

Environmental Division

## CERTIFICATE OF ANALYSIS

<p><b>Work Order</b> : <b>EW1302431</b></p> <p><b>Client</b> : <b>SHOALHAVEN CITY COUNCIL</b></p> <p><b>Contact</b> : Mr Giordano Bianco</p> <p><b>Address</b> : PO Box 42 Nowra NSW 2541</p> <p><b>E-mail</b> : biancoG@shoalhaven.nsw.gov.au</p> <p><b>Telephone</b> : 02 4429 3554</p> <p><b>Facsimile</b> : ----</p> <p><b>Project</b> : West Nowra Landfill</p> <p><b>Order number</b> : 1542516780</p> <p><b>C-O-C number</b> : ----</p> <p><b>Sampler</b> : ----</p> <p><b>Site</b> : ----</p> <p><b>Quote number</b> : ----</p>	<p><b>Page</b> : 1 of 9</p> <p><b>Laboratory</b> : Environmental Division NSW South Coast</p> <p><b>Contact</b> : Glenn Davies</p> <p><b>Address</b> : 99 Kenny Street, Wollongong 2500 Unit 4 / 13 Geary Place, PO Box 3105, North Nowra 2541 AUSTRALIA</p> <p><b>E-mail</b> : glenn.davies@alsglobal.com</p> <p><b>Telephone</b> : 02 4225 3125</p> <p><b>Facsimile</b> : 02 4225 3128</p> <p><b>QC Level</b> : NEPM 2013 Schedule B(3) and ALS QCS3 requirement</p> <p><b>Date Samples Received</b> : 23-AUG-2013</p> <p><b>Issue Date</b> : 02-SEP-2013</p> <p><b>No. of samples received</b> : 23</p> <p><b>No. of samples analysed</b> : 23</p>
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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with  
ISO/IEC 17025.

### Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been 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
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Glenn Davies	Environmental Services Representative	Laboratory - Wollongong
Hoa Nguyen	Senior Inorganic Chemist	Sydney Inorganics



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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.

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

- **Samples BH11, BH15, MW2, MW3a, MW4 and BH1 dry at time of sampling.**



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				SW 1	SW2	SW3	BH2	BH 3
				22-AUG-2013 13:00	22-AUG-2013 14:50	22-AUG-2013 13:35	22-AUG-2013 13:20	22-AUG-2013 13:15
Compound	CAS Number	LOR	Unit	EW1302431-001	EW1302431-002	EW1302431-003	EW1302431-004	EW1302431-005
<b>EA015: Total Dissolved Solids</b>								
Total Dissolved Solids @180°C	----	1	mg/L	748	185	421	334	216
<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	2	7	8	29	<1
Total Alkalinity as CaCO3	----	1	mg/L	2	7	8	29	<1
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	29	5	11	24	50
<b>ED045G: Chloride Discrete analyser</b>								
Chloride	16887-00-6	1	mg/L	366	83	221	123	54
<b>ED093F: Dissolved Major Cations</b>								
Calcium	7440-70-2	1	mg/L	20	5	14	10	<1
Magnesium	7439-95-4	1	mg/L	22	5	14	4	3
Sodium	7440-23-5	1	mg/L	177	43	100	88	48
Potassium	7440-09-7	1	mg/L	5	1	6	3	<1
<b>EK055G: Ammonia as N by Discrete Analyser</b>								
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.01	0.25	<0.01
<b>EN055: Ionic Balance</b>								
Total Anions	----	0.01	meq/L	11.0	2.59	6.62	4.55	2.56
Total Cations	----	0.01	meq/L	10.6	2.56	----	----	----
Total Cations	----	0.01	meq/L	----	----	6.43	4.73	2.33
Ionic Balance	----	0.01	%	1.55	----	----	1.97	----
Ionic Balance	----	0.01	%	----	----	1.47	----	----
<b>EN67 PK: Field Tests</b>								
pH	----	0.1	pH Unit	5.8	5.7	6.0	6.3	4.1
Electrical Conductivity (Non Compensated)	----	1	µS/cm	986	232	559	----	----
Dissolved Oxygen	----	0.01	mg/L	9.90	9.40	8.75	----	----
Standing Water Level	----	0.01	m AHD	----	----	----	30.0	29.7
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	1	mg/L	7	8	6	<1	4
<b>EP030: Biochemical Oxygen Demand (BOD)</b>								
Biochemical Oxygen Demand	----	2	mg/L	<2	<2	<2	----	----



