REMEDIATION WORKS
FORMER SANITARY WASTE FACILITY
SERENITY WAY, VACY

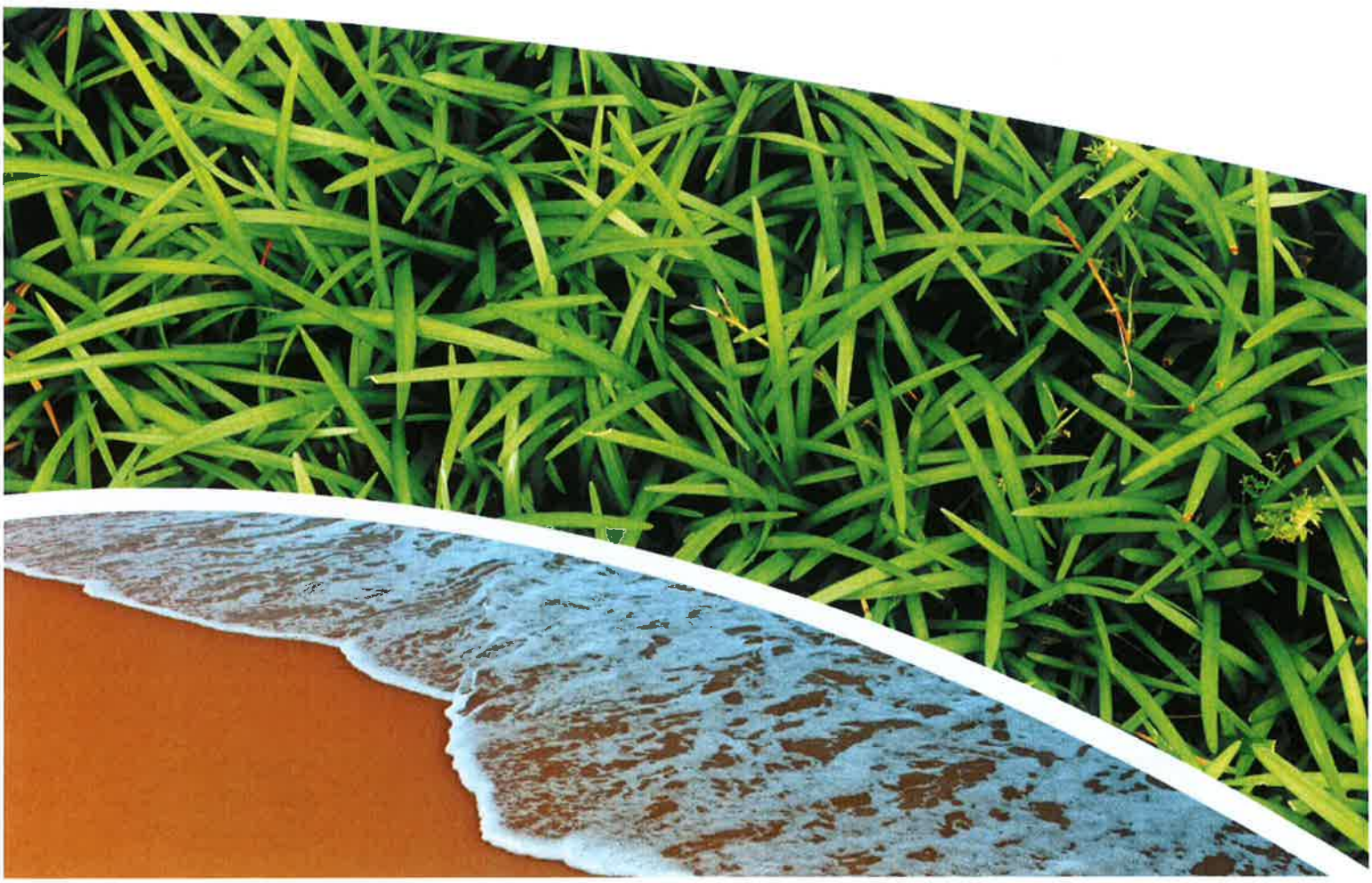
Prepared for Dungog Shire Council

Prepared by RCA Australia

RCA ref 11214a-301/0

June 2016

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL



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bsi. ISO 9001 Quality Management

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Geotechnical Engineering
Engineering Geology
Environmental Engineering
Hydrogeology
Construction Materials Testing
Environmental Monitoring
Sound & Vibration
Occupational Hygiene

RCA ref 11214a-301/0

22 June 2016

Dungog Shire Council
PO Box 95
DUNGOG NSW 2321

Attention: Mr Paul Minett

REMEDIATION WORKS
SERENITY WAY, VACY

1 INTRODUCTION

This report outlines remediation works and investigation works undertaken at the former sanitary waste facility located along Serenity Way, Vacy (Lot 9, DP 1009184).

Prior to remediation works an environmental site assessment (ESA) was undertaken by RCA Australia (RCA) during September 2015 (Ref [1]) at the request of Dungog Shire Council. The objective of that assessment was to determine the sites suitability for rezoning for residential use. The ESA identified:

- Residual tar material and impacted soils in excess of the National Environmental Protection (Assessment of Site Contamination) Measure 2013 (NEPM) (Ref [2]) guidelines for residential land use. These materials were also classified in accordance with the NSW EPA Waste Classification Guidelines (Ref [3]) as Hazardous Solid Waste.
- Microbiological and olfactory results in excess of the NSW Use and Disposal of Biosolids Products guidelines (Ref [4]).

