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Our Ref: 213337_REP_015.docx

21 September 2016

The General Manager
Oberon Council
PO Box 84
OBERON NSW 2787

Attention: Mr Gary Wallace

ENVIRONMENTAL MONITORING: JULY – SEPTEMBER 2016
OBERON WASTE FACILITY (OWF) EPL 20289

This letter summarises the results of groundwater monitoring conducted on 5 September 2016, as well as routine surface water and accumulated gas monitoring conducted during monthly in the quarterly period from July to September 2016.

Surface Water

Surface water discharge events were recorded in July and September 2016.

Both samples were collected by Geolyse staff from the rising stage sampler and was then analysed for parameters as required by the EPL. The location of the surface water monitoring point, SW1 is depicted on **Drawing 05C_EVO2**. Sampling is required to be undertaken monthly during discharge.

Observations were as follows:

- Laboratory measured pH ranged from 7.14 in July 2016 to 7.57 in September 2016. pH remains within the EPL discharge limit range and is also considered suitable for livestock drinking water; being within 6.5 to 8.5 pH units (Markwick, 2007).
- Electrical conductivity (EC) ranged from 75 µS/cm in July 2016 to 478 µS/cm in September 2016, and consistent with previous results. Corresponding total dissolved solids (TDS) concentrations ranged from 50 mg/L to 320 mg/L and was considered suitable for consumption by the most susceptible livestock category, poultry (<3000 mg/L, ANZECC & ARMCANZ, 2000).
- Total suspended solids (TSS) ranged from 8 mg/L in July 2016 to 60 mg/L in September 2016. The September 2016 TSS concentration exceeded the EPL limit of 50 mg/L.
- Oil and grease was recorded at less than the laboratory limit of reporting (LOR) of 5 mg/L in both samples, below the EPL limit of 10 mg/L.

No surface water discharge events were recorded in August 2016.

Surface water results for the period from July 2014 through to the sampling event are presented in the attached charts.

Groundwater Levels

Groundwater levels were recorded at monitoring stations BH1S, BH3S and BH4S. Other monitoring stations BH1D, BH2, BH3D, BH4D, BH5S, BH6S and BH6D were dry when gauging. The locations of groundwater monitoring stations are shown on attachment Drawing 05C_EVO2. The groundwater level measurements are also provided as an attachment in **Table 1** and are illustrated below in **Chart 1**.

Historically, eastern monitoring points BH6S and BH6D have had the most elevated groundwater levels and the western monitoring points BH3S, BH3D, BH4S, BH4D and BH5 have had the lowest groundwater levels. Standing water levels, where water was present, were observed to have increased compared to the previous monitoring round in May 2016. The average change in groundwater level was an increase of 3.19 m.

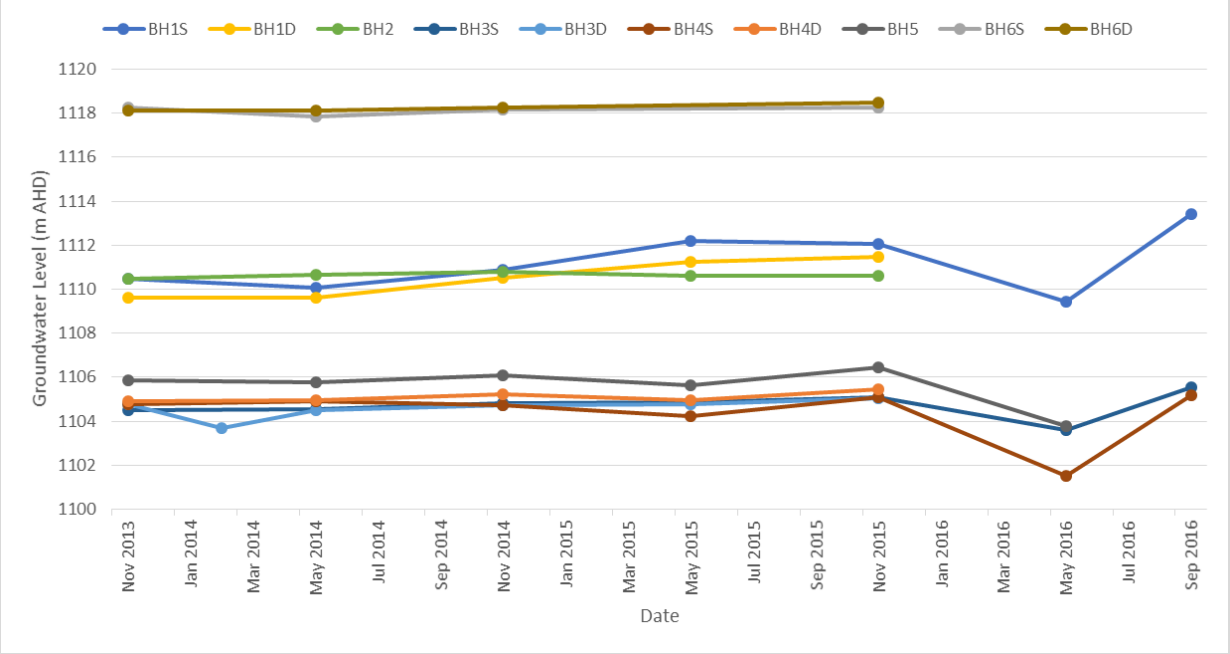


Chart 1: **Groundwater Levels, November 2013 to May 2016**

Groundwater Quality

The three piezometers that recorded a standing water level were purged for sampling, and sufficient recharge of groundwater for water quality sampling occurred.

