

## CERTIFICATE OF ANALYSIS

**Work Order** : **EW1700268**  
**Client** : **WINGECARRIBEE SHIRE COUNCIL**  
**Contact** : MR CHRIS MURPHY  
**Address** : PO BOX 141  
 MOSSVALE NSW  
 AUSTRALIA  
**Telephone** : ----  
**Project** : Biannual Surface & Gound Water  
**Order number** : PO00184509  
**C-O-C number** : ----  
**Sampler** : Glenn Davies  
**Site** : ----  
**Quote number** : WO/019/13  
**No. of samples received** : 17  
**No. of samples analysed** : 17

**Page** : 1 of 10  
**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** : 20-Jan-2017 14:00  
**Date Analysis Commenced** : 20-Jan-2017  
**Issue Date** : 30-Jan-2017 20:45



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
Robert DaLio	Sampler	Laboratory - Wollongong



## 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.

- ED041G: LOR raised for Sulfate on sample No 9 due to sample matrix.
- 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.
- It has been noted that Ammonia is greater than TKN for sample 9, however this difference is within the limits of experimental variation.
- Sampling and sample data supplied by ALS Wollongong.
- Sampling completed as per FWI-EN001 Groundwater Sampling.
- Sampling completed as per FWI-EN002 Surface Water Sampling.
- Field tests completed on day of sampling/receipt.



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Point 1 WELM-01	Point 2 WELM-02	Point 3 WELM-04	Point 4 WELM-05	Point 5 WELM-06S
Client sampling date / time				20-Jan-2017 10:40	20-Jan-2017 11:40	20-Jan-2017 11:10	20-Jan-2017 11:50	20-Jan-2017 12:02	
Compound	CAS Number	LOR	Unit	EW1700268-001	EW1700268-002	EW1700268-003	EW1700268-004	EW1700268-005	
				Result	Result	Result	Result	Result	
<b>EA005FD: Field pH</b>									
pH	----	0.1	pH Unit	4.9	6.3	5.3	----	4.6	
<b>EA010FD: Field Conductivity</b>									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	375	2030	1300	----	1250	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	10	mg/L	319	1430	873	----	745	
<b>EA025: Total Suspended Solids dried at 104 ± 2°C</b>									
Suspended Solids (SS)	----	5	mg/L	----	----	----	----	----	
<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	4	310	31	----	8	
Total Alkalinity as CaCO3	----	1	mg/L	4	310	31	----	8	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	23	369	271	----	94	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	55	327	248	----	341	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	13	114	22	----	12	
Magnesium	7439-95-4	1	mg/L	10	46	26	----	20	
Sodium	7440-23-5	1	mg/L	44	214	171	----	164	
Potassium	7440-09-7	1	mg/L	2	66	30	----	24	
<b>EG020T: Total Metals by ICP-MS</b>									
Arsenic	7440-38-2	0.001	mg/L	0.003	0.002	0.040	----	0.005	
Cadmium	7440-43-9	0.0001	mg/L	0.0012	<0.0001	0.0010	----	0.0001	
Chromium	7440-47-3	0.001	mg/L	0.012	0.002	0.135	----	0.010	
Nickel	7440-02-0	0.001	mg/L	0.026	0.010	0.096	----	0.014	
Lead	7439-92-1	0.001	mg/L	0.011	0.013	0.078	----	0.034	
Zinc	7440-66-6	0.005	mg/L	0.266	0.071	0.577	----	0.072	
Iron	7439-89-6	0.05	mg/L	3.70	3.24	22.8	----	6.74	
<b>EG035T: Total Recoverable Mercury by FIMS</b>									
Mercury	7439-97-6	0.0001	mg/L	0.0002	<0.0001	0.0001	----	0.0008	
<b>EK040P: Fluoride by PC Titrator</b>									



