



Environmental

## CERTIFICATE OF ANALYSIS

<b>Work Order</b>	<b>: EW1400569</b>	<b>Page</b>	<b>: 1 of 8</b>
<b>Client</b>	<b>: SHOALHAVEN CITY COUNCIL</b>	<b>Laboratory</b>	<b>: Environmental Division NSW South Coast</b>
<b>Contact</b>	<b>: Mr David Hojem</b>	<b>Contact</b>	<b>: Glenn Davies</b>
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<b>Project</b>	<b>: West Nowra Landfill Quarterly Sampling</b>	<b>QC Level</b>	<b>: NEPM 2013 Schedule B(3) and ALS QCS3 requirement</b>
<b>Order number</b>	<b>: 15425 16780</b>	<b>Date Samples Received</b>	<b>: 26-FEB-2014</b>
<b>C-O-C number</b>	<b>: ----</b>	<b>Issue Date</b>	<b>: 05-MAR-2014</b>
<b>Sampler</b>	<b>: ----</b>	<b>No. of samples received</b>	<b>: 23</b>
<b>Site</b>	<b>: ----</b>	<b>No. of samples analysed</b>	<b>: 23</b>
<b>Quote number</b>	<b>: ----</b>		

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
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Glenn Davies	Environmental Services Representative	Laboratory - Wollongong
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Environmental

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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

- **EW1400569/1, 2, 3, 4, 7, 8, 11, 15, 19 & 23 a sample was not able to be taken for analysis due to the well being Dry**
- **Ionic Balance out of acceptable limits for various samples due to analytes not quantified in this report.**
- **TDS by method EA-015 may bias high for sample 6 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.**



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				SW 1 (Drain)	SW2 (Creek Bridge)	SW3 (Creek)	BH2	BH 3
				26-FEB-2014 10:41	26-FEB-2014 09:35	26-FEB-2014 10:58	26-FEB-2014 10:51	26-FEB-2014 10:46
Compound	CAS Number	LOR	Unit	EW1400569-001	EW1400569-002	EW1400569-003	EW1400569-004	EW1400569-005
<b>EA015: Total Dissolved Solids</b>								
Total Dissolved Solids @180°C	----	1	mg/L	----	----	----	----	215
<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	----	----	----	----	<1
Total Alkalinity as CaCO3	----	1	mg/L	----	----	----	----	<1
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	----	----	47
<b>ED045G: Chloride Discrete analyser</b>								
Chloride	16887-00-6	1	mg/L	----	----	----	----	52
<b>ED093F: Dissolved Major Cations</b>								
Calcium	7440-70-2	1	mg/L	----	----	----	----	<1
Magnesium	7439-95-4	1	mg/L	----	----	----	----	3
Sodium	7440-23-5	1	mg/L	----	----	----	----	42
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	----	----	----	----	0.03
<b>EN055: Ionic Balance</b>								
Total Anions	----	0.01	meq/L	----	----	----	----	2.45
Total Cations	----	0.01	meq/L	----	----	----	----	2.07
Ionic Balance	----	0.01	%	----	----	----	----	8.25
<b>EN67 PK: Field Tests</b>								
pH	----	0.1	pH Unit	----	----	----	----	4.1
Field Observations	----	0.01	--	Dry	Dry	Dry	Dry	----
Standing Water Level	----	0.01	m AHD	----	----	----	----	29.4
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	1	mg/L	----	----	----	----	3



