DLA environmental
ABN 36 926 009 197

Sydney
Unit 2B 30 Leighton Place
Hornsby NSW 2077
Phone: 9476 1765
Fax: 9476 1557
Email: dlaenvironmental@bigpond.com

Maitland
42B Church Street
Maitland NSW 2320
PO Box 137
Branxton NSW 2335
Phone: 4933 0001
Email: dla.hunter@bigpond.com

20th December 2013

DL3060_S001215

Mr Chris Ryan
Ionic Management Pty Ltd
Shop 1, 22 Gadigal Avenue
Zetland NSW 2017

Dear Chris,

Re: Response to Council's Comments on DLA's Proposed Dewatering Management Plan -Kirrawee Brickpit, 566-594 Princes Highway, Kirrawee

DLA Environmental (DLA) were commissioned by Chris Ryan of Ionic Management on behalf of South Village Pty Ltd to prepare a Dewatering and Groundwater Management Plan for the dewatering of the former Kirrawee Brick Pit located on the property identified as Lot 2 DP589977 at 566-594 Princes Highway, Kirrawee (the Site). The plan was submitted to Council, with comments outlined in section 4 of File Ref: DN13/0061 dated 02 December 2013 addressed below.

1. DLA undertook additional water sampling in December 2013. Water was sampled at depths of below 2m and 4m from two (2) locations (east and west) within the brickpit and from the two (2) remaining groundwater wells onsite. Samples were also collected from the proposed receiving waters of Dents Creek and Oyster Gully.

   All samples were analysed for Manganese and Iron. Analysis indicated manganese concentrations were not detected above the laboratory limit of reporting (LOR) at depths within the brickpit of 2m, with concentrations of 930µg/L and 1200µg/L at a depths of below 4m. Recorded concentrations fall below the trigger level for manganese of 1900µg/L in the ANZECC Water Quality Guidelines for Fresh and Marine Waters 2000 (95% freshwater). See **Appendix A**

   Iron concentrations of 22µg/L at 2m depths at both locations and 11µg/L at 4m were found to be significantly lower than in both proposed receiving waters (110µg/L in Dents Creek and 160µg/L in Oyster Gully). No action trigger levels currently exist for iron in the ANZECC Water Quality Guidelines for Fresh and

Marine Waters 2000 (95% freshwater). As such there is no indication that the addition of water contained within the brickpit will adversely impact on the water quality of the receiving waters and is suitable for discharge to the stormwater system.

2. Following review of the most recent data obtained for the site waters, DLA will include ongoing analysis of manganese and iron concentrations as part of water quality monitoring being conducted on a frequent basis during initial stages of the dewatering process. Sampling frequency will be reviewed based on analytical results received.

3. DLA acknowledges Council's recommendation on an approved discharge rate of 15L/s per pump to minimise any potential adverse impact on downstream receiving environments, and will modify the proposed Dewatering Management Plan accordingly.

4. DLA acknowledges Council's recommendation that discharge of water from the brickpit be ceased during rainfall events to ensure sufficient capacity is maintained within Council's stormwater system, and will modify the proposed Dewatering Management Plan accordingly.

5. DLA will conduct ongoing monitoring of changes in groundwater levels and quality during the dewatering process. DLA acknowledge and will adopt the management recommendations for monitoring requirements for environmental impacts during dewatering as outlined in the Pells Sullivan Meynink Geotechnical Groundwater and Assessment Report (October 2013) and Geotechnical Monitoring Plan During Dewatering (November 2013).

   In response to comments from the Department of Primary Industries (Doc. OUT13/27069) in relation to groundwater management during dewatering, the NSW Aquifer Interference Policy (DPI – NSW Office of Water, September 2012) has been reviewed.

   As the site has been identified to fall within a fractured rock aquifer and meets the criteria of a less productive groundwater source, a decline in water table of less than 2m is identified in the Minimal Impact Considerations for Aquifer Interference Activities from Less Productive Groundwater Sources as an acceptable impact on the water table.

   The additional protocol for groundwater level management will incorporate weekly monitoring of groundwater levels during discharge. A change in groundwater levels of 1m from pre-dewatering levels will be utilised as a trigger for increased

frequency of groundwater level monitoring and the Site's geotechnical consultants will be notified. In the event of a change in groundwater levels of 1.5m or greater from pre-dewatering levels, DLA will work with the site's Geotechnical consultants, with the option of reducing or ceasing discharge until further geotechnical investigations have been undertaken.

