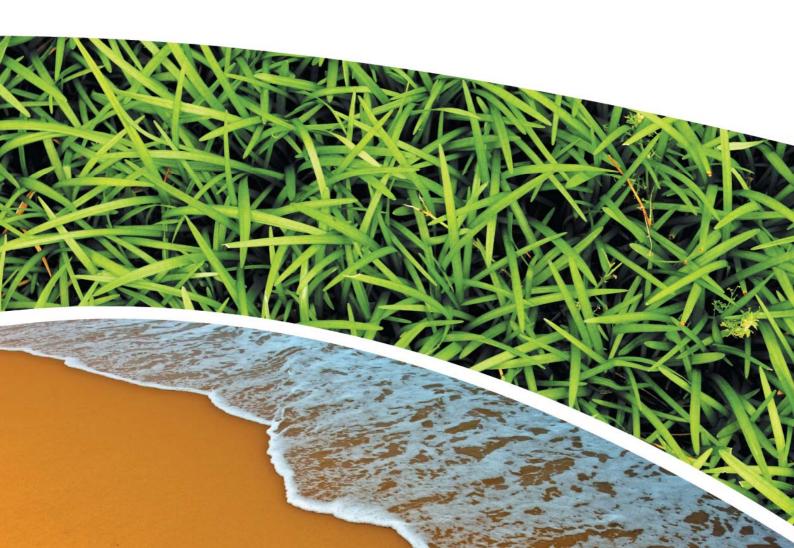


GEOTECHNICAL INVESTIGATION REPORT SOUTH SYDNEY TO REVESBY 132KV FEEDER PROJECT

Prepared for Ausgrid
Prepared by RCA Australia
RCA ref 13529-202/1

August 2018





RCA Australia

ABN 53 063 515 711 92 Hill Street, Carrington NSW 2294

Telephone: (02 4902 9200 Fax: (02) 4902 9299

Email: administrator@rca.com.au

Internet: www.rca.com.au

This document is and shall remain the property of RCA Australia. The document may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement for the commission supplied at the time of proposal. Unauthorised use of this document in any form whatsoever is prohibited.

	DOCUMENT STATUS												
Rev	pproved for Issue (Project Manager)												
No	Comment	Author	Reviewer	Name	Signature	Date							
/0	Draft	Mark Allman	Robert Carr	Mark Allman		04.07.18							
/1	Final	Mark Allman	Robert Carr	Mark Allman	Mask	30.08.18							

	DOCUMENT DISTRIBUTION												
Rev No													
/0	1	Electronic (email)	Ausgrid, majorprojects@ausgrid.com.au	04.07.18									
/0	1	Electronic report	RCA – job archive	04.07.18									
/1	1	Electronic (email)	Ausgrid, majorprojects@ausgrid.com.au	30.08.18									
/1	1	Electronic report	RCA – job archive	30.08.18									





Contents

1	INTRO	DUCTION	1
2	FIELD	AND LABORATORY INVESTIGATIONS	2
3	SITE D	ESCRIPTION	4
	3.1 3.2 3.3 3.4	REGIONAL GEOLOGY SOIL LANDSCAPE SURFACE CONDITIONS SUBSURFACE CONDITIONS	4 4
4	DISCU	SSION AND COMMENTS	6
	4.1 4.2 4.3 4.4	EXCAVATION	7 7 8 8 8
	4.5	INDICATIVE WASTE CLASSIFICATION	0
5	LIMITA	ATIONS1	2
APPE	ENDIX A	Δ.	
	DRAWI	NGS	
APPE	ENDIX I	3	
	PAVEM ROCK (BORE I	EERING LOGS ENT CORE PHOTOGRAPHS CORE PHOTOGRAPHS LOCATION PHOTOGRAPHS NATORY NOTES	
APPE	ENDIX (
	C1 – T	CHNICAL LABORATORY RESULTS: HERMAL RESISTIVITY CID SULFATE	

APPENDIX D

PAVEMENT DETAILS TABLE

APPENDIX E

CONTAMINATION LABORATORY RESULTS INDICATIVE WASTE CLASSIFICATION







RCA ref 13529-202/1

30 August 2018

AUSGRID 25-27 Pomeroy Street HOMEBUSH NSW 2140 Geotechnical Engineering

Engineering Geology

Environmental Engineering

Hydrogeology

Construction Materials Testing

Environmental Monitoring

Sound & Vibration

Occupational Hygiene

GEOTECHNICAL INVESTIGATION REPORT SOUTH SYDNEY TO REVESBY 132KV FEEDER PROJECT

1 INTRODUCTION

This report describes geotechnical studies carried out for Ausgrid on the proposed 132kV feeder replacement project located at South Sydney to Revesby (SS2R).

This work was commissioned by Ausgrid on 20 April 2018.

Based on plans provided by Ausgrid it is understood that the proposed development comprises replacement of 132kV underground feeders as part of project SJ-00232 between South Sydney to Revesby.

Data provided in relation to the project comprised:

- Proposed cable route plan (244732 Sydney South BSP to Revesby ZS 132kV Feeders 282/1 & 283/1 Replacement Underground Feeders Route Plan and Construction Details).
- 3 x 132kV Feeder Replacement Cable Route Borehole Investigations Document
- Site Hazard and Risk Profile Document.

This report contains descriptions of the surface and subsurface conditions at the sites together with:

- A geotechnical assessment
- Waste classification
- Thermal resistivity (TR) tests
- Pavement detail report

The factual data on which this report is based is presented in the attached appendices.

The investigation is to provide geotechnical data for use in design of the feeder replacements.

2 FIELD AND LABORATORY INVESTIGATIONS

Fieldwork was conducted over the period 14 May 2018 and 17 May 2018, and consisted of:

• Drilling of 16 bores to depths ranging 0.8m to 1.5m. Bores were drilled by trailer mounted drill rig and hand auger. BH301-304 were drilled on natural ground within the Georges River National Park and were drilled by trailer mounted drill rig and hand auger. BH305-316 were on roads and were initially drilled with diamond core drilling by a trailer mounted drill rig through asphaltic concrete (AC). Photographs of the pavement core were taken. Bores were then continued with continuous flight augers (large auger with 110mm diameter and small auger with 85mm diameter) and NMLC rock coring. Point load strength testing was undertaken on representative core samples together with photography of the core. In situ sampling and testing involving bulk sampling from the auger and recovery of undisturbed 75mm diameter tube samples.

All fieldwork was carried out by and in the presence of RCA Australia (RCA) personnel. Approximate test locations are shown on the attached site plans (**Drawings 1, 2 and 3**).

Borehole locations have been set out from existing site features by tape and with hand held GPS and should only be considered as approximate. Bore depths have been recorded relative to the existing ground surface at the time of investigation. Hand held GPS coordinates of test locations are included on bore logs and listed on the Pavement Detail Table in **Appendix D**.

All bores in natural ground were backfilled with soil and pavement bores were backfilled with stabilised sand and topped with quickset concrete or cold mix AC.

Engineering logs of bores are presented in **Appendix B**, together with photographs of pavement core, rock core and borehole site, and explanation sheets. Groundwater conditions/levels have been noted on the bore logs at the time of fieldwork. Fluctuations in groundwater conditions may be expected due to variations in rainfall and site conditions.

Laboratory testing of samples recovered during fieldwork consisted of:

- Sixteen (16) thermal resistivity tests
- Sixteen (16) acid sulfate screen tests
- One (1) SPOCAS/CRS test
- Nine (9) waste classification samples for total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylene (BTEX), polycylic aromatic hydrocarbons (PAH), metals (arsenic, cadmium, chromium, copper, nickel, lead, zinc, mercury), asbestos, pesticides and polychlorinated biphenyls. A duplicate sample was also collected.

All laboratory test result sheets are attached in Appendix C and Appendix E.



Results of thermal resistivity tests are summarised in **Table 1**. Acid sulfate test results are summarised and discussed in **Section 4.4.**

 Table 1
 Summary of Thermal Resistivity Results (Fully Dried State)

Borehole	Depth (m)	Description	Field Moisture Content (%)	Dry Density, tested (t/m³)	Resistivity, 0% moisture content (mK/W)
BH301	0.7-1.5	Sandy CLAY	17.5	1.602	1.800
BH302	0.9-1.45	EW SANDSTONE	9.7	1.691	1.450
BH303	0.4-0.8	Silty SAND	5.8	1.786	1.050
BH304	1.07-1.41	SANDSTONE CORE	-	2.49	0.304
BH305	0.52-0.81	Silty Gravelly CLAY	12.4	1.761	2.080
ВН306	0.8-1.5	EW SANDSTONE	13.0	1.644	1.750
BH307	0.8-1.5	Silty CLAY	17.8	1.630	1.670
BH308	0.45-1.0	Silty CLAY	18.6	1.582	1.970
BH309	0.8-1.5	Silty CLAY	22.6	1.477	1.960
BH310	0.8-1.5	Silty CLAY	16.7	1.605	1.820
BH311b	0.35-0.7	FILL, Silty Gravelly SAND / Clayey Gravelly SAND	11.3	1.826	1.820
BH312	0.8-1.5	Silty CLAY	19.2	1.684	1.640
BH313	0.13-1.5	SILTSTONE	9.2	1.673	1.820
BH314	0.8-1.5	Silty CLAY and EW SILTSTONE	10.8	1.676	1.710
BH315	0.8-1.5	Silty CLAY and EW SILTSTONE	15.2	1.626	1.930
BH316	0.8-1.2	Silty CLAY	22.0	1.674	1.620

3 SITE DESCRIPTION

3.1 REGIONAL GEOLOGY

Drawing 2 presents an overlay of geology that the proposed alignment traverses. The geology was obtained from the NSW Geological Survey 1:100000 Sydney Geology Map. With reference to **Drawing 2** the proposed alignment is situated over:

- Hawkesbury Sandstone which is listed to comprise medium to course grained sandstone with very minor shale and laminate lenses (BH301-302 & BH305).
- Ashfield Shale which is listed to comprise black to dark grey shale and laminate (BH303-304 & BH306-316)

3.2 SOIL LANDSCAPE

Drawing 3 presents an overlay of soil landscapes that the proposed alignment traverses. Soil landscapes identified that the alignment traverses include:

- Lucas Heights Landscape Residual (BH301-302)
- Blacktown Landscape Residual (BH303-310 & BH312-316)
- Hawkesbury Landscape Colluvial (BH311)

3.3 SURFACE CONDITIONS

The alignment initially passes through the Georges River National Park (BH301-304) and then along suburban streets for the remaining length (BH305-316). Borehole location photographs of each bore location are provided in **Appendix B** with each bore log. All bores in roadways were initially bored with diamond core to penetrate the wearing surface to obtain access to the pavement formation and the subgrade below.

Numerous underground services are present within the road corridor and existing high voltage feeders are present in the easement within Georges River National Park.

Topographically the alignment traverses relatively level ground with levels dropping from about 50m AHD near BH301 to about 20m AHD near BH316.

3.4 SUBSURFACE CONDITIONS

The subsurface profile encountered in the boreholes is detailed on the attached bore logs and is summarised in the Pavement Details summary table that is presented in **Appendix D**.

A pavement formation was encountered at BH305-316. A pavement wearing course comprising asphaltic concrete was encountered at thicknesses of between 60mm at BH305 and 160mm at BH311b. The pavement base course comprised gravel mixtures and sandstone cobble to depths of up to about 0.7m.

Pavement subgrade comprised fill and natural sandy and silty clay with rock encountered in some boreholes. Fill was typically sandy with varying amounts of gravel present.

Rock was encountered in the following bores: BH302 (depth 0.9m), BH303 (0.4m), BH304 (0.6m), BH305 (0.8m), BH306 (0.8m), BH308 (1.1m), BH313 (0.13m), BH314 (0.9m) and BH315 (1.0m). The depth to rock noted on the borelogs refers to the presence of rock structure and properties and is not necessarily related to rock strength or excavatability.



Based on the boreholes and the geology (Drawing 2) shallow rock can be expected in the vicinity of BH302-306, BH308 and BH313-315. Exposed sandstone was observed on the footpath in the vicinity of BH313 (see **Photograph 1**).

Medium strength or better rock was encountered in boreholes at the following locations and depths:

- BH303 below 1.0m
- BH304 below 0.98m
- BH313 below 0.85m

At the time of fieldwork no groundwater was encountered in any of the boreholes

It is noted that BH311 was unable to be drilled to the target depth of 1.5m due to multiple refusals on concrete or what appeared to be a hollow vessel. Three bores (BH311, 311a and 311b) were attempted at this location with all three refusing and the bore was abandoned at depths between 0.5 and 0.8m.

No potential asbestos containing materials were observed in the boreholes.

No obvious olfactory or visual evidence of contamination was encountered in the boreholes.





Photograph 1 Exposed Sandstone on the Eastern Avenue footpath in the vicinity of BH313.

4 DISCUSSION AND COMMENTS

4.1 EXCAVATION

It is understood that the depth of excavation for the proposed feeder mains is typically less than 1.5m and typically bores were drilled to 1.5m depth.

The subsurface conditions, including wearing course type and thickness and the depth to rock, are identified on the bore logs in **Appendix B** and summarized on the Pavement Details Table in **Appendix D**.

The pavement wearing course was asphaltic concrete at all bore locations and thickness varied between 60mm at BH305 and 160mm at BH311b. Excavation of the pavement wearing course will require sawing and removal to expose the pavement base course and soil profile beneath.

It is expected that soil material (pavement basecourse, fill and residual soils) could be excavated to the depth of weathered sandstone and siltstone by conventional earthmoving equipment such as backhoes and excavators.

It is expected that most very low to low strength sandstone at the site could be excavated by conventional earthmoving equipment such as backhoes and excavators.

The excavatability of medium strength or better rock will be dependent upon:



- The strength of the rock mass and the number and spacing of defects (joints). Rock strength may be variable.
- The types of plant used, experience of the operator and the degree of confinement within the excavation.
- The degree to which the rock can be removed by excavator bucket will be related to the size of the machine, the nature of the bucket (ie. rock teeth) and the confinement of the excavation

Where excavation of medium to high strength rock is required it would be prudent to allow for the use of a high capacity hydraulic ripper, hydraulic rock hammer or specialized rock excavation techniques such as rock sawing or profiling.

It is noted that the alignment traverses residential areas and consideration will need to be given to noise and vibration when selecting excavation methods, especially in areas where medium to high strength rock is likely to be encountered.

Particular care should be taken in the choice of excavation equipment and methods where excavation is to be undertaken in the vicinity of the existing development – including residences and services. Monitoring of noise and vibration should be undertaken along with observation and monitoring of the existing adjacent development for any signs of distress.

It is recommended that advice from experienced excavation contractors be obtained when selecting excavation methodology.

Where excavations are proposed within the zone of influence (within a 1V:1H projection from the base of the excavation) of existing services or structures suitable support will be required to be provided for those existing services or structures.

4.2 STABILITY OF EXCAVATIONS

Vertical sided excavations are not expected to stay open in the short term in non-cohesive (sand) strata. Excavations in non-cohesive (sand) strata could be expected to require excavation support in the form of propping or shoring of the excavation or battering of the excavation sides. Allowance for full support of excavations should be made where non-cohesive (sand) strata are encountered.

Vertical sided excavations are expected to stay open in the short term in residual clays and weathered rock material.

Where personnel are to enter excavations, the soil profile should be fully supported or battered back to 1H:1V in clay and 1.5H:1V in sand.

4.3 GROUNDWATER CONTROL

No groundwater or seepage was encountered in the boreholes.

