

Environmental Division

## CERTIFICATE OF ANALYSIS

<p><b>Work Order</b> : <b>EW1300434</b></p> <p><b>Client</b> : <b>WOLLONGONG CITY COUNCIL</b></p> <p><b>Contact</b> : MR WAYDE PETERSON</p> <p><b>Address</b> : 41 BURELLI STREET WOLLONGONG NSW, AUSTRALIA 2500</p> <p><b>E-mail</b> : wpeterson@wollongong.nsw.gov.au</p> <p><b>Telephone</b> : +61 02 4227 7111</p> <p><b>Facsimile</b> : +61 02 4227 7277</p> <p><b>Project</b> : Whytes Gully Stage 3 Bores &amp; Surface Water Quarterly</p> <p><b>Order number</b> : 3001821</p> <p><b>C-O-C number</b> : ----</p> <p><b>Sampler</b> : Craig Wilson</p> <p><b>Site</b> : ----</p> <p><b>Quote number</b> : WL/090/11 Stage 3</p>	<p><b>Page</b> : 1 of 7</p> <p><b>Laboratory</b> : Environmental Division NSW South Coast</p> <p><b>Contact</b> : Glenn Davies</p> <p><b>Address</b> : 99 Kenny Street, Wollongong 2500 Unit 4 / 13 Geary Place, PO Box 3105, North Nowra 2541 AUSTRALIA</p> <p><b>E-mail</b> : glenn.davies@alsglobal.com</p> <p><b>Telephone</b> : 02 4225 3125</p> <p><b>Facsimile</b> : 02 4225 3128</p> <p><b>QC Level</b> : NEPM 1999 Schedule B(3) and ALS QCS3 requirement</p> <p><b>Date Samples Received</b> : 14-FEB-2013</p> <p><b>Issue Date</b> : 22-FEB-2013</p> <p><b>No. of samples received</b> : 23</p> <p><b>No. of samples analysed</b> : 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>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	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

- **EP005: NPOC (Nonpurgeable Organic Carbon) was analysed for sample ID Leachate due to high IC (Inorganic Carbon) content.**
- **Site GMW102 - Dry at time of sampling.**

**Site GABH01 - Destroyed.**



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				GMW102	GMW103	GMW104	GMW105	GMW108S
				14-FEB-2013 11:50	14-FEB-2013 11:40	14-FEB-2013 12:00	14-FEB-2013 11:30	14-FEB-2013 13:25
Compound	CAS Number	LOR	Unit	EW1300434-001	EW1300434-002	EW1300434-003	EW1300434-004	EW1300434-005
<b>ED037P: Alkalinity by PC Titrator</b>								
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	----	363	434	59	367
Total Alkalinity as CaCO3	----	1	mg/L	----	363	434	59	367
<b>ED045G: Chloride Discrete analyser</b>								
Chloride	16887-00-6	1	mg/L	----	502	108	32	192
<b>EG020T: Total Metals by ICP-MS</b>								
Manganese	7439-96-5	0.001	mg/L	----	0.006	0.488	0.568	0.140
Iron	7439-89-6	0.05	mg/L	----	0.14	17.1	10.9	1.35
<b>EK055G: Ammonia as N by Discrete Analyser</b>								
Ammonia as N	7664-41-7	0.01	mg/L	----	0.04	0.07	0.08	0.01
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	<0.1	0.6	0.4	0.3
<b>EN67 PK: Field Tests</b>								
pH	----	0.1	pH Unit	----	7.1	7.3	5.8	7.1
Electrical Conductivity (Non Compensated)	----	1	µS/cm	----	2380	1280	258	1390
Dissolved Oxygen	----	0.01	mg/L	----	3.53	1.31	1.84	1.20
Redox Potential	----	0.1	mV	----	128	-97.0	178	61.0
Temperature	----	0.1	°C	----	20.0	19.0	20.1	19.4
Depth	----	0.01	m	----	7.74	7.98	11.08	2.76
Field Observations	----	0.01	--	DRY	----	----	----	----
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	1	mg/L	----	1	2	4	11