Samples were analysed for the biannual suite of parameters. The groundwater quality results are summarised in the attached **Table 2**. Where possible, parameters are compared to available guideline values for informative purposes, as such, these guidelines should not be interpreted as provisional limits for the facility.

Observations are as follows:

- Laboratory measured pH ranged from 6.38 pH units at BH1S to 7.04 pH units at BH4S, and no major fluctuations were evident since the previous groundwater monitoring round. The pH of BH1S was more acidic than what is considered suitable for livestock drinking water; other values were within the guideline range of 6.5 to 8.5 pH units (Markwick, 2007).
- Electrical conductivity ranged from 113 µS/cm at BH1S to 1,160 µS/cm at BH4S. Corresponding total dissolved solids (TDS) concentrations ranged from 76 mg/L to 777 mg/L and was considered suitable for consumption by the most susceptible livestock category, poultry (<3000 mg/L, ANZECC & ARMCANZ, 2000).
- Total alkalinity concentrations ranged from 29 mg$CaCO_3$/L (BH1S) to 366 mg$CaCO_3$/L (BH4S). All values were consistent with historical results, however alkalinity recorded at BH4S exceeded the guideline hardness value for potential fouling of waters (350 mg/L, ANZECC & ARMCANZ, 2000).
- Chloride concentrations ranged from 6 mg/L at BH1S to 154 mg/L at BH4S. All concentrations were lower than the guideline value for irrigation to moderately tolerant crops (700 mg/L, ANZECC & ARMCANZ, 2000).
- Sulfate concentrations ranged from 8 mg/L at BH3S, to 12 mg/L at BH1S and BH4S. All concentrations were significantly lower than the 1000 mg/L guideline value for livestock drinking water (ANZECC & ARMCANZ, 2000).
- Calcium concentrations ranged from 3 mg/L at BH1S to 8 mg/L at BH4S. All concentrations were significantly lower than the livestock drinking water guideline value of 1000 mg/L (ANZECC & ARMCANZ, 2000).
- Magnesium concentrations ranged from below the laboratory LOR of 1 mg/L at BH1S to 40 mg/L at BH4S.
- Potassium concentrations were at or below the laboratory LOR of <1 mg/L at all locations sampled.
- Sodium concentrations were recorded to be highest at BH4S (160 mg/L), and BH1S recorded the lowest sodium concentration at 21 mg/L. These values are below the guideline for irrigation of moderately tolerant crops (460 mg/L, ANZECC & ARMCANZ, 2000), and the conservative aesthetic guideline for human drinking water (180 mg/L, NHMRC & NRMMC, 2011).
- Ammonia was low across the facility, ranging from below the LOR of 0.01 mg/L at BH1S, to 0.06 mgN/L at BH3S and BH4S. All values were below the conservative aesthetic guideline for ammonia in human drinking water (0.41 mgN/L, NHMRC & NRMMC, 2011).
- Nitrite was recorded below the laboratory LOR (<0.01 mg/L) in all groundwater samples. Results were significantly lower than the livestock drinking water guideline value of 9.12 mgN/L (ANZECC & ARMCANZ, 2000).
- Nitrate was lowest at BH4s (0.06 mgN/L) and most elevated at BH1S (1.43 mgN/L). These results are lower than the livestock drinking water guideline value for nitrate (90.29 mg/L, ANZECC & ARMCANZ, 2000).
- Reactive phosphorus was below the laboratory LOR in all groundwater samples. Total phosphorus was recorded up to 3.22 mg/L at BH3S. All total phosphorous concentrations recorded in groundwater were below 12 mg/L, the upper limit of the short-term crop irrigation range (ANZECC & ARMCANZ, 2000).

- Total organic carbon in groundwater was recorded to range from 2 mg/L at BH2S and BH3S, to 7 mg/L at BH4S.

Landfill Gas

No accumulated gas was detected during routine monitoring rounds conducted in June, July, August or September 2016.

Conclusions

Groundwater monitoring indicated that standing levels increased since the previous groundwater monitoring conducted in May 2016. Water quality parameters were generally comparable to results from the previous water quality sampling event in November 2015 (no samples were able to be collected in the monitoring event in May 2016).

Surface water discharges were recorded in July and September 2016. Total suspended solids were recorded at 60 mg/L in September 2016, exceeding the EPL limit concentration of 50 mg/L.

No accumulated landfill gas was detected in structures in June, July, August or September, 2016.

The next round of routine monitoring is scheduled for November 2016. Please do not hesitate to contact us with any questions or comments you may have regarding this report.