RCA recommended (Ref [1]) remediation works be undertaken to remediate those areas impacted by tar and/or microbiological contaminants. The objective of remediation works is to bring environmental conditions at the site to a level suitable for residential land use.

2 PREVIOUS INVESTIGATIONS

2.1 RCA AUSTRALIA, ENVIRONMENTAL SITE ASSESSMENT, OCTOBER 2015

RCA undertook an ESA, consisting of a desktop review of the site's historical land uses as well as on site soil sampling, during September 2015. The subsequent report (Ref [1]), issued in October 2015, presented the findings of that assessment.

Sampling was undertaken across the site. The sampling regime also targeted an area in the south of the site which was identified by Dungog Shire Council as the location of the former night spoil disposal area. Additional test pitting works were also conducted across the site to provide an adequate assessment of the site's soil profile and subterranean features.

Soil sample results were compared to the NEPM (Ref [2]) for residential site use as well as the 'Biosolids Guidelines' (Ref [4]). With the exception of samples 'TAR 1' and 'TAR 2', all samples met the NEPM guidelines. The samples in excess of the NEPM guidelines contained high polycyclic aromatic hydrocarbons (PAH) concentrations and were noted to be within the area historically used for tarring sanitary containers. This general location was visually identified in the field due to residual tar on the ground surface. Chemical analysis of the suspected tar material collected in the field ('TAR 1' and 'TAR 2') confirmed the presence of coal tar. As a result, these materials were deemed to be pre-classified as Hazardous Solid Waste in accordance with the Waste Classification Guidelines.

Microbiological analysis was undertaken upon samples collected from across the site including the former night soil disposal area of the site. With the exception of sample TP15b, all samples reported biological concentrations below the laboratory detection limit and thus below the 'Biosolids Guidelines'. Sample TP15b was found to have *E. coli* and thermotolerant coliform counts in excess of the 'applied biosolids' guidelines. This location was noted to be within the former night soil disposal area. Location TP15 was also identified in the field, based on olfactory indications, during test pitting works as a possible area of concern.

The report concluded that remediation of those areas exceeding the NEPM and 'Biosolid Guidelines' be undertaken to render the site suitable for rezoning as residential land. Recommended remediation included the removal and disposal off site of tar and impacted soils and mixing of lime (bioremediation) to the soil in the vicinity of location TP15.

Drawing 1, **Appendix A** shows approximate locations of remediation areas and sampling locations.

2.2 RCA AUSTRALIA, VARIATION TO REMEDIATION WORKS, APRIL 2016

RCA undertook initial remediation works and validation sampling during December 2015 in accordance with those recommendations of the ESA. The subsequent report/variation (Ref [5]) presented the following information and recommended additional delineation/validation works.

An environmental technician oversaw and/or visually validated the scraping and removal of tar impacted materials as well as all other earthworks.

Shallow excavations (<0.4m) were not reinstated due to their shallow nature. The excavation of sample location TP15 is to be re-instated following the completion of bioremediation.

2.2.1 REMOVAL OF TAR AND IMPACTED SOILS

An environmental technician undertook remediation works and validation sampling on 17 December 2015. Works undertaken on 17 December 2015 were done with the assistance of a backhoe and operator supplied by Dungog Shire Council.

The following works were undertaken upon the areas identified in the initial ESA report as being impacted by tar.

- A site inspection. This site inspection was used to identify impacted areas and mark out these areas which the backhoe was to excavate (**Photograph 1**, **Appendix B**).
- Tar material visually identified on the ground surface and underlying soils to 0.4m below the surface were scraped/excavated (**Photograph 2**, **Appendix B**) and removed off site to an appropriately licensed waste handling facility. The volume of impacted materials removed from site was approximately $10m^3$.
    - Further tar impacted materials were observed during these works which were not removed from site due to the vehicle used for removal reaching its load capacity. Some of this material was pushed up into small soil stockpiles adjacent to the scraped areas and the remainder was left *in situ* (**Photographs 3** and **4**, **Appendix B**). In addition, further tar impacted materials were encountered which correlated to a gravel hardstand area in the south west of the site.
- Following the removal of impacted materials, ten (10) validation samples were collected – one (1) from each wall and one (1) from the base of each of two (2) excavations.
    - Validation samples were laboratory analysed for polycyclic aromatic hydrocarbons (PAH). All samples from the walls of the excavations reported concentrations of benzo(a)pyrene in excess of the site guidelines for residential use. However, no detectable concentrations were identified in the leachate generated with distilled water. This is considered to indicate that the contaminants would not leach with the action of rainfall.

2.2.2 MICROBIOLOGICAL REMEDIATION

The following works were undertaken upon the former night soil disposal area and the location identified as TP15.

- The former night soil disposal area, approximately $1,700m^2$ in size, was 'ripped' to a depth of 0.4m with the aid of a backhoe (**Photograph 5**, **Appendix B**).
- An area 4m x 4m in the vicinity of sample location TP15 was excavated to a depth of approximately 0.6m and placed within an adjacent treatment area prepared by RCA measuring approximately $25m^2$ in size consisting of a hydrated lime pad to prevent microbial transport into the subsoil (**Photograph 6**, **Appendix B**). The materials transferred to this area were then allowed sufficient time for material drying and microbial die-off to occur. The materials excavated were based on visual and olfactory evidence encountered in the field.