As previously noted, groundwater conditions and levels are likely to fluctuate with variations in climatic conditions. Consequently, the requirement for groundwater control along the alignment could be expected to be dependent on climatic conditions prior to and during construction.

Based on the groundwater conditions encountered in the bores at the time of fieldwork it is generally expected that groundwater control is unlikely to be required along the alignment when construction is undertaken during dry weather.



4.4 ACID SULFATE SOIL ASSESSMENT

4.4.1 ACID SULFATE SOIL RISK MAP

The Botany Bay Acid Sulfate Soil Risk Map published by the Department of Land and Water Conservation indicates that there is no known occurrence of acid sulfate soil materials in the area of the proposed feeder alignment.

4.4.2 ASSESSMENT CRITERIA

Reference to the ASSMAC Acid Sulfate Soil Manual 1998 (Ref [6]) indicates the soil action criteria for soils according to their texture and the combined existing and potential acidity of the material. The action criteria also take into account the volume of soil to be disturbed, as shown on **Table 2**.

 Table 2
 Texture Based Acid Sulfate Action Criteria (Ref [6])

Type of Mater	ial	Action Criter Tonnes of Distu		Action Criteria > 1000 Tonnes of material is Disturbed			
Soil Texture	Approx. Clay Content (%)	Equivalent Sulfur (%S)	Equivalent Acidity (mol H ⁺ /tonne)	Equivalent Sulfur (%S)	Equivalent Acidity (mol H ⁺ /tonne)		
Coarse (silty sand to sands)	≤5	0.03	18	0.03	18		
Medium (sandy loam-light clay)	5-40	0.06	36	0.03	18		
Fine (Medium to heavy clays and silty clays)	≥40	0.1	62	0.03	18		

Based on the subsurface conditions encountered in the boreholes the action criteria for soils of either coarse or fine texture would be considered appropriate depending on the soil type. The assessed soil textures for each of the samples tested are shown on **Table 3** and **Table 4** in Section 4.4.3.

4.4.3 LABORATORY TEST RESULTS

Acid sulfate screening tests were undertaken on sixteen (16) soil and weathered rock samples recovered from the boreholes drilled along the feeder alignment the results of the acid sulfate screening tests are detailed on the laboratory test reports attached in **Appendix C** and are summarised on **Table 3**.



 Table 3
 Acid Sulfate Screening Test Results

Borehole	Depth (m)	Soil Type	Assessed Soil Texture	pH₅	pH _{FOX}	pH _F – pH _{FOX}	Reaction Rate
BH301	0.7-0.9	Sandy CLAY	Fine	5.33	4.26	1.1	1
BH302	0.2-0.4	Silty Gravelly SAND	Coarse	6.84	5.40	1.4	3
BH303	0-0.1	Gravelly SAND	Coarse	7.16	6.05	1.1	4
BH304	0.4-0.5	Gravelly SAND	Coarse	6.05	4.58	1.5	1
BH305	0.42-0.5	Gravelly Sandy CLAY	Fine	8.08	6.97	1.1	1
BH306	1.2-1.3	SANDSTONE	Coarse	5.68	4.49	1.2	2
BH307	1.2-1.3	Silty CLAY	Fine	5.05	3.92	1.1	1
BH308	1.2-1.3	SILTSTONE	Fine	5.04	4.20	0.8	2
BH309	0.7-0.9	Silty CLAY	Fine	6.14	5.00	1.1	1
BH310	0.4-0.5	Silty CLAY	Fine	7.52	7.05	0.5	4
BH311	0.35-0.45	Clayey Silty SAND	Fine	5.06	3.81	1.3	4
BH312	0.5-0.55	Silty CLAY	Fine	8.17	7.14	1.0	4
BH313	0.13-0.85	SILTSTONE	Fine	4.74	3.96	0.8	1
BH314	0.4-0.5	Silty CLAY	Fine	7.10	6.07	1.0	4
BH315	0.4-0.5	CLAY	Fine	5.00	3.86	1.1	4
BH316	1.2-1.3	Silty CLAY	Fine	4.17	3.11	1.1	3

Note: Results shown in shaded cells exceed the ASSMAC (Ref [6]) action criteria. Reaction Rate: 1 = Slight, 2 = Moderate, 3 = High, 4 = Very Vigorous

The field pH (pH_F) of all samples tested was greater than 4 and, as such, the soils and weathered rock tested would not be classified as actual acid sulfate soils.

However, positive acid sulfate screening test results indicated the possible presence of potential acid sulfate soils and weathered rocks. The ASSMAC guidelines (Ref [6]) indicate that potential acid sulfate soil conditions are present where the pH of soil in peroxide (pH_{FOX}) is less than 3.5 and/or the pH change during the test (pH_F – pH_{FOX}) is greater than 1. Based on the ASSMAC guidelines (Ref [6]) and the results of the screening tests, there appeared to be a potential for acid forming conditions upon oxidation for some of the samples tested, with thirteen (13) of the samples on which screening testing was undertaken exhibiting a pH change (pH_F – pH_{FOX}) of more than 1 and one (1) sample exhibited a pH in peroxide (pH_{FOX}) of less than 3.5.



The residual silty clay sample from BH316 was selected for further analysis by the Suspension Peroxide Oxidation Combined Acidity and Sulfate (SPOCAS) and Chromium Reducible Sulfur (CRS) methods based on the results of the screening testing and the results of this analysis is detailed on the laboratory test report attached in **Appendix C** and summarised on **Table 4**.

 Table 4
 Summary of CRS and SPOCAS Test Results

Borehole	Depth	Soil	Assessed Soil	Chromium Reducible Sulfur (S _{CR})	Titratable Actual Acidity (TAA)	Titratable Sulfidic Acidity (TSA)	Peroxide Oxidisable Sulfur (Spos)	Net Acidity
Borenole	(m)	3011	Texture	%S	mole H ⁺ / tonne	mole H ⁺ /tonne	%S	mole H ⁺ / tonne
BH316	1.2-1.3	Silty CLAY	Fine	<0.005	42	157	<0.02	49

Note: Results shown in shaded cells exceed the ASSMAC (Ref [6]) action criteria for > 1000 tonnes disturbed

The further analysis by the SPOCAS and CRS indicated:

- The sample of residual silty clay tested had concentrations of acidity and/or sulfur that exceed the ASSMAC (Ref [6]) action criteria determined by the Net Acidity value.
- The sample of residual silty clay tested had existing pH of 3.5 which would classify the soil as actual acid sulfate soil.

It is however noted that:

- The alignment lies within an area of no known acid sulfate soils and does not satisfy any of the normal criteria for ASS (ie. recent or marine sediments and soil horizons less than 10m AHD).
- The further analysis by the SPOCAS and CRS did not indicate the presence of oxidisable sulfur (no chromium reducible sulfer (S_{CR}) or peroxide oxidisable sulfur (Spos)).

On this basis it is assumed that the acidity is likely from a source other than oxidisable inorganic sulfur.

Based on the presence of acidic residual soils and the exceedance of the action criteria determined by the Net Acidity value it is recommended that it would be prudent to allow for the preparation of an Acid Sulfate Management Plan (ASSMP) for all excavation works in the residual soils.

4.5 INDICATIVE WASTE CLASSIFICATION

It is noted that RCA have not undertaken assessment of the road construction materials (pavement and basecourse) during these works.



Samples were collected from the natural materials, noting that some strata was considered to have been placed at the site, from the surface (in areas where there was no road surface) to 1.2m below the surface. Materials comprised a various sand, silt and clay strata as well as two (2) samples of siltstone. Bedrock comprising siltstone, sandstone and shale was encountered at depths ranging from 0.85 to greater than 1.5m below the surface.

Hydrocarbons (BTEX, TRH, PAH) and metals concentrations were either not detected or reported concentrations below the guidelines for general solid waste with the exception of chromium and nickel in BH312C. Asbestos was not detected in any sample, nor were pesticides or polychlorinated biphenyls (PCB).

RCA undertook further analysis of BH312C in accordance with the provisions of the Waste Classification Guidelines (Ref [4]) and the concentrations were below the Tier 2 criteria for general solid waste.

A duplicate sample of BH309B was submitted for analysis and relative percentage difference calculations of the results indicate some uncertainty with nickel results only. This sample was from the natural material directly underlying the basecourse at the location and the higher concentration may be due to inclusion of some of the above layer or may be entirely representative of the sampled layer at this location. It is noted that the primary sample (BH309B) exhibited higher concentrations than the duplicate and as such the uncertainty is considered conservative.

A comparison of the results to the guidelines (Ref [4]) is included as **Appendix E** and laboratory report sheets are included in **Appendix E**.

RCA recommends that material be stockpiled/managed according to material type with pavement (asphaltic concrete) and underlying basecourse separated from natural material.

No indications of coal tar were observed within the pavement and the detected PAH concentrations in the analysed samples indicate that there wasn't any encountered. RCA recommends that pavement material be inspected during the removal works and in the event that visual or olfactory indications of coal tar be identified, that pavement and underlying basecourse material either be:

- Disposed of as general solid waste as per the pre-classification of the guidelines (Ref [4]).
- Stockpiled and tested for the presence of coal tar and PAH concentrations prior to determining the fate of the material.

If coal tar or high PAH concentrations are identified within the road material, underlying natural material should also be tested for PAH concentrations prior to determination of the fate of the material.

Natural material assessed by RCA is anticipated to be classified as general solid waste based on the testing undertaken. As such, it is anticipated that the majority of material excavated for the purpose of the construction can, depending on the final volume and in consultation with the receiving waste facility, be disposed of as general solid waste. Alternatively, natural material may potentially, based on the samples assessed as part of this project, be classified as excavated natural material in accordance with the relevant Resource Recovery Order (Ref [5]).



Whilst no site history assessment has been undertaken as part of this project, RCA considers that the siltstone/sandstone/shale bedrock would be classified as virgin excavated natural material (VENM, Ref [4]) in the absence of any visual or olfactory indications of contamination. RCA recommends particular attention is paid to excavated sandstone in the vicinity of any potential underground sources of contamination (such as service stations) and in the event of olfactory or visual indications of contaminant impact the bedrock should be stockpiled separately for further assessment.

5 LIMITATIONS

This report has been prepared for Ausgrid in accordance with the 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 Ausgrid for the specific purpose and the specific development described in the report. The report may not contain sufficient information for purposes or developments other than that described in the report or for parties other than Ausgrid. This report shall only be presented in full and may not be used to support objectives other than those stated in the report without permission.

The information in this report is considered accurate at the date of issue with regard to the current conditions of the site. The conclusions drawn in the report are based on interpolation between boreholes or test pits. Conditions can vary between test locations that cannot be explicitly defined or inferred by investigation.

Yours faithfully

RCA AUSTRALIA

Mark Allman

Principal Geotechnical Engineer

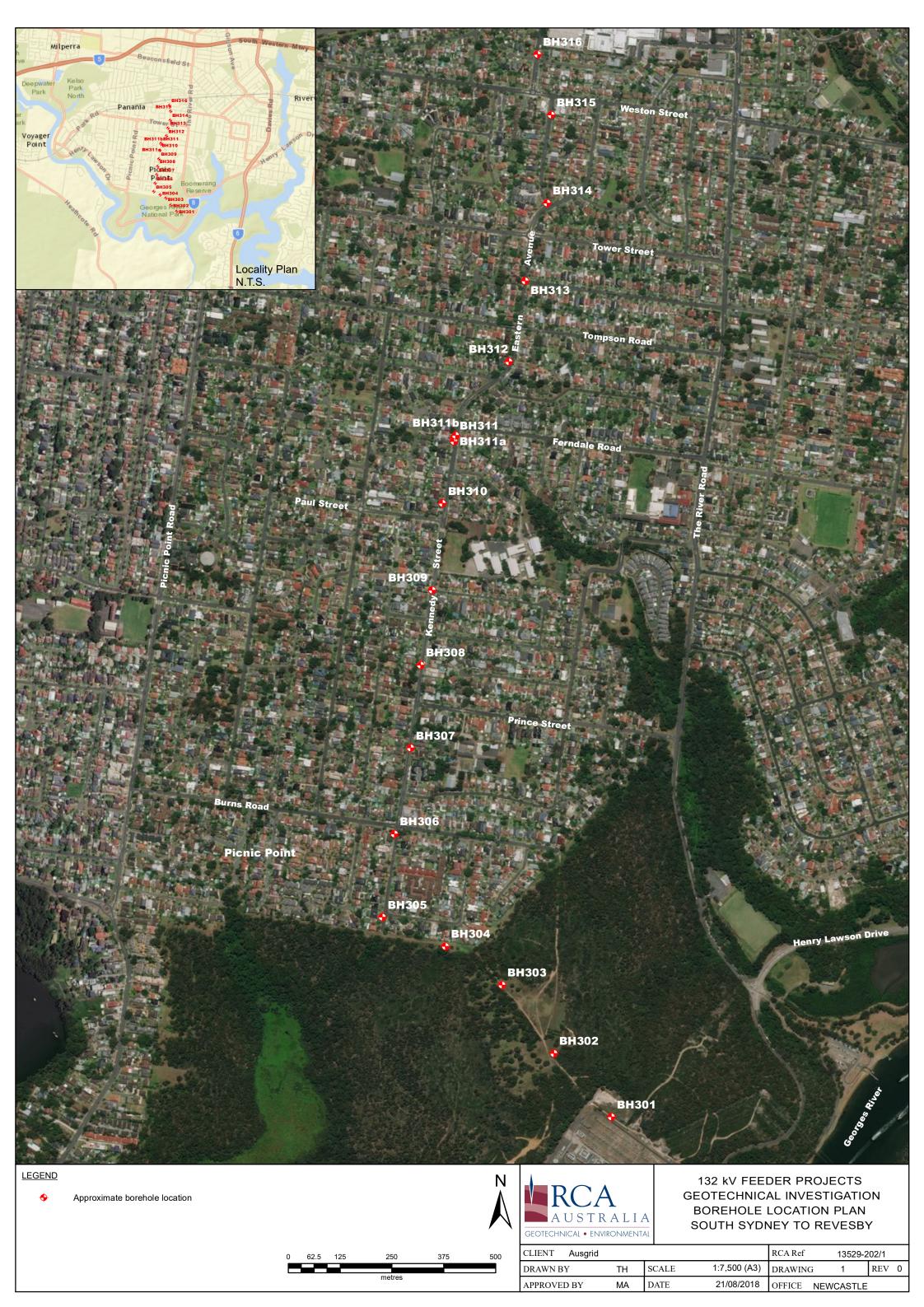
REFERENCES

- [1] CSIRO. Foundation Maintenance and Footing Performance: A Homeowner's Guide. Information sheet BTF 18, 2003.
- [2] Standards Association of Australia. AS 2870-2011: Residential Slabs and Footings Construction. Standards Association of Australia, 2011.
- [3] Standards Association of Australia. AS 3798-2007: Guidelines on Earthworks for Commercial and Residential Structures. Standards Association of Australia, 2007.
- [4] DECC, Waste Classification Guidelines, Part 1; Classifying Waste, November 2014.
- [5] Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014, the excavated natural material order 2014.
- [6] Stone, Y, Ahern, CR, and Blunden, B, Acid Sulfate Soil Manual 1998, ASSMAC, Wollongbar, NSW, 1998.



