



CERTIFICATE OF ANALYSIS

Work Order : **EW1702162**
Client : **WOLLONGONG CITY COUNCIL**
Contact : **MR WAYDE PETERSON**
Address : **41 BURELLI STREET**
WOLLONGONG NSW, AUSTRALIA 2500

Telephone : **+61 02 4227 7111**
Project : **Helensburgh Groundwater Quarterly**
Order number : **3058354**
C-O-C number : **----**
Sampler : **Robert DaLio**
Site : **HELENSBURGH LANDFILL**
Quote number : **SY/454/14 Tender**
No. of samples received : **8**
No. of samples analysed : **8**

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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 : **16-May-2017 15:30**
Date Analysis Commenced : **16-May-2017**
Issue Date : **24-May-2017 09:04**



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



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

∅ = 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 and sample data supplied by ALS Wollongong.
- Sampling completed as per FWI-EN001 Groundwater Sampling.
- Field tests completed on day of sampling/receipt.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH 1	BH 4	BH 5 GWMB5	BH 6 GWMB6	LGMB1
Client sampling date / time				16-May-2017 13:55	16-May-2017 12:15	16-May-2017 14:12	16-May-2017 13:10	16-May-2017 14:05	
Compound	CAS Number	LOR	Unit	EW1702162-001	EW1702162-003	EW1702162-004	EW1702162-005	EW1702162-006	
				Result	Result	Result	Result	Result	
EA005FD: Field pH									
pH	----	0.1	pH Unit	5.1	4.4	4.7	6.9	5.0	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	1	mg/L	326	----	115	284	160	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	----	<1	<1	<1	
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	----	<1	<1	<1	
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	10	----	<1	190	10	
Total Alkalinity as CaCO ₃	----	1	mg/L	10	----	<1	190	10	
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA									
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	96	----	23	<1	68	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	73	----	34	13	14	
ED093T: Total Major Cations									
Calcium	7440-70-2	1	mg/L	21	----	4	41	8	
Magnesium	7439-95-4	1	mg/L	20	----	4	27	8	
Sodium	7440-23-5	1	mg/L	43	----	34	21	37	
Potassium	7440-09-7	1	mg/L	<1	----	<1	5	3	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.16	----	0.02	<0.01	<0.01	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	5	----	1	11	9	
FWI-EN/001: Groundwater Sampling - Depth									
Depth	----	0.01	m	3.10	2.78	3.09	1.73	2.58	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	LGMB2	LGMB3	LGMB4	----	----
Client sampling date / time				16-May-2017 13:45	16-May-2017 12:40	16-May-2017 12:55	----	----	
Compound	CAS Number	LOR	Unit	EW1702162-007	EW1702162-008	EW1702162-009	-----	-----	
				Result	Result	Result	---	---	
EA005FD: Field pH									
pH	----	0.1	pH Unit	5.6	5.7	5.0	----	----	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	1	mg/L	330	110	112	----	----	
ED037P: Alkalinity by PC Titrator									
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	21	18	4	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	21	18	4	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	28	14	28	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	38	12	12	----	----	
ED093T: Total Major Cations									
Calcium	7440-70-2	1	mg/L	25	8	6	----	----	
Magnesium	7439-95-4	1	mg/L	13	5	4	----	----	
Sodium	7440-23-5	1	mg/L	36	10	14	----	----	
Potassium	7440-09-7	1	mg/L	8	5	21	----	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.06	0.02	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	10	2	4	----	----	
FWI-EN/001: Groundwater Sampling - Depth									
Depth	----	0.01	m	2.66	2.25	2.78	----	----	