



Environmental

CERTIFICATE OF ANALYSIS

Work Order : **EW1403542**

Client : **WOLLONGONG CITY COUNCIL**

Contact : MR WAYDE PETERSON

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Project : Whytes Gully Stage 3 Bores Quarterly

Order number : 3030159

C-O-C number : ----

Sampler : Craig Wilson

Site : ----

Quote number : SY/454/14 Tender

Page : 1 of 6

Laboratory : Environmental Division NSW South Coast

Contact : Glenn Davies

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QC Level : NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Date Samples Received : 24-NOV-2014

Issue Date : 01-DEC-2014

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. All pages of this report have been checked and approved for release.

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
Glenn Davies	Environmental Services Representative	Laboratory - Wollongong
Shobhna Chandra	Metals Coordinator	Sydney Inorganics

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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

- **Field tests completed on day of sampling/receipt.**
- **Ionic Balance out of acceptable limits for sample 3 due to analytes not quantified in this report.**
- **Sampling and sample data supplied by ALS Wollongong.**
- **Sampling completed as per FWI-EN001 Groundwater Sampling.**
- **Site GMW106 (Point 13) - Dry at time of sampling.**
- **Site GABH01 (Point 2) - Found destroyed at time of sampling.**
- **TDS by method EA-015 may bias high for sample 4 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.**



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				GMW102 Point 9	GMW103 Point 10	GMW104 Point 11	GMW105 Point 12	GMW106 Point 13
				24-NOV-2014 11:35	24-NOV-2014 11:55	24-NOV-2014 11:20	24-NOV-2014 12:15	24-NOV-2014 12:25
Compound	CAS Number	LOR	Unit	EW1403542-001	EW1403542-002	EW1403542-003	EW1403542-004	EW1403542-005
EA005FD: Field pH								
pH	----	0.1	pH Unit	7.2	6.9	7.2	5.8	----
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	578	240	1090	251	----
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	----	10	mg/L	406	1620	455	213	----
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	278	440	284	44	----
Total Alkalinity as CaCO3	----	1	mg/L	278	440	284	44	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	24	155	42	15	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	14	553	53	36	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	59	234	40	6	----
Magnesium	7439-95-4	1	mg/L	20	75	22	3	----
Sodium	7440-23-5	1	mg/L	37	178	84	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	0.02	0.05	0.03	0.03	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	6.45	27.6	8.04	2.21	----
Total Cations	----	0.01	meq/L	6.20	25.6	7.46	2.20	----
Ionic Balance	----	0.01	%	1.98	3.79	3.78	----	----
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	11.7	7.73	7.49	10.9	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				GMW108S Point 14	GMW108D Point 15	GMW109S Point 16	GMW109D Point 19	GMW110 Point 17
				24-NOV-2014 13:30	24-NOV-2014 13:40	24-NOV-2014 08:30	24-NOV-2014 08:45	24-NOV-2014 09:45
Compound	CAS Number	LOR	Unit	EW1403542-006	EW1403542-007	EW1403542-008	EW1403542-009	EW1403542-010
EA005FD: Field pH								
pH	----	0.1	pH Unit	6.8	6.9	6.4	7.1	6.7
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	3670	3140	1510	1640	4020
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	----	10	mg/L	1880	1800	776	1000	2430
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	566	505	365	248	634
Total Alkalinity as CaCO3	----	1	mg/L	566	505	365	248	634
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	220	223	93	28	326
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	709	710	252	424	923
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	136	134	104	90	210
Magnesium	7439-95-4	1	mg/L	99	88	37	45	153
Sodium	7440-23-5	1	mg/L	420	423	163	188	459
Potassium	7440-09-7	1	mg/L	<1	<1	4	2	2
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.02	1.69	0.04	0.02
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	35.9	34.8	16.3	17.5	45.5
Total Cations	----	0.01	meq/L	33.2	32.3	15.4	16.4	43.1
Ionic Balance	----	0.01	%	3.90	3.64	2.87	3.17	2.72
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	<1	<1	<1	<1	<1
FWI-EN/001: Groundwater Sampling - Depth								
Depth	----	0.01	m	2.73	2.26	3.50	3.07	4.15



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				GMW111 Point 18	GABH01 Point 2	GABH02 Point 5	GABH03 Point 6	GABH06S Point 7
				24-NOV-2014 09:10	24-NOV-2014 13:00	24-NOV-2014 11:00	24-NOV-2014 10:25	24-NOV-2014 13:05
Compound	CAS Number	LOR	Unit	EW1403542-011	EW1403542-012	EW1403542-013	EW1403542-014	EW1403542-015
EA005FD: Field pH								
pH	----	0.1	pH Unit	7.0	----	6.6	6.6	7.0
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	2	----	5250	5290	3080
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	----	10	mg/L	1350	----	3220	3450	1750
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	475	----	1120	761	454
Total Alkalinity as CaCO3	----	1	mg/L	475	----	1120	761	454
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	116	----	187	222	246
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	523	----	1260	1390	698
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	96	----	347	400	97
Magnesium	7439-95-4	1	mg/L	68	----	198	211	81
Sodium	7440-23-5	1	mg/L	338	----	618	506	499
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	----	0.02	0.03	0.02
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	26.7	----	61.8	59.0	33.9
Total Cations	----	0.01	meq/L	25.1	----	60.6	59.4	33.2
Ionic Balance	----	0.01	%	3.00	----	1.02	0.30	1.02
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	6.33	----	5.00	0.63	2.40



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				GABH06D Point 8	BH6 Point 20	----	----	----
				24-NOV-2014 13:15	24-NOV-2014 09:50	----	----	----
				EW1403542-016	EW1403542-017	----	----	----
Compound	CAS Number	LOR	Unit					
EA005FD: Field pH								
pH	----	0.1	pH Unit	6.8	6.8	----	----	----
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	2890	4940	----	----	----
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	----	10	mg/L	1630	2710	----	----	----
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	376	794	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	376	794	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	225	329	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	704	1150	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	117	130	----	----	----
Magnesium	7439-95-4	1	mg/L	67	130	----	----	----
Sodium	7440-23-5	1	mg/L	449	790	----	----	----
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	0.09	----	----	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	32.1	55.2	----	----	----
Total Cations	----	0.01	meq/L	30.9	51.6	----	----	----
Ionic Balance	----	0.01	%	1.83	3.40	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	<1	<1	----	----	----
FWI-EN/001: Groundwater Sampling - Depth								
Depth	----	0.01	m	1.90	1.51	----	----	----