Appendix A

Drawings







Appendix B

Engineering Logs
Pavement Core Photographs
Rock Core Photographs
Bore Location Photographs
Explanatory Notes



GEOTECHNICAL BOREHOLE LOG

SHEET 1 OF 1

PROJECT No: 13529 CLIENT: Ausgrid

PROJECT: 132KV Feeder Projects
LOCATION: South Sydney to Revesby

DATE COMMENCED: 14/05/2018 DATE COMPLETED: 14/05/2018

SURFACE RL:

COORDS: 316461.00 m E 6238616.00 m N MGA94 56 DRILL MODEL: Hand Auger & Trailer Mounted Drill Rig

L	OCAT	ΓΙΟΝ: South	Sydney to	o Reve	esby								
	Е	Borehole Info	rmation				Field Material Informati						
METHOD	WATER	FIELD	SAMPLE	DEРТН (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS			
НА			D 0.40m D-ES-B ASS 0.50m D	- - - - - - - - - - - - -		SM	FILL, Gravelly Silty SAND, fine to medium grained, pale brown, gravel fine to coarse up to 40mm diameter comprising sandstone rock fragments, sub angular to angular FILL, Gravelly Silty SAND, fine to medium grained, brown, with clay, gravel comprises sandstone fragments	D - M		FILL -			
< <p><<drawingfile>> 03/07/2018 17:18 Produced by gINT Professional. Developed by Datgel AD/T</drawingfile></p>	Not Encountered		D-ES-C D 0.90m 1.00m D 1.20m ES-D ASS 1.30m D	- 1.0		CL- CI	Sandy CLAY, low to medium plasticity, red with pale brown and grey mottles, fine to medium grained sand, trace fine gravel Becoming medium plasticity, mottled pale grey and red-brown, without gravel at 1.2m	М		RESIDUAL Hand auger refusal at 1.0m			
08.1 RCA_STANDARD.GLB Log RCA NON CORED LOG 13529-300_LOGS.GPJ < <drawingfile>> 03</drawingfile>				- 1.5- - - - 2.0			BOREHOLE BH301 TERMINATED AT 1.50 m NOTE: Coordinates have been taken from a hand held GPS			-			
9	LOGGED: TH					CHECKED: MA DATE: 04/09/2018							



BH301 (Looking southeast)

Project: South Sydney to Revesby 132KV Feeder Project

Location: South Sydney to Revesby RCA ref: 13529-202/0



GEOTECHNICAL BOREHOLE LOG

SHEET 1 OF 1

PROJECT No: 13529 CLIENT: Ausgrid

PROJECT: 132KV Feeder Projects
LOCATION: South Sydney to Revesby

DATE COMMENCED: 14/05/2018 DATE COMPLETED: 14/05/2018

SURFACE RL:

COORDS: 316322.00 m E 6238769.00 m N MGA94 56

DRILL MODEL: Trailer Mounted Drill Rig

L		ION: South		o Rev	esby		DRILL MODEL: Trailer Mounted Drill Rig							
-	В	orehole Info	mation	1		z	Field Material Informa	tion	L 1					
METHOD	WATER	FIELD	SAMPLE	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS				
			ES-a ASS	-		SM	FILL/TOPSOIL, Silty Gravelly SAND, fine to medium grained, brown			FILL / TOPSOIL				
			0.20m	<u> </u>										
			ES-B	-										
			0.40m	_										
	ntered		D	-0.5 -						-				
_	ncour		0.70m	0.70 -	\bowtie	CL		MC <pl< td=""><td></td><td>RESIDUAL / FILL?</td></pl<>		RESIDUAL / FILL?				
gel AD/T	Not Encountered		D	-		OL	Sandy CLAY, low plasticity, red brown with pale grey mottles, fine to medium grained sand	WIONE		NESIDONE / FILE!				
by Dat			0.90m	0.90 -	////		Extremely Weathered SANDSTONE (EW material),	EW	EL	BEDROCK				
sional, Developed			U75-D	- 1.0			properties of Clayey SAND/Sandy CLAY, low plasticity, red-brown and pale grey, fine grained sand			U75 pushed 0.2m				
gini Profes			1.20m ES-C	_				EW - HW	VL					
Produced by			ASS 1.30m	<u> </u> 										
2018 17:18			D 1.45m	1.45										
UG: _KCA_STANDARD.GLB LOG RCA NUN CURED LUG. 13529-330_LUGGS.GFJ <				- 1.5 -			BOREHOLE BH302 TERMINATED AT 1.45 m TC Bit refusal on bedrock NOTE: Coordinates have been taken from a hand held GPS			-				
OG 13529-300_LOGS.				-										
NON COREUL				-2.0						-				
GLB Log RCA				-										
RCA STANDARD.C				_										
9	LOGGED: TH					1	CHECKED: MA	DATE: 04/09/2018						



BH302 (Looking northwest)

Project: South Sydney to Revesby 132KV Feeder Project

Location: South Sydney to Revesby **RCA ref**: 13529-202/0



GEOTECHNICAL BOREHOLE LOG

SHEET 1 OF 2

PROJECT No: 13529 CLIENT: Ausgrid

PROJECT: 132KV Feeder Projects
LOCATION: South Sydney to Revesby

DATE COMMENCED: 14/05/2018 DATE COMPLETED: 14/05/2018

SURFACE RL:

COORDS: 316197.00 m E 6238934.00 m N MGA94 56 DRILL MODEL: Hand Auger & Trailer Mounted Drill Rig

LC		ΓΙΟΝ: South		o Reve	esby			er & Tra	iler Mounted Drill Rig		
	В	Borehole Infor	mation			- I	Field Material Informa	tion			
METHOD	WATER	FIELD	SAMPLE	DEРТН (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS	
	A		ES-A ASS 0.10m	_		SM	FILL, Sitty Gravelly SAND, fine to coarse grained, brown, trace copper fragments/twisted copper pipe, fine to medium sub rounded to sub angular gravel	D-M		FILL -	
			D 0.30m	-						-	
	(p		ES-B 0.40m	- 0.40 -		SM	Silty SAND, medium grained, brown	_		RESIDUAL	
НА	(Not Encountered)			-0.5			Only Only, median graned, blown			EW Bedrock	
			D	- 0.60 - -	Sec. 7.00 5		SANDSTONE, fine to medium grained, brown	EW - DW	EL - L	BEDROCK -	
Jargel			0.80m	_						-	
	\			-1.0-			CONTINUED AS CORED BOREHOLE			-	
N Professional,				_						-	
Produced by gir				_						-	
81.718102//0/				-						-	
awingrile>> 03				- 1.5 -						-	
Jes. GPJ < <ur< td=""><td></td><td></td><td></td><td>_</td><td></td><td></td><td></td><td></td><td></td><td>-</td></ur<>				_						-	
13528-300_LC				_						-	
ON CORED LOC				-2.0						_	
S LOG RCA NO				_						-	
KCA_LIB_B61_KCA_STANDARD.GLE LOG KCA NON CORED LOG 13529-300_LOGS.G-0 <-CJRWING-H8>> USUT/Z018 17:18 Froduced by gin1 Froressional, beveloped by Dagge				_						-	
2 US:1 RCA V										_	
L L	_OG(GED: TH					CHECKED: MA	DATE: 04/09/2018			



CORED BOREHOLE LOG

SHEET 2 OF 2

PROJECT No: 13529 CLIENT: Ausgrid

PROJECT: 132KV Feeder Projects
LOCATION: South Sydney to Revesby

DATE COMMENCED: 14/05/2018 DATE COMPLETED: 14/05/2018

SURFACE RL:

COORDS: 316197.00 m E 6238934.00 m N MGA94 56 DRILL MODEL: Hand Auger & Trailer Mounted Drill Rig

					/dney t	o Revesby	PESBY DRILL MODEL: Hand Auger & Trailer Mounted Drill Rig Field Material Description									
МЕТНОР		RECOVERY I		DEPTH (m)	GRAPHIC LOG	(SOIL NA particle s minor const	DESCRIPTION ME; plasticity/grain sizhape, secondary comituents) (ROCK NAME) lour, minor constituen		THERING	INF STF Is ₍	ERR RENC 50) M	RED GTH Pa	DE SP	ACIN	NG	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling,
NMLC	0% Water LOSS ──▼	RE			5	START CORING A	√T 1.00m	ts)	WEA	EL 0.03	F. W. H.		10	mm) (8)	0001	planarity, roughness, thickness)
NMLC	100% Water LOSS	40	0	- - 1.30 - -		SANDSTONE (retugrained, red, brown	urned as sandstone fra n and grey	agments), medium	HW							– FZ
	0,					CORED BOREHO NOTE: Coordinate: GPS	LE BH303 TERMINATs have been taken from	TED AT 1.50 m m a hand held								
L	.OG(GED	: TH				CHECKED: MA	1	•						AT	E: 04/09/2018



BH303

Project: 132KV Feeder Projects

Location: South Sydney to Revesby **RCA ref:** 13529



BH303 (Looking northwest)

Project: South Sydney to Revesby 132KV Feeder Project

Location: South Sydney to Revesby **RCA ref:** 13529-202/0



GEOTECHNICAL BOREHOLE LOG

SHEET 1 OF 2

PROJECT No: 13529 CLIENT: Ausgrid

PROJECT: 132KV Feeder Projects LOCATION: South Sydney to Revesby

SURFACE RL:

DATE COMMENCED: 14/05/2018 DATE COMPLETED: 14/05/2018

COORDS: 316061.00 m E 6239027.00 m N MGA94 56

DRILL MODEL: Trailer Mounted Drill Rig

L	LOCATION: South Sydney to Revesby DRILL MODEL: Trailer Mounted Drill Rig Parabela Information													
L	E	Borehole Infor	mation				Field Material Information							
METHOD	WATER	FIELD	SAMPLE	DEРТН (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS				
RCA_LIB_081_RCA_STANDARD.GLB Log RCA NON CORED LOG 13529-300_LOGS GPJ < <drawingfile>> 03/07/2018 17:18 Produced by gINT Professional, Developed by Datgel AD/T METHO</drawingfile>	tered)		Table Tabl)HLdGQ	CAN CANADA CANAD	SP	(SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents)	MOISTUF WEATHER	CONSISTEI RELATIV RELATIV DENSITTEI DENSITTEI STRENG" STRENG"	STRUCTURE AND ADDITIONAL OBSERVATIONS RESIDUAL / SLOPEWASH				
ACA LIB US.1 ACA ST	LOGGED: TH						CHECKED: MA	DA ⁻	ΓE: 04/0	09/2018				



CORED BOREHOLE LOG

SHEET 2 OF 2

PROJECT No: 13529 CLIENT: Ausgrid PROJECT: 132KV Feeder Projects

LOCATION: South Sydney to Revesby

DATE COMMENCED: 14/05/2018 DATE COMPLETED: 14/05/2018

SURFACE RL:

COORDS: 316061.00 m E 6239027.00 m N MGA94 56

DRILL MODEL: Trailer Mounted Drill Rig

-				prmation Field Material Description											<u> </u>
METHOD		RECOVERY	RQD	DEPTH (m) GRAPHIC LOG		minor const	DESCRIPTION ME; plasticity/grain size, colour, shape, secondary components, ituents) (ROCK NAME; grain size, lour, minor constituents)	WEATHERING	INI STI	NFERRED ASTRENGTH IS (50) MPa S		SP	DEFECT SPACING		AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling,
	A			- - - - 0.5 0.60		START CORING A									
NMLC	r — 0% Water LOSS — 0%	63	38	- 0.98 - 1.U - -		SANDSTONE, mer Recovered as sand	dium grained, brown dstone fragments from 0.98m to 1.07m	HW - MW							− FZ − JT 20° CN PR RF
	<u> </u>			-1.48 -1.5		TC bit grinding on	LE BH304 TERMINATED AT 1.48 m inferred sandstone at 0.6m s have been taken from a hand held								
L	LOGGED: TH CHECKED: MA											 DAT	TE: 04/09/2018		



BH304

Project: 132KV Feeder Projects

Location: South Sydney to Revesby **RCA ref:** 13529



BH304 (Looking west)

Project: South Sydney to Revesby 132KV Feeder Project

Location: South Sydney to Revesby **RCA ref**: 13529-202/0



GEOTECHNICAL BOREHOLE LOG

SHEET 1 OF 2

PROJECT No: 13529 CLIENT: Ausgrid

PROJECT: 132KV Feeder Projects

I OCATION: South Sydney to Revesby

DATE COMMENCED: 15/05/2018 DATE COMPLETED: 15/05/2018

SURFACE RL:

COORDS: 315909.00 m E 6239097.00 m N MGA94 56

DRILL MODEL: Trailer Mounted Drill Rig

LOCATION: South Sydney to Revesby							DRILL MODEL: Trailer Mounted Drill Rig									
	В	orehole Info	rmation			 	Field Material Information									
METHOD	WATER	FIELD	SAMPLE	ОЕРТН (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS						
DT	A		Pavemen Core	0.03 -			ASPHALT, 30mm thick, nominal 7mm minus aggregate (AC7)			PAVEMENT WEARING COURSE						
			(0.06m	0.06 -		GM	ASPHALT, 30mm thick, nominal 14mm minus aggregate (AC14) Silty Sandy GRAVEL, fine to medium, angular, dark grey, fine to coarse grained sand	D		PAVEMENT MATERIAL						
AD/T	—— (Not Encountered) —		0.42m AE-A ASS 0.52m	- 0.42 - - 0.5		CI	Gravelly Sandy CLAY, medium plasticity, grey and brown, fine to coarse grained sand, fine to medium sub rounded gravel	MC>PL		RESIDUAL						
			D 0.80m D	- 0.80 -			Clayey SAND/Sandy CLAY (Extremely Weathered	EW		U75 refusal after 10mm						
			0.90m				Sandstone Material), dark red-brown with some orange and pale grey zones									
				- 1.0			CONTINUED AS CORED BOREHOLE									
				_												
				-												
				- 1.5												
				-												
				_												
				-												
				-2.0												
				_												
				-												
				_												
L	.ogg	GED: TH					CHECKED: MA	DA ⁻	ΓE: 04/0	09/2018						



CORED BOREHOLE LOG

SHEET 2 OF 2

PROJECT No: 13529 CLIENT: Ausgrid

PROJECT: 132KV Feeder Projects

LOCATION: South Sydney to Revesby

SURFACE RL:

DATE COMMENCED: 15/05/2018 DATE COMPLETED: 15/05/2018

COORDS: 315909.00 m E 6239097.00 m N MGA94 56

DRILL MODEL: Trailer Mounted Drill Rig

Во	reho	le In	forma	ation	<u> </u>	•	Field Material Description								
МЕТНОБ	WATER	RECOVERY	RQD	DEPTH (m)	GRAPHIC LOG	minor const	DESCRIPTION ME; plasticity/grain size, shape, secondary compo ituents) (ROCK NAME; g blour, minor constituents)	colour, nents, ırain size,	THERING	INFE STR Is ₍₅	ERRED ENGTH D) MPa	O A	DEFE SPAC	CT ING	AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling,
				- - - -0.5		START CORING A	NT 0 90m								
	A			0.90 1.0		START CORING A SANDSTONE, me some decomposed	dium grained, grey, dark i	red and orange,	EW - HW MW	55555555555					DZ JT 30 - 80° SN CU RF
NMLC		83	0	- - - 1.30 -		CORE LOSS 0.10	m (1 30 1 40)		EW		300000000000000000000000000000000000000				— JT 30° SN PR RF Decomposed zone
	*			- 1.40 - 1.5-			remnants rock structure,	medium to high							— Decomposed zone
				2.0			LE BH305 TERMINATEDS have been taken from a								
	.OG	GED	: TH				CHECKED: MA							DA ⁻	ΓΕ: 04/09/2018