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				GMW108D	GMW109S	GMW109D	GMW110	GMW111
				14-FEB-2013 13:35	14-FEB-2013 09:10	14-FEB-2013 09:05	14-FEB-2013 09:45	14-FEB-2013 09:25
Compound	CAS Number	LOR	Unit	EW1300434-006	EW1300434-007	EW1300434-008	EW1300434-009	EW1300434-010
<b>ED037P: Alkalinity by PC Titrator</b>								
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	457	735	224	553	474
Total Alkalinity as CaCO3	----	1	mg/L	457	735	224	553	474
<b>ED045G: Chloride Discrete analyser</b>								
Chloride	16887-00-6	1	mg/L	652	160	385	828	512
<b>EG020T: Total Metals by ICP-MS</b>								
Manganese	7439-96-5	0.001	mg/L	0.001	4.36	0.013	0.037	0.472
Iron	7439-89-6	0.05	mg/L	<0.05	15.0	0.13	0.70	4.69
<b>EK055G: Ammonia as N by Discrete Analyser</b>								
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	7.64	0.06	<0.01	0.09
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	9.1	<0.1	<0.1	<0.1
<b>EN67 PK: Field Tests</b>								
pH	----	0.1	pH Unit	6.8	7.0	7.1	6.7	7.0
Electrical Conductivity (Non Compensated)	----	1	µS/cm	3100	2430	1660	3900	2630
Dissolved Oxygen	----	0.01	mg/L	1.65	1.62	4.58	2.12	1.79
Redox Potential	----	0.1	mV	50.0	-90.0	41.0	107	83.0
Temperature	----	0.1	°C	21.6	20.4	20.2	19.8	19.3
Depth	----	0.01	m	2.34	3.27	3.07	4.17	6.46
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	1	mg/L	2	33	<1	3	1



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				GABH01	GABH02	GABH03	GABH06S	GABH06D
				14-FEB-2013 12:15	14-FEB-2013 11:05	14-FEB-2013 10:55	14-FEB-2013 13:00	14-FEB-2013 13:10
Compound	CAS Number	LOR	Unit	EW1300434-011	EW1300434-012	EW1300434-013	EW1300434-014	EW1300434-015
<b>ED037P: Alkalinity by PC Titrator</b>								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	<1	<1	106
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	<1	<1	<1	48
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	964	655	416	<1
Total Alkalinity as CaCO3	----	1	mg/L	----	964	655	416	154
<b>ED045G: Chloride Discrete analyser</b>								
Chloride	16887-00-6	1	mg/L	----	1130	1220	645	589
<b>EG020T: Total Metals by ICP-MS</b>								
Manganese	7439-96-5	0.001	mg/L	----	0.062	0.321	0.168	<0.001
Iron	7439-89-6	0.05	mg/L	----	0.24	1.13	0.61	<0.05
<b>EK055G: Ammonia as N by Discrete Analyser</b>								
Ammonia as N	7664-41-7	0.01	mg/L	----	0.01	0.03	<0.01	0.12
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	<0.1	<0.1	<0.1	0.9
<b>EN67 PK: Field Tests</b>								
pH	----	0.1	pH Unit	----	6.6	6.5	7.0	9.4
Electrical Conductivity (Non Compensated)	----	1	µS/cm	----	5420	5290	3180	3050
Dissolved Oxygen	----	0.01	mg/L	----	1.46	1.87	1.73	2.91
Redox Potential	----	0.1	mV	----	91.0	32.0	15.0	-137
Temperature	----	0.1	°C	----	19.2	20.9	21.5	22.7
Depth	----	0.01	m	----	5.29	0.86	2.74	2.29
Field Observations	----	0.01	--	DESTROYED	----	----	----	----
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	1	mg/L	----	15	<1	<1	4



