



CERTIFICATE OF ANALYSIS

<p>Work Order : EW1303160</p> <p>Client : WOLLONGONG CITY COUNCIL</p> <p>Contact : MR WAYDE PETERSON</p> <p>Address : 41 BURELLI STREET WOLLONGONG NSW, AUSTRALIA 2500</p> <p>E-mail : wpeterson@wollongong.nsw.gov.au</p> <p>Telephone : +61 02 4227 7111</p> <p>Facsimile : +61 02 4227 7277</p> <p>Project : Whytes Gully Stage 3 Bores & Surface Water</p> <p>Order number : 3015425</p> <p>C-O-C number : ----</p> <p>Sampler : Craig Wilson</p> <p>Site : ----</p> <p>Quote number : WL/090/11 Stage 3</p>	<p>Page : 1 of 7</p> <p>Laboratory : Environmental Division NSW South Coast</p> <p>Contact : Glenn Davies</p> <p>Address : 99 Kenny Street, Wollongong 2500 Unit 4 / 13 Geary Place, PO Box 3105, North Nowra 2541 AUSTRALIA</p> <p>E-mail : glenn.davies@alsglobal.com</p> <p>Telephone : 02 4225 3125</p> <p>Facsimile : 02 4225 3128</p> <p>QC Level : NEPM 2013 Schedule B(3) and ALS QCS3 requirement</p> <p>Date Samples Received : 06-NOV-2013</p> <p>Issue Date : 14-NOV-2013</p> <p>No. of samples received : 23</p> <p>No. of samples analysed : 23</p>
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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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Glenn Davies	Environmental Services Representative	Laboratory - Wollongong
Hoa Nguyen	Senior Inorganic Chemist	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.

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

- **Sites GMW102 and Surface Water 5 - Dry at time of sampling.**
Site GABH01 - Sample point found destroyed at time of sampling.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				GMW102	GMW103	GMW104	GMW105	GMW108S
				06-NOV-2013 11:50	06-NOV-2013 12:15	06-NOV-2013 11:55	06-NOV-2013 12:25	06-NOV-2013 12:55
Compound	CAS Number	LOR	Unit	EW1303160-001	EW1303160-002	EW1303160-003	EW1303160-004	EW1303160-005
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	----	10	mg/L	----	1710	674	197	753
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	----	365	404	48	319
Total Alkalinity as CaCO3	----	1	mg/L	----	365	404	48	319
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	138	56	13	55
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	----	524	91	41	204
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	----	196	49	4	16
Magnesium	7439-95-4	1	mg/L	----	72	32	2	16
Sodium	7440-23-5	1	mg/L	----	192	164	34	280
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	0.02	0.02	0.03
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	----	25.0	11.8	2.39	13.3
Total Cations	----	0.01	meq/L	----	24.1	12.2	----	14.3
Total Cations	----	0.01	meq/L	----	----	----	2.32	----
Ionic Balance	----	0.01	%	----	1.75	1.67	----	3.66
EN67 PK: Field Tests								
pH	----	0.1	pH Unit	----	6.9	7.3	5.7	6.9
Electrical Conductivity (Non Compensated)	----	1	µS/cm	----	2460	1220	258	1620
Depth	----	0.01	m	----	7.57	7.34	10.83	2.84
Field Observations	----	0.01	--	DRY	----	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	----	21	20	11	15



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				GMW108D	GMW109S	GMW109D	GMW110	GMW111
				06-NOV-2013 13:00	06-NOV-2013 09:55	06-NOV-2013 10:00	06-NOV-2013 10:30	06-NOV-2013 10:15
Compound	CAS Number	LOR	Unit	EW1303160-006	EW1303160-007	EW1303160-008	EW1303160-009	EW1303160-010
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	----	10	mg/L	1830	1330	1060	2590	1380
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	446	822	222	547	437
Total Alkalinity as CaCO3	----	1	mg/L	446	822	222	547	437
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	193	93	25	280	112
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	653	165	382	848	510
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	124	189	78	178	78
Magnesium	7439-95-4	1	mg/L	92	56	44	151	73
Sodium	7440-23-5	1	mg/L	474	183	204	500	397
Potassium	7440-09-7	1	mg/L	<1	11	2	2	1
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.02	7.10	0.02	0.01	0.01
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	31.4	23.0	15.7	40.7	25.4
Total Cations	----	0.01	meq/L	34.4	22.3	16.4	43.1	27.2
Ionic Balance	----	0.01	%	4.59	1.62	2.19	2.89	3.29
EN67 PK: Field Tests								
pH	----	0.1	pH Unit	6.8	7.0	7.5	6.7	6.9
Electrical Conductivity (Non Compensated)	----	1	µS/cm	3170	2110	1650	3950	2510
Depth	----	0.01	m	2.38	3.62	3.23	4.23	6.43
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	23	80	9	28	19