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Point 1 WELM-01	Point 2 WELM-02	Point 3 WELM-04	Point 4 WELM-05	Point 5 WELM-06S
Client sampling date / time				20-Jan-2017 10:40	20-Jan-2017 11:40	20-Jan-2017 11:10	20-Jan-2017 11:50	20-Jan-2017 12:02	
Compound	CAS Number	LOR	Unit	EW1700268-001	EW1700268-002	EW1700268-003	EW1700268-004	EW1700268-005	
				Result	Result	Result	Result	Result	
<b>EK040P: Fluoride by PC Titrator - Continued</b>									
Fluoride	16984-48-8	0.1	mg/L	<0.1	0.1	0.2	----	<0.1	
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	0.19	0.44	5.48	----	7.74	
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>									
Nitrite + Nitrate as N	----	0.01	mg/L	11.7	0.06	0.15	----	13.5	
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.6	0.8	5.7	----	7.9	
<b>EN67 PK: Field Tests</b>									
Field Observations	----	0.01	--	----	----	----	DRY	----	
<b>EP005: Total Organic Carbon (TOC)</b>									
Total Organic Carbon	----	1	mg/L	7	12	22	----	5	
<b>EP025FD: Field Dissolved Oxygen</b>									
Dissolved Oxygen	----	0.01	mg/L	----	----	----	----	----	
<b>EP030: Biochemical Oxygen Demand (BOD)</b>									
Biochemical Oxygen Demand	----	2	mg/L	----	----	----	----	----	
<b>EP035G: Total Phenol by Discrete Analyser</b>									
Phenols (Total)	----	0.05	mg/L	<0.05	<0.05	<0.05	----	<0.05	
<b>FWI-EN/001: Groundwater Sampling - Depth</b>									
Depth	----	0.01	m	3.79	3.05	6.26	----	7.16	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Point 6 WELD-06D	Point 7 WELD-07S	Point 8 WELD-07D	Point 9 WELM LEACH-01	Point 10 DAM-1
Client sampling date / time				20-Jan-2017 11:55	20-Jan-2017 12:25	20-Jan-2017 12:20	20-Jan-2017 10:30	20-Jan-2017 10:50	
Compound	CAS Number	LOR	Unit	EW1700268-006	EW1700268-007	EW1700268-008	EW1700268-009	EW1700268-010	
				Result	Result	Result	Result	Result	
<b>EA005FD: Field pH</b>									
pH	----	0.1	pH Unit	----	----	----	6.9	8.7	
<b>EA010FD: Field Conductivity</b>									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	----	----	----	5350	716	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	10	mg/L	----	----	----	2920	----	
<b>EA025: Total Suspended Solids dried at 104 ± 2°C</b>									
Suspended Solids (SS)	----	5	mg/L	----	----	----	----	53	
<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	----	----	----	2280	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	----	----	2280	----	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	----	<10	----	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	----	----	----	579	----	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	----	----	----	272	----	
Magnesium	7439-95-4	1	mg/L	----	----	----	120	----	
Sodium	7440-23-5	1	mg/L	----	----	----	302	----	
Potassium	7440-09-7	1	mg/L	----	----	----	235	----	
<b>EG020T: Total Metals by ICP-MS</b>									
Arsenic	7440-38-2	0.001	mg/L	----	----	----	0.007	----	
Cadmium	7440-43-9	0.0001	mg/L	----	----	----	0.0004	----	
Chromium	7440-47-3	0.001	mg/L	----	----	----	0.008	----	
Nickel	7440-02-0	0.001	mg/L	----	----	----	0.057	----	
Lead	7439-92-1	0.001	mg/L	----	----	----	0.022	----	
Zinc	7440-66-6	0.005	mg/L	----	----	----	0.263	----	
Iron	7439-89-6	0.05	mg/L	----	----	----	14.6	----	
<b>EG035T: Total Recoverable Mercury by FIMS</b>									
Mercury	7439-97-6	0.0001	mg/L	----	----	----	<0.0001	----	
<b>EK040P: Fluoride by PC Titrator</b>									