Yours faithfully
Geolyse Pty Ltd

BRENDAN STUART
Environmental Scientist

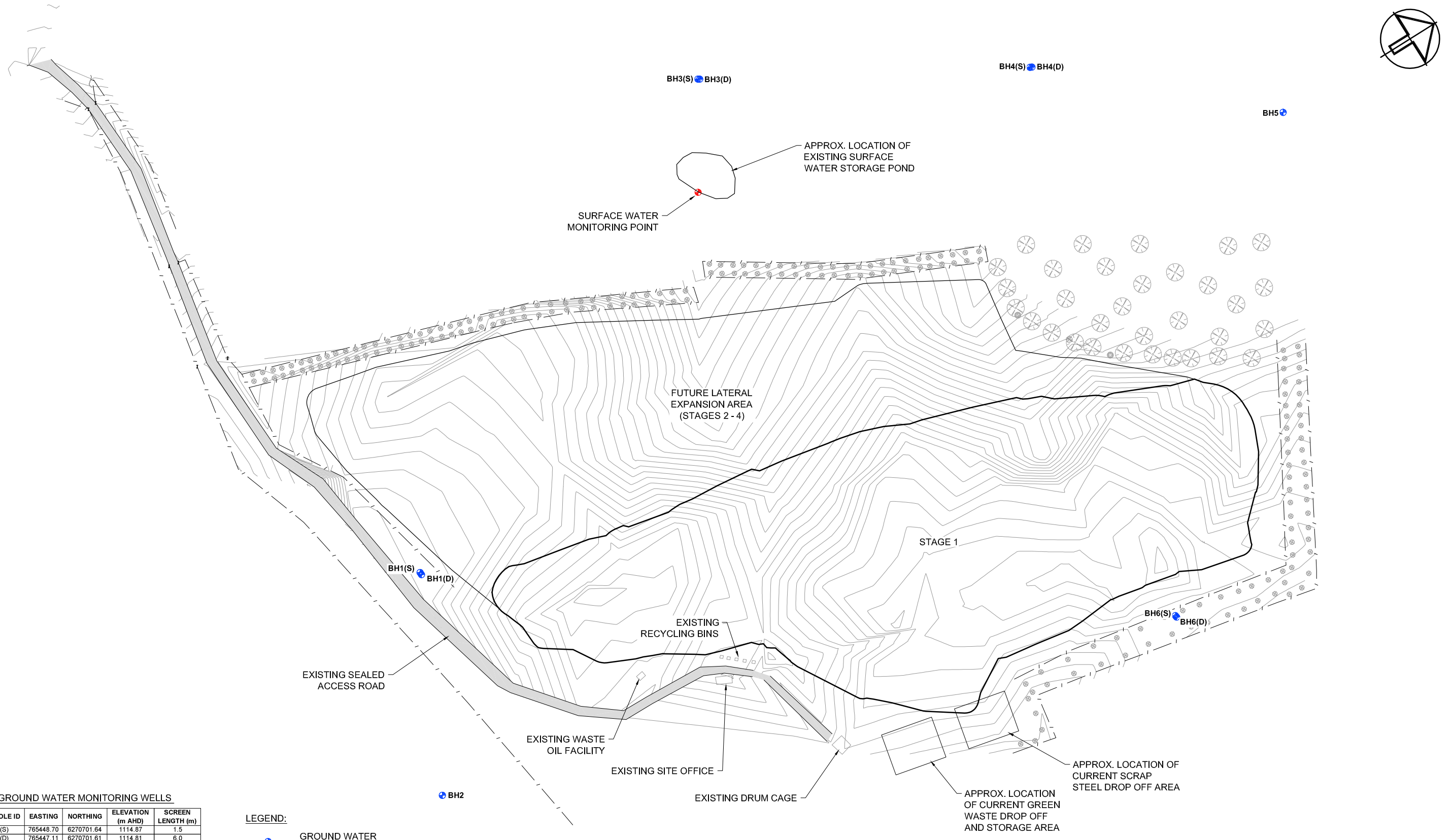
No. of Attachments – 6: Monitoring Locations
Table 1: Results of Laboratory Analysis – Surface Water
Table 2: Groundwater Gauging Results
Table 3: Results of Laboratory Analysis – Groundwater
Charts – Surface Water Quality Parameters
Analytical Laboratory Results

References:

Australian and New Zealand Environment and Conservation Council and the Agriculture and Resource Management Council of Australia and New Zealand (ANZECC & ARMCANZ), 2000, '*Australian and New Zealand Guidelines for Fresh and Marine Water Quality*'.

Markwick, G 2007, '*Water requirements for sheep and cattle'*, Primefact 326, New South Wales Department of Primary Industries, Australia.

National Health and Medical Research Council and the Natural Resource Management Ministerial Council (NHMRC & NRMMC), 2011, '*National Water Quality Management Strategy: Australian Drinking Water Guidelines*', Australia. (updated 2015)



GROUND WATER MONITORING WELLS

BOREHOLE ID	EASTING	NORTHING	ELEVATION (m AHD)	SCREEN LENGTH (m)
BH1(S)	765448.70	6270701.64	1114.87	1.5
BH1(D)	765447.11	6270701.61	1114.81	6.0
BH2	765577.81	6270636.72	1113.52	1.5
BH3(S)	765270.91	6271025.90	1106.14	1.5
BH3(D)	765273.17	6271029.31	1105.96	6.0
BH4(S)	765379.42	6271213.28	1106.15	1.5
BH4(D)	765379.95	6271214.43	1106.16	6.0
BH5	765491.95	6271337.41	1107.75	1.5
BH6(S)	765732.53	6271103.63	1123.07	1.5
BH6(D)	765733.70	6271103.79	1123.20	6.0

LEGEND:

- GROUND WATER MONITORING POINT
- SURFACE WATER MONITORING POINT
- EXISTING LANDFORM CONTOURS (0.5m INTERVAL)

0 100 200 300 400 500

SCALE 1:10000 (A3)

