ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW1704789**	Page	: 1 of 8
Client	: **WOLLONGONG CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: MR WAYDE PETERSON	Contact	: Glenn Davies
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Telephone	: +61 02 4227 7111	Telephone	: 02 42253125
Project	: Whytes Gully Stage 3 Bores Quarterly	Date Samples Received	: 17-Nov-2017 14:36
Order number	: 3071587	Date Analysis Commenced	: 20-Nov-2017
C-O-C number	: ----	Issue Date	: 29-Nov-2017 12:14
Sampler	: Robert DaLio		
Site	: Whytes Gully LANDFILL		
Quote number	: SY/454/14 Tender		
No. of samples received	: 17		
No. of samples analysed	: 17		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ashesh Patel	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Dian Dao		Sydney Inorganics, Smithfield, NSW
Kristy Boje	Laboratory Supervisor	Laboratory - Wollongong, NSW

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
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- TDS by method EA-015 may bias high for various samples due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Sampling completed as per FWI-EN001 Groundwater Sampling.
- Field data supplied by ALS Wollongong.
- Field tests completed on day of sampling/receipt.

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	20-Nov-2017 10:30	20-Nov-2017 10:55	20-Nov-2017 10:15	20-Nov-2017 11:20	20-Nov-2017 11:10
Compound	CAS Number	LOR	Unit	EW1704789-001	EW1704789-002	EW1704789-003	EW1704789-004	EW1704789-005
				Result	Result	Result	Result	Result
EA005FD: Field pH								
pH	----	0.1	pH Unit	6.8	7.2	7.3	5.8	----
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	354	2200	1340	278	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	342	1280	718	217	----
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	113	300	476	34	----
Total Alkalinity as CaCO3	----	1	mg/L	113	300	476	34	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	12	134	72	14	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	26	414	114	39	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	26	162	50	7	----
Magnesium	7439-95-4	1	mg/L	10	61	34	4	----
Sodium	7440-23-5	1	mg/L	28	180	183	41	----
Potassium	7440-09-7	1	mg/L	<1	<1	<1	<1	----
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	----	----	7.70	----	----
Barium	7440-39-3	0.001	mg/L	----	----	0.036	----	----
Cadmium	7440-43-9	0.0001	mg/L	----	----	<0.0001	----	----
Cobalt	7440-48-4	0.001	mg/L	----	----	0.006	----	----
Chromium	7440-47-3	0.001	mg/L	----	----	0.005	----	----
Copper	7440-50-8	0.001	mg/L	----	----	0.014	----	----
Manganese	7439-96-5	0.001	mg/L	----	----	0.374	----	----
Lead	7439-92-1	0.001	mg/L	----	----	0.004	----	----
Zinc	7440-66-6	0.005	mg/L	----	----	0.027	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.04	0.03	0.10	----
EN67 PK: Field Tests								
Field Observations	----	0.01	--	----	----	----	----	DRY

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	20-Nov-2017 10:30	20-Nov-2017 10:55	20-Nov-2017 10:15	20-Nov-2017 11:20	20-Nov-2017 11:10
Compound	CAS Number	LOR	Unit		EW1704789-001	EW1704789-002	EW1704789-003	EW1704789-004	EW1704789-005
					Result	Result	Result	Result	Result
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**2**	**1**	**2**	**6**	**----**
FWI-EN/001: Groundwater Sampling - Depth									
Depth	----	0.01	m		**8.18**	**7.69**	**7.45**	**11.7**	**----**