3 FIELDWORK

Following an interval of approximately five (5) months, RCA returned to the site on 3 May 2016 to undertake validation of the remediation works and additional sampling to delineate the tar affected soils.

3.1 DELINEATION OF TAR AND IMPACTED SOILS

This scope of work included the following:

- A site 'walkover' to identify any tar deposits and potentially tar impacted soils (gravel hardstand areas) remaining on site.
- The collection of fifteen (15) soil samples from around the perimeter of the formerly identified tar impacted area. Ten (10) of these samples were selected for laboratory analysis for PAH.

3.1 MICROBIOLOGICAL REMEDIATION

This scope of work included the following:

- An olfactory assessment of the 'ripped' disposal area as well as the treatment area adjacent to sample location TP15. This assessment involved digging and turning the soil in fifteen (15) locations to depths of up to 0.3m with the aid of a shovel and assessing any odour/s present.
- In addition, three (3) samples were collected from within the treatment area and laboratory analysed for *E. coli*, total coliforms, thermotolerant coliforms.

4 QUALITY ASSURANCE/QUALITY CONTROL

The collection of all soil samples was undertaken in compliance with RCA methodology. The sample collection method comprised disturbed samples direct from the hand auger. This collection method was chosen due to the nature of the validation samples required.

Decontamination of the sampling equipment was undertaken by brushing of excess soil from augers between sample locations.

All samples were preserved as recommended by the analytical laboratory and stored in the field in an Esky on ice. Samples were sent to the laboratory within 24 hours of sampling.

All samples were sent under Chain of Custody (COC) documentation detailing the sample identification, required analysis, the name of the sampler and date released from custody. The laboratory acknowledged the receipt of samples by signature and date and returned the COC with a sample receipt notice indicating the condition of the samples received upon receipt.

Two (2) intralaboratory soil duplicate samples were submitted blind to the laboratory for analysis. This represents a percentage of 10%, in accordance with the frequency recommended by the Australian Standard AS 4482.1-2005 (Ref [6]) and RCA protocol.

RCA omitted the field and trip blank due to the low potential for cross contamination during the sampling and transport processes, trip spikes due to low potential for volatile loss during the transport process and equipment wash due to the low potential for cross-contamination from the sampling equipment.

Results are summarised in **Appendix C**.

No analyses results reported RPD in excess of the acceptance criteria.

Eurofins mgt was chosen as the laboratory for chemical analysis and Sonic was chosen as the laboratory for microbiological analysis. These laboratories are NATA accredited and are experienced in the analytical requirements for potentially contaminated soil.

Eurofins mgt undertook internal quality assurance testing. Results are contained within the laboratory report sheets, **Appendix D**. **Error! Reference source not found.1** presents a summary of their review.

Table 1 *Internal Quality Assurance Review*

	Number Samples (including QA)	Laboratory Duplicates	Spikes	Laboratory Control Samples	Laboratory Blanks
Requirement		**10%**	**5%**	**One every batch**	**One every batch**
PAH	11	1 (0)	1 (0)	1	1

Numbers in brackets refer the tests undertaken on samples not from this project but within the same laboratory batch.

Examination of the above table reveals that Eurofins mgt has undertaken laboratory quality assurance testing in accordance with the NEPM (Ref [2]).

- Recoveries of Surrogates were within acceptance criteria of 70-130%.
- Holding times were within laboratory specified timeframes.
- Recoveries of laboratory control samples were within the acceptance criteria of 70-130%.
- Recoveries of Spikes were within acceptance criteria of 70-130%.
- Relative Percentage Differences for Duplicates were within acceptance criteria as defined for intralaboratory duplicates in **Appendix C**.
- No Laboratory Blank result was detected above the PQL.

It is therefore considered that the data obtained from this testing is accurate and reliable in as far as it can be ascertained.

5 RESULTS

All soil results are compared to the relevant criteria in **Appendix E**. The following presents a summary.

- PAH concentrations were not detected or were detected at low concentrations below the relevant criteria with the exception of:
  - Sample V7 which reported a carcinogenic PAH (B(a)P equivalent) concentration in excess of the relevant HSL.
- Microbiological counts for *E. coli* were not detected, however the detection limit is higher than the guideline criterion.

- Total coliforms, thermotolerant coliforms were not detected or were detected at low concentrations below the relevant biosolids criteria.

The olfactory assessment of the 'ripped' former night soil disposal area and location TP15 treatment area revealed no odours to be present.

6 SITE CONTAMINATION CHARACTERISATION

The former night soil disposal area and the area in the vicinity of sample location TP15 no longer contain significant odour or elevated coliform results. There is some potential for E. coli to be present due to the detection limit of the analysis being higher than the guideline, however based on the discrepancy between the previous results and these, as well as the absence of detectable thermotolerant coliforms, it is considered that there is unlikely to be a significant presence of E. coli. RCA considers these areas to be successfully remediated based upon the earthworks and/or treatments undertaken at each site and subsequent results of the odour and laboratory analysis assessments.

Delineation of the tar impacted area is considered to have been achieved with the exception of the north western extent of the area. Delineation samples for each respective direction and depth of the impacted area are summarised in **Table 2** and shown on **Drawing 1**, **Appendix A**.