BH305

Project: 132KV Feeder Projects

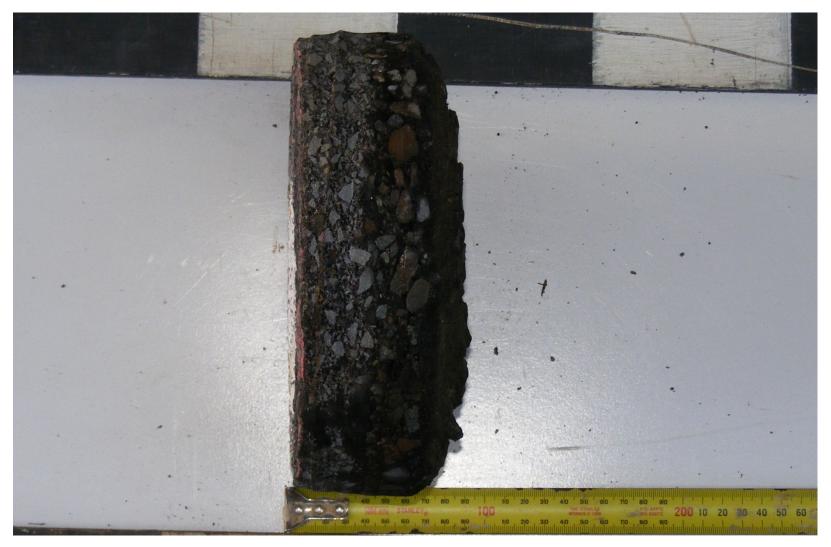
Location: South Sydney to Revesby **RCA ref:** 13529



PAVEMENT CORE PHOTOGRAPH Pavement Core BH305

Project: 132KV Feeder Projects

Location: South Sydney to Revesby RCA ref: 13529



Detail – Pavement Core BH305

Project: 132KV Feeder Projects



BH305 (Looking north)

Project: South Sydney to Revesby 132KV Feeder Project



GEOTECHNICAL BOREHOLE LOG

SHEET 1 OF 1

PROJECT No: 13529 CLIENT: Ausgrid

PROJECT: 132KV Feeder Projects

DATE COMMENCED: 15/05/2018 DATE COMPLETED: 15/05/2018

SURFACE RL:

COORDS: 315938.00 m E 6239298.00 m N MGA94 56

LO	CAT	ION: South	Sydney to	o Rev	esby		DRILL MODEL: Tra	ailer Mo	unted D	rill Rig
	В	orehole Info	mation				Field Material Informa			
METHOD	WATER	FIELD	SAMPLE	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
DT			Pavemen Core (0.08m	0.04 - 0.06 - 0.08 -		GM	ASPHALT, 35mm thick, nominal 7mm minus aggregate (AC7) ASPHALT, 25mm thick, nominal 7mm minus aggregate (AC7) ASPHALT, 20mm thick, nominal 10mm minus aggregate (AC10) FILL, Silty Sandy GRAVEL, fine to medium, sub angular to angular, dark grey,m, fine to coarse grained sand	D		PAVEMENT WEARING COURSE PAVEMENT MATERIAL -
AD/T	Not Encountered		0.45m ES-A ASS 0.55m D	- 0.45 - - 0.5 -		CI	Sandy CLAY, medium plasticity, orange brown	MC <pl< td=""><td></td><td>RESIDUAL</td></pl<>		RESIDUAL
Journal by givi Froiessional, Developed by Daug			0.95m D 1.20m ES-B ASS 1.30m	- 0.90 - - 1.0			Becoming Extremely Weathered SANDSTONE, medium grained, grey and orange brown (extremely weathered material properties of hard Sandy CLAY/Clayey SAND)	EW	EL	BEDROCK U75 refusal at 0.95m -
STATE OF THE STATE			D 1.50m	- 1.5 -			BOREHOLE BH306 TERMINATED AT 1.50 m NOTE: Coordinates have been taken from a hand held GPS			
RCA_IDE_08.1_RCA_STANDARD.GLE LOG RCA ROTH CORED LOG 13255500_LOGS.GFO <-DRAWINGFIRSY 0307/2018 IT.18 Fromcestorial, Developed by Dagge				-2.0						- - -
L	OGG	ED: TH					CHECKED: MA	DA	ΓE: 04/0	09/2018



PAVEMENT CORE PHOTOGRAPH BH306

Project: 132KV Feeder Projects



Detail – Pavement Core BH306

Project: 132KV Feeder Projects



BH306 (Looking north)

Project: South Sydney to Revesby 132KV Feeder Project



GEOTECHNICAL BOREHOLE LOG

SHEET 1 OF 1

PROJECT No: 13529 CLIENT: Ausgrid

PROJECT: 132KV Feeder Projects

DATE COMMENCED: 15/05/2018 DATE COMPLETED: 15/05/2018

SURFACE RL:

COORDS: 315977.00 m E 6239505.00 m N MGA94 56

LOCATION: South Sydney to Reve	esby DRILL MODEL: Tra	ailer Mounted Drill Rig
Borehole Information	Field Material Informa	
METHOD WATER FIELD TEST SAMPLE DEPTH (m)	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/G CONSISTENCY/ RELATIVE DENSITY/ STRENGTH STRENG
Pavement 0.03 - 0.08 - 0.15m 0.15 -	ASPHALT, 30mm thick, nominal 7mm minus aggregate (AC7) ASPHALT, 50mm thick, nominal 7mm minus aggregate (AC7) ASPHALT, 70mm thick, nominal 14mm minus aggregate (AC7) ASPHALT, 70mm thick, nominal 14mm minus aggregate (AC14) FILL, Silty Sandy GRAVEL/Silty Gravelly SAND, fine to coarse grained, fine to medium gravel, comprising sandstone rock	PAVEMENT WEARING COURSE PAVEMENT MATERIAL
0.40m ES-A ASS 0.50m 0.50m 0.50m 0.50m 0.50m 0.50m 0.50m 0.50m 0.80m	CI Silty CLAY, medium plasticity, grey and orange brown, fine to medium grained sand Becoming with relict siltstone rock structure at depth	MC <pl h="" residual<="" td=""></pl>
U75-D	BOREHOLE BH307 TERMINATED AT 1.50 m NOTE: Coordinates have been taken from a hand held GPS	
LOGGED: TH	CHECKED: MA	DATE: 04/09/2018



BH307 (Looking north)

Project: South Sydney to Revesby 132KV Feeder Project



GEOTECHNICAL BOREHOLE LOG

SHEET 1 OF 1

PROJECT No: 13529 CLIENT: Ausgrid

PROJECT: 132KV Feeder Projects
LOCATION: South Sydney to Revesby

DATE COMMENCED: 15/05/2018 DATE COMPLETED: 15/05/2018

SURFACE RL:

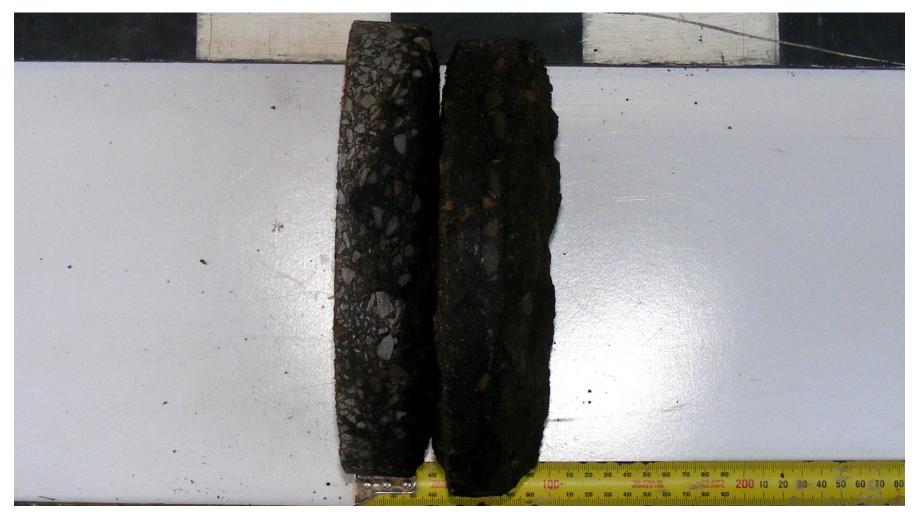
COORDS: 316001.00 m E 6239705.00 m N MGA94 56

	OCATION: South Sydney to Revesby Borehole Information						DRILL MODEL: Trailer Mounted Drill Rig Field Material Information									
	В	orenole intol	mation			Z			≽							
METHOD	WATER	FIELD TEST	SAMPLE	ОЕРТН (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH							
DT			Pavemen Core	t 0.04 -			ASPHALT, 40mm thick, nominal 7mm minus aggregate (AC7)			PAVEMENT WEARING COURSE						
			(<u>0.07m</u>	0.07 -		GM	ASPHALT, 30mm thick, nominal 10mm minus aggregate (AC10) FILL, Sandy Silty GRAVEL, fine to medium, sub rounded to sub angular, dark brown with clay	D		FILL						
			0.35m ES-A ASS	0.35 -		CI	FILL, Sandy CLAY, medium plasticity, brown	M - MC <pl< td=""><td></td><td></td></pl<>								
			0.45m	0.45 - 0.5		CI	Silty CLAY, medium plasticity, orange-brown and grey, some fine grained sand	M	VSt - H	RESIDUAL						
	Not Encountered		D	_												
AD/T	Not E		0.80m	_												
			U75-D	_												
		PP380 - >450kPa	1.00m D	-1.0												
			1.20m ES-B	- 1.10 -			SILTSTONE, grey and brown, fine to medium grained,	EW	VL - L	BEDROCK Started 3.5" auger						
			ASS 1.30m	_												
			1.40m	1.40			BOREHOLE BH308 TERMINATED AT 1.40 m TC Bit refusal on siltstone bedrock NOTE: Coordinates have been taken from a hand held GPS									
				1.5 -			NOTE. Cooldinates have been taken from a hand field GF3									
				_												
				-												
				-2.0												
				_												
				-												
				_												
L	.OGG	GED: TH		l	l		CHECKED: MA	DAT	ΓE: 04/0	09/2018						



PAVEMENT CORE PHOTOGRAPH Pavement Core 308

Project: 132KV Feeder Projects



Detail – Pavement Core BH308

Project: 132KV Feeder Projects



BH308 (Looking north)

Project: South Sydney to Revesby 132KV Feeder Project



GEOTECHNICAL BOREHOLE LOG

SHEET 1 OF 1

PROJECT No: 13529 CLIENT: Ausgrid

PROJECT: 132KV Feeder Projects

DATE COMMENCED: 15/05/2018 DATE COMPLETED: 15/05/2018

SURFACE RL:

COORDS: 316029.00 m E 6239885.00 m N MGA94 56

LC	CAT	ION: South	Sydney to	o Rev	esby		DRILL MODEL: Tra	ailer Mo	ounted D	rill Rig
	В	orehole Info	rmation				Field Material Informa			
METHOD	WATER	FIELD	SAMPLE	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
DT			Pavemen Core 0.10m	t		GM	ASPHALT, 30mm thick, nominal 7mm minus aggregate (AC7) ASPHALT, 70mm thick, nominal 14mm minus aggregate (AC14) FILL, Silty Sandy GRAVEL, fine to medium, sub angular to angular, dark grey	D		PAVEMENT WEARING COURSE PAVEMENT MATERIAL
AD/T	Not Encountered		0.60m ES-A ASS 0.70m ES-Bx2 ASS 0.80m	- 0.5 - - 0.70 -		Ci-CH	Silty CLAY, medium to high plasticity, red and grey		VSt - H	RESIDUAL .
L		_PP320 - 420kPa	1.20m ES-C ASS 1.30m	1.0 						- - -
			1.50m	1.5- - -	<u> </u>		BOREHOLE BH309 TERMINATED AT 1.50 m NOTE: Coordinates have been taken from a hand held GPS			
				- 2.0 -						
	.og@	GED: TH		-			CHECKED: MA	DA [*]	ΓE: 04/0	09/2018



PAVEMENT CORE PHOTOGRAPH

Pavement Core BH309

Project: 132KV Feeder Projects



Detail – Pavement Core BH309

Project: 132KV Feeder Projects



BH309 (Looking north)

Project: South Sydney to Revesby 132KV Feeder Project



GEOTECHNICAL BOREHOLE LOG

SHEET 1 OF 1

PROJECT No: 13529 CLIENT: Ausgrid

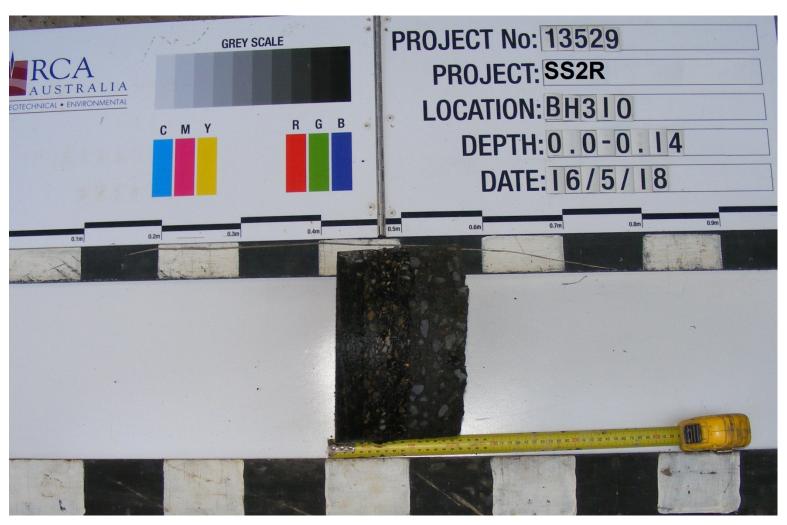
PROJECT: 132KV Feeder Projects

DATE COMMENCED: 16/05/2018 DATE COMPLETED: 16/05/2018

SURFACE RL:

COORDS: 316054.00 m E 6240094.00 m N MGA94 56

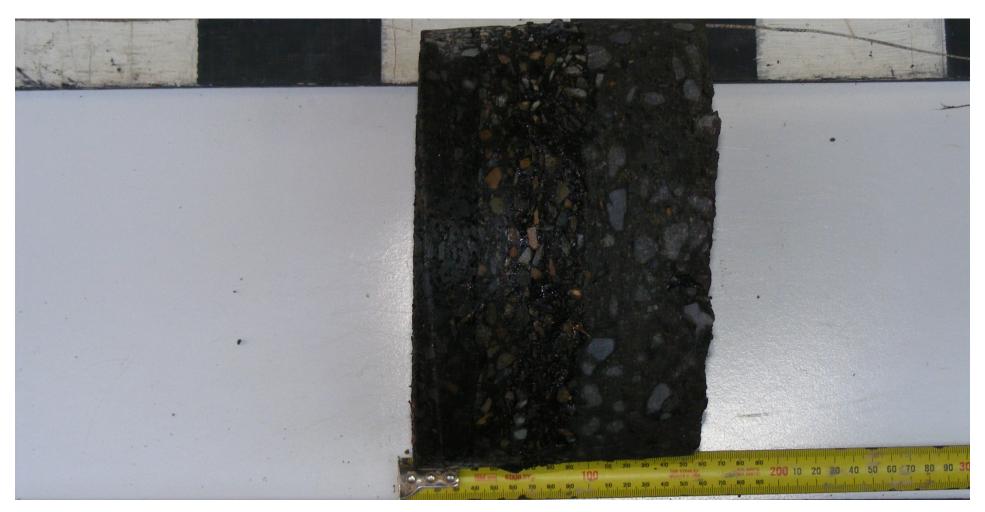
LC	LOCATION: South Sydney to Revesby					DRILL MODEL: Trailer Mounted Drill Rig								
	В	Borehole Info	rmation			Field Material Information								
METHOD	WATER	FIELD	SAMPLE	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS				
			Pavemen	t 0.03 -		Ě	ASPHALT, 30mm thick, nominal 7mm minus aggregate (AC7)			PAVEMENT WEARING COURSE				
DT			Core	0.08 -			ASPHALT, 50mm thick, nominal 7mm minus aggregate (AC7)			PAVEMENT MATERIAL -				
			0.14m	0.14 -	XXXX	GM	ASPHALT or ASPHALT Stabilised Sandy GRAVEL, fine to medium, sub angular to angular, grey	ļ		FILL				
				-			FILL, Silty Sandy GRAVEL, fine to medium, dark grey			-				
			0.40m											
			ES-A	- 0.40 -		CI-	FILL, Silty CLAY, medium to high plasticity, orange brown	М		-				
			ASS 0.50m	-0.5		CH	and dark grey-brown, with some sand and fine gravel			_				
	Not Encountered		D	_						-				
Ę	Not		0.80m	- 0.80 -	$\stackrel{\sim}{\sim}$	CI	Silty CLAY, medium plasticity, red-brown and pale grey			RESIDUAL				
TOTALE OF THE PROPERTY OF THE			U75	-			Sity CLA1, medium plasticity, red-brown and pale grey			-				
			D .	- 1.0	YXX.					-				
			1.10m	_						-				
			1.20m	- 1.20 -	<u> </u>	L.				-				
6			ES-B ASS 1.30m	-		CL- CI	Silty CLAY, low to medium plasticity, dark red with pale grey mottles, fine grained sand, with some relict rock structure			-				
			D	-						-				
			1.50m	-1.5-	1.4.4		DODELIGI E DI 1940 TEDMINIATED AT 4 50							
p p				-			BOREHOLE BH310 TERMINATED AT 1.50 m NOTE: Coordinates have been taken from a hand held GPS			-				
				_						-				
1														
				-						-				
				-2.0						-				
				-										
				-										
 	LOGO	GED: TH					CHECKED: MA	DA ⁻	TE: 04/0	09/2018				



PAVEMENT CORE PHOTOGRAPH

Pavement Core BH310

Project: 132KV Feeder Projects



Detail – Pavement Core BH310

Project: 132KV Feeder Projects



BH310 (Looking north)

Project: South Sydney to Revesby 132KV Feeder Project



GEOTECHNICAL BOREHOLE LOG

SHEET 1 OF 1

PROJECT No: 13529 CLIENT: Ausgrid

PROJECT: 132KV Feeder Projects

usgrid SURFACE RL:

DATE COMMENCED: 16/05/2018
DATE COMPLETED: 16/05/2018

COORDS: 316078.00 m E 6240251.00 m N MGA94 56

LC		ION: South	Sydney to	-			DRILL MODEL: Tr			rill Rig
	В	orehole Infor	mation			7	Field Material Informa		L	
METHOD	WATER	FIELD TEST	SAMPLE	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
DT			Pavemen Core 0.16m	0.04 - 0.08 - 0.16 -		CM	ASPHALT, 40mm thick, nominal 7mm minus aggregate (AC7) ASPHALT, 40mm thick, nominal 7mm minus aggregate (AC7) ASPHALT, 80mm thick, nominal 20mm minus aggregate (AC20)			PAVEMENT WEARING COURSE
	ıntered		0.35m	-		GM	FILL, Silty Sandy GRAVEL, fine to medium, sub angular, brown, comprising sandstone fragments	D		PAVEMENT MATERIAL
AD/T	Not Encountered		ES-A ASS 0.45m	- 0.35 - - - 0.5		SC- SM	FILL, Clayey Silty SAND, very dark grey, with some fine to medium gravel, with lumps of Sandy clay	М		FILL
,			D	_						
			0.80m	-0.80-	XXXX		BOREHOLE BH311 TERMINATED AT 0.80 m NOTE: Coordinates have been taken from a hand held GPS			
				- 1.0 -			Refusal at 0.8, on concrete pipe? BH311 redrilled nearby. Refusal at 0.5m on concrete? Hole abandoned			
				_						
				1.5 						
				-						
				-2.0						
				-						
				_						
	_OGG	GED: TH					CHECKED: MA	DA.	TE: 04/0	09/2018



PAVEMENT CORE PHOTOGRAPH

Pavement Core BH311

Client: Ausgrid

Project: 132KV Feeder Projects

Location: South Sydney to Revesby

RCA ref: 13529

RCA Australia



Detail - Pavement Core BH311

Project: 132KV Feeder Projects



BH311 (Looking north)

Project: South Sydney to Revesby 132KV Feeder Project



GEOTECHNICAL BOREHOLE LOG BH311a

SHEET 1 OF 1

PROJECT No: 13529 CLIENT: Ausgrid

PROJECT: 132KV Feeder Projects LOCATION: South Sydney to Revesby DATE COMMENCED: 16/05/2018 DATE COMPLETED: 16/05/2018

SURFACE RL:

COORDS: 316078.00 m E 6240249.00 m N MGA94 56

L	OCA	ATION: South	Sydney t	o Reve	esby		DRILL MODEL: Tr	ailer Mo	ounted D	rill Rig
		Borehole Infor	mation			-	Field Material Informa			
METHOD	WATER	FIELD	SAMPLE	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	Not Encountered		0.35m	0.04 -		SM	ASPHALT, 40mm thick, nominal 7mm minus aggregate (AC7) ASPHALT, 40mm thick, nominal 7mm minus aggregate (AC7) FILL, Silty Sandy GRAVEL, fine to medium, sub angular, brown, comprising sandstone fragments	D		PAVEMENT WEARING COURSE PAVEMENT MATERIAL
			D 0.50m	0.35 -		SC- SM	FILL, Clayey Silty SAND, very dark grey, with fine to medium gravel	М		FILL
08.1_RCA_STANDARD.GLB Log RCA NON CORED LOG 13529-300_LOGS.GPJ <-DrawingFile>> 03/07/2018 17:18 Produced by gINT Professional, Developed by Datgel				-1.0 -1.5 -2.0			BOREHOLE BH311a TERMINATED AT 0.50 m TC Bit refusal on concrete? NOTE: Coordinates have been taken from a hand held GPS			
열	LOC	GGED: TH					CHECKED: MA	DA	TE: 04/0	09/2018



GEOTECHNICAL BOREHOLE LOG BH311b

SHEET 1 OF 1

PROJECT No: 13529 CLIENT: Ausgrid

PROJECT: 132KV Feeder Projects

SURFACE RL:

DATE COMMENCED: 17/05/2018 DATE COMPLETED: 17/05/2018

COORDS: 316079.00 m E 6240251.00 m N MGA94 56

	DCATION: South Sydney to Revesby Borehole Information					DRILL MODEL: Trailer Mounted Drill Rig								
	В	orehole Info	mation				Field Material Informat							
METHOD	WATER	FIELD	SAMPLE	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS				
				0.04 - 0.08 - - 0.16 -		GM	ASPHALT, 40mm thick, nominal 7mm minus aggregate (AC7) ASPHALT, 40mm thick, nominal 7mm minus aggregate (AC7) ASPHALT, 80mm thick, nominal 20mm minus aggregate (AC20) FILL, Silty Sandy GRAVEL, fine to medium, sub angular,			PAVEMENT WEARING COURSE				
AD/T	Not Encountered		0.25m ES-A ASS 0.35m	0.25 - - - 0.40 -		SM	brown, comprising sandstone fragments FILL, Silty Gravelly SAND, fine to coarse grained, brown, fine gravel	М		FILL _				
			D	- 0.5 -		SC	FILL, Clayey Gravelly SAND, fine to coarse grained, dark brown/grey			-				
y Datgel			0.70m	-0.70-			BOREHOLE BH311b TERMINATED AT 0.70 m TC Bit refusal on hollow sounding concrete (service?) NOTE: Coordinates have been taken from a hand held GPS			-				
rfessional, Developed by				1.0 						-				
7:18 Produced by gin I Pro				_						-				
rawingFile>> 03/07/2018 1				- 1.5 -						- -				
228-300_LUGS.GPJ <<0				-						- - -				
A NON CORED LOG 18				2.0 										
KCA_LIB_B61_KCA_STANDARD.GLE LOG KCA NON CORED LOG 13525-300_LOGS.GF0 < <p>CADRAMING-RIS> USUT/Z018 17:18 Froduced by gin1 Froressional, Developed by Dagget Company of the Company of the</p>				- -						- -				
ACA LIB 00.1	LOGO	SED: TH					CHECKED: MA	DA	ΓE: 04/0	09/2018				



GEOTECHNICAL BOREHOLE LOGBH312

SHEET 1 OF 1

PROJECT No: 13529 CLIENT: Ausgrid

PROJECT: 132KV Feeder Projects

No: 13529 DATE COMPLETED: 17/05/2018 suggrid SURFACE RL:

COORDS: 316214.00 m E 6240436.00 m N MGA94 56

DRILL MODEL: Trailer Mounted Drill Rig

DATE COMMENCED: 17/05/2018

LC	DCAT	ION: South	Sydney to	Reve	esby		DRILL MODEL: Tra	ailer Mo	unted D	rill Rig					
	В	orehole Infor	mation				Field Material Information								
METHOD	WATER	FIELD	SAMPLE	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS					
DT			Pavemen Core	0.04			ASPHALT, 35mm thick, nominal 7mm minus aggregate (AC7)			PAVEMENT WEARING COURSE					
	1		Core 0.09m	0.06 - _ 0.09 -	XXXX	GM	ASPHALT, 20mm thick, nominal 7mm minus aggregate (AC7) ASPHALT, 35mm thick, nominal 10mm minus aggregate	D		PAVEMENT MATERIAL -					
	Seepage		0.35m ES-C	- - 0.35 –		GM	(AC10) FILL, Silty Sandy GRAVEL, fine to medium, sub angular to angular, grey, fine to coarse grained sand FILL, Silty Sandy GRAVEL, fine, sub angular, medium to	M-W		- - FILL					
	-		ASS 0.45m 0.50m	- 0.5%		O.V.	coarse grained sand, grey, trace of clay			-					
			A.S.S m 0.55m	0.50j -		CI- CH	FILL, Silty CLAY, medium to high plasticity, brown	W - MC>PL	VSt	_					
			D	-			Becoming grey with brown mottles, with some fine sand and a trace fine to medium gravel and rock fragments at ~0.6m	M - MC>PL	vol	-					
AD/T			0.80m	-						-					
Professional, Developed			U75-D	1.0 						-					
19 Produced by gint		PP220 - 350kPa	1.20m ES-B ASS 1.30m	-						-					
3/0//2010			D 1.50m	- 1.5						-					
LOGS.GFJ SSDGWINGFIRSS O				-			BOREHOLE BH312 TERMINATED AT 1.50 m NOTE: Coordinates have been taken from a hand held GPS			- - -					
IN CORED LOG 15528-500_				- 2.0						-					
TROALING AND				-						-					
	_ogo	GED: TH					CHECKED: MA	DAT	E: 04/0	09/2018					



PAVEMENT CORE PHOTOGRAPH

Pavement Core BH312

RCA Australia

Client: Ausgrid

Project: 132KV Feeder Projects



Detail – Pavement Core BH312

Project: 132KV Feeder Projects



BH312 (Looking north)

Project: South Sydney to Revesby 132KV Feeder Project



GEOTECHNICAL BOREHOLE LOG

SHEET 1 OF 2

PROJECT No: 13529 CLIENT: Ausgrid

PROJECT: 132KV Feeder Projects
LOCATION: South Sydney to Revesby

DATE COMMENCED: 16/05/2018 DATE COMPLETED: 16/05/2018

SURFACE RL:

COORDS: 316253.00 m E 6240630.00 m N MGA94 56

1	D	orehole Infor		o Reve			DRILL MODEL: Tr			
	ь		mation			Z			\$	
METHOD	WATER	FIELD	SAMPLE	ОЕРТН (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
	A		Pavemen	t 0.03 -			ASPHALT, 25mm thick, nominal 7mm minus aggregate (AC7)	EW		PAVEMENT WEARING COURSE
DT			Core	0.08 -		GM	ASPHALT, 55mm thick, nominal 10mm minus aggregate (AC10)			PAVEMENT MATERIAL
	1		0.13m	0.13 -	XXXX		FILL, Bound Silty Sandy GRAVEL, fine to medium, sub		VL	BEDROCK
				-	====		angular up to 40mm diameter SILTSTONE, orange-brown, fractured			
							OLTOTOTAL, Grange-brown, madrated			
	(Not Encountered)			-						
_	Encol		D-ES-A		=====					
AD/T	– (Not		ASS	-0.5						
							Thin bands competent siltstone (less than 30mm) - auger grinding			
				_			~200mm bands fractured and brittle siltstone (EL strength?)			
5			0.85m	-			Becoming more competent at 0.8m		L - M	
ogonzoto 17.19 modeced by ginn moressional, beveloped by baggi							CONTINUED AS CORED BOREHOLE			
G pod										
				- 1.0						
2										
200				-						
				-						
ŝ										
200				-						
2										
2										
				- 1.5						
				-						
				_						
5										
				-						
				-2.0						
				-						
2				_						
3										
OTHER PRINCIPLE ENGINEERING TO THE PRINCIPLE OF THE PRINC				-						
5				ļ .						
1	_OGG	GED: TH					CHECKED: MA	DA ⁻	ΓE: 04/0	09/2018



CORED BOREHOLE LOG

SHEET 2 OF 2

PROJECT No: 13529 CLIENT: Ausgrid PROJECT: 132KV Feeder Projects

LOCATION: South Sydney to Revesby

DATE COMMENCED: 16/05/2018 DATE COMPLETED: 16/05/2018

SURFACE RL:

COORDS: 316253.00 m E 6240630.00 m N MGA94 56

Dor					Juney (o Revesby		Field Mat								unted Drill Rig
МЕТНОБ	WATER	RECOVERY II		ation (m) HLAGO	GRAPHIC LOG	(SOIL NAM) particle sha minor constitu colo	DESCRIPTION E; plasticity/grain size, colape, secondary componen ents) (ROCK NAME; grair ur, minor constituents)		THERING	INF STI	FERF	RED GTH	DE SP	EFE(ACI	CT NG	DEFECT DESCRIPTION AND ADDITIONAL OBSERVATIONS (defect type, inclination, infilling, planarity, roughness, thickness)
AD/T NMLC	▲- 0% Water LOSS →	100 10 100	0 0 0	-0.85-		START CORING AT Laminated SILTSTOI Thinly laminated (non coreable, fractu AD/T from 1.1m to 1. Laminated SILTSTOI	NE/SHALE, grey-brown res on drilling) 5m		EW							BP 0° CN PR RF Spaced at 10-20mm
				-1.5-			EBH313 TERMINATED AT lave been taken from a ha									
L	.OG(GED	: TH				CHECKED: MA								DAT	E: 04/09/2018



BH313

Project: 132KV Feeder Projects



PAVEMENT CORE PHOTOGRAPH

Pavement Core BH313

Project: 132KV Feeder Projects



Detail – Pavement Core BH313

Project: 132KV Feeder Projects



BH313 (Looking north)