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				GABH01	GABH02	GABH03	GABH06S	GABH06D
				06-NOV-2013 11:40	06-NOV-2013 11:15	06-NOV-2013 11:05	06-NOV-2013 11:25	06-NOV-2013 11:30
Compound	CAS Number	LOR	Unit	EW1303160-011	EW1303160-012	EW1303160-013	EW1303160-014	EW1303160-015
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	----	10	mg/L	----	3550	3890	1800	1900
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	----	974	658	399	318
Total Alkalinity as CaCO3	----	1	mg/L	----	974	658	399	318
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	160	194	215	203
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	----	1160	1280	658	700
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	----	299	342	97	127
Magnesium	7439-95-4	1	mg/L	----	194	208	94	83
Sodium	7440-23-5	1	mg/L	----	661	554	486	453
Potassium	7440-09-7	1	mg/L	----	3	2	<1	1
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	----	0.03	0.02	0.02	0.02
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	----	55.5	53.3	31.0	30.3
Total Cations	----	0.01	meq/L	----	59.7	58.3	33.7	32.9
Ionic Balance	----	0.01	%	----	3.64	4.52	4.16	4.06
EN67 PK: Field Tests								
pH	----	0.1	pH Unit	----	6.6	6.6	7.0	6.7
Electrical Conductivity (Non Compensated)	----	1	µS/cm	----	5330	5310	3110	3090
Depth	----	0.01	m	----	5.02	0.72	2.50	2.02
Field Observations	----	0.01	--	Destroyed	----	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	----	44	35	17	18



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				BH6	Surface Water 1	Surface Water 2	Surface Water 3	Surface Water 4
				06-NOV-2013 10:40	06-NOV-2013 09:45	06-NOV-2013 09:30	06-NOV-2013 09:35	06-NOV-2013 09:25
Compound	CAS Number	LOR	Unit	EW1303160-016	EW1303160-017	EW1303160-018	EW1303160-019	EW1303160-020
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	----	10	mg/L	2930	798	782	286	442
EA025: Suspended Solids								
Suspended Solids (SS)	----	5	mg/L	----	390	12	<5	20
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	719	232	420	166	249
Total Alkalinity as CaCO3	----	1	mg/L	719	232	420	166	249
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	283	73	<1	8	2
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	1120	300	223	60	117
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	122	66	48	34	45
Magnesium	7439-95-4	1	mg/L	136	45	39	18	27
Sodium	7440-23-5	1	mg/L	882	206	225	40	92
Potassium	7440-09-7	1	mg/L	<1	2	31	3	7
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.07	0.57	0.05	0.06	0.33
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	51.8	14.6	14.7	5.18	8.32
Total Cations	----	0.01	meq/L	55.6	16.0	16.2	4.99	8.65
Ionic Balance	----	0.01	%	3.51	4.53	4.85	1.78	1.94
EN67 PK: Field Tests								
pH	----	0.1	pH Unit	6.8	7.6	7.9	7.6	7.3
Electrical Conductivity (Non Compensated)	----	1	µS/cm	5040	1440	1440	543	881
Depth	----	0.01	m	1.64	----	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	17	11	51	10	20



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				Surface Water 5	Surface Water 6	Leachate	----	----
				06-NOV-2013 09:20	06-NOV-2013 10:25	06-NOV-2013 12:43	----	----
				EW1303160-021	EW1303160-022	EW1303160-023	----	----
Compound	CAS Number	LOR	Unit					
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	----	10	mg/L	----	348	10500	----	----
EA025: Suspended Solids								
Suspended Solids (SS)	----	5	mg/L	----	<5	380	----	----
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	650	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	168	7210	----	----
Total Alkalinity as CaCO3	----	1	mg/L	----	168	7860	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	31	<1	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	----	66	2950	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	----	43	39	----	----
Magnesium	7439-95-4	1	mg/L	----	20	41	----	----
Sodium	7440-23-5	1	mg/L	----	41	2160	----	----
Potassium	7440-09-7	1	mg/L	----	3	814	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	----	0.03	1940	----	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	----	5.86	240	----	----
Total Cations	----	0.01	meq/L	----	5.65	----	----	----
Total Cations	----	0.01	meq/L	----	----	259	----	----
Ionic Balance	----	0.01	%	----	1.84	----	----	----
Ionic Balance	----	0.01	%	----	----	3.80	----	----
EN67 PK: Field Tests								
pH	----	0.1	pH Unit	----	7.5	8.2	----	----
Electrical Conductivity (Non Compensated)	----	1	µS/cm	----	618	22900	----	----
Depth	----	0.01	m	----	----	<0.01	----	----
Field Observations	----	0.01	--	DRY	----	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	----	9	2430	----	----