Table 2 *Summary of Delineated Tar Impacted Area*

Direction	Validated Sample Location	Validated Sample Depth
North	V9	0.1m
North east	V3	0.1m
East	V11	0.1m
South east	V12	0.1m
South	V13	0.1m
South west	V6	0.1m
West	V8	0.1m
North west	Not validated (V7 impacted)	Not validated (V7 impacted)

RCA considers that, based on its location and the aerial image, V7 may be in an area of a historical driveway, although it is noted that the existence of this is not certain. The gravelly fill material identified as being tar impacted may have been impacted prior to placement at the site, although more likely, the material has become impacted over time due to the tarring practices undertaken on the site. The driveway area may have become impacted due to deliveries to and from the facility.

Based on previous leaching procedures (Refer Section 2.2.1) it is not considered that the contaminant concentration pose a significant risk to the environment, nor is there considered to be a risk to human health in the site's current vacant state.

Risk to human health would increase with the development of the site for residential use, specifically due to inhalation of dust (primarily a construction issue), ingestion of and dermal contact with the material (primarily by children occupying a residence on the site). The requirement for further remediation is considered to be dependent on the layout of any proposed residential development and RCA has prepared a management protocol (**Appendix F**) for the site which details the constraints associated with the use of the site and the measures to be implemented to minimise the potential impact to human health. The existence of this protocol should be noted on the Section 149 Certificate for the property.

7 CONCLUSIONS

This report has outlined remediation works and investigation works undertaken by RCA at the former sanitary waste facility located along Serenity Way, Vacy.

The remediation works were largely successful with the bulk of the PAH contaminated materials identified and removed from site. No microbiological contamination was identified following remediation and a consideration of odours at the site has also led RCA to conclude that there is limited odour potential at the site.

There is one (1) sampling location remaining at site which exhibits concentrations of PAH in excess of the relevant residential guidelines and a management protocol has been prepared to guide the management of risks during development and use of the site for residential purpose.

RCA considers that the site is suitable for residential use following the removal of stockpiled gravel material and with implementation of the management protocol. If the items in the protocol cannot be implemented, additional remediation may be required.

8 LIMITATIONS

This report has been prepared for Dungog Shire Council in accordance with an agreement with RCA. The services performed by RCA have been conducted in a manner consistent with that generally exercised by members of its profession and consulting practice.

This report has been prepared for the sole use of Dungog Shire Council. The report may not contain sufficient information for purposes of other uses or for parties other than Dungog Shire Council. This report shall only be presented in full and may not be used to support objectives other than those stated in the report without written permission from RCA.

The information in this report is considered accurate at the date of issue with regard to the current conditions of the site. Conditions can vary across any site that cannot be explicitly defined by investigation.

Environmental conditions including contaminant concentrations can change in a limited period of time. This should be considered if the report is used following a significant period of time after the date of issue.

Yours faithfully

RCA AUSTRALIA

Tristyn Gibbons/Nic McLaughlin
Environmental Technician/Environmental Scientist

Fiona Brooker
Associate Environmental Engineer

REFERENCES

[1] RCA Australia, *Environmental Site Assessment – Former Sanitary Waste Depot, Vacy*, (RCA ref: 11214-201/0), October 2015.

[2] NEPC, National Environment Protection (Assessment of Site Contamination) Measure, 1999 as amended 2013.

[3] NSW EPA, *Waste Classification Guidelines, Part 1; Classifying Waste*, November 2014.

[4] NSW EPA, *Use and Disposal of Biosolids Products*, 1997 (reprinted December 2000).

[5] RCA Australia, *Variation to Remediation Works – Former Sanitary Waste Depot, Vacy,* (RCA ref: 11214a-102/0), April 2016.

[6] Standards Australia, *Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds*, AS 4482.1-2005.

GLOSSARY

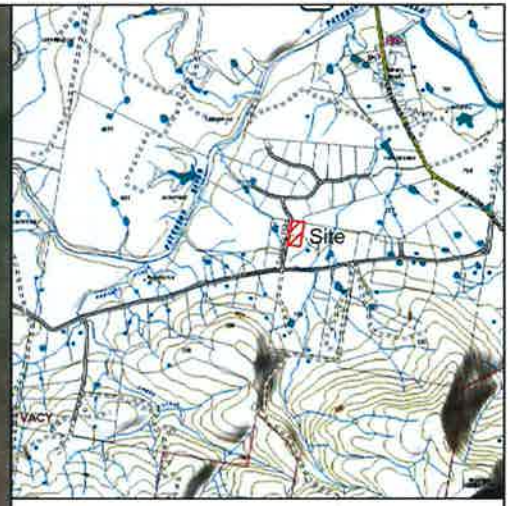
Aerobic	An environment that has a partial pressure of oxygen similar to normal atmospheric conditions.
Anaerobic	An environment without oxygen.
Biosolids	Primarily an organic solid product produced by the municipal sewage treatment process, previously referred to as sewage sludge. Solids become biosolids when they come out of a digester or other treatment process and can be beneficially used. Until such solids are suitable for beneficial use they are defined as waste-water solids. The solid content in biosolids should be equal to or greater than 0.5% weight by volume.
EIL	Ecological investigation level. Relates to soil concentrations which may pose a risk to ecological health.
EMP	Environmental management plan.
ESL	Ecological screening level. Relates to vapour risk from petroleum hydrocarbons which may pose a risk to ecological health.