Project: South Sydney to Revesby 132KV Feeder Project



GEOTECHNICAL BOREHOLE LOG

SHEET 1 OF 1

PROJECT No: 13529 CLIENT: Ausgrid

PROJECT: 132KV Feeder Projects

DATE COMMENCED: 16/05/2018 DATE COMPLETED: 16/05/2018

SURFACE RL:

COORDS: 316306.00 m E 6240818.00 m N MGA94 56

LOCATION: South Sydney to	•	sby DRILL MODEL: Trailer Mounted Drill Rig				
Borehole Information		Field Material Information				
METHOD WATER FIELD TEST SAMPLE	GRAPHIC LOG CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS	
DT Pavement Core		ASPHALT, 40mm thick, nominal 7mm minus aggregate (AC7) ASPHALT, 90mm thick, nominal 10mm minus aggregate			PAVEMENT WEARING COURSE	
0.13m -	9.13 GM	(AC10) FILL, Silty Sandy GRAVEL, fine to medium, sub angular to angular, dark grey, fine to coarse grained sand	W		PAVEMENT MATERIAL -	
0.40m Es-A ASS 0.50m	0.40 CI- CH	Silty CLAY, medium to high plasticity, dark grey brown	MC>PL		RESIDUAL	
0.80m U75 0.90m U75 0.90m U75 0.90m	1.0	Extremely Weathered SILTSTONE (extremely weathered material), recovered as Clayey Gravelly SILT Lenses of very low strength siltstone (rig grinding then dropping)	EW		BEDROCK	
1.20m ES-B ASS 1.30m					- - -	
1.50m	1.5	BOREHOLE BH314 TERMINATED AT 1.50 m NOTE: Coordinates have been taken from a hand held GPS			- - -	
NON CORED LOG 13529-300	2.0				- -	
Company Comp					- -	
등 일 보 LOGGED: TH	1 1	CHECKED: MA	DAT	E: 04/0	09/2018	

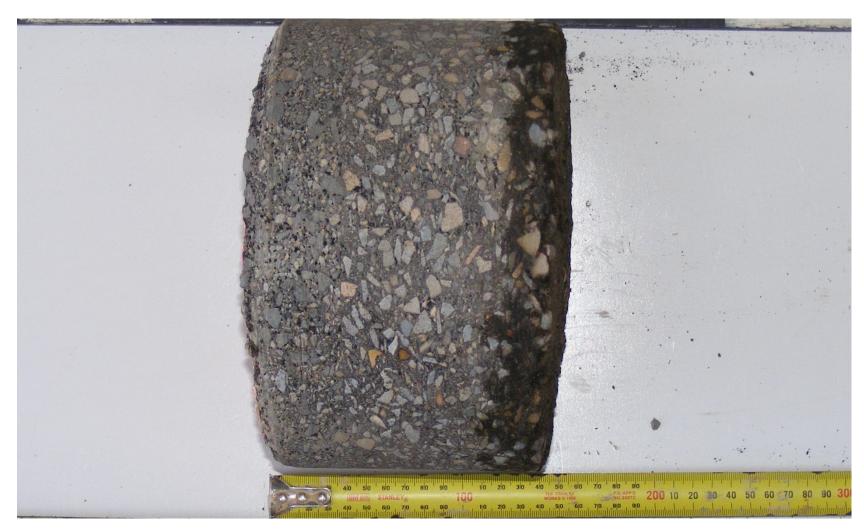


PAVEMENT CORE PHOTOGRAPH

Pavement Core BH314

Project: 132KV Feeder Projects

Location: South Sydney to Revesby RCA ref: 13529



Detail – Pavement Core BH314

Project: 132KV Feeder Projects

Location: South Sydney to Revesby RCA ref: 13529



BH314 (Looking north)

Project: South Sydney to Revesby 132KV Feeder Project

Location: South Sydney to Revesby **RCA ref**: 13529-202/0



GEOTECHNICAL BOREHOLE LOG

SHEET 1 OF 1

PROJECT No: 13529 CLIENT: Ausgrid

PROJECT: 132KV Feeder Projects

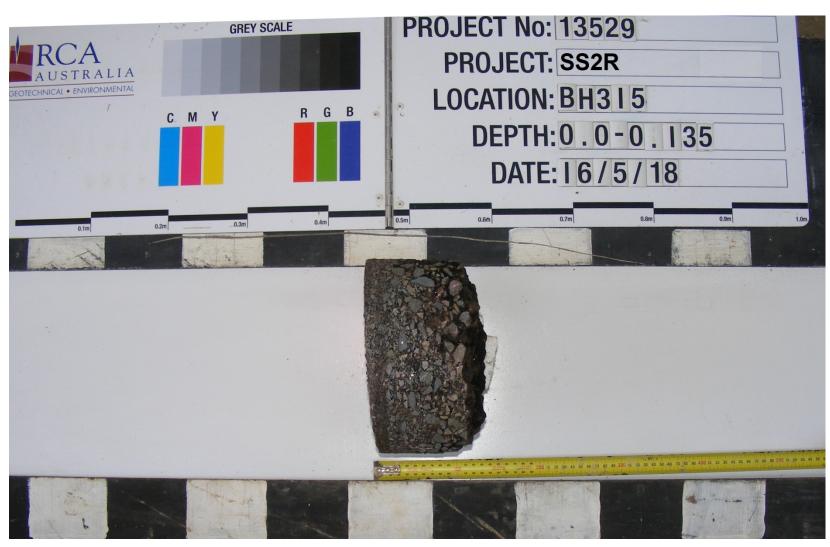
DATE COMMENCED: 16/05/2018 DATE COMPLETED: 16/05/2018

SURFACE RL:

COORDS: 316316.00 m E 6241030.00 m N MGA94 56

DRILL MODEL: Trailer Mounted Drill Rig

LC	DCAT	ION: South	Sydney to	Reve	vesby DRILL MODEL: Trailer Mounted Drill Rig					
	В	orehole Info	mation			Field Material Information				
METHOD	WATER	FIELD	SAMPLE	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
			Pavemen	t 0.04 -			ASPHALT, 35mm thick, nominal 7mm minus aggregate (AC7)			PAVEMENT WEARING COURSE
DT			Core 0.12m	0.12 -			ASPHALT, 80mm thick, nominal 14mm minus aggregate (AC14)			
			0.40	-		GM	FILL, Silty Sandy GRAVEL, fine to medium, sub angular to angular, dark grey, fine to coarse grained sand	D		PAVEMENT MATERIAL .
			0.40m ES-A ASS 0.50m	- 0.40 - 0.5		CI- CH	CLAY, medium to high plasticity, dark red	M - MC>PL		RESIDUAL -
	Not Encountered		D	-			Becoming with grey mottles at ~0.6m			
AD/T	Not Er		0.80m U75	- -						
					///	1				
		-PP>450kPa	D (1.02m)	1.001 - -			Extremely Weathered SILTSTONE (EW material) weathered to Sitty CLAY, low to medium plasticity, pale brown, trace medium to coarse, sub angular gravel	MC <pl< td=""><td>_</td><td>Rock structure no fall in base of U75</td></pl<>	_	Rock structure no fall in base of U75
			1.20m ES-B ASS 1.30m	_						
			D	-			Becoming extremely to highly weathered siltstone at ~1.3m			
ı			1.50m	1.5 -	<u> </u>		BOREHOLE BH315 TERMINATED AT 1.50 m NOTE: Coordinates have been taken from a hand held GPS			
				- -						
				- 2.0						
				-						
				-						
V				-						
L	LOGO	GED: TH					CHECKED: MA	DA	ΓE: 04/0	09/2018



PAVEMENT CORE PHOTOGRAPH

Pavement Core BH315

Project: 132KV Feeder Projects

Location: South Sydney to Revesby RCA ref: 13529



Detail – Pavement Core BH315

Project: 132KV Feeder Projects

Location: South Sydney to Revesby RCA ref: 13529



BH315 (Looking north)

Project: South Sydney to Revesby 132KV Feeder Project

Location: South Sydney to Revesby RCA ref: 13529-202/0



GEOTECHNICAL BOREHOLE LOG

SHEET 1 OF 1

PROJECT No: 13529 CLIENT: Ausgrid

PROJECT: 132KV Feeder Projects
LOCATION: South Sydney to Revesby

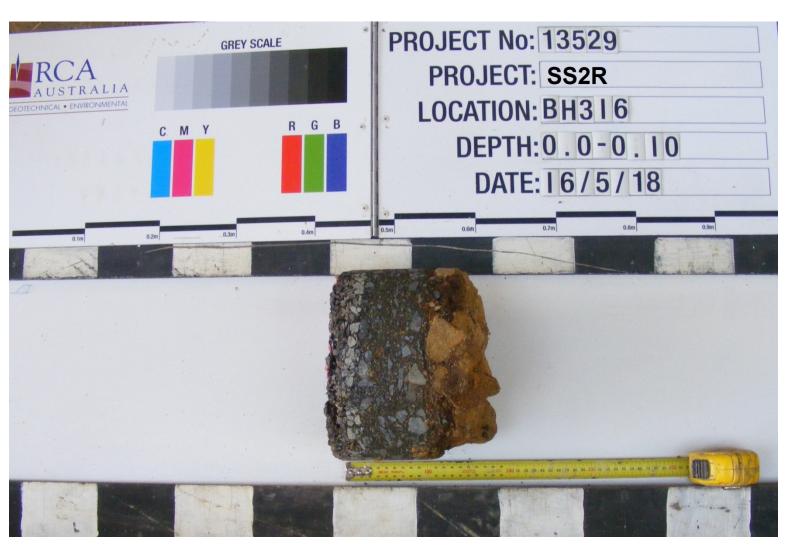
DATE COMMENCED: 17/05/2018 DATE COMPLETED: 17/05/2018

SURFACE RL:

COORDS: 316283.00 m E 6241176.00 m N MGA94 56

DRILL MODEL: Trailer Mounted Drill Rig

L.		TON: South		Reve	esby					
	В	orehole Infor	mation			Field Material Information				
METHOD	WATER	FIELD	SAMPLE	DEРТН (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
DT			Pavemen Core	t _{0.03} –			ASPHALT, 30mm thick, nominal 7mm minus aggregate (AC7)			PAVEMENT WEARING COURSE
וטו			0.10m	- 0.10 -		000	ASPHALT, 70mm thick, nominal 20mm minus aggregate (AC20)			PAVEMENT MATERIAL Stabilised
			0.22m	0.22 -		GP	FILL, Sandy GRAVEL, medium to coarse, sub rounded to sub angular, orange brown, comprises sandstone rock fragments (stabilised)	D		
			ES-A ASS 0.32m	0.22 -		CI- CH	FILL, Sandy CLAY, medium to high plasticity, dark brown, fine to coarse grained sand	M - MC>PL		FILL / RESIDUAL
			D	- - 0.5 - 0.60 -						-
	ountered			- 0.00 -		CH	Silty CLAY, high plasticity, red-brown		St - VSt	RESIDUAL
AD/T	Not Encountered		0.80m	_						
			U75-D	- 1.00) -		СН	Silty CLAY, high plasticity, pale grey with orange mottles			-
		_PP200 - _250kPa	1.20m ES-B	-						
			ASS 1.30m	-						
			D 1.50m	=						
			1.00111	 1.5 -	7 .7 17		BOREHOLE BH316 TERMINATED AT 1.50 m NOTE: Coordinates have been taken from a hand held GPS			
				_						
				-						
				-						
				-2.0						-
				_						
				_						
				_						
	_ogo	ED: TH					CHECKED: MA	DAT	ΓE: 04/0	09/2018



PAVEMENT CORE PHOTOGRAPH

Pavement Core BH316

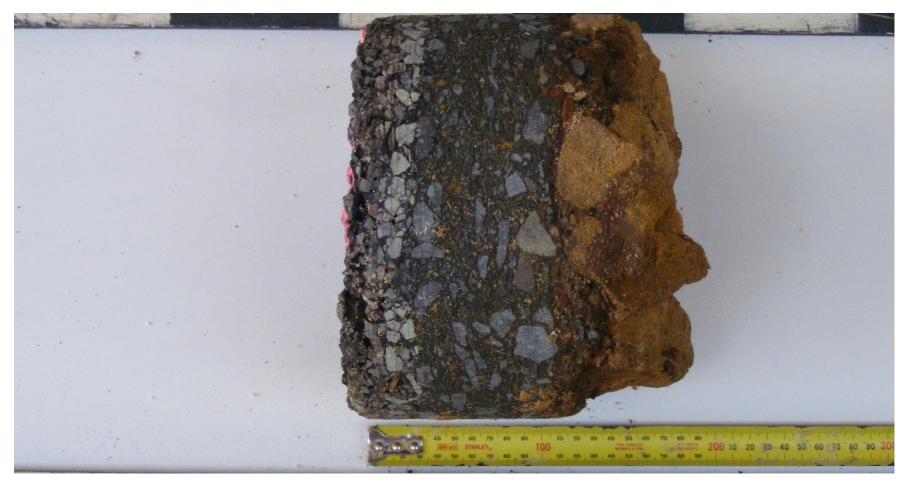
Client: Ausgrid

Project: 132KV Feeder Projects

Location: South Sydney to Revesby

RCA Australia

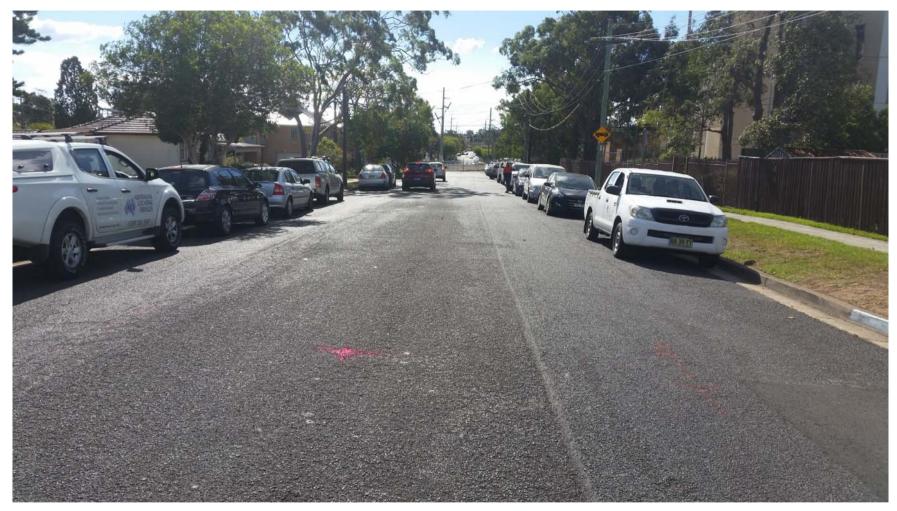
RCA ref: 13529



Detail – Pavement Core BH316

Project: 132KV Feeder Projects

Location: South Sydney to Revesby RCA ref: 13529



BH316 (Looking north)

Project: South Sydney to Revesby 132KV Feeder Project

Location: South Sydney to Revesby **RCA ref:** 13529-202/0



Explanatory Notes – Soil Description

In engineering terms, soil includes every type of uncemented or partially cemented material found in the ground. In practice, if the material can be remoulded by hand in its field condition or in water it is described as a soil. The dominant soil constituent is given in capital letters, with secondary textures in lower case. The dominant feature is assessed from AS 1726:2017 – Geotechnical Site Investigations and a soil symbol is used to define a soil layer.