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				BH 4	BH 5	BH 6	BH 7	BH 10
				22-AUG-2013 13:10	22-AUG-2013 12:40	22-AUG-2013 12:15	22-AUG-2013 12:20	22-AUG-2013 12:10
Compound	CAS Number	LOR	Unit	EW1302431-006	EW1302431-007	EW1302431-008	EW1302431-009	EW1302431-010
<b>EA015: Total Dissolved Solids</b>								
Total Dissolved Solids @180°C	----	1	mg/L	175	2470	1000	316	283
<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	8	<1	16	8
Total Alkalinity as CaCO3	----	1	mg/L	<1	8	<1	16	8
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	30	38	37	36	2
<b>ED045G: Chloride Discrete analyser</b>								
Chloride	16887-00-6	1	mg/L	32	1270	554	118	116
<b>ED093F: Dissolved Major Cations</b>								
Calcium	7440-70-2	1	mg/L	<1	28	12	13	5
Magnesium	7439-95-4	1	mg/L	4	65	22	10	5
Sodium	7440-23-5	1	mg/L	18	701	316	69	55
Potassium	7440-09-7	1	mg/L	<1	4	3	3	<1
<b>EK055G: Ammonia as N by Discrete Analyser</b>								
Ammonia as N	7664-41-7	0.01	mg/L	0.11	0.76	0.03	<0.01	1.85
<b>EN055: Ionic Balance</b>								
Total Anions	----	0.01	meq/L	1.53	36.8	16.4	4.40	3.47
Total Cations	----	0.01	meq/L	1.11	37.3	16.2	4.55	3.48
Ionic Balance	----	0.01	%	----	0.75	0.53	1.69	----
Ionic Balance	----	0.01	%	----	----	----	----	0.13
<b>EN67 PK: Field Tests</b>								
pH	----	0.1	pH Unit	4.5	5.6	4.5	5.6	5.3
Standing Water Level	----	0.01	m AHD	29.5	28.7	30.1	30.1	35.0
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	1	mg/L	4	9	8	11	<1



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				BH 11	BH 12	BH 13	BH 14	BH 15
				22-AUG-2013 12:35	22-AUG-2013 12:30	22-AUG-2013 13:50	22-AUG-2013 14:35	22-AUG-2013 14:20
Compound	CAS Number	LOR	Unit	EW1302431-011	EW1302431-012	EW1302431-013	EW1302431-014	EW1302431-015
<b>EA015: Total Dissolved Solids</b>								
Total Dissolved Solids @180°C	----	1	mg/L	----	1470	1560	709	----
<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	----	<1	1	<1	----
Total Alkalinity as CaCO3	----	1	mg/L	----	<1	1	<1	----
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	34	5	65	----
<b>ED045G: Chloride Discrete analyser</b>								
Chloride	16887-00-6	1	mg/L	----	775	993	398	----
<b>ED093F: Dissolved Major Cations</b>								
Calcium	7440-70-2	1	mg/L	----	37	4	5	----
Magnesium	7439-95-4	1	mg/L	----	44	14	15	----
Sodium	7440-23-5	1	mg/L	----	411	412	206	----
Potassium	7440-09-7	1	mg/L	----	<1	<1	1	----
<b>EK055G: Ammonia as N by Discrete Analyser</b>								
Ammonia as N	7664-41-7	0.01	mg/L	----	<0.01	0.50	0.17	----
<b>EN055: Ionic Balance</b>								
Total Anions	----	0.01	meq/L	----	22.6	28.1	12.6	----
Total Cations	----	0.01	meq/L	----	23.4	----	----	----
Total Cations	----	0.01	meq/L	----	----	31.1	12.9	----
Ionic Balance	----	0.01	%	----	1.68	----	----	----
Ionic Balance	----	0.01	%	----	----	4.99	1.41	----
<b>EN67 PK: Field Tests</b>								
pH	----	0.1	pH Unit	----	5.0	5.0	4.6	----
Field Observations	----	0.01	--	Dry	----	----	----	Dry
Standing Water Level	----	0.01	m AHD	----	30.5	33.6	36.8	----
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	1	mg/L	----	2	3	<1	----