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No	DATE	DRAFTING CHECK	APPROVED BY	DETAILS
A	02/05/13	LP	KH	DRAFT
B	16/05/13	LP	KH	ISSUED
C	01/10/14	MY	MH	UPDATE PIEZO BH3(D) DATA

PROJECT
OBERON LANDFILL EXTENSION
LANDFILL ENVIRONMENTAL MANAGEMENT PLAN

FILE REFERENCE: 211129_05C_EV01-EV07.dwg

APPROVAL AUTHORITY
OBERON COUNCIL
ENVIRONMENT PROTECTION AUTHORITY

CLIENT
OBERON COUNCIL

DRAWING
EXPANSION STAGES AND MONITORING POINTS

PROJECT NUMBER: 211129 | DRAWING NUMBER: 05C_EV02 | REV: C

SOURCE: INTERNAL

TABLE 1 - EPL 20289 OBERON WASTE FACILITY - RESULTS OF LABORATORY ANALYSIS: SURFACE WATER
JULY 2014 - SEPTEMBER 2016

			Sample ID	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1
			Sample Date	22/07/2014	10/09/2014	22/12/2014	3/03/2015	6/05/2015	23/06/2015	16/07/2015	5/08/2015	10/09/2015	23/11/2015	11/07/2016	5/09/2016
Group	**Analyte**	**LOR**	**Units**	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS
pH by PC Titrator	pH Value	0.01	pH Unit	**7.58**	**7.58**	**7.67**	**7.23**	**6.95**	**7.08**	**7.08**	**7.32**	**8.13**	**7.62**	**7.14**	**7.57**
Conductivity by PC Titrator	Electrical Conductivity @ 25°C	1	µS/cm	**172**	**143**	**167**	**121**	**82**	**112**	**107**	**126**	**601**	**184**	**75**	**478**
Total Suspended Solids dried at 104 ± 2°C	Suspended Solids (SS)	5	mg/L	**7**	**11**	**8**	**90**	**46**	**15**	**70**	**15**	**85**	**12**	**8**	**60**
Oil and Grease (O&G)	Oil & Grease	5	mg/L	< 5	< 5	< 5	< 5	< 5	**7**	**10**	< 5	< 5	< 5	< 5	< 5

µS/cm	microsiemens per centimetre
mg/L	milligrams per litre
µg/L	micrograms per litre
meq/L	milliequivalents per litre
NTU	Nephelometric Turbidity Units
LOR	limit of reporting
PS	primary sample

TABLE 2 - EPL 20289 OBERON WASTE FACILITY- GROUNDWTER GAUGING RESULTS

Ground Water Levels: 5-Sep-16

Piezometer Details:

	Ground Elev (mAHD)	Stickup (m)	Elevation Top PVC (mAHD)	Date	Measured (m)	GWL (mAHD)	Well Depth (m)	Well Base (mAHD)	Water Column (m)
BH1S	-	-	1114.87	5/09/2016	1.46	1113.41	5.5	1109.37	4.04
BH1D	-	-	1114.81	5/09/2016	NMWL	-	26.5	1088.31	nil
BH2	-	-	1113.52	5/09/2016	NMWL	-	5.8	1107.72	nil
BH3S	-	-	1106.14	5/09/2016	0.61	1105.53	5.0	1101.14	4.39
BH3D	-	-	1105.96	5/09/2016	NMWL	-	26.6	1079.36	nil
BH4S	-	-	1106.15	5/09/2016	0.97	1105.18	4.8	1101.35	3.83
BH4D	-	-	1106.16	5/09/2016	NMWL	-	50.5	1055.66	nil
BH5	-	-	1107.75	5/09/2016	NMWL	-	5.5	1102.25	nil
BH6S	-	-	1123.07	5/09/2016	NMWL	-	5.9	1117.20	nil
BH6D	-	-	1123.20	5/09/2016	NMWL	-	27.0	1096.20	nil

Definitions:

Stickup: Height of piezometer pipe above ground surface.
Ground Elev: Actual elevation of ground at the piezometer relative to an arbitrary datum. All ground elevations are measured to the same datum, hence Piezo GWLs are relative to each other.
GWL: Actual elevation of groundwater at the piezometer relative to an arbitrary datum.
Measured: Depth of groundwater measured from the top of the piezometer pipe.

