Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EW1203111**	Page	: 1 of 5
Client	: **WOLLONGONG CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
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Project	: Whytes Gully Groundwater Quarterly	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 13-NOV-2012
Sampler	: c wilson	Issue Date	: 20-NOV-2012
Site	: ----		
		No. of samples received	: 12
Quote number	: WL/001/11 Whytes Gully Groundwater Quarterly	No. of samples analysed	: 12

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

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

- **EA015: TDS by method EA-015 may bias high for samples BH3 and BH5 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.**
- **Sites BH1A, BH2A, BH3A & BH7A - Dry at time of sampling.**

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
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Glenn Davies	Environmental Services Representative	Laboratory - Wollongong
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Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Client sample ID	BH1	BH1A	BH2A	BH3	BH3A
				Client sampling date / time	13-NOV-2012 12:00	13-NOV-2012 11:00	13-NOV-2012 11:05	13-NOV-2012 11:35	13-NOV-2012 11:10
					EW1203111-001	EW1203111-002	EW1203111-003	EW1203111-004	EW1203111-005
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	GIS-210-010	1	mg/L		**2530**	----	----	**2750**	----
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		**232**	----	----	**969**	----
Total Alkalinity as CaCO3	----	1	mg/L		**232**	----	----	**969**	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**246**	----	----	**159**	----
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L		**1300**	----	----	**1060**	----
ED093T: Total Major Cations									
Calcium	7440-70-2	1	mg/L		**78**	----	----	**131**	----
Magnesium	7439-95-4	1	mg/L		**84**	----	----	**151**	----
Sodium	7440-23-5	1	mg/L		**755**	----	----	**684**	----
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	----	----	**0.11**	----
EN67 PK: Field Tests									
pH	----	0.1	pH Unit		**6.4**	----	----	**7.1**	----
Electrical Conductivity (Non Compensated)	----	1	µS/cm		**4300**	----	----	**4500**	----
Depth	----	0.01	m		**4.08**	----	----	**2.17**	----
Field Observations	----	0.01	--		----	**0**	**0**	----	**0**
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**2**	----	----	**4**	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Client sample ID: BH4	BH4A	BH5	BH5A	BH6
				Client sampling date / time: 13-NOV-2012 11:50	13-NOV-2012 10:50	13-NOV-2012 11:25	13-NOV-2012 10:40	13-NOV-2012 10:00
				EW1203111-006	EW1203111-007	EW1203111-008	EW1203111-009	EW1203111-010
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**626**	**862**	**1100**	**5120**	**2940**
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	**145**	**212**	**295**	**553**	**688**
Total Alkalinity as CaCO3	----	1	mg/L	**145**	**212**	**295**	**553**	**688**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**88**	**152**	**9**	**542**	**322**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**226**	**258**	**129**	**2290**	**1260**
ED093T: Total Major Cations								
Calcium	7440-70-2	1	mg/L	**21**	**41**	**66**	**118**	**122**
Magnesium	7439-95-4	1	mg/L	**14**	**28**	**27**	**194**	**129**
Sodium	7440-23-5	1	mg/L	**176**	**212**	**164**	**1360**	**842**
Potassium	7440-09-7	1	mg/L	**4**	**4**	**6**	<1	<1
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.03**	**0.87**	**0.50**	**0.02**	**0.10**
EN67 PK: Field Tests								
pH	----	0.1	pH Unit	**6.6**	**7.3**	**7.5**	**7.1**	**6.9**
Electrical Conductivity (Non Compensated)	----	1	µS/cm	**929**	**1380**	**895**	**7260**	**4770**
Depth	----	0.01	m	**2.22**	**2.34**	**8.00**	**2.70**	**1.58**
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**5**	**14**	**27**	**2**	**4**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH6A	BH7A	----	----	----
				Client sampling date / time	13-NOV-2012 10:30	13-NOV-2012 09:50	----	----	----
Compound	CAS Number	LOR	Unit		EW1203111-011	EW1203111-012	----	----	----
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	GIS-210-010	1	mg/L		6990	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		970	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		970	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		1520	----	----	----	----
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L		1940	----	----	----	----
ED093T: Total Major Cations									
Calcium	7440-70-2	1	mg/L		243	----	----	----	----
Magnesium	7439-95-4	1	mg/L		378	----	----	----	----
Sodium	7440-23-5	1	mg/L		1410	----	----	----	----
Potassium	7440-09-7	1	mg/L		1	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.02	----	----	----	----
EN67 PK: Field Tests									
pH	----	0.1	pH Unit		6.9	----	----	----	----
Electrical Conductivity (Non Compensated)	----	1	µS/cm		8250	----	----	----	----
Depth	----	0.01	m		3.19	----	----	----	----
Field Observations	----	0.01	--		----	0	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		2	----	----	----	----