

## CERTIFICATE OF ANALYSIS

<b>Work Order</b>	: <b>EW1802085</b>	Page	: 1 of 7
<b>Amendment</b>	: <b>1</b>	<b>Laboratory</b>	: Environmental Division NSW South Coast
<b>Client</b>	: <b>WOLLONGONG CITY COUNCIL</b>	<b>Contact</b>	: Glenn Davies
<b>Contact</b>	: MR WAYDE PETERSON	<b>Address</b>	: 1/19 Ralph Black Dr, North Wollongong 2500 4/13 Geary Pl, North Nowra 2541 Australia NSW
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<b>Telephone</b>	: +61 02 4227 7111	<b>Date Samples Received</b>	: 22-May-2018 14:30
<b>Project</b>	: Whytes Gully Stage 3 Bores Quarterly	<b>Date Analysis Commenced</b>	: 22-May-2018
<b>Order number</b>	: 3071587	<b>Issue Date</b>	: 29-May-2018 17:00
<b>C-O-C number</b>	: ----		
<b>Sampler</b>	: Robert DaLio		
<b>Site</b>	: Whytes Gully LANDFILL		
<b>Quote number</b>	: SY/454/14 Tender		
<b>No. of samples received</b>	: 13		
<b>No. of samples analysed</b>	: 13		



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Glenn Davies	Environmental Services Representative	Laboratory - Wollongong, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, 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.

- EP005 : NPOC analysis was carried out for sample 12 due to high inorganic carbon content.
- Amendment (29/05/2018): This report has been amended to allow the distribution of an Electronic Data Deliverable (EDD) not previously provided. All analysis results are as per the previous report.
- Sodium Absorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



## 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				22-May-2018 12:05	22-May-2018 11:50	22-May-2018 12:10	22-May-2018 11:43	22-May-2018 11:37	
Compound	CAS Number	LOR	Unit	EW1802085-001	EW1802085-002	EW1802085-003	EW1802085-004	EW1802085-005	
				Result	Result	Result	Result	Result	
<b>EA005FD: Field pH</b>									
pH	----	0.1	pH Unit	----	7.0	7.2	----	----	
<b>EA010FD: Field Conductivity</b>									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	----	2250	1340	----	----	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	10	mg/L	----	1400	766	----	----	
<b>ED037P: Alkalinity by PC Titrator</b>									
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	----	438	500	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	438	500	----	----	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	151	76	----	----	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	----	455	122	----	----	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	----	190	62	----	----	
Magnesium	7439-95-4	1	mg/L	----	65	42	----	----	
Sodium	7440-23-5	1	mg/L	----	172	180	----	----	
Potassium	7440-09-7	1	mg/L	----	<1	<1	----	----	
<b>EG020T: Total Metals by ICP-MS</b>									
Aluminium	7429-90-5	0.01	mg/L	----	----	7.49	----	----	
Barium	7440-39-3	0.001	mg/L	----	----	0.037	----	----	
Cadmium	7440-43-9	0.0001	mg/L	----	----	<0.0001	----	----	
Cobalt	7440-48-4	0.001	mg/L	----	----	0.004	----	----	
Chromium	7440-47-3	0.001	mg/L	----	----	0.005	----	----	
Copper	7440-50-8	0.001	mg/L	----	----	0.011	----	----	
Manganese	7439-96-5	0.001	mg/L	----	----	0.381	----	----	
Lead	7439-92-1	0.001	mg/L	----	----	0.004	----	----	
Zinc	7440-66-6	0.005	mg/L	----	----	0.025	----	----	
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	----	0.03	0.04	----	----	
<b>EN67 PK: Field Tests</b>									
Field Observations	----	0.01	--	DRY	----	----	DRY	DRY	



**Analytical Results**

Sub-Matrix: <b>WATER</b> (Matrix: <b>WATER</b> )				Client sample ID	GMW102 (Point 9)	GMW103 (Point 10)	GMW104 (Point 11)	GMW105 (Point 12)	GMW106 (Point 13)
Client sampling date / time					22-May-2018 12:05	22-May-2018 11:50	22-May-2018 12:10	22-May-2018 11:43	22-May-2018 11:37
Compound	CAS Number	LOR	Unit		<b>EW1802085-001</b>	<b>EW1802085-002</b>	<b>EW1802085-003</b>	<b>EW1802085-004</b>	<b>EW1802085-005</b>
					Result	Result	Result	Result	Result
<b>EP005: Total Organic Carbon (TOC)</b>									
Total Organic Carbon	----	1	mg/L		----	2	2	----	----
<b>FWI-EN/001: Groundwater Sampling - Depth</b>									
Depth	----	0.01	m		----	7.75	7.90	----	----