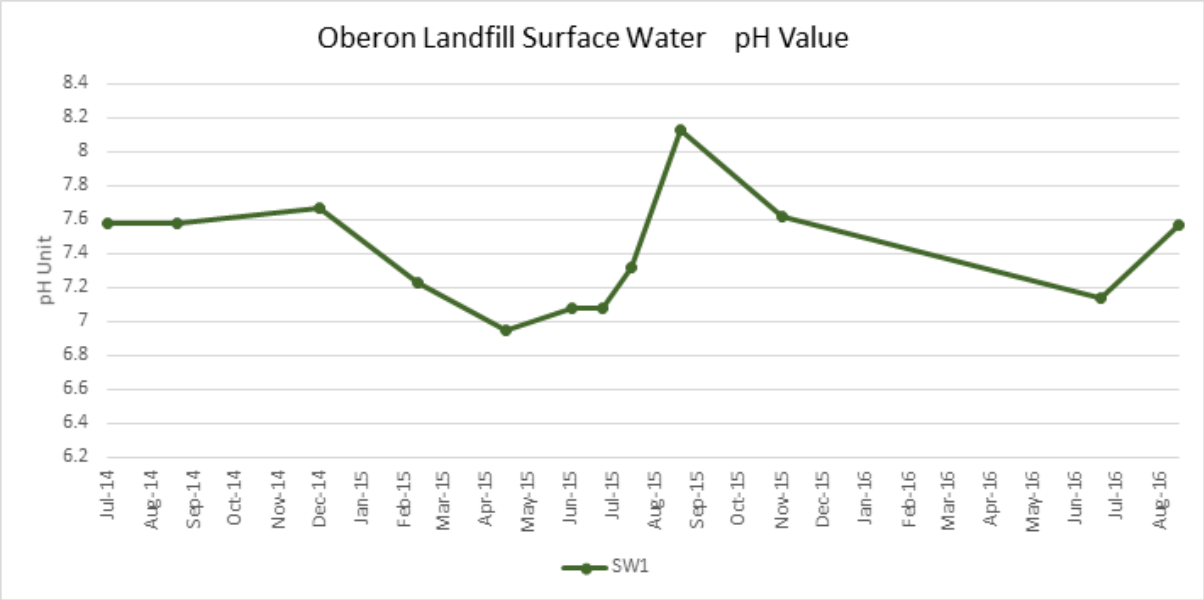
	BH1S		**BH1D**		**BH2**		**BH3S**		**BH3D**		**BH4S**		**BH4D**		**BH5**		**BH6S**		**BH6D**	
Date	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	
19-Nov-13	4.41	1110.46	5.20	1109.61	3.06	1110.46	1.63	1104.51	1.18	1104.78	1.40	1104.75	1.27	1104.89	1.89	1105.86	4.83	1118.24	5.06	1118.14
25-Feb-14	-		-		-		-		2.28	1103.68	-		-		-					
12-May-14	4.80	1110.07	5.20	1109.61	2.85	1110.67	1.58	1104.56	1.48	1104.48	1.26	1104.89	1.23	1104.93	1.97	1105.78	5.20	1117.87	5.07	1118.13
5-Nov-14	3.99	1110.88	4.28	1110.53	2.72	1110.80	1.31	1104.83	1.24	1104.72	1.43	1104.72	0.92	1105.24	1.66	1106.09	4.90	1118.17	4.94	1118.26
6-May-15	2.67	1112.20	3.58	1111.23	2.90	1110.62	1.27	1104.87	1.18	1104.78	1.91	1104.24	1.21	1104.95	2.11	1105.64	NMWL		NMWL	
23-Nov-15	2.82	1112.05	3.33	1111.48	2.90	1110.62	1.04	1105.10	0.94	1105.02	1.05	1105.10	0.70	1105.46	1.30	1106.45	4.83	1118.24	4.73	1118.47
19-May-16	5.42	1109.45	NMWL		NMWL		2.55	1103.59	NMWL		4.65	1101.50	NMWL		3.97	1103.78	NMWL		NMWL	
5-Sep-16	1.46	1113.41	NMWL		NMWL		0.61	1105.53	NMWL		0.97	1105.18	NMWL		NMWL		NMWL		NMWL	

TABLE 3 - EPL 20289 OBERON WASTE FACILITY - RESULTS OF LABORATORY ANALYSIS: GROUNDWATER
SEPTEMBER 2016

				Sample ID	BH1S	BH3S	W9003	BH4S
				Sample Date	5/09/2016	5/09/2016	5/09/2016	5/09/2016
Group	**Analyte**	**LOR**	**Units**		PS	PS	FD	PS
pH by PC Titrator	pH Value	0.01	pH Unit		**6.38**	**6.63**	**6.63**	**7.04**
Conductivity by PC Titrator	Electrical Conductivity @ 25°C	1	µS/cm		**113**	**415**	**416**	**1160**
Alkalinity by PC Titrator	Bicarbonate Alkalinity as CaCO3	1	mg/L		**29**	**141**	**146**	**366**
	Carbonate Alkalinity as CaCO3	1	mg/L		< 1	< 1	< 1	< 1
	Hydroxide Alkalinity as CaCO3	1	mg/L		< 1	< 1	< 1	< 1
	Total Alkalinity as CaCO3	1	mg/L		**29**	**141**	**146**	**366**
Sulfate (Turbidimetric) as SO4 2- by DA	Sulfate as SO4 - Turbidimetric	1	mg/L		**12**	**8**	**8**	**12**
Chloride by Discrete Analyser	Chloride	1	mg/L		**6**	**40**	**40**	**154**
Fluoride by PC Titrator	Fluoride	0.1	mg/L		< 0.1	**0.6**	**0.6**	**0.7**
Dissolved Major Cations	Calcium	1	mg/L		**3**	**4**	**4**	**8**
	Magnesium	1	mg/L		< 1	**15**	**16**	**40**
	Potassium	1	mg/L		< 1	< 1	< 1	**1**
	Sodium	1	mg/L		**21**	**58**	**57**	**160**
Ionic Balance	Ionic Balance	0.01	%		-	**1.97**	**2.68**	**5.49**
	Total Anions	0.01	meq/L		**1**	**4.11**	**4.21**	**11.9**
	Total Cations	0.01	meq/L		**1.06**	**3.96**	**4**	**10.7**
Ammonia as N by Discrete Analyser	Ammonia as N	0.01	mg/L		< 0.01	**0.06**	**0.05**	**0.06**
Nitrite as N by Discrete Analyser	Nitrite as N	0.01	mg/L		< 0.01	< 0.01	< 0.01	< 0.01
Nitrate as N by Discrete Analyser	Nitrate as N	0.01	mg/L		**1.43**	**0.08**	**0.06**	**0.06**
Nitrite plus Nitrate as N (NOx) by Discrete Analyser	Nitrite + Nitrate as N	0.01	mg/L		**1.43**	**0.08**	**0.06**	**0.06**
Total Kjeldahl Nitrogen By Discrete Analyser	Total Kjeldahl Nitrogen as N	0.1	mg/L		**0.6**	**4.2**	**4.6**	**2.2**
Total Nitrogen as N (TKN + NOx) by Discrete Analyser	Total Nitrogen as N	0.1	mg/L		**2**	**4.3**	**4.7**	**2.3**
Total Phosphorus as P by Discrete Analyser	Total Phosphorus as P	0.01	mg/L		**0.22**	**3.22**	**2.94**	**0.48**
Total Organic Carbon (TOC)	Total Organic Carbon	1	mg/L		**2**	**2**	**2**	**7**
Total Hardness as CaCO3	Total Hardness as CaCO3	1	mg/L		**7**	**72**	**76**	**185**
Reactive Phosphorus as P by discrete analyser	Reactive Phosphorus as P	0.01	mg/L		< 0.01	< 0.01	< 0.01	< 0.01
Sodium Adsorption Ratio (SAR)	Sodium Adsorption Ratio	0.01	-		**3.34**	**2.98**	**2.85**	**5.12**