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				MW 1D	MW 1S	MW 2	MW 3	MW 4
				22-AUG-2013 11:25	22-AUG-2013 11:20	22-AUG-2013 12:00	22-AUG-2013 11:15	22-AUG-2013 14:10
Compound	CAS Number	LOR	Unit	EW1302431-016	EW1302431-017	EW1302431-018	EW1302431-019	EW1302431-020
<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	<1	<1	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	----	----	----
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	8	11	----	----	----
<b>ED045G: Chloride Discrete analyser</b>								
Chloride	16887-00-6	1	mg/L	201	206	----	----	----
<b>ED093F: Dissolved Major Cations</b>								
Calcium	7440-70-2	1	mg/L	12	7	----	----	----
Magnesium	7439-95-4	1	mg/L	11	12	----	----	----
Sodium	7440-23-5	1	mg/L	93	102	----	----	----
Potassium	7440-09-7	1	mg/L	<1	1	----	----	----
<b>EG020F: Dissolved Metals by ICP-MS</b>								
Iron	7439-89-6	0.05	mg/L	<0.05	0.30	----	----	----
<b>EK055G: Ammonia as N by Discrete Analyser</b>								
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	----	----	----
<b>EK058G: Nitrate as N by Discrete Analyser</b>								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	----	----	----
<b>EN055: Ionic Balance</b>								
Total Anions	----	0.01	meq/L	5.84	----	----	----	----
Total Anions	----	0.01	meq/L	----	6.04	----	----	----
Total Cations	----	0.01	meq/L	5.72	5.82	----	----	----
Ionic Balance	----	0.01	%	1.04	1.90	----	----	----
<b>EN67 PK: Field Tests</b>								
pH	----	0.1	pH Unit	4.4	3.9	----	----	----
Electrical Conductivity (Non Compensated)	----	1	µS/cm	568	637	----	----	----
Field Observations	----	0.01	--	----	----	Dry	Dry	Dry
Standing Water Level	----	0.01	m AHD	38.5	38.4	----	----	----
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	1	mg/L	<1	<1	----	----	----
<b>EP030: Biochemical Oxygen Demand (BOD)</b>								



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

				MW 1D	MW 1S	MW 2	MW 3	MW 4
				22-AUG-2013 11:25	22-AUG-2013 11:20	22-AUG-2013 12:00	22-AUG-2013 11:15	22-AUG-2013 14:10
				EW1302431-016	EW1302431-017	EW1302431-018	EW1302431-019	EW1302431-020
Compound	CAS Number	LOR	Unit					
<b>EP030: Biochemical Oxygen Demand (BOD) - Continued</b>								
Biochemical Oxygen Demand	----	2	mg/L	<2	<2	----	----	----
<b>EP035G: Total Phenol by Discrete Analyser</b>								
Phenols (Total)	----	0.05	mg/L	<0.05	<0.05	----	----	----



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				duplicate	Blank	BH1	----	----
				23-AUG-2013 11:20	23-AUG-2013 11:45	23-AUG-2013 13:40	----	----
Compound	CAS Number	LOR	Unit	EW1302431-021	EW1302431-022	EW1302431-023	----	----
<b>EA015: Total Dissolved Solids</b>								
Total Dissolved Solids @180°C	----	1	mg/L	----	<1	----	----	----
<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	<1	<1	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	----	----	----
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	10	<1	----	----	----
<b>ED045G: Chloride Discrete analyser</b>								
Chloride	16887-00-6	1	mg/L	210	<1	----	----	----
<b>ED093F: Dissolved Major Cations</b>								
Calcium	7440-70-2	1	mg/L	6	<1	----	----	----
Magnesium	7439-95-4	1	mg/L	11	<1	----	----	----
Sodium	7440-23-5	1	mg/L	100	<1	----	----	----
Potassium	7440-09-7	1	mg/L	1	<1	----	----	----
<b>EG020F: Dissolved Metals by ICP-MS</b>								
Iron	7439-89-6	0.05	mg/L	0.32	----	----	----	----
<b>EK055G: Ammonia as N by Discrete Analyser</b>								
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	----	----	----
<b>EK058G: Nitrate as N by Discrete Analyser</b>								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	----	----	----	----
<b>EN055: Ionic Balance</b>								
Total Anions	----	0.01	meq/L	6.13	<0.01	----	----	----
Total Cations	----	0.01	meq/L	----	<0.01	----	----	----
Total Cations	----	0.01	meq/L	5.90	----	----	----	----
Ionic Balance	----	0.01	%	1.89	----	----	----	----
<b>EN67 PK: Field Tests</b>								
pH	----	0.1	pH Unit	3.8	6.8	----	----	----
Electrical Conductivity (Non Compensated)	----	1	µS/cm	638	----	----	----	----
Field Observations	----	0.01	--	----	----	Dry	----	----
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	1	mg/L	<1	<1	----	----	----





## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

	duplicate	Blank	BH1	----	----
Client sampling date / time	23-AUG-2013 11:20	23-AUG-2013 11:45	23-AUG-2013 13:40	----	----
	EW1302431-021	EW1302431-022	EW1302431-023	----	----

Compound	CAS Number	LOR	Unit					
<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	<0.05	----	----	----	----