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				BH 4A	BH 5	BH 6	BH 7	BH 10
				26-FEB-2014 10:42	26-FEB-2014 10:40	26-FEB-2014 10:25	26-FEB-2014 10:20	26-FEB-2014 10:15
Compound	CAS Number	LOR	Unit	EW1400569-006	EW1400569-007	EW1400569-008	EW1400569-009	EW1400569-010
<b>EA015: Total Dissolved Solids</b>								
Total Dissolved Solids @180°C	----	1	mg/L	176	----	----	925	1080
<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	74
Total Alkalinity as CaCO3	----	1	mg/L	<1	----	----	1	74
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	32	----	----	37	6
<b>ED045G: Chloride Discrete analyser</b>								
Chloride	16887-00-6	1	mg/L	31	----	----	441	575
<b>ED093F: Dissolved Major Cations</b>								
Calcium	7440-70-2	1	mg/L	<1	----	----	25	25
Magnesium	7439-95-4	1	mg/L	4	----	----	28	27
Sodium	7440-23-5	1	mg/L	20	----	----	224	278
Potassium	7440-09-7	1	mg/L	<1	----	----	2	2
<b>EK055G: Ammonia as N by Discrete Analyser</b>								
Ammonia as N	7664-41-7	0.01	mg/L	0.19	----	----	0.07	1.58
<b>EN055: Ionic Balance</b>								
Total Anions	----	0.01	meq/L	1.54	----	----	13.2	----
Total Anions	----	0.01	meq/L	----	----	----	----	17.8
Total Cations	----	0.01	meq/L	1.20	----	----	13.4	----
Total Cations	----	0.01	meq/L	----	----	----	----	18.7
Ionic Balance	----	0.01	%	12.5	----	----	0.43	----
Ionic Balance	----	0.01	%	----	----	----	----	2.33
<b>EN67 PK: Field Tests</b>								
pH	----	0.1	pH Unit	4.3	----	----	5.2	5.8
Field Observations	----	0.01	--	----	Dry	Dry	----	----
Standing Water Level	----	0.01	m AHD	31.3	----	----	29.6	33.7
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	1	mg/L	3	----	----	3	8



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

				BH 11	BH 12a	BH 13	BH 14	BH 15
				26-FEB-2014 10:35	26-FEB-2014 10:30	26-FEB-2014 11:06	26-FEB-2014 11:25	26-FEB-2014 11:20
				EW1400569-011	EW1400569-012	EW1400569-013	EW1400569-014	EW1400569-015
Compound	CAS Number	LOR	Unit					
<b>EA015: Total Dissolved Solids</b>								
Total Dissolved Solids @180°C	----	1	mg/L	----	1670	1420	1150	----
<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	----	6	9	<1	----
Total Alkalinity as CaCO3	----	1	mg/L	----	6	9	<1	----
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	39	6	48	----
<b>ED045G: Chloride Discrete analyser</b>								
Chloride	16887-00-6	1	mg/L	----	776	935	636	----
<b>ED093F: Dissolved Major Cations</b>								
Calcium	7440-70-2	1	mg/L	----	37	4	7	----
Magnesium	7439-95-4	1	mg/L	----	44	14	33	----
Sodium	7440-23-5	1	mg/L	----	458	448	356	----
Potassium	7440-09-7	1	mg/L	----	<1	<1	2	----
<b>EK055G: Ammonia as N by Discrete Analyser</b>								
Ammonia as N	7664-41-7	0.01	mg/L	----	0.10	0.48	0.38	----
<b>EN055: Ionic Balance</b>								
Total Anions	----	0.01	meq/L	----	22.8	26.7	18.9	----
Total Cations	----	0.01	meq/L	----	25.4	20.8	18.6	----
Ionic Balance	----	0.01	%	----	5.31	12.3	0.92	----
<b>EN67 PK: Field Tests</b>								
pH	----	0.1	pH Unit	----	4.8	5.0	4.1	----
Field Observations	----	0.01	--	Dry	----	----	----	Dry
Standing Water Level	----	0.01	m AHD	----	29.6	32.8	36.6	----
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	1	mg/L	----	2	9	3	----