METHOD

Method	Description
AD/T	Auger Drilling with tungsten carbide bit
AD/V	Auger Drilling with V Bit
AS	Auger Screwing
AT	Air Track
BH	Backhoe
CT	Cable Tool Rig
DB	Washbore Drag Bit
DT	Diatube
E	Excavator
EH	Excavator with Hammer
HA	Hand Auger
HQ	Diamond Core-63mm diameter
N	Natural Exposure
NMLC	Diamond Core-52mm diameter
NQ	Diamond Core-47mm diameter
Percussion	Percussion Drilling
PT	Push Tube
RR	Rock Roller
V	Vacuum Excavation
WS	Washbore
Χ	Existing Excavation

WATER



Water level at date shown



Seepage

NOT ENCOUNTERED: The borehole/test pit was dry soon after excavation. Inflow may have been observed had the borehole/test pit been left open for a longer period.

NOT OBSERVED: The observation of groundwater, whether present or not, was not possible due to drilling water, surface seepage or cave in of the borehole/test pit.

SAMPLING

Sample	Description
В	Bulk Disturbed Sample
D	Disturbed Sample '
SPT	Standard Penetration Test
U50	Undisturbed Sample - 50mm diameter
U75	Undisturbed Sample - 75mm diameter
ES	Soil Sample, Environmental
EW	Water Sample, Environmental
G	Gas Sample

SOIL CLASSIFICATION

The appropriate symbols are selected based on the result of visual examination, field tests and available laboratory test results, such as particle size analysis, liquid limit and plasticity index.

Group Symbol	Description
GW	Well graded gravel
GP	Poorly graded gravel
GM	Silty gravel
GC	Clayey gravel
SW	Well graded sand
SP	Poorly graded sand
SM	Silty sand
SC	Clayey sand
ML	Silt of low plasticity
CL	Clay of low plasticity
OL	Organic soil of low plasticity
CI	Clay of medium plasticity
MH	Silt of high plasticity
CH	Clay of high plasticity
OH	Organic soil of high plasticity
Pt	Peat, highly organic soil

MOISTURE CONDITION

For coarse grained soils, the following terms are used

Dry - Non-cohesive and free-running

Moist - Soil feels cool, darkened in colour

- Soil tends to stick together

Wet - Soil feels cool, darkened in colour

- Soil tends to stick together, free water forms when handling

For fine grained soils, the following moisture content (w) terms are used:

w < PL - Moist, dry of plastic limit $w \approx PL$ - Moist, near plastic limit. w > PL - Moist, wet of plastic limit. $w \approx LL$ - Wet, near liquid limit. w > LL - Wet, wet of liquid limit

PLASTICITY

Soil plasticity is a measure of the range of water content over which a soil exhibits plastic properties. The classification of the degree of plasticity in terms of the Liquid Limit (LL) is as follows.

Description of Plasticity	Range of Liquid Limit for Silt	Range of Liquid Limit for Clay
Non-plastic	Not applicable	Not applicable
Low plasticity	≤50	≤35
Medium plasticity	Not applicable	>35 and ≤50
High plasticity	>50	>50

COHESIVE SOILS - CONSISTENCY

The consistency of a cohesive soil is defined by descriptive terminology such as very soft, soft, firm, stiff, very stiff and hard. These terms are assessed by the shear strength of the soil as observed visually, by hand penetrometer, dynamic cone penetrometer or vane shear values and by resistance to deformation to hand moulding.

A hand penetrometer may be used in the field or the laboratory to provide an approximate assessment of the unconfined compressive strength (UCS) of cohesive soils. Undrained shear strength

 $c_{\rm u} = 0.5 {\rm xUCS}$. Undrained shear strength values are recorded in kPa as follows:

Strength	Symbol	Indicative Undrained Shear Strength, c _u (kPa)
Very Soft	VS	≤12
Soft	S	>12 and ≤25
Firm	F	>25 and ≤50
Stiff	St	>50 and ≤100
Very Stiff	VSt	>100 and ≤200
Hard	Н	>200
Friable	Fr	_

COHESIONLESS SOILS – RELATIVE DENSITY

Relative density terms such as very loose, loose, medium dense, dense and very dense are used to describe silty and sandy material, and these are usually based on resistance to drilling penetration, Standard Penetration Test (SPT) N values or Perth Sand Penetrometer resistance.

Term	Symbol	Density Index	
Very Loose	VL	0 to 15	
Loose	L	15 to 35	
Medium Dense	MD	35 to 65	
Dense	D	65 to 85	
Very Dense	VD	>85	

SOIL PARTICLE SIZE DESCRIPTIVE TERMS

Fraction	Name	Subdivision	Size (mm)
Oversize	Boulders		>200
Oversize	Cobbles		63 to 200
		Coarse	19 to 63
	Gravel	Medium	6.7 to 19
Coarse		Fine	2.36 to 6.7
grained soil		Coarse	0.6 to 2.36
	Sand	Medium	0.21 to 0.6
		Fine	0.075 to 0.21
Fine	Silt		0.002 to 0.075
grained soil	Clay		<0.002



Explanatory Notes - Rock Description

METHOD

Refer to soil description sheet.

WATER

Refer to soil description sheet.

ROCK QUALITY

The defect spacing is shown where applicable and the Rock Quality Designation (RQD) and Total Core Recovery (TCR) for each core run is given where:

$$TCR = \frac{Length of core recovered}{Length of core run} \times 100\%$$

$$RQD = \frac{Sum \text{ of axial length of sound core pieces } > 100mm \text{ long}}{Length \text{ of core run}} \times 100\%$$

ROCK MATERIAL WEATHERING

Rock material weathering is described using the abbreviations and definitions used in AS1726:2017– Geotechnical Site Investigations.

Term		Abbre	viation	Definition
Residual Soil		RS		Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely weathered		xw		Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible.
Highly Weathered	Distinctly Weathered	HW	DW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching or may be decreased due to deposition of weathering products in pores.
Moderately Weathered	۵	MW		The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.
Slightly Weathere	d	SW		Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh		FR		Rock shows no sign of decomposition of individual minerals or colour changes.

Where it is not practicable to distinguish between 'Highly Weathered' and 'Moderately Weathered' rock the term 'Distinctly Weathered' may be used. 'Distinctly Weathered' is defined as follows: 'Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in the pores'. There is some change in rock strength.

ROCK MATERIAL STRENGTH

Rock strength is described using AS1726:2017– Geotechnical Site Investigations and ISRM – Commission on Standardisation of Laboratory and Field Tests, 'Suggested method of determining the Uniaxial Compressive Strength of Rock materials and the Point Load Index' as follows:

Term	Abbreviation	Uniaxial Compressive Strength (MPa)	Point Load Index Is ₅₀ (MPa)
Very Low	VL	0.6 to 2	0.03 to 0.1
Low	L	2 to 6	0.1 to 0.3
Medium	M	6 to 20	0.3 to 1
High	Н	20 to 60	1 to 3
Very High	VH	60 to 200	3 to 10
Extremely High	EH	>200	>10



Diametral Point Load Index test.



Axial Point Load Index test.

DEFECT SPACING/BEDDING THICKNESS

Depending on the project, may be either described as mean perpendicular spacing within a set of defects or bedding, or as the spacing between all defects within the rock mass.

Term	Defect Spacing	Bedding
Extremely closely spaced	<6 mm	Thinly laminated
	6 to 20 mm	Laminated
Very closely spaced	20 to 60 mm	Very thin
Closely spaced	0.06 to 0.2 m	Thin
Moderately widely spaced	0.2 to 0.6 m	Medium
Widely spaced	0.6 to 2.0 m	Thick
Very widely spaced	>2 m	Very thick

DEFECT DESCRIPTION

Туре	Definition	
JT	Joint	
BP	Bedding Parting	
CO	Contact	
CS	Clay Seam	
CZ	Crush Zone	
DK	Dyke	
DZ	Decomposed Zone	
FC	Fracture	
FZ	Fracture Zone	
FL	Foliation	
FLT	Fault	
VN	Vein	
SM	Seam	
IS	Infilled Seam	
SZ	Shear Zone	

Planarity	Roughness	
PR – Planar	VR – Very Rough	
CU – Curved	RF – Rough	
U - Undulating	S – Smooth	
ST - Stepped	POL – Polished	
IR – Irregular	SL – Slickensided	

Symbol	Coating or Infill	
CA	Calcite	
Clay	Clay	
CN	Clean	
Fe	Iron oxide	
KT	Chlorite	
Qz	Quartz	
Χ	Carbonaceous	
SN	Stain	
VNR	Veneer	

The inclinations of defects are measured from perpendicular to the core axis.

Appendix C

Geotechnical Laboratory Results:

C1 – Thermal Resistivity

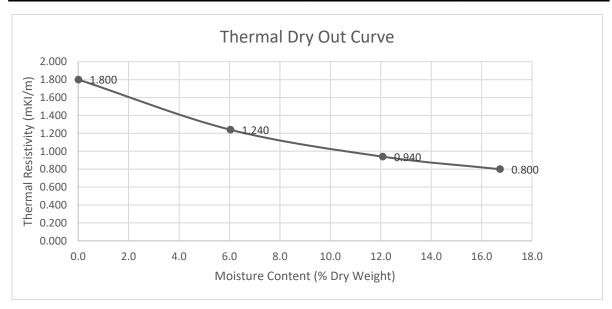
C2 – Acid Sulfate

Manage the earth, eliminate the risk

Remoulded Thermal Resistivity With Dry Out Curve

Rep	oort Number :	18087-21 Report Date :			13/06/2018
Р	roject Name :	132kV Feeder Sydney So	uth to Reve	esby	Page 1 of 1
(Client Name :	RCA Laboratories			
Proj	ect Location :	Sydney South to Revesby	′		
Sam	ple Location :	BH301 (0.7-1.5m)			
Sam	ple Number :	#21			
Da	ate Sampled :	14-17/05/2018			
Material	Description:	Brown Sandy Clay			
Samp	ling Method:	AS 1289.1.2.1.6.5.4 Machine excavated pit/trench			
SMDD :	1.78 t/m3	Target Density Ratio :	90%	Moulded Density Ratio:	90.0%
OMC :	16.6 %	Target Moisture Ratio:	100%	Moulded Moisture Ratio:	100.8%
FMC :	17.5 %	Material > 19.0mm :	0%	Moulded Moisture :	16.7%

Moisture Content	Wet Density	Dry Density	Resistivity
(% Dry Weight)	(t/m3)	(t/m3)	(mK/W)
16.7	1.870	1.602	0.800
12.1	1.796	1.602	0.940
6.0	1.699	1.602	1.240
0.0	1.603	1.602	1.800



Reported By: Brett Bellingham - Ph: 0409 780 620 | email: brett@allgeo.com.au

Alliance Geotechnical Pty Ltd

Phone: 1800 288 188 | Website: allgeo.com.au | Email:office@allgeo.com.au Office & Laboratory Address: 10 Welder Road, Seven Hills NSW 2147

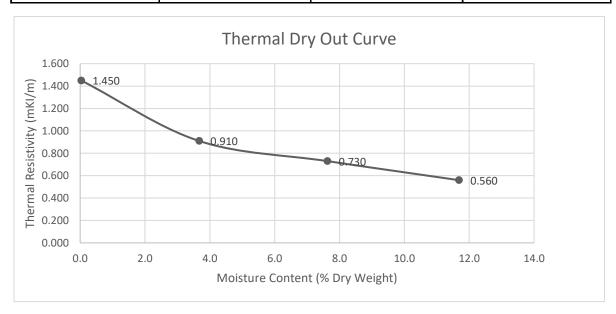


Manage the earth, eliminate the risk

Remoulded Thermal Resistivity With Dry Out Curve

Rep	oort Number :	18087-22 Report Date :			13/06/2018
Р	roject Name :	132kV Feeder Sydney So	uth to Reve	esby	Page 1 of 1
(Client Name :	RCA Laboratories			
Proj	ect Location :	Sydney South to Revesby	′		
Sam	ple Location :	BH302 (0.9-1.45m)			
Sam	ple Number :	#22			
Da	ate Sampled :	14-17/05/2018			
Material	Description:	EW Sandstone			
Samp	ling Method:	AS 1289.1.2.1.6.5.4 Machine excavated pit/trench			
SMDD :	1.87 t/m3	Target Density Ratio :	90%	Moulded Density Ratio:	90.4%
OMC :	11.7 %	Target Moisture Ratio:	100%	Moulded Moisture Ratio:	99.9%
FMC :	9.7 %	Material > 19.0mm:	0%	Moulded Moisture :	11.7%

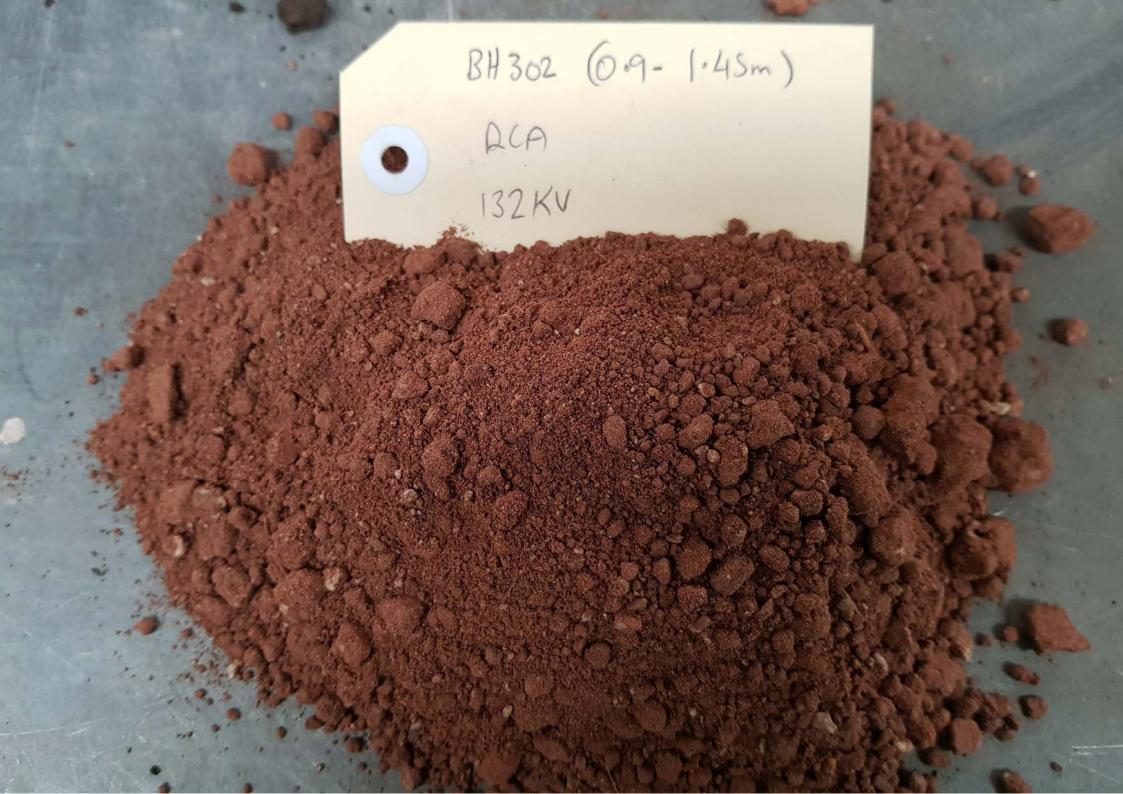
Moisture Content	Wet Density	Dry Density	Resistivity
(% Dry Weight)	(t/m3)	(t/m3)	(mK/W)
11.7	1.888	1.691	0.560
7.6	1.820	1.691	0.730
3.7	1.753	1.691	0.910
0.0	1.691	1.691	1.450



