



CERTIFICATE OF ANALYSIS

Work Order : **EW1600496**
Client : **WOLLONGONG CITY COUNCIL**
Contact : **MR WAYDE PETERSON**
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Project : **Whytes Gully Stage 3 Bores Quarterly**
Order number : **3044522**
C-O-C number : **----**
Sampler : **Craig Wilson**
Site : **----**

Quote number : **----**

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Laboratory : **Environmental Division NSW South Coast**
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QC Level : **NEPM 2013 B3 & ALS QC Standard**
Date Samples Received : **05-Feb-2016 14:00**
Date Analysis Commenced : **05-Feb-2016**
Issue Date : **12-Feb-2016 14:35**

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, Smithfield, NSW

Glenn Davies

Environmental Services Representative

Laboratory - Wollongong

Shobhna Chandra

Metals Coordinator

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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

∅ = ALS is not NATA accredited for these tests.

- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
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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				05-Feb-2016 11:30	05-Feb-2016 11:40	05-Feb-2016 11:15	05-Feb-2016 11:50	05-Feb-2016 11:45	
Compound	CAS Number	LOR	Unit	EW1600496-001	EW1600496-002	EW1600496-003	EW1600496-004	EW1600496-005	
				Result	Result	Result	Result	Result	
EA005FD: Field pH									
pH	----	0.1	pH Unit	6.6	7.0	7.4	5.9	----	
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	288	2330	944	220	----	
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	----	10	mg/L	222	1480	408	341	----	
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	100	442	233	44	----	
Total Alkalinity as CaCO3	----	1	mg/L	100	442	233	44	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	11	120	38	16	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	15	378	42	18	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	21	184	36	5	----	
Magnesium	7439-95-4	1	mg/L	7	64	23	2	----	
Sodium	7440-23-5	1	mg/L	21	173	81	30	----	
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	<0.01	<0.01	<0.01	----	
EN67 PK: Field Tests									
Field Observations	----	0.01	--	----	----	----	----	DRY	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	2	1	1	2	----	
FWI-EN/001: Groundwater Sampling - Depth									
Depth	----	0.01	m	2.60	7.40	7.43	10.5	----	



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				05-Feb-2016 12:15	05-Feb-2016 12:20	05-Feb-2016 12:35	05-Feb-2016 12:38	05-Feb-2016 12:45	
Compound	CAS Number	LOR	Unit	EW1600496-006	EW1600496-007	EW1600496-008	EW1600496-009	EW1600496-010	
				Result	Result	Result	Result	Result	
EA005FD: Field pH									
pH	----	0.1	pH Unit	7.0	7.0	6.4	7.2	6.9	
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	864	3200	1310	1740	4160	
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	----	10	mg/L	563	1950	728	1090	2650	
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	406	486	230	238	616	
Total Alkalinity as CaCO3	----	1	mg/L	406	486	230	238	616	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	19	192	74	26	303	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	38	637	240	414	815	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	48	124	64	91	198	
Magnesium	7439-95-4	1	mg/L	21	87	39	47	151	
Sodium	7440-23-5	1	mg/L	124	403	152	180	451	
Potassium	7440-09-7	1	mg/L	4	1	2	1	2	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.04	<0.01	0.66	<0.01	<0.01	
EN67 PK: Field Tests									
Field Observations	----	0.01	--	----	----	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	9	2	7	<1	<1	
FWI-EN/001: Groundwater Sampling - Depth									
Depth	----	0.01	m	2.44	1.95	2.97	2.74	3.98	



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				05-Feb-2016 12:40	05-Feb-2016 10:30	05-Feb-2016 10:40	05-Feb-2016 11:05	05-Feb-2016 10:50	
Compound	CAS Number	LOR	Unit	EW1600496-011	EW1600496-012	EW1600496-013	EW1600496-014	EW1600496-015	
				Result	Result	Result	Result	Result	
EA005FD: Field pH									
pH	----	0.1	pH Unit	7.0	----	6.6	6.9	7.2	
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	2550	----	5550	5540	3040	
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	----	10	mg/L	1760	----	3490	3880	1810	
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	502	----	1100	729	423	
Total Alkalinity as CaCO3	----	1	mg/L	502	----	1100	729	423	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	140	----	168	194	210	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	543	----	1060	1180	590	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	110	----	302	376	89	
Magnesium	7439-95-4	1	mg/L	86	----	188	214	78	
Sodium	7440-23-5	1	mg/L	373	----	575	500	459	
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	0.02	<0.01	
EN67 PK: Field Tests									
Field Observations	----	0.01	--	----	DESTROYED	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	2	----	5	4	2	
FWI-EN/001: Groundwater Sampling - Depth									
Depth	----	0.01	m	6.27	----	4.89	0.39	2.20	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID			GABH06D (Point 8)	BH6 (Point 20)	----	----	----
Client sampling date / time				05-Feb-2016 10:45	05-Feb-2016 12:25	----	----	----	
Compound	CAS Number	LOR	Unit	EW1600496-016	EW1600496-017	-----	-----	-----	
				Result	Result	Result	Result	Result	
EA005FD: Field pH									
pH	----	0.1	pH Unit	6.8	7.0	----	----	----	
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	2820	4160	----	----	----	
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	----	10	mg/L	1730	2880	----	----	----	
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	355	697	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	355	697	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	164	276	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	584	953	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	107	120	----	----	----	
Magnesium	7439-95-4	1	mg/L	62	121	----	----	----	
Sodium	7440-23-5	1	mg/L	408	728	----	----	----	
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	0.07	----	----	----	
EN67 PK: Field Tests									
Field Observations	----	0.01	--	----	----	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	<1	3	----	----	----	
FWI-EN/001: Groundwater Sampling - Depth									
Depth	----	0.01	m	1.64	1.24	----	----	----	