

CERTIFICATE OF ANALYSIS

Work Order : **EW1903474**
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 : 12-Aug-2019 13:53
Date Analysis Commenced : 12-Aug-2019
Issue Date : 19-Aug-2019 15:55



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
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, 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.

- TDS by method EA-015 may bias high for sample 2 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Sampling and sample data supplied by ALS Wollongong.
- Sampling completed as per EN/67.11 Groundwater Sampling.
- Field data supplied by ALS Wollongong.
- 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					12-Aug-2019 11:55	12-Aug-2019 11:13	12-Aug-2019 11:37	12-Aug-2019 11:10	12-Aug-2019 11:05
Compound	CAS Number	LOR	Unit	EW1903474-001	EW1903474-002	EW1903474-003	EW1903474-004	EW1903474-005	
				Result	Result	Result	Result	Result	
EA005FD: Field pH									
pH	----	0.1	pH Unit	----	7.1	7.2	----	----	
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	----	1980	1180	----	----	
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	----	10	mg/L	----	1180	713	----	----	
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	----	416	362	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	416	362	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	138	52	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	327	66	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	162	54	----	----	
Magnesium	7439-95-4	1	mg/L	----	60	40	----	----	
Sodium	7440-23-5	1	mg/L	----	177	170	----	----	
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	----	0.03	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	----	7.92	7.53	----	----	



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				12-Aug-2019 10:48	12-Aug-2019 10:30	12-Aug-2019 09:53	12-Aug-2019 09:43	12-Aug-2019 09:20
Compound	CAS Number	LOR	Unit	EW1903474-006	EW1903474-007	EW1903474-008	EW1903474-009	EW1903474-010
				Result	Result	Result	Result	Result
EA005FD: Field pH								
pH	----	0.1	pH Unit	6.9	6.8	6.2	6.8	6.7
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	737	3240	1660	1780	4320
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	----	10	mg/L	582	1700	1100	1010	2680
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	212	437	217	216	561
Total Alkalinity as CaCO3	----	1	mg/L	212	437	217	216	561
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	23	204	126	20	326
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	57	644	341	427	842
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	31	127	80	87	203
Magnesium	7439-95-4	1	mg/L	15	89	58	49	162
Sodium	7440-23-5	1	mg/L	103	483	199	201	521
Potassium	7440-09-7	1	mg/L	3	1	2	1	1
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.17	0.03	0.40	0.04	0.01
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	8	<1	2	<1	1
FWI-EN/001: Groundwater Sampling - Depth								
Depth	----	0.01	m	3.25	2.81	3.46	3.26	4.45



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID			GMW111 (Point 18)	GABH02 (Point 5)	BH6 (Point 20)	----	----
Client sampling date / time		12-Aug-2019 09:05			12-Aug-2019 12:00		12-Aug-2019 10:10		
Compound	CAS Number	LOR	Unit	EW1903474-011	EW1903474-012	EW1903474-013	-----	-----	
				Result	Result	Result	----	----	
EA005FD: Field pH									
pH	----	0.1	pH Unit	7.2	----	7.0	----	----	
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	3460	----	1670	----	----	
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	----	10	mg/L	1780	----	1000	----	----	
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	496	----	512	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	496	----	512	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	191	----	117	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	667	----	163	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	125	----	80	----	----	
Magnesium	7439-95-4	1	mg/L	104	----	50	----	----	
Sodium	7440-23-5	1	mg/L	487	----	244	----	----	
Potassium	7440-09-7	1	mg/L	1	----	3	----	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.01	----	0.10	----	----	
EN67 PK: Field Tests									
Field Observations	----	0.01	--	----	bore bent / damaged	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	15	----	26	----	----	
FWI-EN/001: Groundwater Sampling - Depth									
Depth	----	0.01	m	6.33	----	1.92	----	----	