

CERTIFICATE OF ANALYSIS

Work Order : **EW2102036**
Client : **WOLLONGONG CITY COUNCIL**
Contact : DELLA KUTZNER
Address : 41 BURELLI STREET
 WOLLONGONG NSW, AUSTRALIA 2500

Telephone : +61 02 4227 7111
Project : Whytes Gully Stage 3 Bores Quarterly
Order number : 1021509
C-O-C number : ----
Sampler : Robert DaLio
Site : ----
Quote number : WO/005/18 TENDER
No. of samples received : 13
No. of samples analysed : 13

Page : 1 of 8
Laboratory : Environmental Division NSW South Coast
Contact : Aneta Prosaroski
Address : 1/19 Ralph Black Dr, North Wollongong 2500
 4/13 Geary Pl, North Nowra 2541
 Australia NSW Australia
Telephone : 02 42253125
Date Samples Received : 10-May-2021 16:54
Date Analysis Commenced : 10-May-2021
Issue Date : 18-May-2021 14:51



Accreditation No. 825
 Accredited for compliance with
 ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Aneta Prosaroski	Client Liaison Officer	Laboratory - Wollongong, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- TDS by method EA-015 may bias high for various samples due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- pH performed by ALS Wollongong via in-house method EA005FD and EN67 PK.
- Electrical conductivity performed by ALS Wollongong via in-house method EA010FD and EN67 PK.
- Sampling and groundwater depth measurements completed by ALS Wollongong via inhouse sampling method EN/67.11 Groundwater Sampling.
- All field analysis performed by ALS Wollongong were completed at the time of sampling.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GMW102 (Point 9)	GMW103 (Point 10)	GMW104 (Point 11)	GMW105 (Point 12)	GMW106 (Point 13)
Sampling date / time				10-May-2021 13:30	10-May-2021 14:10	10-May-2021 12:50	10-May-2021 14:20	10-May-2021 14:30	
Compound	CAS Number	LOR	Unit	EW2102036-001	EW2102036-002	EW2102036-003	EW2102036-004	EW2102036-005	
				Result	Result	Result	Result	Result	
EA005FD: Field pH									
pH	----	0.1	pH Unit	6.7	7.3	7.4	6.3	----	
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	349	1520	930	231	----	
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	----	10	mg/L	254	810	502	346	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	122	631	375	43	----	
Total Alkalinity as CaCO3	----	1	mg/L	122	631	375	43	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	49	76	42	11	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	14	114	69	38	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	23	119	42	7	----	
Magnesium	7439-95-4	1	mg/L	7	48	27	3	----	
Sodium	7440-23-5	1	mg/L	45	159	122	34	----	
Potassium	7440-09-7	1	mg/L	1	1	<1	<1	----	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	----	----	4.13	----	----	
Barium	7440-39-3	0.001	mg/L	----	----	0.032	----	----	
Cadmium	7440-43-9	0.0001	mg/L	----	----	<0.0001	----	----	
Cobalt	7440-48-4	0.001	mg/L	----	----	0.003	----	----	
Chromium	7440-47-3	0.001	mg/L	----	----	0.003	----	----	
Copper	7440-50-8	0.001	mg/L	----	----	0.010	----	----	
Manganese	7439-96-5	0.001	mg/L	----	----	0.324	----	----	
Lead	7439-92-1	0.001	mg/L	----	----	0.003	----	----	
Zinc	7440-66-6	0.005	mg/L	----	----	0.019	----	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	<0.01	0.01	----	
EN67 PK: Field Tests									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GMW102 (Point 9)	GMW103 (Point 10)	GMW104 (Point 11)	GMW105 (Point 12)	GMW106 (Point 13)
Sampling date / time					10-May-2021 13:30	10-May-2021 14:10	10-May-2021 12:50	10-May-2021 14:20	10-May-2021 14:30
Compound	CAS Number	LOR	Unit	EW2102036-001	EW2102036-002	EW2102036-003	EW2102036-004	EW2102036-005	
				Result	Result	Result	Result	Result	Result
EN67 PK: Field Tests - Continued									
Field Observations	----	0.01	--	----	----	----	----	----	DRY
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	1	<1	<1	<1	<1	----
FWI-EN/001: Groundwater Sampling - Depth									
Depth	----	0.01	m	2.54	6.62	6.68	8.32	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GMW108S (Point 14)	GMW108D (Point 15)	GMW109S (Point 16)	GMW109D (Point 19)	GMW110 (Point 17)
