



## CERTIFICATE OF ANALYSIS

**Work Order** : **EW1604450**  
**Client** : **WOLLONGONG CITY COUNCIL**  
**Contact** : **MR WAYDE PETERSON**  
**Address** : **41 BURELLI STREET**  
**WOLLONGONG NSW, AUSTRALIA 2500**

**Telephone** : **+61 02 4227 7111**  
**Project** : **Whytes Gully Stage 3 Bores Quarterly**  
**Order number** : **3058354**  
**C-O-C number** : **----**  
**Sampler** : **Robert DaLio**  
**Site** : **3058354**  
**Quote number** : **----**  
**No. of samples received** : **17**  
**No. of samples analysed** : **17**

**Page** : **1 of 6**  
**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**  
**Telephone** : **02 42253125**  
**Date Samples Received** : **28-Nov-2016 16:30**  
**Date Analysis Commenced** : **28-Nov-2016**  
**Issue Date** : **06-Dec-2016 16:41**



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
Wisam Marassa	Inorganics Coordinator	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

∅ = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- TDS by method EA-015 may bias high for sample 1 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Field tests completed on day of sampling/receipt.



## 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				28-Nov-2016 14:00	28-Nov-2016 13:40	28-Nov-2016 11:30	28-Nov-2016 13:10	28-Nov-2016 12:55	
Compound	CAS Number	LOR	Unit	EW1604450-001	EW1604450-002	EW1604450-003	EW1604450-004	EW1604450-005	
				Result	Result	Result	Result	Result	
<b>EA005FD: Field pH</b>									
pH	----	0.1	pH Unit	7.0	6.7	7.4	----	8.2	
<b>EA010FD: Field Conductivity</b>									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	545	1950	1260	----	3550	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	10	mg/L	626	1150	809	----	2100	
<b>ED037P: Alkalinity by PC Titrator</b>									
Hydroxide Alkalinity as CaCO <sub>3</sub>	DMO-210-001	1	mg/L	<1	<1	<1	----	<1	
Carbonate Alkalinity as CaCO <sub>3</sub>	3812-32-6	1	mg/L	<1	<1	<1	----	<1	
Bicarbonate Alkalinity as CaCO <sub>3</sub>	71-52-3	1	mg/L	247	444	453	----	594	
Total Alkalinity as CaCO <sub>3</sub>	----	1	mg/L	247	444	453	----	594	
<b>ED041G: Sulfate (Turbidimetric) as SO<sub>4</sub> 2- by DA</b>									
Sulfate as SO <sub>4</sub> - Turbidimetric	14808-79-8	1	mg/L	13	114	45	----	596	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	20	374	90	----	408	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	65	164	55	----	64	
Magnesium	7439-95-4	1	mg/L	17	68	38	----	65	
Sodium	7440-23-5	1	mg/L	29	159	176	----	635	
Potassium	7440-09-7	1	mg/L	<1	<1	<1	----	3	
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.01	0.22	----	0.04	
<b>EN67 PK: Field Tests</b>									
Field Observations	----	0.01	--	----	----	----	DRY	----	
<b>EP005: Total Organic Carbon (TOC)</b>									
Total Organic Carbon	----	1	mg/L	5	3	3	----	4	
<b>FWI-EN/001: Groundwater Sampling - Depth</b>									
Depth	----	0.01	m	11.35	7.90	7.80	----	5.30	



