



CERTIFICATE OF ANALYSIS

Work Order	: EW1511388	Page	: 1 of 6
Client	: WOLLONGONG CITY COUNCIL	Laboratory	: Environmental Division NSW South Coast
Contact	: MR WAYDE PETERSON	Contact	: Glenn Davies
Address	: 41 BURELLI STREET WOLLONGONG NSW, AUSTRALIA 2500	Address	: 1/19 Ralph Black Drive, North Wollongong, 2500
E-mail	: wpeterson@wollongong.nsw.gov.au	E-mail	: glenn.davies@alsglobal.com
Telephone	: +61 02 4227 7111	Telephone	: 02 42253125
Facsimile	: +61 02 4227 7277	Facsimile	: W 02 42253128 N 02 44232083
Project	: Whytes Gully Groundwater Quarterly	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: 3044522	Date Samples Received	: 21-Aug-2015 13:00
C-O-C number	: ----	Date Analysis Commenced	: 21-Aug-2015
Sampler	: Craig Wilson	Issue Date	: 31-Aug-2015 13:54
Site	: ----		
Quote number	: ----	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.

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Glenn Davies	Environmental Services Representative	Laboratory - Wollongong
Raymond Commodore	Instrument Chemist	Sydney Inorganics



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.

- 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				21-Aug-2015 10:20	21-Aug-2015 10:35	21-Aug-2015 09:55	21-Aug-2015 10:50	21-Aug-2015 10:45
Compound	CAS Number	LOR	Unit	EW1511388-001	EW1511388-002	EW1511388-003	EW1511388-004	EW1511388-005
				Result	Result	Result	Result	Result
EA005FD: Field pH								
pH	----	0.1	pH Unit	7.0	6.9	7.2	5.8	----
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	606	2390	507	260	----
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	----	10	mg/L	377	1610	297	191	----
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	302	445	230	50	----
Total Alkalinity as CaCO3	----	1	mg/L	302	445	230	50	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	18	144	34	14	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	16	395	31	28	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	73	249	33	7	----
Magnesium	7439-95-4	1	mg/L	22	85	21	4	----
Sodium	7440-23-5	1	mg/L	36	198	78	40	----
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	0.03	<0.01	<0.01	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	6.86	23.0	6.18	2.08	----
^ Total Cations	----	0.01	meq/L	7.02	28.0	6.77	2.42	----
^ Ionic Balance	----	0.01	%	1.15	9.81	4.53	----	----
EN67 PK: Field Tests								
Field Observations	----	0.01	--	----	----	----	----	DRY
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	<1	<1	<1	<1	----
FWI-EN/001: Groundwater Sampling - Depth								
Depth	----	0.01	m	10.98	7.69	7.26	10.85	----



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				21-Aug-2015 11:30	21-Aug-2015 11:40	21-Aug-2015 08:25	21-Aug-2015 08:40	21-Aug-2015 09:00
Compound	CAS Number	LOR	Unit	EW1511388-006 Result	EW1511388-007 Result	EW1511388-008 Result	EW1511388-009 Result	EW1511388-010 Result
EA005FD: Field pH								
pH	----	0.1	pH Unit	7.0	6.8	6.2	7.3	6.7
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	1750	3080	1220	1670	3960
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	----	10	mg/L	1280	1810	716	991	2450
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	528	513	258	248	643
Total Alkalinity as CaCO3	----	1	mg/L	528	513	258	248	643
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	116	214	95	26	306
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	311	528	163	326	630
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	76	138	63	95	202
Magnesium	7439-95-4	1	mg/L	63	97	38	51	144
Sodium	7440-23-5	1	mg/L	385	471	159	205	463
Potassium	7440-09-7	1	mg/L	1	<1	2	2	2
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.01	0.01	0.66	0.01	<0.01
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	21.7	29.6	11.7	14.7	37.0
^ Total Cations	----	0.01	meq/L	25.7	35.4	13.2	17.9	42.1
^ Ionic Balance	----	0.01	%	8.42	8.85	6.02	9.86	6.48
EN67 PK: Field Tests								
Field Observations	----	0.01	--	----	----	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	4	<1	4	<1	4
FWI-EN/001: Groundwater Sampling - Depth								
Depth	----	0.01	m	2.64	2.13	3.27	2.92	4.07



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				21-Aug-2015 08:50	21-Aug-2015 11:00	21-Aug-2015 09:40	21-Aug-2015 09:30	21-Aug-2015 11:05
Compound	CAS Number	LOR	Unit	EW1511388-011	EW1511388-012	EW1511388-013	EW1511388-014	EW1511388-015
				Result	Result	Result	Result	Result
EA005FD: Field pH								
pH	----	0.1	pH Unit	7.0	----	6.7	7.2	7.1
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	2680	----	5190	5160	2880
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	----	10	mg/L	1560	----	3310	3450	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	489	----	1130	752	458
Total Alkalinity as CaCO3	----	1	mg/L	489	----	1130	752	458
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	148	----	188	221	215
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	422	----	911	996	470
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	110	----	340	383	93
Magnesium	7439-95-4	1	mg/L	83	----	187	191	81
Sodium	7440-23-5	1	mg/L	372	----	661	512	474
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	<0.01	----	0.01	0.03	<0.01
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	24.8	----	52.2	47.7	26.9
^ Total Cations	----	0.01	meq/L	28.5	----	61.2	57.2	31.9
^ Ionic Balance	----	0.01	%	7.06	----	7.93	9.00	8.55
EN67 PK: Field Tests								
Field Observations	----	0.01	--	----	DESTROYED	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	<1	----	<1	<1	<1
FWI-EN/001: Groundwater Sampling - Depth								
Depth	----	0.01	m	6.20	----	4.85	0.50	2.24



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		GABH06D (Point 8)	BH6 (Point 20)	----	----	----
Client sampling date / time		21-Aug-2015 11:15		21-Aug-2015 09:15		----	----	----
Compound	CAS Number	LOR	Unit	EW1511388-016	EW1511388-017	-----	-----	-----
				Result	Result	Result	Result	Result
EA005FD: Field pH								
pH	----	0.1	pH Unit	6.7	6.8	----	----	----
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	2780	4870	----	----	----
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	----	10	mg/L	1610	2940	----	----	----
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	377	777	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	377	777	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	178	313	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	464	850	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	107	137	----	----	----
Magnesium	7439-95-4	1	mg/L	67	140	----	----	----
Sodium	7440-23-5	1	mg/L	443	877	----	----	----
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	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	24.3	46.0	----	----	----
^ Total Cations	----	0.01	meq/L	30.1	56.5	----	----	----
^ Ionic Balance	----	0.01	%	10.6	10.2	----	----	----
EN67 PK: Field Tests								
Field Observations	----	0.01	--	----	----	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	<1	<1	----	----	----
FWI-EN/001: Groundwater Sampling - Depth								
Depth	----	0.01	m	1.72	1.52	----	----	----