HIL	Health investigation level. Relates to soil concentrations which may pose a risk to human health in soil.
HSL	Health screening level. Relates to the vapour risk from petroleum hydrocarbons which may pose a risk to human health in soil.
In-Situ	In place, without excavation.
Interlaboratory	A sample sent to two different laboratories for comparative analysis.
Intralaboratory	A sample split into two and sent blind to the sample laboratory for comparative analysis.
ISL	Investigation screening levels for soil. Comprised of HIL/EIL and HSL/ESL.
kg	kilogram, 1000 gram.
µg	microgram, 1/1000 milligram.
mg	milligram, 1/1000 gram.
NEPC	National Environment Protection Council.
NEPM	National Environment Protection Measure.
NHMRC	National Health and Medical Research Council.
NSWEPA	NSW Environment Protection Authority – formerly a component of DECC, DECCW, OEH but made a separate entity in 2011 to regulates the contaminated land industry.
Pathogen	An organism capable of causing disease.
PQL	Practical Quantitation Limit.
QA	Quality Assurance.
QC	Quality Control.
RPD	Relative Percentage Difference.
Chemical Compounds	
PAH	Polycyclic aromatic hydrocarbons. Multi-ring compounds found in fuels, oils and creosote. These are also common combustion products.

Appendix A

Drawing

CDT-DWG-A4H-001/1



Locality Plan
N.T.S.

LEGEND

- Approximate validation sample location
- Approximate excavation location
- Approximate soil turning location
- Approximate visible gravel location
- Approximate microbiological sample location
- Approximate stockpile location

Aerial taken from Google Earth, February 2016

0 5 10 15 20 25
metres

RCA AUSTRALIA
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SITE LAYOUT AND LOCATION PLAN
SERENITY WAY
VACY

CLIENT	Dungog Shire Council			RCA Ref	11214a-301/0
DRAWN BY	TG	SCALE	1 : 500 (A4)	DRAWING No 1	REV 0
APPROVED BY	FB	DATE	22/6/2016	OFFICE	NEWCASTLE

Appendix B

Site Photographs

PHOTOGRAPH 1 *Tar impacted area marked for removal*

PHOTOGRAPH 2 *Scraping of tar impacted area by backhoe*

Client:	Dungog Shire Council	**RCA Australia**
Project:	Remediation Works	
Location:	Serenity Way, Vacy	**RCA ref:** 11214a-301/0

PHOTOGRAPH 3 *Completed (scraped) tar impacted area showing stockpiles*

PHOTOGRAPH 4 *Several tar deposits remaining on site*

Client:	Dungog Shire Council	**RCA Australia**
Project:	Remediation Works	
Location:	Serenity Way, Vacy	**RCA ref:** 11214a-301/0

PHOTOGRAPH 5 *'Turned' former night soil disposal area*

PHOTOGRAPH 6 *Lime treatment area (f/ground) and location TP15 (b/ground)*

Appendix C

External Quality Assurance Review

Sample Identification	PQL	V3	QA1-V	RPD %	Micro-V1	QA1	RPD %
Sample Depth (m)		0.1			0.1		
Date		3.5.2016			3.5.2016		
Duplicate Type		Intralaboratory			Intralaboratory		
Sample Profile		Silt, pale grey, trace of gravel, dry			SILT, trace Sand and Clay, grey / brown		
Sample Purpose		Validation			Validation		
Sample collected by		TG			TG		
Polycyclic Aromatic Hydrocarbons (PAH)							
Acenaphthene	0.5	0.25	0.25	*0.0*	--	--	--
Acenaphthylene	0.5	0.25	0.25	*0.0*	--	--	--
Anthracene	0.5	0.25	0.25	*0.0*	--	--	--
Benz(a)anthracene	0.5	0.9	1.2	*28.6*	--	--	--
Benzo(a) pyrene	0.5	1.1	1.4	*24.0*	--	--	--
Benzo(b)&(j)fluoranthene	0.5	0.6	0.9	*40.0*	--	--	--
Benzo(g,h,i)perylene	0.5	0.8	0.9	*11.8*	--	--	--
Benzo(k)fluoranthene	0.5	0.8	1	*22.2*	--	--	--
Chrysene	0.5	1.1	1.4	*24.0*	--	--	--
Dibenz(a,h)anthracene	0.5	0.25	0.25	*0.0*	--	--	--
Fluoranthene	0.5	1.8	2.3	*24.4*	--	--	--
Fluorene	0.5	0.25	0.25	*0.0*	--	--	--
Indeno(1,2,3-c,d)pyrene	0.5	0.6	0.7	*15.4*	--	--	--
Naphthalene	0.5	0.25	0.25	*0.0*	--	--	--
Phenanthrene	0.5	1	1.1	*9.5*	--	--	--
Pyrene	0.5	1.9	2.5	*27.3*	--	--	--
Carcinogenic PAH (B(a)P equivalent)	1.21	1.659	2.053	*21.2*	--	--	--
Sum of reported PAH	8	12.1	14.9	*20.7*	--	--	--
Microbiological							
Total Coliforms - cfu/100ml	200	--	--	--	100	100	*0.0*
E. Coli - MPN/100ml	200	--	--	--	100	100	*0.0*
Thermotolerant Coliforms MPN/100ml	200	--	--	--	100	100	*0.0*

All units in mg/kg unless stated otherwise

PQL = Practical Quantitation Limit. Where PQL is for a summation, PQL of all components is summed and may be different from that presented by laboratory

Results underlined were not detected and are reported as half the detection limit for statistical purpose.