## 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				28-Nov-2016 14:45	28-Nov-2016 15:00	28-Nov-2016 10:30	28-Nov-2016 10:50	28-Nov-2016 10:10	
Compound	CAS Number	LOR	Unit	EW1604450-006	EW1604450-007	EW1604450-008	EW1604450-009	EW1604450-010	
				Result	Result	Result	Result	Result	
<b>EA005FD: Field pH</b>									
pH	----	0.1	pH Unit	6.7	7.1	6.4	7.0	6.9	
<b>EA010FD: Field Conductivity</b>									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	1870	3140	1540	1780	4340	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	10	mg/L	1100	1760	858	948	2510	
<b>ED037P: Alkalinity by PC Titrator</b>									
Hydroxide Alkalinity as CaCO <sub>3</sub>	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO <sub>3</sub>	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO <sub>3</sub>	71-52-3	1	mg/L	414	473	358	218	603	
Total Alkalinity as CaCO <sub>3</sub>	----	1	mg/L	414	473	358	218	603	
<b>ED041G: Sulfate (Turbidimetric) as SO<sub>4</sub> 2- by DA</b>									
Sulfate as SO <sub>4</sub> - Turbidimetric	14808-79-8	1	mg/L	83	175	45	22	262	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	360	675	247	438	902	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	50	125	84	91	194	
Magnesium	7439-95-4	1	mg/L	42	84	38	47	150	
Sodium	7440-23-5	1	mg/L	312	422	164	190	463	
Potassium	7440-09-7	1	mg/L	<1	<1	2	2	1	
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.01	1.16	0.05	0.01	
<b>EN67 PK: Field Tests</b>									
Field Observations	----	0.01	--	----	----	----	----	----	
<b>EP005: Total Organic Carbon (TOC)</b>									
Total Organic Carbon	----	1	mg/L	6	14	14	6	4	
<b>FWI-EN/001: Groundwater Sampling - Depth</b>									
Depth	----	0.01	m	2.79	2.28	3.70	3.23	4.21	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GMW111 (Point 18)	GABH01 (Point 2)	GABH02 (Point 5)	GABH03 (Point 6)	GABH06S (Point 7)
Client sampling date / time				28-Nov-2016 09:45	[28-Nov-2016]	28-Nov-2016 12:05	28-Nov-2016 11:55	28-Nov-2016 14:15	
Compound	CAS Number	LOR	Unit	EW1604450-011	EW1604450-012	EW1604450-013	EW1604450-014	EW1604450-015	
				Result	Result	Result	Result	Result	
<b>EA005FD: Field pH</b>									
pH	----	0.1	pH Unit	7.0	----	7.8	7.1	6.8	
<b>EA010FD: Field Conductivity</b>									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	3320	----	5620	5640	2980	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	10	mg/L	1690	----	3330	3500	1530	
<b>ED037P: Alkalinity by PC Titrator</b>									
Hydroxide Alkalinity as CaCO <sub>3</sub>	DMO-210-001	1	mg/L	<1	----	<1	<1	<1	
Carbonate Alkalinity as CaCO <sub>3</sub>	3812-32-6	1	mg/L	<1	----	<1	<1	<1	
Bicarbonate Alkalinity as CaCO <sub>3</sub>	71-52-3	1	mg/L	494	----	1060	671	420	
Total Alkalinity as CaCO <sub>3</sub>	----	1	mg/L	494	----	1060	671	420	
<b>ED041G: Sulfate (Turbidimetric) as SO<sub>4</sub> 2- by DA</b>									
Sulfate as SO <sub>4</sub> - Turbidimetric	14808-79-8	1	mg/L	152	----	150	123	119	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	670	----	1220	1390	640	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	116	----	311	351	81	
Magnesium	7439-95-4	1	mg/L	93	----	189	206	73	
Sodium	7440-23-5	1	mg/L	418	----	622	515	465	
Potassium	7440-09-7	1	mg/L	1	----	2	2	<1	
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	0.03	----	<0.01	0.03	0.02	
<b>EN67 PK: Field Tests</b>									
Field Observations	----	0.01	--	----	DESTROYED	----	----	----	
<b>EP005: Total Organic Carbon (TOC)</b>									
Total Organic Carbon	----	1	mg/L	25	----	7	5	<1	
<b>FWI-EN/001: Groundwater Sampling - Depth</b>									
Depth	----	0.01	m	6.40	----	5.10	0.69	2.50	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GABH06D (Point 8)	BH6 (Point 20)	----	----	----
Client sampling date / time				28-Nov-2016 14:30	28-Nov-2016 16:00	----	----	----	
Compound	CAS Number	LOR	Unit	EW1604450-016	EW1604450-017	-----	-----	-----	
				Result	Result	----	----	----	
<b>EA005FD: Field pH</b>									
pH	----	0.1	pH Unit	6.7	6.6	----	----	----	
<b>EA010FD: Field Conductivity</b>									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	2800	5100	----	----	----	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	10	mg/L	1650	3060	----	----	----	
<b>ED037P: Alkalinity by PC Titrator</b>									
Hydroxide Alkalinity as CaCO <sub>3</sub>	DMO-210-001	1	mg/L	<1	<1	----	----	----	
Carbonate Alkalinity as CaCO <sub>3</sub>	3812-32-6	1	mg/L	<1	<1	----	----	----	
Bicarbonate Alkalinity as CaCO <sub>3</sub>	71-52-3	1	mg/L	336	725	----	----	----	
Total Alkalinity as CaCO <sub>3</sub>	----	1	mg/L	336	725	----	----	----	
<b>ED041G: Sulfate (Turbidimetric) as SO<sub>4</sub> 2- by DA</b>									
Sulfate as SO <sub>4</sub> - Turbidimetric	14808-79-8	1	mg/L	189	47	----	----	----	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	645	1170	----	----	----	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	98	128	----	----	----	
Magnesium	7439-95-4	1	mg/L	59	127	----	----	----	
Sodium	7440-23-5	1	mg/L	414	819	----	----	----	
Potassium	7440-09-7	1	mg/L	<1	<1	----	----	----	
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.21	----	----	----	
<b>EN67 PK: Field Tests</b>									
Field Observations	----	0.01	--	----	----	----	----	----	
<b>EP005: Total Organic Carbon (TOC)</b>									
Total Organic Carbon	----	1	mg/L	4	10	----	----	----	
<b>FWI-EN/001: Groundwater Sampling - Depth</b>									
Depth	----	0.01	m	1.97	1.53	----	----	----	