



CERTIFICATE OF ANALYSIS

Work Order : **EW1512589**
Client : **WOLLONGONG CITY COUNCIL**
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Project : Whytes Gully Groundwater Quarterly
Order number : 3044522
C-O-C number : ----
Sampler : Glenn Davies
Site : ----

Quote number : ----

Page : 1 of 6
Laboratory : Environmental Division NSW South Coast
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QC Level : NEPM 2013 B3 & ALS QC Standard
Date Samples Received : 16-Nov-2015 13:20
Date Analysis Commenced : 16-Nov-2015
Issue Date : 24-Nov-2015 11:21

No. of samples received : 17

No. of samples analysed : 17

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been 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
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Dian Dao		Sydney Inorganics
Glenn Davies	Environmental Services Representative	Laboratory - Wollongong



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.

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.

- TDS by method EA-015 may bias high 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.
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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				16-Nov-2015 10:10	16-Nov-2015 10:20	16-Nov-2015 09:50	16-Nov-2015 10:25	16-Nov-2015 10:35	
Compound	CAS Number	LOR	Unit	EW1512589-001	EW1512589-002	EW1512589-003	EW1512589-004	EW1512589-005	
				Result	Result	Result	Result	Result	
EA005FD: Field pH									
pH	----	0.1	pH Unit	7.2	7.0	7.4	6.0	----	
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	526	2320	852	233	----	
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	----	10	mg/L	690	1680	605	152	----	
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	261	376	343	37	----	
Total Alkalinity as CaCO3	----	1	mg/L	261	376	343	37	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	20	122	48	15	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	18	446	56	35	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	62	198	42	6	----	
Magnesium	7439-95-4	1	mg/L	19	72	28	3	----	
Sodium	7440-23-5	1	mg/L	30	188	127	38	----	
Potassium	7440-09-7	1	mg/L	<1	<1	<1	<1	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.05	0.03	0.01	----	
EN67 PK: Field Tests									
Field Observations	----	0.01	--	----	----	----	----	DRY	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	3	2	2	2	----	
FWI-EN/001: Groundwater Sampling - Depth									
Depth	----	0.01	m	11.6	7.49	7.61	11.0	----	



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				16-Nov-2015 11:40	16-Nov-2015 11:45	16-Nov-2015 12:05	16-Nov-2015 12:10	16-Nov-2015 12:25	
Compound	CAS Number	LOR	Unit	EW1512589-006	EW1512589-007	EW1512589-008	EW1512589-009	EW1512589-010	
				Result	Result	Result	Result	Result	
EA005FD: Field pH									
pH	----	0.1	pH Unit	6.9	7.0	6.3	7.4	6.8	
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	787	3200	1080	1540	4100	
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	----	10	mg/L	512	1850	657	1140	2640	
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	347	457	226	219	564	
Total Alkalinity as CaCO3	----	1	mg/L	347	457	226	219	564	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	23	197	93	28	318	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	47	612	182	396	786	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	26	118	60	84	183	
Magnesium	7439-95-4	1	mg/L	13	86	35	47	148	
Sodium	7440-23-5	1	mg/L	160	417	151	192	451	
Potassium	7440-09-7	1	mg/L	2	<1	2	1	1	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.05	0.01	0.66	0.01	<0.01	
EN67 PK: Field Tests									
Field Observations	----	0.01	--	----	----	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	10	2	2	1	2	
FWI-EN/001: Groundwater Sampling - Depth									
Depth	----	0.01	m	2.50	2.00	3.13	2.84	3.99	



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				16-Nov-2015 12:20	16-Nov-2015 10:48	16-Nov-2015 09:40	16-Nov-2015 09:35	16-Nov-2015 11:25	
Compound	CAS Number	LOR	Unit	EW1512589-011	EW1512589-012	EW1512589-013	EW1512589-014	EW1512589-015	
				Result	Result	Result	Result	Result	
EA005FD: Field pH									
pH	----	0.1	pH Unit	7.1	----	6.8	6.7	7.0	
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	2640	----	5390	5370	3080	
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	----	10	mg/L	1540	----	3490	4140	1680	
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	435	----	998	639	393	
Total Alkalinity as CaCO3	----	1	mg/L	435	----	998	639	393	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	122	----	175	216	231	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	511	----	1050	1180	586	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	92	----	294	327	80	
Magnesium	7439-95-4	1	mg/L	76	----	196	211	70	
Sodium	7440-23-5	1	mg/L	349	----	623	497	444	
Potassium	7440-09-7	1	mg/L	<1	----	3	2	<1	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.02	----	<0.01	0.01	<0.01	
EN67 PK: Field Tests									
Field Observations	----	0.01	--	----	DESTROYED	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	<1	----	5	4	1	
FWI-EN/001: Groundwater Sampling - Depth									
Depth	----	0.01	m	6.24	----	4.90	0.37	2.15	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID			GABH06D (Point 8)	BH6 (Point 20)	----	----	----
Client sampling date / time				16-Nov-2015 11:30	16-Nov-2015 12:00	----	----	----	
Compound	CAS Number	LOR	Unit	EW1512589-016	EW1512589-017	-----	-----	-----	
				Result	Result	Result	Result	Result	
EA005FD: Field pH									
pH	----	0.1	pH Unit	6.9	6.9	----	----	----	
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	2830	4990	----	----	----	
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	----	10	mg/L	1490	2890	----	----	----	
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	327	702	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	327	702	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	177	310	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	563	971	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	96	118	----	----	----	
Magnesium	7439-95-4	1	mg/L	60	127	----	----	----	
Sodium	7440-23-5	1	mg/L	405	796	----	----	----	
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	<0.01	0.06	----	----	----	
EN67 PK: Field Tests									
Field Observations	----	0.01	--	----	----	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	2	5	----	----	----	
FWI-EN/001: Groundwater Sampling - Depth									
Depth	----	0.01	m	1.65	1.36	----	----	----	