

## CERTIFICATE OF ANALYSIS

**Work Order** : **EW1703553**  
**Client** : **WOLLONGONG CITY COUNCIL**  
**Contact** : MR WAYDE PETERSON  
**Address** : 41 BURELLI STREET  
 WOLLONGONG NSW, AUSTRALIA 2500  
  
**Telephone** : +61 02 4227 7111  
**Project** : Whytes Gully Stage 3 Bores Quarterly  
**Order number** : 3071587  
**C-O-C number** : ----  
**Sampler** : Robert DaLio  
**Site** : Whytes Gully LANDFILL  
**Quote number** : SY/454/14 Tender  
**No. of samples received** : 17  
**No. of samples analysed** : 17

**Page** : 1 of 8  
**Laboratory** : Environmental Division NSW South Coast  
**Contact** : Glenn Davies  
**Address** : 1/19 Ralph Black Dr, North Wollongong 2500  
 4/13 Geary Pl, North Nowra 2541  
 Australia NSW  
**Telephone** : 02 42253125  
**Date Samples Received** : 22-Aug-2017 15:20  
**Date Analysis Commenced** : 22-Aug-2017  
**Issue Date** : 29-Aug-2017 13:14



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
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Glenn Davies	Environmental Services Representative	Laboratory - Wollongong, NSW
Raymond Commodore	Instrument Chemist	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 no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

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 sample 1 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- 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				22-Aug-2017 12:30	22-Aug-2017 11:30	22-Aug-2017 12:15	22-Aug-2017 11:50	22-Aug-2017 12:05	
Compound	CAS Number	LOR	Unit	EW1703553-001	EW1703553-002	EW1703553-003	EW1703553-004	EW1703553-005	
				Result	Result	Result	Result	Result	
<b>EA005FD: Field pH</b>									
pH	----	0.1	pH Unit	7.1	7.0	7.3	5.8	----	
<b>EA010FD: Field Conductivity</b>									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	788	2130	1060	276	----	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	10	mg/L	670	1380	578	217	----	
<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	358	180	349	34	----	
Total Alkalinity as CaCO3	----	1	mg/L	358	180	349	34	----	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	30	122	46	14	----	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	44	389	78	50	----	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	102	197	54	8	----	
Magnesium	7439-95-4	1	mg/L	31	66	31	4	----	
Sodium	7440-23-5	1	mg/L	40	173	140	36	----	
Potassium	7440-09-7	1	mg/L	<1	<1	<1	<1	----	
<b>EG020T: Total Metals by ICP-MS</b>									
Aluminium	7429-90-5	0.01	mg/L	----	----	35.5	----	----	
Barium	7440-39-3	0.001	mg/L	----	----	0.055	----	----	
Cadmium	7440-43-9	0.0001	mg/L	----	----	<0.0001	----	----	
Cobalt	7440-48-4	0.001	mg/L	----	----	0.026	----	----	
Chromium	7440-47-3	0.001	mg/L	----	----	0.021	----	----	
Copper	7440-50-8	0.001	mg/L	----	----	0.050	----	----	
Manganese	7439-96-5	0.001	mg/L	----	----	1.60	----	----	
Lead	7439-92-1	0.001	mg/L	----	----	0.019	----	----	
Zinc	7440-66-6	0.005	mg/L	----	----	0.104	----	----	
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	0.08	0.03	0.02	0.02	----	
<b>EN67 PK: Field Tests</b>									
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					22-Aug-2017 12:30	22-Aug-2017 11:30	22-Aug-2017 12:15	22-Aug-2017 11:50	22-Aug-2017 12:05
Compound	CAS Number	LOR	Unit		EW1703553-001	EW1703553-002	EW1703553-003	EW1703553-004	EW1703553-005
				Result	Result	Result	Result	Result	Result
<b>EP005: Total Organic Carbon (TOC)</b>									
Total Organic Carbon	----	1	mg/L		3	1	2	2	----
<b>FWI-EN/001: Groundwater Sampling - Depth</b>									
Depth	----	0.01	m		12.3	7.70	7.52	10.8	----



## 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-Aug-2017 10:50	22-Aug-2017 11:05	22-Aug-2017 09:50	22-Aug-2017 10:10	22-Aug-2017 09:30	
Compound	CAS Number	LOR	Unit	EW1703553-006	EW1703553-007	EW1703553-008	EW1703553-009	EW1703553-010	
				Result	Result	Result	Result	Result	
<b>EA005FD: Field pH</b>									
pH	----	0.1	pH Unit	6.8	7.0	6.2	7.0	6.8	
<b>EA010FD: Field Conductivity</b>									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	2910	2960	1420	1750	4180	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	10	mg/L	1810	1720	912	868	2120	
<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	498	495	215	209	579	
Total Alkalinity as CaCO3	----	1	mg/L	498	495	215	209	579	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	162	162	84	23	282	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	584	600	282	416	853	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	134	118	70	90	195	
Magnesium	7439-95-4	1	mg/L	97	79	44	48	153	
Sodium	7440-23-5	1	mg/L	372	401	153	188	460	
Potassium	7440-09-7	1	mg/L	2	1	1	1	1	
<b>EG020T: Total Metals by ICP-MS</b>									
Aluminium	7429-90-5	0.01	mg/L	----	----	14.8	----	----	
Barium	7440-39-3	0.001	mg/L	----	----	0.344	----	----	
Cadmium	7440-43-9	0.0001	mg/L	----	----	0.0007	----	----	
Cobalt	7440-48-4	0.001	mg/L	----	----	0.058	----	----	
Chromium	7440-47-3	0.001	mg/L	----	----	0.022	----	----	
Copper	7440-50-8	0.001	mg/L	----	----	0.067	----	----	
Manganese	7439-96-5	0.001	mg/L	----	----	3.14	----	----	
Lead	7439-92-1	0.001	mg/L	----	----	0.036	----	----	
Zinc	7440-66-6	0.005	mg/L	----	----	0.163	----	----	
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	0.08	0.02	0.38	0.08	<0.01	
<b>EP005: Total Organic Carbon (TOC)</b>									
Total Organic Carbon	----	1	mg/L	4	3	7	<1	2	