The modifications outlined above will be made to the Dewatering Management Plan for the Kirrawee site. If we can be of any further assistance or you require more detail please do not hesitate to call.

Yours faithfully

Josh Crawford

Environmental Consultant

DLA Environmental

Appendix B

NATA Certified Analytical Results

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 102351

Client:
David Lane Associates
2B, 30 Leighton Pl
Hornsby
NSW 2077

Attention: Josh Crawford

Sample log in details:

Your Reference:	**DL3060 - Kirawee**		
No. of samples:	9 waters		
Date samples received / completed instructions received	12/12/13	/	12/12/13

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	17/12/13	/	17/12/13
Date of Preliminary Report:	Not issued		

NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Jacinta Hurst
Laboratory Manager

HM in water - dissolved Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	102351-1 Pit-East-2m 12/12/2013 water	102351-2 Pit-East-4m 12/12/2013 water	102351-3 Pit-West-2m 12/12/2013 water	102351-4 Pit-West-4m 12/12/2013 water	102351-5 GW1 12/12/2013 water
Date prepared	-	16/12/2013	16/12/2013	16/12/2013	16/12/2013	16/12/2013
Date analysed	-	16/12/2013	16/12/2013	16/12/2013	16/12/2013	16/12/2013
Arsenic-Dissolved	µg/L	[NA]	<1	[NA]	<1	[NA]
Cadmium-Dissolved	µg/L	[NA]	<0.1	[NA]	<0.1	[NA]
Chromium-Dissolved	µg/L	[NA]	<1	[NA]	<1	[NA]
Copper-Dissolved	µg/L	[NA]	<1	[NA]	<1	[NA]
Lead-Dissolved	µg/L	[NA]	<1	[NA]	<1	[NA]
Mercury-Dissolved	µg/L	[NA]	<0.05	[NA]	<0.05	[NA]
Nickel-Dissolved	µg/L	[NA]	<1	[NA]	<1	[NA]
Zinc-Dissolved	µg/L	[NA]	<1	[NA]	<1	[NA]
Iron-Dissolved	µg/L	22	<10	22	11	520
Manganese-Dissolved	µg/L	<5	930	<5	1,200	<5
Boron-Dissolved	µg/L	520	540	530	540	44

HM in water - dissolved Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	102351-6 GW2 12/12/2013 water	102351-7 Dents Creek 12/12/2013 water	102351-8 Oyster-East 12/12/2013 water	102351-9 Oyster-West 12/12/2013 water
Date prepared	-	16/12/2013	16/12/2013	16/12/2013	16/12/2013
Date analysed	-	16/12/2013	16/12/2013	16/12/2013	16/12/2013
Arsenic-Dissolved	µg/L	[NA]	<1	<1	<1
Cadmium-Dissolved	µg/L	[NA]	<0.1	0.1	<0.1
Chromium-Dissolved	µg/L	[NA]	<1	<1	<1
Copper-Dissolved	µg/L	[NA]	3	3	2
Lead-Dissolved	µg/L	[NA]	<1	<1	<1
Mercury-Dissolved	µg/L	[NA]	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	[NA]	1	8	<1
Zinc-Dissolved	µg/L	[NA]	28	14	18
Iron-Dissolved	µg/L	<10	110	25	160
Manganese-Dissolved	µg/L	47	<5	<5	9
Boron-Dissolved	µg/L	50	55	94	43

Miscellaneous Inorganics						
Our Reference:	UNITS	102351-2	102351-4	102351-7	102351-8	102351-9
Your Reference	----------	Pit-East-4m	Pit-West-4m	Dents Creek	Oyster-East	Oyster-West
Date Sampled	----------	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013
Type of sample		water	water	water	water	water
Date prepared	-	13/12/2013	13/12/2013	13/12/2013	13/12/2013	13/12/2013
Date analysed	-	13/12/2013	13/12/2013	13/12/2013	13/12/2013	13/12/2013
pH	pH Units	7.4	7.4	7.4	8.0	7.4
Electrical Conductivity	µS/cm	970	970	610	650	530
Total Suspended Solids	mg/L	20	28	<5	33	<5
Total Dissolved Solids (grav)	mg/L	510	490	320	340	290

Method ID	Methodology Summary
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA 22nd ED, 4500-H+.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell and dedicated meter, in accordance with APHA 22nd ED 2510 and Rayment & Lyons.
Inorg-019	Suspended Solids - determined gravimetrcially by filtration of the sample, in accordance with APHA 22nd ED, 2540-D. The samples are dried at 104+/-5oC.
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180+/-5oC.