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				MW 1D	MW 1S	MW 2	MW 3a	MW 4
				26-FEB-2014 09:40	26-FEB-2014 09:50	26-FEB-2014 10:10	26-FEB-2014 09:55	26-FEB-2014 11:15
Compound	CAS Number	LOR	Unit	EW1400569-016	EW1400569-017	EW1400569-018	EW1400569-019	EW1400569-020
<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	<1	<1	70	----	<1
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	70	----	<1
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5	8	12	----	28
<b>ED045G: Chloride Discrete analyser</b>								
Chloride	16887-00-6	1	mg/L	211	236	486	----	678
<b>ED093F: Dissolved Major Cations</b>								
Calcium	7440-70-2	1	mg/L	12	8	35	----	<1
Magnesium	7439-95-4	1	mg/L	12	13	28	----	25
Sodium	7440-23-5	1	mg/L	97	116	272	----	401
Potassium	7440-09-7	1	mg/L	<1	<1	<1	----	<1
<b>EG020F: Dissolved Metals by ICP-MS</b>								
Iron	7439-89-6	0.05	mg/L	0.24	2.24	17.8	----	41.7
<b>EK055G: Ammonia as N by Discrete Analyser</b>								
Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.02	0.06	----	0.30
<b>EK057G: Nitrite as N by Discrete Analyser</b>								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	<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	<0.01	----	<0.01
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>								
Nitrite + Nitrate as N	----	0.01	mg/L	0.01	<0.01	<0.01	----	<0.01
<b>EN055: Ionic Balance</b>								
Total Anions	----	0.01	meq/L	6.06	6.82	15.4	----	19.7
Total Cations	----	0.01	meq/L	5.81	6.51	15.9	----	19.5
Ionic Balance	----	0.01	%	2.12	2.33	1.67	----	0.55
<b>EN67 PK: Field Tests</b>								
pH	----	0.1	pH Unit	4.1	3.9	5.7	----	4.5
Electrical Conductivity (Non Compensated)	----	1	µS/cm	767	824	1820	----	2410
Field Observations	----	0.01	--	----	----	----	Dry	----
Standing Water Level	----	0.01	m AHD	37.8	37.7	36.1	----	35.5



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				MW 1D	MW 1S	MW 2	MW 3a	MW 4
				26-FEB-2014 09:40	26-FEB-2014 09:50	26-FEB-2014 10:10	26-FEB-2014 09:55	26-FEB-2014 11:15
Compound	CAS Number	LOR	Unit	EW1400569-016	EW1400569-017	EW1400569-018	EW1400569-019	EW1400569-020
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	1	mg/L	<1	<1	1	----	14
<b>EP030: Biochemical Oxygen Demand (BOD)</b>								
Biochemical Oxygen Demand	----	2	mg/L	<2	<2	<2	----	5
<b>EP035G: Total Phenol by Discrete Analyser</b>								
Phenols (Total)	----	0.05	mg/L	<0.05	<0.05	<0.05	----	<0.05



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				Duplicate	Blank	BH 1	----	----
				26-FEB-2014 10:20	26-FEB-2014 10:25	26-FEB-2014 10:57	----	----
Compound	CAS Number	LOR	Unit	EW1400569-021	EW1400569-022	EW1400569-023	----	----
<b>EA015: Total Dissolved Solids</b>								
Total Dissolved Solids @180°C	----	1	mg/L	928	----	----	----	----
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	2	<1	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	2	<1	----	----	----
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	37	<1	----	----	----
<b>ED045G: Chloride Discrete analyser</b>								
Chloride	16887-00-6	1	mg/L	490	<1	----	----	----
<b>ED093F: Dissolved Major Cations</b>								
Calcium	7440-70-2	1	mg/L	27	<1	----	----	----
Magnesium	7439-95-4	1	mg/L	32	<1	----	----	----
Sodium	7440-23-5	1	mg/L	273	<1	----	----	----
Potassium	7440-09-7	1	mg/L	2	<1	----	----	----
<b>EK055G: Ammonia as N by Discrete Analyser</b>								
Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.01	----	----	----
<b>EN055: Ionic Balance</b>								
Total Anions	----	0.01	meq/L	14.6	<0.01	----	----	----
Total Cations	----	0.01	meq/L	15.9	<0.01	----	----	----
Ionic Balance	----	0.01	%	4.16	----	----	----	----
<b>EN67 PK: Field Tests</b>								
pH	----	0.1	pH Unit	5.2	6.4	----	----	----
Field Observations	----	0.01	--	----	----	Dry	----	----
Standing Water Level	----	0.01	m AHD	29.6	----	----	----	----
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	1	mg/L	6	<1	----	----	----