Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EW1201466**	Page	: 1 of 8
Amendment	: **1**		
Client	: **SHOALHAVEN CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Mr David Hojem	Contact	: Brianne Martin
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Project	: West Nowra Landfill Quarterly	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: 15425 16780		
C-O-C number	: ----	Date Samples Received	: 22-MAY-2012
Sampler	: Craig Wilson	Issue Date	: 31-MAY-2012
Site	: ----		
		No. of samples received	: 22
Quote number	: ----	No. of samples analysed	: 22

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.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Glenn Davies	Environmental Services Representative	Laboratory - Wollongong
Sarah Millington	Senior Inorganic Chemist	Sydney Inorganics

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

- **BH 4 - Destroyed**
  BH15 & MW3a - Dry at time of sampling.
- **EA015: LCS for TDS falls otside the Dunamic Control Limits, however, it is within the acceptable criteria based on ALS DQO. No further action is required.**
- **EG020-: LCS recovery for some elements falls outside ALS Dynamic Control Limit. However, they are within the acceptance criteria based on ALS DQO. No further action is required.**
- **EK057G LOR raised for Nitrite on the sample ID (MW 2,MW 4) due to sample matrix.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: SW 1	SW2	SW3	BH2	BH 3
				Client sampling date / time: 22-MAY-2012 09:45	22-MAY-2012 08:20	22-MAY-2012 09:00	22-MAY-2012 09:15	22-MAY-2012 09:25
				EW1201466-001	EW1201466-002	EW1201466-003	EW1201466-004	EW1201466-005
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	1810	175	1640	490	197
ED037P: Alkalinity by PC Titrator								
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	----	----	----	24	<1
Total Alkalinity as CaCO3	----	1	mg/L	----	----	----	24	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	----	<1	50
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	----	----	----	229	38
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	----	----	----	7	<1
Magnesium	7439-95-4	1	mg/L	----	----	----	7	3
Sodium	7440-23-5	1	mg/L	----	----	----	138	42
Potassium	7440-09-7	1	mg/L	110	1	91	2	<1
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	30.8	0.32	17.0	0.14	0.14
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	----	----	----	6.94	2.11
Total Cations	----	0.01	meq/L	----	----	----	6.98	2.07
Ionic Balance	----	0.01	%	----	----	----	0.27	----
EN67 PK: Field Tests								
pH	----	0.1	pH Unit	8.3	6.4	8.3	5.2	4.2
Electrical Conductivity (Non Compensated)	----	1	µS/cm	3650	302	3370	----	----
Dissolved Oxygen	----	0.01	mg/L	10.6	7.38	10.9	----	----
Standing Water Level	----	0.01	m AHD	----	----	----	31.5	31.0
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	42	13	38	31	1
EP030: Biochemical Oxygen Demand (BOD)								
Biochemical Oxygen Demand	----	2	mg/L	10	<2	8	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: BH 4	BH 5	BH 6	BH 7	BH 10
				Client sampling date / time: 22-MAY-2012 09:35	22-MAY-2012 10:05	22-MAY-2012 10:15	22-MAY-2012 10:25	22-MAY-2012 10:45
				EW1201466-006	EW1201466-007	EW1201466-008	EW1201466-009	EW1201466-010
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	----	**2710**	**864**	**372**	**136**
ED037P: Alkalinity by PC Titrator								
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	**8**	**34**
Total Alkalinity as CaCO3	----	1	mg/L	----	<1	<1	**8**	**34**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	**29**	**45**	**27**	<1
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	----	**1580**	**513**	**120**	**48**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	----	**46**	**6**	**13**	**4**
Magnesium	7439-95-4	1	mg/L	----	**69**	**14**	**9**	**4**
Sodium	7440-23-5	1	mg/L	----	**842**	**333**	**57**	**33**
Potassium	7440-09-7	1	mg/L	----	**5**	**2**	**4**	<1
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	----	**0.57**	**0.04**	**0.03**	**0.73**
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	----	**45.2**	**15.4**	**4.11**	**2.03**
Total Cations	----	0.01	meq/L	----	**44.7**	**16.0**	**3.97**	**1.96**
Ionic Balance	----	0.01	%	----	**0.51**	**1.83**	**1.68**	----
EN67 PK: Field Tests								
pH	----	0.1	pH Unit	----	**4.2**	**4.1**	**5.4**	**5.4**
Field Observations	----	0.01	--	**DESTROYED**	----	----	----	----
Standing Water Level	----	0.01	m AHD	----	**29.0**	**30.7**	**30.3**	**34.1**
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	----	**7**	**3**	**12**	**13**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: BH 11 Client sampling date / time: 22-MAY-2012 10:35 EW1201466-011	BH 12 22-MAY-2012 10:10 EW1201466-012	BH 13 22-MAY-2012 09:55 EW1201466-013	BH 14 22-MAY-2012 11:40 EW1201466-014	BH 15 22-MAY-2012 08:40 EW1201466-015
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**2390**	**1500**	**1740**	**240**	----