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Point 6 WELD-06D	Point 7 WELD-07S	Point 8 WELD-07D	Point 9 WELM LEACH-01	Point 10 DAM-1
Client sampling date / time				20-Jan-2017 11:55	20-Jan-2017 12:25	20-Jan-2017 12:20	20-Jan-2017 10:30	20-Jan-2017 10:50	
Compound	CAS Number	LOR	Unit	EW1700268-006	EW1700268-007	EW1700268-008	EW1700268-009	EW1700268-010	
				Result	Result	Result	Result	Result	
<b>EK040P: Fluoride by PC Titrator - Continued</b>									
Fluoride	16984-48-8	0.1	mg/L	----	----	----	0.2	----	
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	----	----	----	180	0.04	
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>									
Nitrite + Nitrate as N	----	0.01	mg/L	----	----	----	0.02	----	
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	----	----	177	----	
<b>EN67 PK: Field Tests</b>									
Field Observations	----	0.01	--	DRY	DRY	DRY	----	----	
<b>EP005: Total Organic Carbon (TOC)</b>									
Total Organic Carbon	----	1	mg/L	----	----	----	125	----	
<b>EP025FD: Field Dissolved Oxygen</b>									
Dissolved Oxygen	----	0.01	mg/L	----	----	----	----	6.23	
<b>EP030: Biochemical Oxygen Demand (BOD)</b>									
Biochemical Oxygen Demand	----	2	mg/L	----	----	----	----	9	
<b>EP035G: Total Phenol by Discrete Analyser</b>									
Phenols (Total)	----	0.05	mg/L	----	----	----	<0.05	----	
<b>FWI-EN/001: Groundwater Sampling - Depth</b>									
Depth	----	0.01	m	----	----	----	8.80	----	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Point 11 DAM-2	Point 12 DAM-3	Point 13 DAM-4	Point 14 DAM-5	Point 15 DAM-6
Client sampling date / time				20-Jan-2017 12:40	20-Jan-2017 12:30	20-Jan-2017 11:45	20-Jan-2017 11:35	20-Jan-2017 11:20	
Compound	CAS Number	LOR	Unit	EW1700268-011	EW1700268-012	EW1700268-013	EW1700268-014	EW1700268-015	
				Result	Result	Result	Result	Result	
<b>EA005FD: Field pH</b>									
pH	----	0.1	pH Unit	6.6	7.4	----	7.2	7.8	
<b>EA010FD: Field Conductivity</b>									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	178	2450	----	1870	1750	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	10	mg/L	----	----	----	----	----	
<b>EA025: Total Suspended Solids dried at 104 ± 2°C</b>									
Suspended Solids (SS)	----	5	mg/L	14	16	----	62	15	
<b>ED037P: Alkalinity by PC Titrator</b>									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	----	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	----	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	----	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	----	----	----	----	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	----	----	----	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	----	----	----	----	----	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	----	----	----	----	----	
Magnesium	7439-95-4	1	mg/L	----	----	----	----	----	
Sodium	7440-23-5	1	mg/L	----	----	----	----	----	
Potassium	7440-09-7	1	mg/L	----	----	----	----	----	
<b>EG020T: Total Metals by ICP-MS</b>									
Arsenic	7440-38-2	0.001	mg/L	----	----	----	----	----	
Cadmium	7440-43-9	0.0001	mg/L	----	----	----	----	----	
Chromium	7440-47-3	0.001	mg/L	----	----	----	----	----	
Nickel	7440-02-0	0.001	mg/L	----	----	----	----	----	
Lead	7439-92-1	0.001	mg/L	----	----	----	----	----	
Zinc	7440-66-6	0.005	mg/L	----	----	----	----	----	
Iron	7439-89-6	0.05	mg/L	----	----	----	----	----	
<b>EG035T: Total Recoverable Mercury by FIMS</b>									
Mercury	7439-97-6	0.0001	mg/L	----	----	----	----	----	
<b>EK040P: Fluoride by PC Titrator</b>									





## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Point 11 DAM-2	Point 12 DAM-3	Point 13 DAM-4	Point 14 DAM-5	Point 15 DAM-6
Client sampling date / time				20-Jan-2017 12:40	20-Jan-2017 12:30	20-Jan-2017 11:45	20-Jan-2017 11:35	20-Jan-2017 11:20	
Compound	CAS Number	LOR	Unit	EW1700268-011	EW1700268-012	EW1700268-013	EW1700268-014	EW1700268-015	
				Result	Result	Result	Result	Result	
<b>EK040P: Fluoride by PC Titrator - Continued</b>									
Fluoride	16984-48-8	0.1	mg/L	----	----	----	----	----	
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	0.17	0.10	----	0.05	0.62	
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>									
Nitrite + Nitrate as N	----	0.01	mg/L	----	----	----	----	----	
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	----	----	----	----	
<b>EN67 PK: Field Tests</b>									
Field Observations	----	0.01	--	----	----	DRY	----	----	
<b>EP005: Total Organic Carbon (TOC)</b>									
Total Organic Carbon	----	1	mg/L	----	----	----	----	----	
<b>EP025FD: Field Dissolved Oxygen</b>									
Dissolved Oxygen	----	0.01	mg/L	3.95	1.86	----	2.25	4.16	
<b>EP030: Biochemical Oxygen Demand (BOD)</b>									
Biochemical Oxygen Demand	----	2	mg/L	2	3	----	3	3	
<b>EP035G: Total Phenol by Discrete Analyser</b>									
Phenols (Total)	----	0.05	mg/L	----	----	----	----	----	
<b>FWI-EN/001: Groundwater Sampling - Depth</b>									
Depth	----	0.01	m	----	----	----	----	----	





## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		Point 16 WELM SW-01	Point 17 WELM SW-02	----	----	----
Client sampling date / time		20-Jan-2017 13:00		20-Jan-2017 13:00		----	----	----
Compound	CAS Number	LOR	Unit	EW1700268-016	EW1700268-017	-----	-----	-----
				Result	Result	---	---	---
<b>EA005FD: Field pH</b>								
pH	----	0.1	pH Unit	7.7	----	----	----	----
<b>EA010FD: Field Conductivity</b>								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	488	----	----	----	----
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>								
Total Dissolved Solids @180°C	----	10	mg/L	----	----	----	----	----
<b>EA025: Total Suspended Solids dried at 104 ± 2°C</b>								
Suspended Solids (SS)	----	5	mg/L	12	----	----	----	----
<b>ED037P: Alkalinity by PC Titrator</b>								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	----	----	----	----	----
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	----	----	----
<b>ED045G: Chloride by Discrete Analyser</b>								
Chloride	16887-00-6	1	mg/L	----	----	----	----	----
<b>ED093F: Dissolved Major Cations</b>								
Calcium	7440-70-2	1	mg/L	----	----	----	----	----
Magnesium	7439-95-4	1	mg/L	----	----	----	----	----
Sodium	7440-23-5	1	mg/L	----	----	----	----	----
Potassium	7440-09-7	1	mg/L	----	----	----	----	----
<b>EG020T: Total Metals by ICP-MS</b>								
Arsenic	7440-38-2	0.001	mg/L	----	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	----	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	----	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	----	----	----	----	----
Lead	7439-92-1	0.001	mg/L	----	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	----	----	----	----	----
Iron	7439-89-6	0.05	mg/L	----	----	----	----	----
<b>EG035T: Total Recoverable Mercury by FIMS</b>								
Mercury	7439-97-6	0.0001	mg/L	----	----	----	----	----
<b>EK040P: Fluoride by PC Titrator</b>								



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Point 16 WELM SW-01	Point 17 WELM SW-02	----	----	----
Client sampling date / time				20-Jan-2017 13:00	20-Jan-2017 13:00	----	----	----	
Compound	CAS Number	LOR	Unit	EW1700268-016	EW1700268-017	-----	-----	-----	
				Result	Result	---	---	---	
<b>EK040P: Fluoride by PC Titrator - Continued</b>									
Fluoride	16984-48-8	0.1	mg/L	----	----	----	----	----	
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	0.16	----	----	----	----	
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>									
Nitrite + Nitrate as N	----	0.01	mg/L	----	----	----	----	----	
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	----	----	----	----	
<b>EN67 PK: Field Tests</b>									
Field Observations	----	0.01	--	----	NO ACCESS	----	----	----	
<b>EP005: Total Organic Carbon (TOC)</b>									
Total Organic Carbon	----	1	mg/L	----	----	----	----	----	
<b>EP025FD: Field Dissolved Oxygen</b>									
Dissolved Oxygen	----	0.01	mg/L	8.41	----	----	----	----	
<b>EP030: Biochemical Oxygen Demand (BOD)</b>									
Biochemical Oxygen Demand	----	2	mg/L	<2	----	----	----	----	
<b>EP035G: Total Phenol by Discrete Analyser</b>									
Phenols (Total)	----	0.05	mg/L	----	----	----	----	----	
<b>FWI-EN/001: Groundwater Sampling - Depth</b>									
Depth	----	0.01	m	----	----	----	----	----	