME-(AU)-[ENV]AN135**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Alkalinity as CaCO3	LB244034	mg/L	5	<5	1%	94%

**Ammonia Nitrogen by Discrete Analyser Method: ME-(AU)-[ENV]AN291**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Ammonia Nitrogen, NH <sub>3</sub> as N	LB244037	mg/L	0.01	<0.01	20 - 40%	106%	102%

**Anions by Ion Chromatography in Water Method: ME-(AU)-[ENV]AN245**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Chloride	LB244040	mg/L	1	<0.05	2%	94%	
Sulfate, SO <sub>4</sub>	LB244040	mg/L	1	<1.0	1%	92%	
Fluoride	LB244040	mg/L	0.1	<0.10	2%	92%	
Nitrate Nitrogen, NO <sub>3</sub> -N	LB244040	mg/L	0.005	<0.005	2%	94%	97%

**Forms of Carbon Method: ME-(AU)-[ENV]AN190**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Organic Carbon as NPOC	LB244035	mg/L	0.2	<0.2	17%	89%

**Metals in Water (Dissolved) by ICPOES Method: ME-(AU)-[ENV]AN320**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Calcium, Ca	LB244213	mg/L	0.2	<0.2	0 - 1%	106%	101%
Magnesium, Mg	LB244213	mg/L	0.1	<0.1	0 - 1%	102%	103%
Potassium, K	LB244213	mg/L	0.1	<0.1	0 - 1%	104%	108%
Sodium, Na	LB244213	mg/L	0.5	<0.5	0 - 1%	103%	113%

MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

**Nitrite in Water Method: ME-(AU)-[ENV]AN277**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Nitrite Nitrogen, NO2 as N	LB244037	mg/L	0.005	<0.005	0 - 1%	100%	96%

**pH in water Method: ME-(AU)-[ENV]AN101**

Parameter	QC Reference	Units	LOR	DUP %RPD	LCS %Recovery
pH**	LB244036	No unit	-	0%	99%

**Total and Volatile Suspended Solids (TSS / VSS) Method: ME-(AU)-[ENV]AN114**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Suspended Solids Dried at 103-105°C	LB244038	mg/L	5	<5	4%	95%

**Total Phenolics in Water Method: ME-(AU)-[ENV]AN295**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Phenols	LB244294	mg/L	0.05	<0.05	0%	92%	91%

**Trace Metals (Dissolved) in Water by ICPMS Method: ME-(AU)-[ENV]AN318**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Iron, Fe	LB244212	mg/L	0.005	<0.005	0%	114%	111%
Manganese, Mn	LB244212	mg/L	0.001	<0.001	2%	116%	102%

METHOD

METHODOLOGY SUMMARY

AN020	Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN114	Total Suspended and Volatile Suspended Solids: The sample is homogenised by shaking and a known volume is filtered through a pre-weighed GF/C filter paper and washed well with deionised water. The filter paper is dried and reweighed. The TSS is the residue retained by the filter per unit volume of sample. Reference APHA 2540 D. Internal Reference AN114
AN135	Alkalinity (and forms of) by Titration: The sample is titrated with standard acid to pH 8.3 (P titre) and pH 4.5 (T titre) and permanent and/or total alkalinity calculated. The results are expressed as equivalents of calcium carbonate or recalculated as bicarbonate, carbonate and hydroxide. Reference APHA 2320. Internal Reference AN135
AN190	TOC and DOC in Water: A homogenised micro portion of sample is injected into a heated reaction chamber packed with an oxidative catalyst that converts organic carbon to carbon dioxide. The CO <sub>2</sub> is measured using a non-dispersive infrared detector. The process is fully automated in a commercially available analyser. If required a sugar value can be calculated from the TOC result. Reference APHA 5310 B.
AN190	Chemical oxygen demand can be calculated/estimated based on the O <sub>2</sub> /C relation as 2.67*NPOC (TOC). This is an estimate only and the factor will vary with sample matrix so results should be interpreted with caution.
AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO <sub>2</sub> , NO <sub>3</sub> and SO <sub>4</sub> are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN277	Nitrite ions, when reacted with a reagent containing sulphanilamide and N-(1-naphthyl)-ethylenediamine dihydrochloride produce a highly coloured azo dye that is measured photometrically at 540nm.
AN291	Ammonia in solution reacts with hypochlorite ions from Sodium Dichloroisocyanate, and salicylate in the presence of Sodium Nitroprusside to form indophenol blue and measured at 670 nm by Discrete Analyser.
AN295	The water sample or extract of sample is distilled in a phosphoric acid stream. Phenolic compounds in the distillate react with a reagent stream of potassium hexacyanoferrate(III) and 4-Amino-2,3-dimethyl-3-pyrazolin-5-one in an alkaline medium to form a coloured complex which is analysed spectrophotometrically onboard a continuous flow analyser.
AN318	Determination of elements at trace level in waters by ICP-MS technique,, referenced to USEPA 6020B and USEPA 200.8 (5.4).
AN320	Metals by ICP-OES: Samples are preserved with 10% nitric acid for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components .



METHOD

METHODOLOGY SUMMARY

AN320

Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B.

Calculation

Free and Total Carbon Dioxide may be calculated using alkalinity forms only when the samples TDS is <500mg/L. If TDS is >500mg/L free or total carbon dioxide cannot be reported. APHA4500CO2 D.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
**	Indicative data, theoretical holding time exceeded.	QFL	QC result is below the lower tolerance
***	Indicates that both * and ** apply.	-	The sample was not analysed for this analyte
		NVL	Not Validated

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.  
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the "Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.

Note that in terms of units of radioactivity:

- a. 1 Bq is equivalent to 27 pCi
- b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: [www.sgs.com.au/en-gb/environment-health-and-safety](http://www.sgs.com.au/en-gb/environment-health-and-safety).

This document is issued by the Company under its General Conditions of Service accessible at [www.sgs.com/en/Terms-and-Conditions.aspx](http://www.sgs.com/en/Terms-and-Conditions.aspx). Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client only. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law .

This report must not be reproduced, except in full.