ED037P: Alkalinity by PC Titrator								
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**	<1	<1	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	**1**	<1	<1	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	**27**	**4**	**71**	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**1340**	**880**	**960**	**53**	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**6**	**31**	**4**	**1**	----
Magnesium	7439-95-4	1	mg/L	**51**	**39**	**14**	**3**	----
Sodium	7440-23-5	1	mg/L	**781**	**505**	**553**	**59**	----
Potassium	7440-09-7	1	mg/L	<1	<1	<1	<1	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.26**	**0.09**	**0.06**	**0.27**	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	**37.8**	**25.4**	**27.2**	**2.97**	----
Total Cations	----	0.01	meq/L	**38.5**	**26.7**	**25.4**	**2.86**	----
Ionic Balance	----	0.01	%	**0.86**	**2.51**	**3.36**	----	----
EN67 PK: Field Tests								
pH	----	0.1	pH Unit	**4.1**	**4.3**	**4.6**	**4.8**	----
Field Observations	----	0.01	--	----	----	----	----	**DRY**
Standing Water Level	----	0.01	m AHD	**30.5**	**30.3**	**33.6**	**37.2**	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**26**	<1	**4**	**2**	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: MW 1D Client sampling date / time: 22-MAY-2012 11:10 EW1201466-016	MW 1S 22-MAY-2012 11:20 EW1201466-017	MW 2 22-MAY-2012 10:55 EW1201466-018	MW 3a 22-MAY-2012 11:30 EW1201466-019	MW 4 22-MAY-2012 08:30 EW1201466-020
ED037P: Alkalinity by PC Titrator								
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	**53**	----	**54**
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	**53**	----	**54**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**6**	**12**	**12**	----	**22**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**153**	**148**	**650**	----	**735**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**10**	**4**	**37**	----	<1
Magnesium	7439-95-4	1	mg/L	**10**	**7**	**33**	----	**14**
Sodium	7440-23-5	1	mg/L	**73**	**82**	**362**	----	**445**
Potassium	7440-09-7	1	mg/L	**1**	<1	<1	----	<1
EG020F: Dissolved Metals by ICP-MS								
Iron	7439-89-6	0.05	mg/L	**0.05**	**0.27**	**14.3**	----	**59.9**
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.28**	**0.05**	**0.09**	----	**0.07**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	<0.10	----	<0.10
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.01**	<0.01	<0.10	----	<0.10
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.01**	<0.01	<0.10	----	<0.10
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	**4.44**	**4.42**	**19.6**	----	**22.3**
Total Cations	----	0.01	meq/L	**4.52**	**4.34**	**20.3**	----	**20.5**
Ionic Balance	----	0.01	%	**0.91**	**0.95**	**1.65**	----	**4.14**
EN67 PK: Field Tests								
pH	----	0.1	pH Unit	**4.6**	**3.8**	**4.9**	----	**5.1**
Electrical Conductivity (Non Compensated)	----	1	µS/cm	**566**	**595**	**1880**	----	**2220**
Field Observations	----	0.01	--	----	----	----	**DRY**	----
Standing Water Level	----	0.01	m AHD	**38.5**	**38.5**	**36.2**	----	**35.2**
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	<1	<1	<1	----	**14**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: MW 1D	MW 1S	MW 2	MW 3a	MW 4
				Client sampling date / time: 22-MAY-2012 11:10	22-MAY-2012 11:20	22-MAY-2012 10:55	22-MAY-2012 11:30	22-MAY-2012 08:30
				EW1201466-016	EW1201466-017	EW1201466-018	EW1201466-019	EW1201466-020
EP030: Biochemical Oxygen Demand (BOD)								
Biochemical Oxygen Demand	----	2	mg/L	<2	<2	<2	----	**9**
EP035G: Total Phenol by Discrete Analyser								
Phenols (Total)	----	0.05	mg/L	<0.05	<0.05	<0.05	----	<0.05

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: Duplicate	Blank	----	----	----
				Client sampling date / time: 22-MAY-2012 10:25	22-MAY-2012 08:25	----	----	----
				EW1201466-021	EW1201466-022	----	----	----
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	----	<1	----	----	----
Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**320**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
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	**8**	<1	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**8**	<1	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**25**	<1	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**120**	<1	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**14**	<1	----	----	----
Magnesium	7439-95-4	1	mg/L	**10**	<1	----	----	----
Sodium	7440-23-5	1	mg/L	**57**	<1	----	----	----
Potassium	7440-09-7	1	mg/L	**4**	<1	----	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.06**	<0.01	----	----	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	**4.07**	<0.01	----	----	----
Total Cations	----	0.01	meq/L	**4.10**	<0.01	----	----	----
Ionic Balance	----	0.01	%	**0.46**	----	----	----	----
EN67 PK: Field Tests								
pH	----	0.1	pH Unit	**5.4**	**6.5**	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**13**	<1	----	----	----