µS/cm	microsiemens per centimetre
mg/L	milligrams per litre
µg/L	micrograms per litre
meq/L	milliequivalents per litre
NTU	Nephelometric Turbidity Units
LOR	limit of reporting
PS	primary sample
FD	field duplicate

CHARTS


Oberon Landfill Surface Water pH Value
pH Unit
8.4
8.2
8
7.8
7.6
7.4
7.2
7
6.8
6.6
6.4
6.2
Jul-14
Aug-14
Sep-14
Oct-14
Nov-14
Dec-14
Jan-15
Feb-15
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
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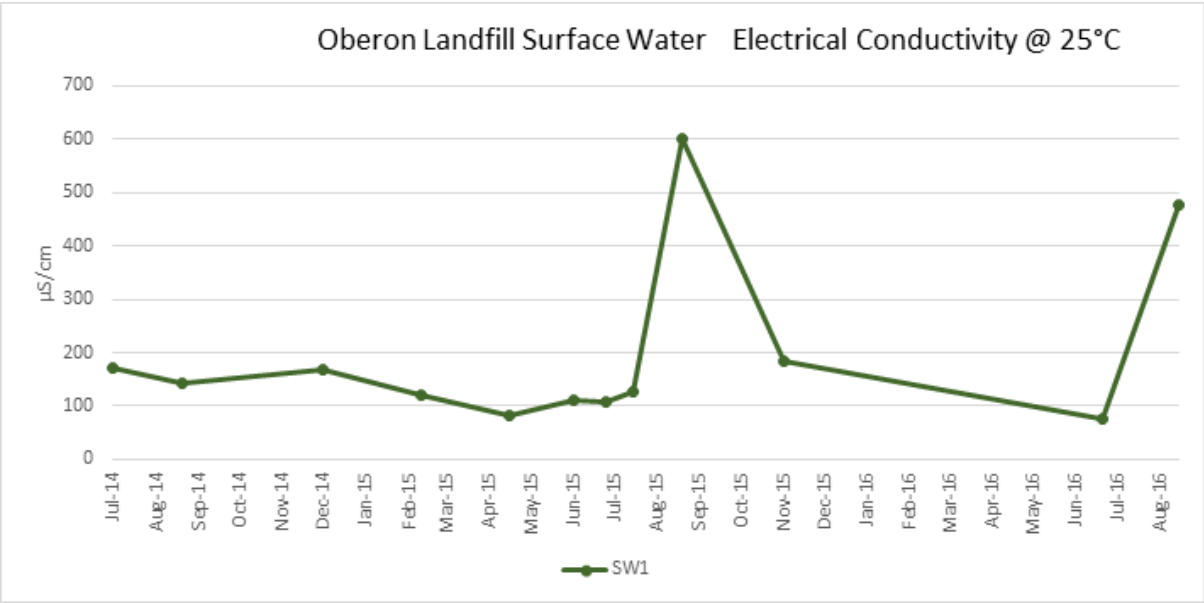
Apr-16
May-16
Jun-16
Jul-16
Aug-16
SW1