## 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					22-May-2018 11:10	22-May-2018 11:20	22-May-2018 10:32	22-May-2018 10:43	22-May-2018 10:18
Compound	CAS Number	LOR	Unit	EW1802085-006	EW1802085-007	EW1802085-008	EW1802085-009	EW1802085-010	
				Result	Result	Result	Result	Result	
<b>EA005FD: Field pH</b>									
pH	----	0.1	pH Unit	6.8	7.3	6.4	6.9	6.7	
<b>EA010FD: Field Conductivity</b>									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	2320	568	1460	1830	4370	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	10	mg/L	1280	348	757	1000	2690	
<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	434	223	266	242	624	
Total Alkalinity as CaCO3	----	1	mg/L	434	223	266	242	624	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	142	18	95	26	338	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	496	49	288	480	988	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	94	46	66	89	207	
Magnesium	7439-95-4	1	mg/L	67	14	41	48	159	
Sodium	7440-23-5	1	mg/L	298	40	142	185	460	
Potassium	7440-09-7	1	mg/L	2	12	2	1	1	
<b>EG020T: Total Metals by ICP-MS</b>									
Aluminium	7429-90-5	0.01	mg/L	----	----	4.76	----	----	
Barium	7440-39-3	0.001	mg/L	----	----	0.226	----	----	
Cadmium	7440-43-9	0.0001	mg/L	----	----	<0.0001	----	----	
Cobalt	7440-48-4	0.001	mg/L	----	----	0.033	----	----	
Chromium	7440-47-3	0.001	mg/L	----	----	0.006	----	----	
Copper	7440-50-8	0.001	mg/L	----	----	0.013	----	----	
Manganese	7439-96-5	0.001	mg/L	----	----	3.54	----	----	
Lead	7439-92-1	0.001	mg/L	----	----	0.008	----	----	
Zinc	7440-66-6	0.005	mg/L	----	----	0.055	----	----	
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	0.10	0.11	0.81	0.05	0.01	
<b>EP005: Total Organic Carbon (TOC)</b>									
Total Organic Carbon	----	1	mg/L	8	16	6	<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					22-May-2018 11:10	22-May-2018 11:20	22-May-2018 10:32	22-May-2018 10:43	22-May-2018 10:18
Compound	CAS Number	LOR	Unit		EW1802085-006	EW1802085-007	EW1802085-008	EW1802085-009	EW1802085-010
					Result	Result	Result	Result	Result
<b>FWI-EN/001: Groundwater Sampling - Depth</b>									
Depth	----	0.01	m		2.96	2.46	3.59	3.30	4.35



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GMW111 (Point 18)	GABH02 (Point 5)	BH6 (Point 20)	----	----
Client sampling date / time				22-May-2018 10:05	23-May-2018 08:15	22-May-2018 10:55	----	----	
Compound	CAS Number	LOR	Unit	EW1802085-011	EW1802085-012	EW1802085-013	-----	-----	
				Result	Result	Result	----	----	
<b>EA005FD: Field pH</b>									
pH	----	0.1	pH Unit	7.0	6.5	6.9	----	----	
<b>EA010FD: Field Conductivity</b>									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	3390	5330	5050	----	----	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	10	mg/L	1750	3490	2960	----	----	
<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	<1	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	558	1210	799	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	558	1210	799	----	----	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	205	177	281	----	----	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	739	1140	1200	----	----	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	126	304	121	----	----	
Magnesium	7439-95-4	1	mg/L	104	196	130	----	----	
Sodium	7440-23-5	1	mg/L	433	619	792	----	----	
Potassium	7440-09-7	1	mg/L	1	3	<1	----	----	
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.04	0.24	----	----	
<b>EP005: Total Organic Carbon (TOC)</b>									
Total Organic Carbon	----	1	mg/L	1	----	9	----	----	
Nonpurgeable Organic Carbon	----	1	mg/L	----	8	----	----	----	
<b>FWI-EN/001: Groundwater Sampling - Depth</b>									
Depth	----	0.01	m	6.55	5.56	1.77	----	----	