BOLD identifies where RPD results

>50	*where sample results are >10 x PQL*
>75	*where sample results are > 5 to ≤10 x PQL*
>100	*where sample results are >2 to ≤5 x PQL*
*AD>2.5 * PQL*	*where sample results are ≤2 x PQL*

Where results are within two of the above ranges the most conservative criteria have been used to assess duplicate performance

Appendix D

Laboratory Report Sheets

eurofins | mgt

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Robert Carr and Associates Pty Ltd
PO Box 175
Carrington
NSW 2294

Attention: **Tristyn Gibbons**

Report **499271-S**
Project name REMEDIATION WORKS
Project ID 11214A
Received Date May 05, 2016

Client Sample ID			**V11**	**V12**	**V3**	**V7**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**M16-My04218**	**M16-My04219**	**M16-My04220**	**M16-My04221**
Date Sampled			**May 04, 2016**	**May 04, 2016**	**May 04, 2016**	**May 04, 2016**
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	1.4	6.0
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	1.7	6.0
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.9	6.0
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	1.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	0.9	3.8
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	1.1	4.0
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	0.6	2.3
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	0.8	2.8
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	0.8	2.4
Chrysene	0.5	mg/kg	< 0.5	< 0.5	1.1	3.6
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	0.9
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	1.8	6.9
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	0.6	2.2
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	1.0	4.3
Pyrene	0.5	mg/kg	0.6	< 0.5	1.9	7.5
Total PAH*	0.5	mg/kg	0.6	< 0.5	10.6	42.2
2-Fluorobiphenyl (surr.)	1	%	79	78	77	80
p-Terphenyl-d14 (surr.)	1	%	79	78	76	82
% Moisture	1	%	11	7.1	10	7.5

Client Sample ID			V8	V9	V13	V2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M16-My04222	M16-My04223	M16-My04224	M16-My04225
Date Sampled			May 04, 2016	May 04, 2016	May 04, 2016	May 04, 2016
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	2.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	2.7	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	3.0	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	0.6	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	1.8	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	1.9	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	1.1	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	1.4	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	1.3	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	1.7	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	3.8	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	1.0	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	2.3	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	3.9	0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	20.8	0.5
2-Fluorobiphenyl (surr.)	1	%	84	75	80	76
p-Terphenyl-d14 (surr.)	1	%	84	77	81	80
% Moisture	1	%	10	8.1	8.3	8.8

Client Sample ID			V15	V6	QA1-V
Sample Matrix			Soil	Soil	Soil
Eurofins | mgt Sample No.			M16-My04226	M16-My04227	M16-My04228
Date Sampled			May 04, 2016	May 04, 2016	May 04, 2016
Test/Reference	LOR	Unit			
Polycyclic Aromatic Hydrocarbons					
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	0.8	< 0.5	1.8
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	1.1	0.6	2.1
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.4	1.2	2.3
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	0.6	< 0.5	1.2
Benzo(a)pyrene	0.5	mg/kg	0.7	< 0.5	1.4
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	0.5	< 0.5	0.9
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	0.9
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	1.0
Chrysene	0.5	mg/kg	0.7	< 0.5	1.4
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	1.2	< 0.5	2.3
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	0.7
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5

Client Sample ID			V15	V6	QA1-V
Sample Matrix			Soil	Soil	Soil
Eurofins | mgt Sample No.			M16-My04226	M16-My04227	M16-My04228
Date Sampled			May 04, 2016	May 04, 2016	May 04, 2016
Test/Reference	LOR	Unit			
Polycyclic Aromatic Hydrocarbons					
Phenanthrene	0.5	mg/kg	0.8	< 0.5	1.1
Pyrene	0.5	mg/kg	1.3	< 0.5	2.5
Total PAH*	0.5	mg/kg	5.8	< 0.5	13.4
2-Fluorobiphenyl (surr.)	1	%	88	79	84
p-Terphenyl-d14 (surr.)	1	%	90	89	91
% Moisture	1	%	7.3	5.2	9.6

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Polycyclic Aromatic Hydrocarbons	Melbourne	May 05, 2016	14 Day
- Method: USEPA 8270 Polycyclic Aromatic Hydrocarbons			
% Moisture	Melbourne	May 05, 2016	14 Day
- Method: LTM-GEN-7080 Moisture			

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Site # 1254 & 14271

Sydney
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Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Company Name: Robert Carr and Associates Pty Ltd
Address: PO Box 175
Carrington
NSW 2294

Project Name: REMEDIATION WORKS
Project ID: 11214A

Order No.:
Report #: 499271
Phone: 02 4902 9200
Fax: 02 4902 9299

Received: May 5, 2016 8:03 AM
Due: May 12, 2016
Priority: 5 Day
Contact Name: Tristyn Gibbons

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Polycyclic Aromatic Hydrocarbons	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	V11	May 04, 2016		Soil	M16-My04218	X	X
2	V12	May 04, 2016		Soil	M16-My04219	X	X
3	V3	May 04, 2016		Soil	M16-My04220	X	X
4	V7	May 04, 2016		Soil	M16-My04221	X	X
5	V8	May 04, 2016		Soil	M16-My04222	X	X
6	V9	May 04, 2016		Soil	M16-My04223	X	X
7	V13	May 04, 2016		Soil	M16-My04224	X	X
8	V2	May 04, 2016		Soil	M16-My04225	X	X
9	V15	May 04, 2016		Soil	M16-My04226	X	X
10	V6	May 04, 2016		Soil	M16-My04227	X	X