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

				BH6	Surface Water 1	Surface Water 2	Surface Water 3	Surface Water 4
				14-FEB-2013 10:00	14-FEB-2013 08:50	14-FEB-2013 08:35	14-FEB-2013 08:25	14-FEB-2013 08:05
				EW1300434-016	EW1300434-017	EW1300434-018	EW1300434-019	EW1300434-020
Compound	CAS Number	LOR	Unit					
<b>EA025: Suspended Solids</b>								
Suspended Solids (SS)	----	5	mg/L	----	72	8	6	7
<b>ED037P: Alkalinity by PC Titrator</b>								
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	692	286	279	130	179
Total Alkalinity as CaCO3	----	1	mg/L	692	286	279	130	179
<b>ED045G: Chloride Discrete analyser</b>								
Chloride	16887-00-6	1	mg/L	1060	229	197	73	120
<b>EG020T: Total Metals by ICP-MS</b>								
Manganese	7439-96-5	0.001	mg/L	1.59	1.24	1.49	1.32	1.72
Iron	7439-89-6	0.05	mg/L	2.81	3.46	1.86	1.63	4.82
<b>EK055G: Ammonia as N by Discrete Analyser</b>								
Ammonia as N	7664-41-7	0.01	mg/L	0.12	0.21	0.04	0.10	0.10
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	2.8	2.3	0.6	1.2
<b>EN67 PK: Field Tests</b>								
pH	----	0.1	pH Unit	6.7	7.6	7.6	7.2	7.4
Electrical Conductivity (Non Compensated)	----	1	µS/cm	5000	1330	1210	564	790
Dissolved Oxygen	----	0.01	mg/L	1.64	4.73	3.41	4.24	5.81
Redox Potential	----	0.1	mV	-43.0	73.0	40.0	67.0	-44.0
Temperature	----	0.1	°C	22.3	21.0	19.0	19.8	20.2
Depth	----	0.01	m	1.52	----	----	----	----
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	1	mg/L	<1	25	25	7	15



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				Surface Water 5	Surface Water 6	Leachate	----	----
				14-FEB-2013 08:15	14-FEB-2013 09:35	14-FEB-2013 12:45	----	----
				EW1300434-021	EW1300434-022	EW1300434-023	----	----
Compound	CAS Number	LOR	Unit					
<b>EA025: Suspended Solids</b>								
Suspended Solids (SS)	----	5	mg/L	9	<5	30	----	----
<b>ED037P: Alkalinity by PC Titrator</b>								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	705	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	186	154	7680	----	----
Total Alkalinity as CaCO3	----	1	mg/L	186	154	8390	----	----
<b>ED045G: Chloride Discrete analyser</b>								
Chloride	16887-00-6	1	mg/L	127	64	2190	----	----
<b>EG020T: Total Metals by ICP-MS</b>								
Manganese	7439-96-5	0.001	mg/L	2.68	0.382	0.009	----	----
Iron	7439-89-6	0.05	mg/L	5.16	0.54	0.21	----	----
<b>EK055G: Ammonia as N by Discrete Analyser</b>								
Ammonia as N	7664-41-7	0.01	mg/L	0.06	0.02	1620	----	----
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.4	0.2	1640	----	----
<b>EN67 PK: Field Tests</b>								
pH	----	0.1	pH Unit	7.0	7.5	8.2	----	----
Electrical Conductivity (Non Compensated)	----	1	µS/cm	854	583	19400	----	----
Dissolved Oxygen	----	0.01	mg/L	6.94	7.28	0.15	----	----
Redox Potential	----	0.1	mV	-6.0	53.0	-248	----	----
Temperature	----	0.1	°C	19.6	20.6	32.2	----	----
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	1	mg/L	17	2	----	----	----
Nonpurgeable Organic Carbon	----	1	mg/L	----	----	1030	----	----