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	20-Nov-2017 09:40	20-Nov-2017 09:55	20-Nov-2017 09:05	20-Nov-2017 09:20	20-Nov-2017 08:50
Compound	CAS Number	LOR	Unit	EW1704789-006	EW1704789-007	EW1704789-008	EW1704789-009	EW1704789-010
				Result	Result	Result	Result	Result
EA005FD: Field pH								
pH	----	0.1	pH Unit	7.1	7.3	6.2	7.0	6.7
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	479	1340	1430	1800	4230
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	382	780	721	929	2680
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	144	255	238	215	564
Total Alkalinity as CaCO3	----	1	mg/L	144	255	238	215	564
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	25	76	95	23	308
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	42	244	272	413	822
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	20	48	56	76	172
Magnesium	7439-95-4	1	mg/L	10	32	41	45	147
Sodium	7440-23-5	1	mg/L	61	178	162	206	505
Potassium	7440-09-7	1	mg/L	4	10	2	1	1
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	----	----	3.23	----	----
Barium	7440-39-3	0.001	mg/L	----	----	0.160	----	----
Cadmium	7440-43-9	0.0001	mg/L	----	----	<0.0001	----	----
Cobalt	7440-48-4	0.001	mg/L	----	----	0.034	----	----
Chromium	7440-47-3	0.001	mg/L	----	----	0.004	----	----
Copper	7440-50-8	0.001	mg/L	----	----	0.015	----	----
Manganese	7439-96-5	0.001	mg/L	----	----	3.62	----	----
Lead	7439-92-1	0.001	mg/L	----	----	0.005	----	----
Zinc	7440-66-6	0.005	mg/L	----	----	0.039	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.14	0.39	0.08	0.02
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	13	12	7	<1	2

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	20-Nov-2017 09:40	20-Nov-2017 09:55	20-Nov-2017 09:05	20-Nov-2017 09:20	20-Nov-2017 08:50
Compound	CAS Number / LOR / Unit	EW1704789-006	EW1704789-007	EW1704789-008	EW1704789-009	EW1704789-010
		Result	Result	Result	Result	Result
FWI-EN/001: Groundwater Sampling - Depth						
Depth	---- / 0.01 / m	**2.98**	**2.60**	**2.88**	**3.07**	**4.43**

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	20-Nov-2017 08:35	20-Nov-2017 00:00	20-Nov-2017 11:35	20-Nov-2017 00:00	20-Nov-2017 00:00
Compound	CAS Number	LOR	Unit	EW1704789-011	EW1704789-012	EW1704789-013	EW1704789-014	EW1704789-015
				Result	Result	Result	Result	Result
EA005FD: Field pH								
pH	----	0.1	pH Unit	6.8	----	6.8	----	----
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	3550	----	5500	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	2090	----	3030	----	----
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	557	----	1100	----	----
Total Alkalinity as CaCO3	----	1	mg/L	557	----	1100	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	257	----	164	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	672	----	1040	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	113	----	232	----	----
Magnesium	7439-95-4	1	mg/L	103	----	155	----	----
Sodium	7440-23-5	1	mg/L	504	----	543	----	----
Potassium	7440-09-7	1	mg/L	1	----	2	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.02	----	0.03	----	----
EN67 PK: Field Tests								
Field Observations	----	0.01	--	----	DESTROYED	----	DESTROYED	DESTROYED
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	2	----	8	----	----
FWI-EN/001: Groundwater Sampling - Depth								
Depth	----	0.01	m	6.62	----	5.60	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	GABH06D (Point 8)	BH6 (Point 20)	----	----	----
			Client sampling date / time	20-Nov-2017 00:00	20-Nov-2017 12:30	----	----	----
Compound	CAS Number	LOR	Unit	EW1704789-016	EW1704789-017	--------	--------	--------
				Result	Result	----	----	----
EA005FD: Field pH								
pH	----	0.1	pH Unit	----	6.8	----	----	----
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	----	5050	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	----	2600	----	----	----
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	----	658	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	----	658	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	251	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	----	1000	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	----	98	----	----	----
Magnesium	7439-95-4	1	mg/L	----	115	----	----	----
Sodium	7440-23-5	1	mg/L	----	845	----	----	----
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	----	0.28	----	----	----
EN67 PK: Field Tests								
Field Observations	----	0.01	--	DESTROYED	----	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	----	9	----	----	----
FWI-EN/001: Groundwater Sampling - Depth								
Depth	----	0.01	m	----	1.77	----	----	----