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Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Company Name:	Robert Carr and Associates Pty Ltd	**Order No.:**		**Received:**	May 5, 2016 8:03 AM
Address:	PO Box 175 Carrington NSW 2294	**Report #:**	499271	**Due:**	May 12, 2016
		Phone:	02 4902 9200	**Priority:**	5 Day
		Fax:	02 4902 9299	**Contact Name:**	Tristyn Gibbons
Project Name:	REMEDIATION WORKS				
Project ID:	11214A				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Polycyclic Aromatic Hydrocarbons	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
External Laboratory							
11	QA1-V	May 04, 2016		Soil	M16-My04228	X	X
Test Counts						11	11

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Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

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Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	88			70-130	Pass	
Acenaphthylene	%	91			70-130	Pass	
Anthracene	%	92			70-130	Pass	
Benz(a)anthracene	%	85			70-130	Pass	
Benzo(a)pyrene	%	87			70-130	Pass	
Benzo(b&j)fluoranthene	%	85			70-130	Pass	
Benzo(g.h.i)perylene	%	82			70-130	Pass	
Benzo(k)fluoranthene	%	86			70-130	Pass	
Chrysene	%	97			70-130	Pass	
Dibenz(a.h)anthracene	%	90			70-130	Pass	
Fluoranthene	%	88			70-130	Pass	
Fluorene	%	91			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	90			70-130	Pass	
Naphthalene	%	87			70-130	Pass	
Phenanthrene	%	88			70-130	Pass	
Pyrene	%	88			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	M16-My05640	NCP	%	84			70-130	Pass	
Acenaphthylene	M16-My05640	NCP	%	88			70-130	Pass	
Anthracene	M16-My05640	NCP	%	91			70-130	Pass	
Benz(a)anthracene	M16-My05640	NCP	%	85			70-130	Pass	
Benzo(a)pyrene	M16-My05640	NCP	%	84			70-130	Pass	
Benzo(b&j)fluoranthene	M16-My05640	NCP	%	96			70-130	Pass	
Benzo(g.h.i)perylene	M16-My05640	NCP	%	85			70-130	Pass	
Benzo(k)fluoranthene	M16-My05640	NCP	%	80			70-130	Pass	
Chrysene	M16-My05640	NCP	%	84			70-130	Pass	
Dibenz(a.h)anthracene	M16-My05640	NCP	%	92			70-130	Pass	
Fluoranthene	M16-My05640	NCP	%	86			70-130	Pass	
Fluorene	M16-My05640	NCP	%	84			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Indeno(1.2.3-cd)pyrene	M16-My05640	NCP	%	84			70-130	Pass	
Naphthalene	M16-My05640	NCP	%	84			70-130	Pass	
Phenanthrene	M16-My05640	NCP	%	79			70-130	Pass	
Pyrene	M16-My05640	NCP	%	85			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	M16-My04220	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	M16-My04220	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	M16-My04220	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	M16-My04220	CP	mg/kg	0.9	1.0	9.0	30%	Pass	
Benzo(a)pyrene	M16-My04220	CP	mg/kg	1.1	1.2	6.0	30%	Pass	
Benzo(b&j)fluoranthene	M16-My04220	CP	mg/kg	0.6	0.8	18	30%	Pass	
Benzo(g.h.i)perylene	M16-My04220	CP	mg/kg	0.8	0.8	1.0	30%	Pass	
Benzo(k)fluoranthene	M16-My04220	CP	mg/kg	0.8	0.7	12	30%	Pass	
Chrysene	M16-My04220	CP	mg/kg	1.1	1.1	4.0	30%	Pass	
Dibenz(a.h)anthracene	M16-My04220	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	M16-My04220	CP	mg/kg	1.8	1.9	6.0	30%	Pass	
Fluorene	M16-My04220	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	M16-My04220	CP	mg/kg	0.6	0.7	12	30%	Pass	
Naphthalene	M16-My04220	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	M16-My04220	CP	mg/kg	1.0	1.2	21	30%	Pass	
Pyrene	M16-My04220	CP	mg/kg	1.9	2.1	9.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M16-My04227	CP	%	5.2	5.3	1.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs

Authorised By

Andrew Black	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)
Mele Singh	Senior Analyst-Organic (VIC)

Glenn Jackson
National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

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CHAIN OF CUSTODY RECORD

CLIENT DETAILS Page of

Company Name :	RCA Australia	**Contact Name:**	Tristyn Gibbons	**Purchase Order :**	**COC Number :**
Office Address :	92 Hill St Carrington NSW	**Project Manager :**	Fiona Brooker	**PROJECT Number :** 11214a	**Eurofins | mgt quote ID :**
		Email for results :	tristyng@rca.com.au	**PROJECT Name :** Remediation Works	**Data output format:**

Special Directions & Comments :

Eurofins | mgt DI water batch number:

	Sample ID	Date	Matrix	Analytes: PAH	Containers: 1LP	250P	125P	1LA	40mL vial	125mL A	Jar		Sample comments:
1	v11	4.5.16	Soil	X									
2	v12	4.5.16	Soil	X									
3	~~v5~~	4.5.16	Soil	X									
4	v3	4.5.16	Soil	X									
5	v7	4.5.16	Soil	X									
6	v8	4.5.16	Soil	X									
7	v9	4.5.16	Soil	X									
8	v13	4.5.16	Soil	X									
9	v2	4.5.16	Soil	X									
10	v15	4.5.16	Soil	X									
11	v6	4.5.16	Soil	X									
12	QA1-V	4.5.16	Soil	X									
13													
14													
15													
16													