Oberon Landfill Surface Water Electrical Conductivity @ 25°C
µS/cm
700
600
500
400
300
200
100
0
Jul-14
Aug-14
Sep-14
Oct-14
Nov-14
Dec-14
Jan-15
Feb-15
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
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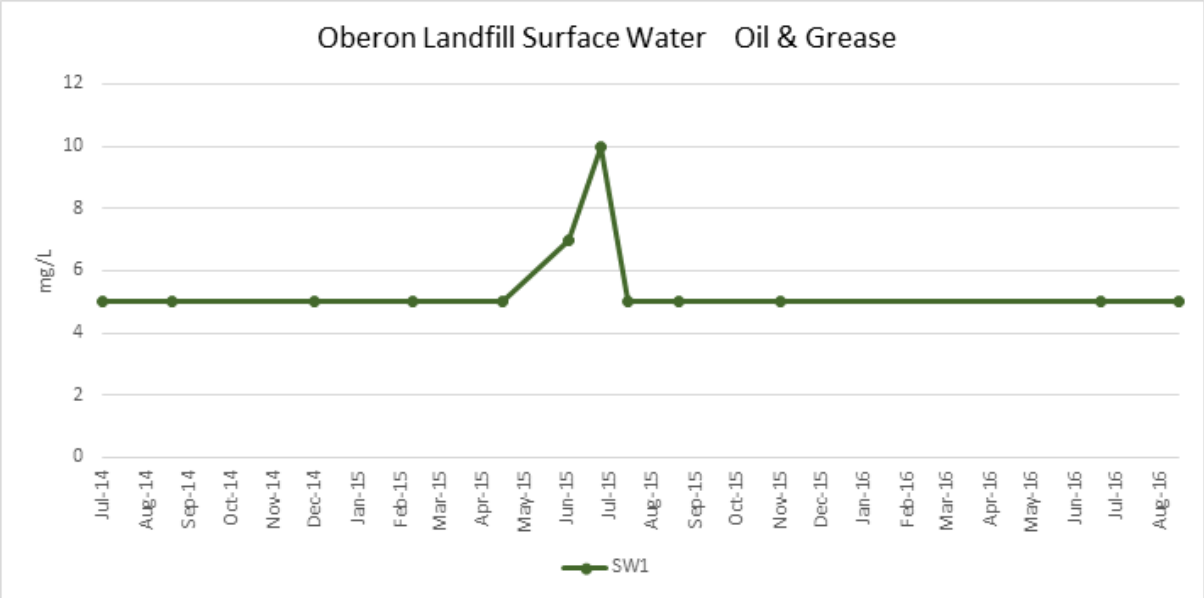
Apr-16
May-16
Jun-16
Jul-16
Aug-16
SW1


Oberon Landfill Surface Water Oil & Grease
mg/L
12
10
8
6
4
2
0
Jul-14
Aug-14
Sep-14
Oct-14
Nov-14
Dec-14
Jan-15
Feb-15
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
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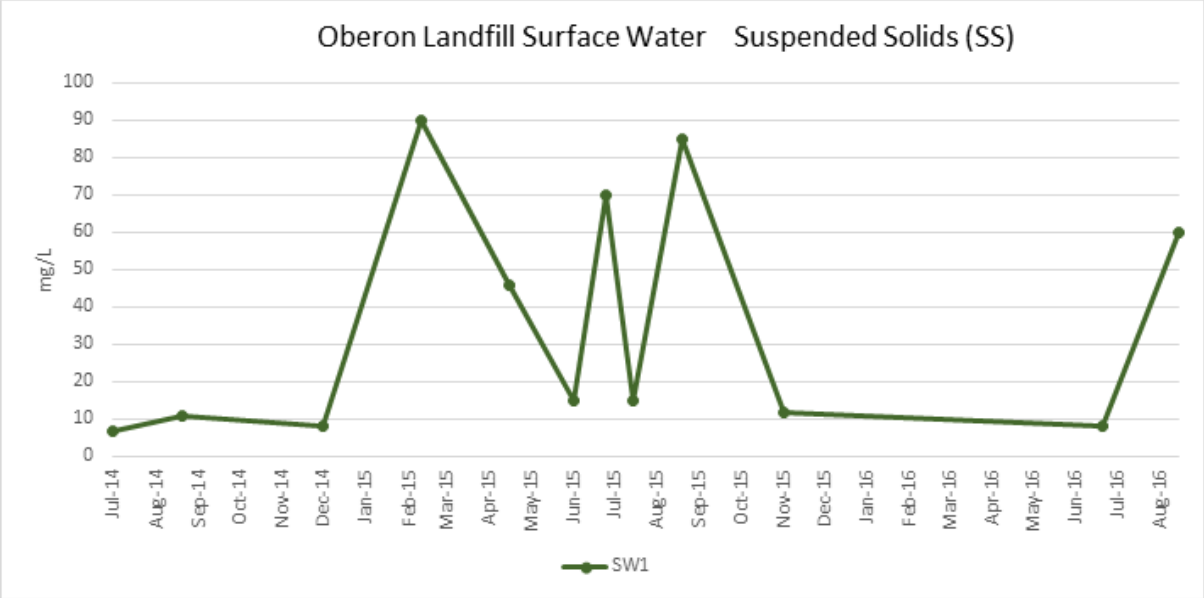
Apr-16
May-16
Jun-16
Jul-16
Aug-16
SW1


Oberon Landfill Surface Water Suspended Solids (SS)
mg/L
100
90
80
70
60
50
40
30
20
10
0
Jul-14
Aug-14
Sep-14
Oct-14
Nov-14
Dec-14
Jan-15
Feb-15
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Jan-16
Feb-16
Mar-16
Apr-16
May-16
Jun-16
Jul-16
Aug-16
SW1

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1615207**	Page	: 1 of 2
Client	: **OBERON COUNCIL**	Laboratory	: Environmental Division Sydney
Contact	: BRENDON STUART	Contact	:
Address	: 137-139 OBERON STREET OBERON NSW,AUSTRALIA 2787	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 6393 5000	Telephone	: +61-2-8784 8555
Project	: 213337	Date Samples Received	: 13-Jul-2016 09:00
Order number	: ----	Date Analysis Commenced	: 13-Jul-2016
C-O-C number	: ----	Issue Date	: 19-Jul-2016 12:33
Sampler	: DEAN LAVERS		
Site	: ----		
Quote number	: ----		
No. of samples received	: 1		
No. of samples analysed	: 1		

NATA Accredited Laboratory 825
Accredited for compliance with
ISO/IEC 17025.

