



## CERTIFICATE OF ANALYSIS

**Work Order** : **EW1604353**  
**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** : ----  
**Quote number** : ----  
**No. of samples received** : 9  
**No. of samples analysed** : 9

**Page** : 1 of 4  
**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  
**Telephone** : 02 42253125  
**Date Samples Received** : 17-Nov-2016 15:43  
**Date Analysis Commenced** : 17-Nov-2016  
**Issue Date** : 23-Nov-2016 18:19



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>
Ashesh Patel	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Glenn Davies	Environmental Services Representative	Laboratory - Wollongong



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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.

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 samples 7 and 8 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.
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## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH 1	BH 2	BH 4	BH 5 GWMB5	BH 6 GWMB6
Client sampling date / time				17-Nov-2016 10:15	17-Nov-2016 11:05	17-Nov-2016 11:20	17-Nov-2016 10:00	17-Nov-2016 11:10	
Compound	CAS Number	LOR	Unit	EW1604353-001	EW1604353-002	EW1604353-003	EW1604353-004	EW1604353-005	
				Result	Result	Result	Result	Result	
<b>EA005FD: Field pH</b>									
pH	----	0.1	pH Unit	4.7	6.2	4.5	4.5	6.0	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	1	mg/L	306	506	302	133	217	
<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	<1	255	<1	<1	67	
Total Alkalinity as CaCO3	----	1	mg/L	<1	255	<1	<1	67	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	83	49	94	21	35	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	74	130	76	40	29	
<b>ED093T: Total Major Cations</b>									
Calcium	7440-70-2	1	mg/L	21	17	<1	4	20	
Magnesium	7439-95-4	1	mg/L	16	9	5	4	10	
Sodium	7440-23-5	1	mg/L	50	157	109	25	27	
Potassium	7440-09-7	1	mg/L	<1	23	1	2	3	
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	0.04	21.2	0.02	<0.01	0.05	
<b>EN67 PK: Field Tests</b>									
Field Observations	----	0.01	--	----	----	----	----	----	
<b>EP005: Total Organic Carbon (TOC)</b>									
Total Organic Carbon	----	1	mg/L	14	22	6	4	7	
<b>FWI-EN/001: Groundwater Sampling - Depth</b>									
Depth	----	0.01	m	3.90	2.65	4.60	6.08	3.80	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	LGMB1	LGMB2	LGMB3	LGMB4	----
Client sampling date / time				17-Nov-2016 10:10	17-Nov-2016 10:18	17-Nov-2016 11:30	17-Nov-2016 11:40	----	
Compound	CAS Number	LOR	Unit	EW1604353-006	EW1604353-007	EW1604353-008	EW1604353-009	-----	
				Result	Result	Result	Result	----	
<b>EA005FD: Field pH</b>									
pH	----	0.1	pH Unit	----	5.3	5.4	5.3	----	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	1	mg/L	----	517	149	188	----	
<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	----	8	15	11	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	8	15	11	----	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	37	15	64	----	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	----	42	30	17	----	
<b>ED093T: Total Major Cations</b>									
Calcium	7440-70-2	1	mg/L	----	15	10	12	----	
Magnesium	7439-95-4	1	mg/L	----	8	5	5	----	
Sodium	7440-23-5	1	mg/L	----	27	12	11	----	
Potassium	7440-09-7	1	mg/L	----	5	3	27	----	
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	----	0.02	0.35	0.06	----	
<b>EN67 PK: Field Tests</b>									
Field Observations	----	0.01	--	DRY	----	----	----	----	
<b>EP005: Total Organic Carbon (TOC)</b>									
Total Organic Carbon	----	1	mg/L	----	4	2	3	----	
<b>FWI-EN/001: Groundwater Sampling - Depth</b>									
Depth	----	0.01	m	----	3.64	3.62	3.33	----	