Sampling date / time				10-May-2021 13:05	10-May-2021 13:10	10-May-2021 11:10	10-May-2021 11:20	10-May-2021 11:00	
Compound	CAS Number	LOR	Unit	EW2102036-006	EW2102036-007	EW2102036-008	EW2102036-009	EW2102036-010	
				Result	Result	Result	Result	Result	
EA005FD: Field pH									
pH	----	0.1	pH Unit	6.8	6.8	6.4	6.8	6.7	
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	396	1530	2020	1900	4020	
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	----	10	mg/L	238	845	1550	1050	2480	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	153	275	438	255	658	
Total Alkalinity as CaCO3	----	1	mg/L	153	275	438	255	658	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	10	87	485	26	344	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	31	294	233	452	787	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	22	64	170	96	191	
Magnesium	7439-95-4	1	mg/L	9	38	87	53	150	
Sodium	7440-23-5	1	mg/L	47	194	188	196	455	
Potassium	7440-09-7	1	mg/L	4	6	2	1	2	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	----	----	2.24	----	----	
Barium	7440-39-3	0.001	mg/L	----	----	0.144	----	----	
Cadmium	7440-43-9	0.0001	mg/L	----	----	0.0002	----	----	
Cobalt	7440-48-4	0.001	mg/L	----	----	0.027	----	----	
Chromium	7440-47-3	0.001	mg/L	----	----	0.002	----	----	
Copper	7440-50-8	0.001	mg/L	----	----	0.012	----	----	
Manganese	7439-96-5	0.001	mg/L	----	----	4.55	----	----	
Lead	7439-92-1	0.001	mg/L	----	----	0.003	----	----	
Zinc	7440-66-6	0.005	mg/L	----	----	0.034	----	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.03	0.34	0.11	<0.01	
EP005: Total Organic Carbon (TOC)									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GMW108S (Point 14)	GMW108D (Point 15)	GMW109S (Point 16)	GMW109D (Point 19)	GMW110 (Point 17)
Sampling date / time					10-May-2021 13:05	10-May-2021 13:10	10-May-2021 11:10	10-May-2021 11:20	10-May-2021 11:00
Compound	CAS Number	LOR	Unit	EW2102036-006	EW2102036-007	EW2102036-008	EW2102036-009	EW2102036-010	
				Result	Result	Result	Result	Result	Result
EP005: Total Organic Carbon (TOC) - Continued									
Total Organic Carbon	----	1	mg/L	<1	<1	<1	<1	<1	<1
FWI-EN/001: Groundwater Sampling - Depth									
Depth	----	0.01	m	2.32	1.82	2.77	2.68	3.78	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GMW111 (Point 18)	GABH02 (Point 5)	BH6 (Point 20)	----	----
Sampling date / time				10-May-2021 10:45	10-May-2021 12:35	10-May-2021 11:33	----	----	
Compound	CAS Number	LOR	Unit	EW2102036-011	EW2102036-012	EW2102036-013	-----	-----	
				Result	Result	Result	----	----	
EA005FD: Field pH									
pH	----	0.1	pH Unit	7.2	7.1	7.0	----	----	
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	3240	3440	1770	----	----	
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	----	10	mg/L	2080	1920	999	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	699	849	573	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	699	849	573	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	172	82	40	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	677	569	260	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	134	176	61	----	----	
Magnesium	7439-95-4	1	mg/L	107	97	43	----	----	
Sodium	7440-23-5	1	mg/L	470	363	271	----	----	
Potassium	7440-09-7	1	mg/L	2	34	3	----	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.43	1.30	0.45	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	<1	<1	<1	----	----	
FWI-EN/001: Groundwater Sampling - Depth									
Depth	----	0.01	m	4.62	6.32	1.25	----	----	



Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP005: Total Organic Carbon (TOC)

(WATER) EK055G: Ammonia as N by Discrete Analyser

(WATER) ED045G: Chloride by Discrete Analyser

(WATER) ED041G: Sulfate (Turbidimetric) as SO₄²⁻ by DA

(WATER) ED037P: Alkalinity by PC Titrator

(WATER) ED093F: Dissolved Major Cations

(WATER) EA015: Total Dissolved Solids

(WATER) EG020T: Total Metals by ICP-MS