NATA
WORLD RECOGNISED ACCREDITATION

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

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.

Signatories	*Position*	*Accreditation Category*
Ashesh Patel	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW

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
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**SW1**	**----**	**----**	**----**	**----**
			Client sampling date / time	11-Jul-2016 10:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1615207-001**	**--------**	**--------**	**--------**	**--------**
				Result	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.14**	**----**	**----**	**----**	**----**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**75**	**----**	**----**	**----**	**----**
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**8**	**----**	**----**	**----**	**----**
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	<5	**----**	**----**	**----**	**----**

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1619837**	Page	: 1 of 6
Client	: **OBERON COUNCIL**	Laboratory	: Environmental Division Sydney
Contact	: BRENDON STUART	Contact	:
Address	: 137-139 OBERON STREET OBERON NSW,AUSTRALIA 2787	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 6393 5000	Telephone	: +61-2-8784 8555
Project	: 213337	Date Samples Received	: 07-Sep-2016 09:30
Order number	: ----	Date Analysis Commenced	: 07-Sep-2016
C-O-C number	: ----	Issue Date	: 13-Sep-2016 19:41
Sampler	: Dean Lavers		
Site	: ----		
Quote number	: ----		
No. of samples received	: 6		
No. of samples analysed	: 6		

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.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW

General Comments

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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
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EA006: Sodium absorption ratio for sample ES1619837 #004 could not be calculated as Ca and Mg results are below the detection limits.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1s	BH3s	BH4s	W9001	W9003
				Client sampling date / time	[05-Sep-2016]	[05-Sep-2016]	[05-Sep-2016]	[05-Sep-2016]	[05-Sep-2016]
Compound	CAS Number	LOR	Unit		ES1619837-001	ES1619837-002	ES1619837-003	ES1619837-004	ES1619837-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		6.38	6.63	7.04	5.72	6.63
EA006: Sodium Adsorption Ratio (SAR)									
Sodium Adsorption Ratio	----	0.01	-		3.34	2.98	5.12	----	2.85
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		113	415	1160	<1	416
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		73	270	754	<1	270
Total Dissolved Solids (Calc.)	----	10	mg/L		----	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		----	----	----	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		7	72	185	<1	76
ED037P: Alkalinity by PC Titrator									
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		29	141	366	<1	146
Total Alkalinity as CaCO3	----	1	mg/L		29	141	366	<1	146
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		12	8	12	<1	8
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		6	40	154	<1	40
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		3	4	8	<1	4
Magnesium	7439-95-4	1	mg/L		<1	15	40	<1	16
Sodium	7440-23-5	1	mg/L		21	58	160	<1	57
Potassium	7440-09-7	1	mg/L		<1	<1	1	<1	<1
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	0.6	0.7	<0.1	0.6
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		<0.01	0.06	0.06	<0.01	0.05
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1s	BH3s	BH4s	W9001	W9003
				Client sampling date / time	[05-Sep-2016]	[05-Sep-2016]	[05-Sep-2016]	[05-Sep-2016]	[05-Sep-2016]
Compound	CAS Number	LOR	Unit		ES1619837-001	ES1619837-002	ES1619837-003	ES1619837-004	ES1619837-005
					Result	Result	Result	Result	Result
EK058G: Nitrate as N by Discrete Analyser - Continued									
Nitrate as N	14797-55-8	0.01	mg/L		1.43	0.08	0.06	0.01	0.06
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		1.43	0.08	0.06	0.01	0.06
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.6	4.2	2.2	<0.1	4.6
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		2.0	4.3	2.3	<0.1	4.7
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.22	3.22	0.48	<0.01	2.94
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		1.00	4.11	11.9	<0.01	4.21
Total Cations	----	0.01	meq/L		1.06	3.96	10.7	<0.01	4.00
Ionic Balance	----	0.01	%		----	1.97	5.49	----	2.68
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		2	2	7	<1	2
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L		----	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW1	----	----	----	----
				Client sampling date / time	[05-Sep-2016]	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1619837-006	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.57	----	----	----	----
EA006: Sodium Adsorption Ratio (SAR)									
Sodium Adsorption Ratio	----	0.01	-		----	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		478	----	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		----	----	----	----	----
Total Dissolved Solids (Calc.)	----	10	mg/L		311	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		60	----	----	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		----	----	----	----	----
ED037P: Alkalinity by PC Titrator									
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		----	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		----	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		----	----	----	----	----
ED093F: Dissolved Major Cations									
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		----	----	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		----	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		----	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		----	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW1	----	----	----	----
				Client sampling date / time	[05-Sep-2016]	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1619837-006	--------	--------	--------	--------
					Result	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser - Continued									
Nitrate as N	14797-55-8	0.01	mg/L		----	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		----	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		----	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		----	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		----	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		----	----	----	----	----
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		----	----	----	----	----
Total Cations	----	0.01	meq/L		----	----	----	----	----
Ionic Balance	----	0.01	%		----	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		----	----	----	----	----
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L		<5	----	----	----	----