Some common holding times (with correct preservation).
For further information contact the lab

Waters		Soils	
BTEX, MAH, VOC	14 days	BTEX, MAH, VOC	14 days
TRH, PAH, Phenols, Pesticides	7 days	TRH, PAH, Phenols, Pesticides	14 days
Heavy Metals	6 months	Heavy Metals	6 months
Mercury, CrVI	28 days	Mercury, CrVI	28 days
Microbiological testing	24 hours	Microbiological testing	72 hours
BOD, Nitrate, Nitrite, Total N	2 days	Anions	28 days
Solids - TSS, TDS etc	7 days	SPOCAS, pH Field and FOX, CrS	24 hours
Ferrous iron	7 days	ASLP, TCLP	7 days

Relinquished By:	Laboratory Staff Received By:	Laboratory Staff Received By:	Turn around time	Method Of Shipment	Temperature on arrival:
	N Peet	A KEMPSTER	1 DAY ☐ 2 DAY ☐ 3 DAY ☐	☑ Courier ☐ Hand Delivered ☐ Postal	
Date & Time::	**Date & Time:** 4.5.16 11 Am	**Date & Time:** 5/5/16 10:41 AM			**Report number:** 499271
Signature:	**Signature:**	**Signature:**	5 DAY ☐ 10 DAY ☐ Other:	**Courier Consignment # :**	

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Melbourne
3-5 Kingston Town Close
Oakleigh Vic 3166
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Sample Receipt Advice

Company name:	**Robert Carr and Associates Pty Ltd**
Contact name:	Tristyn Gibbons
Project name:	REMEDIATION WORKS
Project ID:	11214A
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	May 5, 2016 8:03 AM
Eurofins | mgt reference:	**499271**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ Sample Temperature of a random sample selected from the batch as recorded by Eurofins | mgt Sample Receipt : 10.5 degrees Celsius.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Appropriate sample containers have been used.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Andrew Black on Phone : (+61) 2 9900 8490 or by e.mail: AndrewBlack@eurofins.com

Results will be delivered electronically via e.mail to Tristyn Gibbons - tristyng@rca.com.au.

Note: A copy of these results will also be delivered to the general Robert Carr and Associates Pty Ltd email address.

MICROBIOLOGY FINAL REPORT

SONIC FOOD & WATER TESTING

CERTIFICATE OF ANALYSIS

W1607837
[]

. RCA LABORATORIES
NEENA TEWARI
92 HILL STREET
CARRINGTON NSW 2294

Lab Number:	273823237
Customer Reference Number:	
Site:	AS LISTED X4 JOB NO. 112149
Sample Type:	SOIL
Sample Notes:	
Date and Time of Collection:	03/05/16,0000
Date and Time of Testing:	06/05/16,0800
Collected By:	The Client
Tested:	As Received

TESTS	RESULTS	UNITS	
SITE	FAECAL COLIFORM COUNT	COLIFORM COUNT	E.COLI COUNT
MICRO - V1	<200	<200	<200
MICRO - V2	200	200	<200
MICRO - V3	<200	200	<200
QA1	<200	<200	<200

The above are reported as most probable number/colony forming units per 100 gram

METHODS

* Faecal Coliform Count of Soils - Sonic In-house method WT19-2008 by most probable number method.
* Total Coliform Count in Soils - Sonic In-house Method WT19 by Most probable number method.
* E.coli Count in Soils - Sonic In-house WT19-2008 by most probable number method.

(Key: < = Less than or no growth detected of the target bacteria. > = Greater than)
A: Approximate
NBO: The presence of competing background organisms in the sample may have reduced the count.

Note that the time between sampling and the commencement of testing should not exceed 24 hours.

Signed:. Date:01/06/16

T.Morgan Laboratory Manager; T.Shetty Quality Manager; H.Sialepis Technical Officer; L.Vanhoff Technical Officer; K.McClenahan Scientific Officer; M.Lee Scientific Officer; P.Campora Scientific Officer; R.Bhatt Scientific Officer

NATA ACCREDITED FOR TECHNICAL COMPETENCE
Accreditation No. 4034

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Appendix E

Summary of Results

Appendix F

Management Protocol

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

RCA ref 11214a-301/0 Appendix F

Geotechnical Engineering
Engineering Geology
Environmental Engineering
Hydrogeology
Construction Materials Testing
Environmental Monitoring
Sound & Vibration
Occupational Hygiene

SITE MANAGEMENT PROTOCOL
LOT 9 DP1009184
VACY

- Investigations have shown that polycyclic aromatic hydrocarbons (PAH) are present in the soil at sampling location V7 as shown on attached drawing. This contamination is associated with material comprising a mix of silt, sand and angular gravel.
- Continued inhalation of dust from, ingestion of and dermal contact with this material will present a risk to human health. Short-term exposure is not considered to pose a risk.
- Works undertaken in this area should include best practice dust management to ensure that dust generation is minimised. In addition personnel engaged with excavation works must manage potential human health risks by the implementation of strict hygiene procedures (ie, washing any affected skin surface with soap and potable water) prior to eating, drinking or vacating the site.
- Any development for residential purpose should be designed such that the area is situated under the footprint of a building or driveway.
    - Use of the area for cultivation of food is not considered suitable.
    - Use of the area for active children's play is not considered suitable.

Robert Carr & Associates Pty Ltd
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