

CERTIFICATE OF ANALYSIS

Work Order : **EW1902153**
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 : 3088330
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 5
Laboratory : Environmental Division NSW South Coast
Contact : Glenn Davies
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 : 20-May-2019 14:48
Date Analysis Commenced : 20-May-2019
Issue Date : 27-May-2019 16:46



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. 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>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Glenn Davies	Environmental Services Representative	Laboratory - Wollongong, NSW



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by 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.

- 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)				Client sample ID	GMW102 (Point 9)	GMW103 (Point 10)	GMW104 (Point 11)	GMW105 (Point 12)	GMW106 (Point 13)
Client sampling date / time				20-May-2019 11:00	20-May-2019 11:05	20-May-2019 10:40	20-May-2019 11:10	20-May-2019 11:15	
Compound	CAS Number	LOR	Unit	EW1902153-001	EW1902153-002	EW1902153-003	EW1902153-004	EW1902153-005	
				Result	Result	Result	Result	Result	
EA005FD: Field pH									
pH	----	0.1	pH Unit	----	7.4	7.5	----	----	
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	----	1920	1280	----	----	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	1040	724	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	<1	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	<1	<1	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	399	371	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	399	371	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	158	58	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	313	112	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	166	63	----	----	
Magnesium	7439-95-4	1	mg/L	----	55	40	----	----	
Sodium	7440-23-5	1	mg/L	----	160	166	----	----	
Potassium	7440-09-7	1	mg/L	----	1	<1	----	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	----	0.02	0.02	----	----	
EN67 PK: Field Tests									
Field Observations	----	0.01	--	DRY	----	----	DRY	DRY	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	<1	<1	----	----	
FWI-EN/001: Groundwater Sampling - Depth									
Depth	----	0.01	m	----	7.55	7.64	----	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID				
				GMW108S (Point 14)	GMW108D (Point 15)	GMW109S (Point 16)	GMW109D (Point 19)	GMW110 (Point 17)
Client sampling date / time				20-May-2019 10:15	20-May-2019 10:25	20-May-2019 09:35	20-May-2019 09:45	20-May-2019 09:20
Compound	CAS Number	LOR	Unit	EW1902153-006	EW1902153-007	EW1902153-008	EW1902153-009	EW1902153-010
				Result	Result	Result	Result	Result
EA005FD: Field pH								
pH	----	0.1	pH Unit	7.0	7.0	6.5	7.1	6.9
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	1460	3380	1570	1830	4710
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	836	1820	853	1170	2720
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	260	408	195	200	508
Total Alkalinity as CaCO3	----	1	mg/L	260	408	195	200	508
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	68	247	135	21	400
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	242	661	320	466	942
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	70	130	77	98	212
Magnesium	7439-95-4	1	mg/L	39	83	48	50	155
Sodium	7440-23-5	1	mg/L	170	396	159	188	457
Potassium	7440-09-7	1	mg/L	5	2	2	1	2
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.21	0.05	0.66	0.11	<0.01
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	4	<1	2	<1	<1
FWI-EN/001: Groundwater Sampling - Depth								
Depth	----	0.01	m	3.50	2.75	3.63	3.32	4.42



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GMW111 (Point 18)	GABH02 (Point 5)	BH6 (Point 20)	----	----
Client sampling date / time				20-May-2019 09:10	20-May-2019 11:25	20-May-2019 10:00	----	----	
Compound	CAS Number	LOR	Unit	EW1902153-011	EW1902153-012	EW1902153-013	-----	-----	
				Result	Result	Result	----	----	
EA005FD: Field pH									
pH	----	0.1	pH Unit	7.1	6.9	7.1	----	----	
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	3670	5940	1910	----	----	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	1820	3030	1110	----	----	
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	450	870	473	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	450	870	473	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	246	211	146	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	727	1180	331	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	134	310	73	----	----	
Magnesium	7439-95-4	1	mg/L	101	188	51	----	----	
Sodium	7440-23-5	1	mg/L	416	599	290	----	----	
Potassium	7440-09-7	1	mg/L	1	3	3	----	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.03	0.23	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	<1	<1	13	----	----	
FWI-EN/001: Groundwater Sampling - Depth									
Depth	----	0.01	m	6.55	5.40	1.89	----	----	