QUALITY CONTROL HM in water - dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			16/12/2013	102351-1	16/12/2013 || 16/12/2013	LCS-W1	16/12/2013
Date analysed	-			16/12/2013	102351-1	16/12/2013 || 16/12/2013	LCS-W1	16/12/2013
Arsenic-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	97%
Cadmium-Dissolved	µg/L	0.1	Metals-022 ICP-MS	<0.1	[NT]	[NT]	LCS-W1	102%
Chromium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	100%
Copper-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	97%
Lead-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	100%
Mercury-Dissolved	µg/L	0.05	Metals-021 CV-AAS	<0.05	[NT]	[NT]	LCS-W1	88%
Nickel-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	99%
Zinc-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	100%
Iron-Dissolved	µg/L	10	Metals-022 ICP-MS	<10	102351-1	22 || 21 || RPD: 5	LCS-W1	110%
Manganese-Dissolved	µg/L	5	Metals-022 ICP-MS	<5	102351-1	<5 || <5	LCS-W1	101%
Boron-Dissolved	µg/L	5	Metals-022 ICP-MS	<5	102351-1	520 || 530 || RPD: 2	LCS-W1	92%

QUALITY CONTROL Miscellaneous Inorganics	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			13/12/2013	102351-2	13/12/2013 || 13/12/2013	LCS-W1	13/12/2013
Date analysed	-			13/12/2013	102351-2	13/12/2013 || 13/12/2013	LCS-W1	13/12/2013
pH	pH Units		Inorg-001	[NT]	102351-2	7.4 || [N/T]	LCS-W1	101%
Electrical Conductivity	µS/cm	1	Inorg-002	<1	102351-2	970 || [N/T]	LCS-W1	100%
Total Suspended Solids	mg/L	5	Inorg-019	<5	102351-2	20 || 22 || RPD: 10	LCS-W1	100%
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	102351-2	510 || 510 || RPD: 0	LCS-W1	96%

QUALITY CONTROL HM in water - dissolved	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	102351-2	16/12/2013 || 16/12/2013	102351-2	16/12/2013
Date analysed	-	102351-2	16/12/2013 || 16/12/2013	102351-2	16/12/2013
Arsenic-Dissolved	µg/L	102351-2	<1 || [N/T]	102351-2	97%
Cadmium-Dissolved	µg/L	102351-2	<0.1 || [N/T]	102351-2	101%
Chromium-Dissolved	µg/L	102351-2	<1 || [N/T]	102351-2	99%
Copper-Dissolved	µg/L	102351-2	<1 || [N/T]	102351-2	94%
Lead-Dissolved	µg/L	102351-2	<1 || [N/T]	102351-2	98%
Mercury-Dissolved	µg/L	102351-2	<0.05 || <0.05	[NR]	[NR]
Nickel-Dissolved	µg/L	102351-2	<1 || [N/T]	102351-2	103%
Zinc-Dissolved	µg/L	102351-2	<1 || [N/T]	102351-2	100%
Iron-Dissolved	µg/L	102351-2	<10 || [N/T]	102351-2	110%
Manganese-Dissolved	µg/L	102351-2	930 || [N/T]	102351-2	#
Boron-Dissolved	µg/L	102351-2	540 || [N/T]	102351-2	#

QUALITY CONTROL HM in water - dissolved	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	[NT]	[NT]	102351-4	16/12/2013
Date analysed	-	[NT]	[NT]	102351-4	16/12/2013
Arsenic-Dissolved	µg/L	[NT]	[NT]	[NR]	[NR]
Cadmium-Dissolved	µg/L	[NT]	[NT]	[NR]	[NR]
Chromium-Dissolved	µg/L	[NT]	[NT]	[NR]	[NR]
Copper-Dissolved	µg/L	[NT]	[NT]	[NR]	[NR]
Lead-Dissolved	µg/L	[NT]	[NT]	[NR]	[NR]
Mercury-Dissolved	µg/L	[NT]	[NT]	102351-4	88%
Nickel-Dissolved	µg/L	[NT]	[NT]	[NR]	[NR]
Zinc-Dissolved	µg/L	[NT]	[NT]	[NR]	[NR]
Iron-Dissolved	µg/L	[NT]	[NT]	[NR]	[NR]
Manganese-Dissolved	µg/L	[NT]	[NT]	[NR]	[NR]
Boron-Dissolved	µg/L	[NT]	[NT]	[NR]	[NR]

Report Comments:

Trace Metals: # Percent recovery is not possible to report due to the high concentration of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.