**Analytical Results**

Sub-Matrix: <b>WATER</b> (Matrix: <b>WATER</b> )				Client sample ID	GMW108S (Point 14)	GMW108D (Point 15)	GMW109S (Point 16)	GMW109D (Point 19)	GMW110 (Point 17)
Client sampling date / time					22-Aug-2017 10:50	22-Aug-2017 11:05	22-Aug-2017 09:50	22-Aug-2017 10:10	22-Aug-2017 09:30
Compound	CAS Number	LOR	Unit		<b>EW1703553-006</b>	<b>EW1703553-007</b>	<b>EW1703553-008</b>	<b>EW1703553-009</b>	<b>EW1703553-010</b>
					Result	Result	Result	Result	Result
<b>FWI-EN/001: Groundwater Sampling - Depth</b>									
Depth	----	0.01	m		<b>2.91</b>	<b>2.42</b>	<b>3.35</b>	<b>3.13</b>	<b>4.23</b>



## 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					22-Aug-2017 09:05	22-Aug-2017 00:00	22-Aug-2017 13:15	22-Aug-2017 00:00	22-Aug-2017 00:00
Compound	CAS Number	LOR	Unit	EW1703553-011	EW1703553-012	EW1703553-013	EW1703553-014	EW1703553-015	
				Result	Result	Result	Result	Result	
<b>EA005FD: Field pH</b>									
pH	----	0.1	pH Unit	7.4	----	6.6	----	----	
<b>EA010FD: Field Conductivity</b>									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	3400	----	5420	----	----	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	10	mg/L	1750	----	2960	----	----	
<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	527	----	1120	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	527	----	1120	----	----	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	196	----	147	----	----	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	671	----	1080	----	----	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	123	----	292	----	----	
Magnesium	7439-95-4	1	mg/L	97	----	192	----	----	
Sodium	7440-23-5	1	mg/L	422	----	615	----	----	
Potassium	7440-09-7	1	mg/L	1	----	2	----	----	
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	----	<0.01	----	----	
<b>EN67 PK: Field Tests</b>									
Field Observations	----	0.01	--	----	DESTROYED	----	DESTROYED	DESTROYED	
<b>EP005: Total Organic Carbon (TOC)</b>									
Total Organic Carbon	----	1	mg/L	<1	----	6	----	----	
<b>FWI-EN/001: Groundwater Sampling - Depth</b>									
Depth	----	0.01	m	6.28	----	5.26	----	----	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		GABH06D (Point 8)	BH6 (Point 20)	----	----	----
Client sampling date / time				22-Aug-2017 00:00	22-Aug-2017 10:26	----	----	----
Compound	CAS Number	LOR	Unit	EW1703553-016	EW1703553-017	-----	-----	-----
				Result	Result	----	----	----
<b>EA005FD: Field pH</b>								
pH	----	0.1	pH Unit	----	7.0	----	----	----
<b>EA010FD: Field Conductivity</b>								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	----	4780	----	----	----
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>								
Total Dissolved Solids @180°C	----	10	mg/L	----	2810	----	----	----
<b>ED037P: Alkalinity by PC Titrator</b>								
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	----	701	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	----	701	----	----	----
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	213	----	----	----
<b>ED045G: Chloride by Discrete Analyser</b>								
Chloride	16887-00-6	1	mg/L	----	1030	----	----	----
<b>ED093F: Dissolved Major Cations</b>								
Calcium	7440-70-2	1	mg/L	----	113	----	----	----
Magnesium	7439-95-4	1	mg/L	----	118	----	----	----
Sodium	7440-23-5	1	mg/L	----	747	----	----	----
Potassium	7440-09-7	1	mg/L	----	<1	----	----	----
<b>EK055G: Ammonia as N by Discrete Analyser</b>								
Ammonia as N	7664-41-7	0.01	mg/L	----	0.25	----	----	----
<b>EN67 PK: Field Tests</b>								
Field Observations	----	0.01	--	DESTROYED	----	----	----	----
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	1	mg/L	----	11	----	----	----
<b>FWI-EN/001: Groundwater Sampling - Depth</b>								
Depth	----	0.01	m	----	1.65	----	----	----