Reported By: Brett Bellingham - Ph: 0409 780 620 | email: brett@allgeo.com.au

Alliance Geotechnical Pty Ltd

Phone: 1800 288 188 | Website: allgeo.com.au | Email:office@allgeo.com.au Office & Laboratory Address: 10 Welder Road, Seven Hills NSW 2147

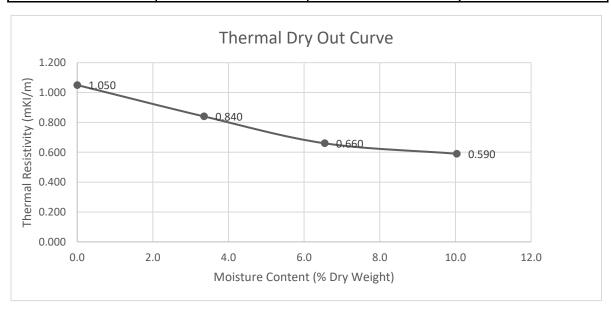


Manage the earth, eliminate the risk

Remoulded Thermal Resistivity With Dry Out Curve

Rep	oort Number:	18087-23 Report Date :			13/06/2018	
Pi	roject Name :	132kV Feeder Sydney So	uth to Reve	esby	Page 1 of 1	
(Client Name :	RCA Laboratories				
Proj	ect Location :	Sydney South to Revesby	1			
Sam	ple Location :	BH303 (0.4-0.8m)				
Sam	ple Number :	#23				
Da	ate Sampled :	14-17/05/2018				
Material	Description:	Brown Silty SAND				
Samp	ling Method:	AS 1289.1.2.1.6.5.4 Machine excavated pit/trench				
SMDD:	1.97 t/m3	Target Density Ratio:	90%	Moulded Density Ratio:	90.7%	
OMC :	10.1 %	Target Moisture Ratio:	100%	Moulded Moisture Ratio:	99.4%	
FMC :	5.8 %	Material > 19.0mm:	0%	Moulded Moisture :	10.0%	

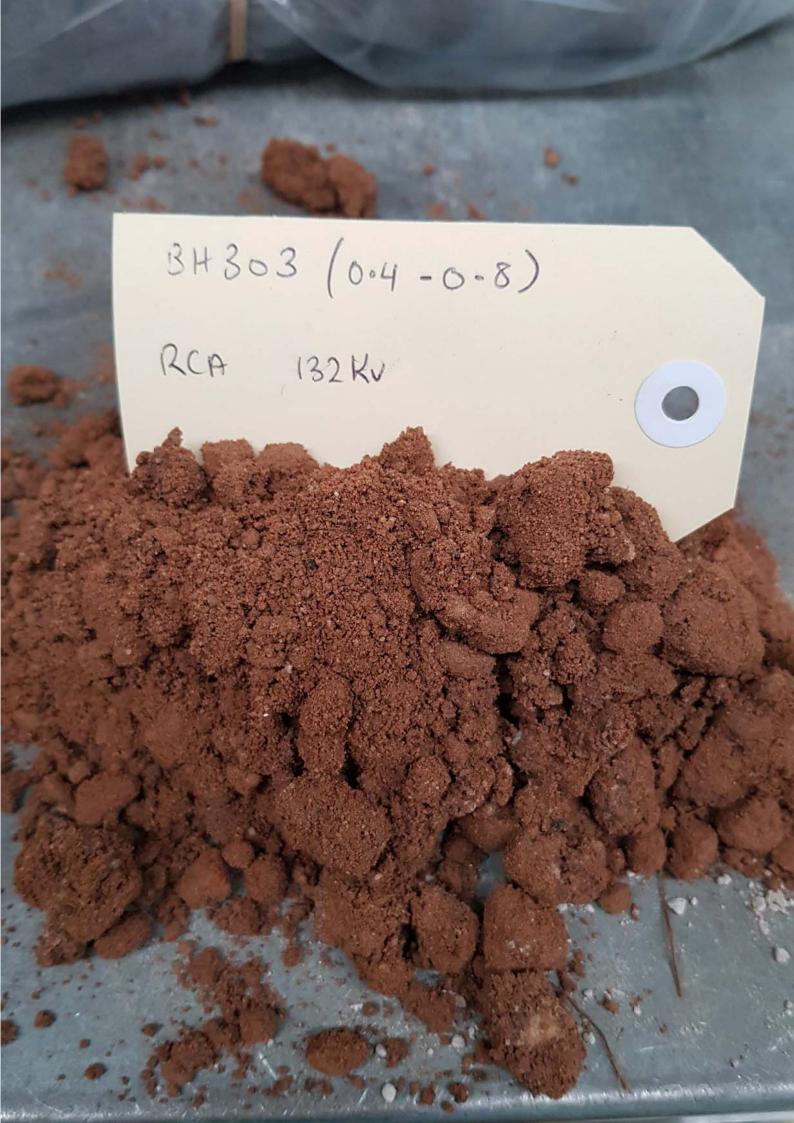
Moisture Content	Wet Density	Dry Density	Resistivity
(% Dry Weight)	(t/m3)	(t/m3)	(mK/W)
10.0	1.965	1.786	0.590
6.5	1.903	1.786	0.660
3.4	1.846	1.786	0.840
0.0	1.786	1.786	1.050



Reported By: Brett Bellingham - Ph: 0409 780 620 | email: brett@allgeo.com.au

Alliance Geotechnical Pty Ltd

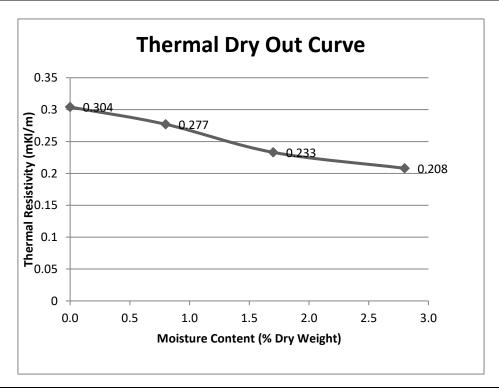
Phone: 1800 288 188 | Website: allgeo.com.au | Email:office@allgeo.com.au Office & Laboratory Address: 10 Welder Road, Seven Hills NSW 2147



Manage the earth, eliminate the risk Remoulded Thermal Resistivity with Dry Out Curve

Report Number:	18087-24	Report Date:	31/05/2018
Project Name:	132kV Feeder Sydney South to I	Revesby	Page 1 of 1
Client Name:	RCA Laboratories		
Project Location:	Feeder Sydney South to Revesby		
Sample Location:	BH304 (1.07m-1.41m)		
Sample Number:	#24		
Date Sampled:	14-17/05/2018		
Material Description:	50mm Sandstone Core		
Sampling Method:	AS 1289.1.2.1.6.5.3		

Moisture Content	Wet Density	Dry Density	Resistivity
(% Dry Weight)	(t/m3)	(t/m3)	(mK/W)
2.8	2.56	2.49	0.208
1.3	2.53	2.49	0.253
0.8	2.51	2.49	0.277
0.0	2.49	2.49	0.304



Reported By: Brett Bellingham - Ph: 0409 780 620 | email: brett@allgeo.com.au

Alliance Geotechnical Pty Ltd

Phone: 1800 288 188 | Website: allgeo.com.au | Email:office@allgeo.com.au Office & Laboratory Address: 10 Welder Road, Seven Hills NSW 2147

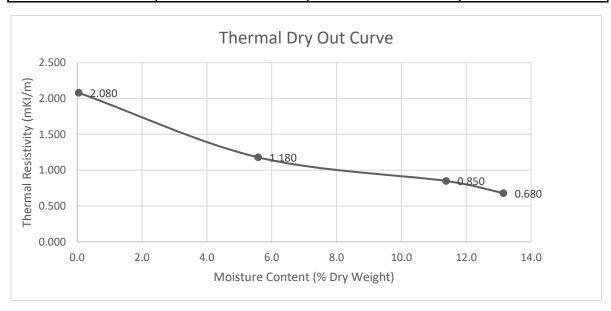


Manage the earth, eliminate the risk

Remoulded Thermal Resistivity With Dry Out Curve

Rep	oort Number :	18087-25 Report Date :		13/06/2018	
Р	roject Name :	132kV Feeder Sydney So	Page 1 of 1		
(Client Name :	RCA Laboratories			
Proj	ect Location :	Sydney South to Revesby	′		
Sam	ple Location :	BH305 (0.52-0.81m)			
Sam	ple Number :	#25			
Da	ate Sampled :	14-17/05/2018			
Material	Description:	escription : Brown Gravelly Sandy CLAY			
Samp	ling Method:	AS 1289.1.2.1.6.5.4 Machine excavated pit/trench			
SMDD:	1.95 t/m3	Target Density Ratio: 90% Moulded Density Ratio:			90.3%
OMC :	13.2 %	Target Moisture Ratio:	100%	Moulded Moisture Ratio:	99.6%
FMC :	12.4 %	Material > 19.0mm :	0%	Moulded Moisture :	13.1%

Moisture Content	Wet Density	Dry Density	Resistivity
(% Dry Weight)	(t/m3)	(t/m3)	(mK/W)
13.1	1.992	1.761	0.680
11.4	1.961	1.761	0.850
5.6	1.859	1.761	1.180
0.0	1.762	1.761	2.080



Reported By: Brett Bellingham - Ph: 0409 780 620 | email: brett@allgeo.com.au

Alliance Geotechnical Pty Ltd

Phone: 1800 288 188 | Website: allgeo.com.au | Email:office@allgeo.com.au Office & Laboratory Address: 10 Welder Road, Seven Hills NSW 2147

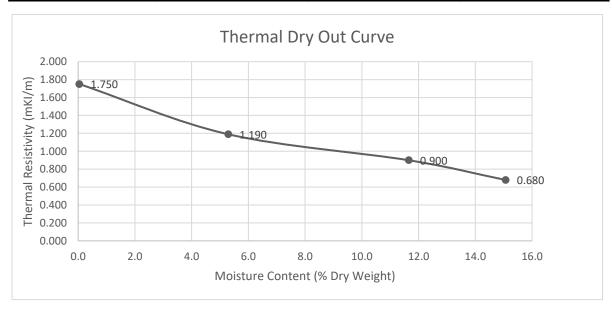


Manage the earth, eliminate the risk

Remoulded Thermal Resistivity With Dry Out Curve

Rep	oort Number:	: 18087-26 Report Date :		13/06/2018	
Р	roject Name :	132kV Feeder Sydney So	Page 1 of 1		
(Client Name :	RCA Laboratories			
Proj	ect Location :	Sydney South to Revesby	1		
Sam	ple Location :	BH306 (0.8-1.5m)			
Sam	ple Number :	#26			
Da	ate Sampled :	: 14-17/05/2018			
Material	Material Description : EW Sandstone				
Samp	Sampling Method: AS 1289.1.2.1.6.5.4 Machine excavated pit/trench				
SMDD:	1.81 t/m3	Target Density Ratio: 90% Moulded Density Ratio:			90.8%
OMC :	15.1 %	Target Moisture Ratio:	100%	Moulded Moisture Ratio:	99.8%
FMC :	13.0 %	Material > 19.0mm :	0%	Moulded Moisture :	15.1%

Moisture Content	Wet Density	Dry Density	Resistivity
(% Dry Weight)	(t/m3)	(t/m3)	(mK/W)
15.1	1.891	1.644	0.680
11.7	1.835	1.644	0.900
5.3	1.730	1.644	1.190
0.0	1.644	1.644	1.750



Reported By: Brett Bellingham - Ph: 0409 780 620 | email: brett@allgeo.com.au

Alliance Geotechnical Pty Ltd

Phone: 1800 288 188 | Website: allgeo.com.au | Email:office@allgeo.com.au Office & Laboratory Address: 10 Welder Road, Seven Hills NSW 2147

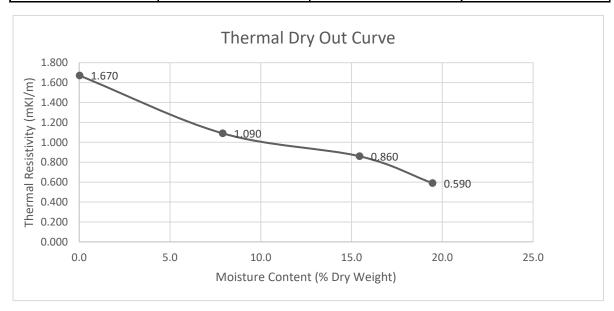


Manage the earth, eliminate the risk

Remoulded Thermal Resistivity With Dry Out Curve

Rep	oort Number :	18087-27 Report Date :			13/06/2018	
Р	roject Name :	132kV Feeder Sydney So	132kV Feeder Sydney South to Revesby			
(Client Name :	RCA Laboratories				
Proj	ect Location :	Sydney South to Revesby	′			
Sam	ple Location :	BH307 (0.8-1.5m)				
Sam	ple Number :	#27				
Da	ate Sampled :	14-17/05/2018				
Material	Description:	cription : Brown Silty CLAY				
Samp	ling Method:	AS 1289.1.2.1.6.5.4 Machine excavated pit/trench				
SMDD :	1.66 t/m3	Target Density Ratio: 99% Moulded Density Ratio:			98.2%	
OMC :	19.4 %	Target Moisture Ratio:	100%	Moulded Moisture Ratio:	100.3%	
FMC :	17.8 %	Material > 19.0mm:	0%	Moulded Moisture :	19.5%	

Moisture Content	Wet Density	Dry Density	Resistivity
(% Dry Weight)	(t/m3)	(t/m3)	(mK/W)
19.5	1.947	1.630	0.590
15.4	1.882	1.630	0.860
7.9	1.759	1.630	1.090
0.0	1.630	1.630	1.670



Reported By: Brett Bellingham - Ph: 0409 780 620 | email: brett@allgeo.com.au

Alliance Geotechnical Pty Ltd

Phone: 1800 288 188 | Website: allgeo.com.au | Email:office@allgeo.com.au Office & Laboratory Address: 10 Welder Road, Seven Hills NSW 2147

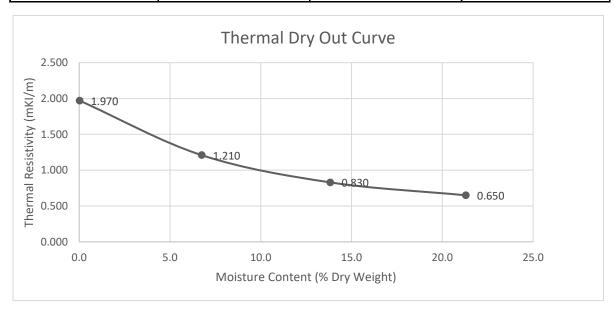


Manage the earth, eliminate the risk

Remoulded Thermal Resistivity With Dry Out Curve

Rep	oort Number :	18087-28 Report Date :		13/06/2018	
Р	roject Name :	132kV Feeder Sydney So	132kV Feeder Sydney South to Revesby		
(Client Name :	RCA Laboratories			
Proj	ect Location :	Sydney South to Revesby			
Sam	ple Location :	BH308 (0.45-1m)			
Sam	ple Number :	#28			
Da	ate Sampled :	: 14-17/05/2018			
Material	Material Description : Silty Clay				
Samp	oling Method:	AS 1289.1.2.1.6.5.4 Mach	ine excava	ted pit/trench	
SMDD:	1.66 t/m3	Target Density Ratio :	Target Density Ratio: 95% Moulded Density Ratio:		
OMC :	21.3 %	Target Moisture Ratio:	100%	Moulded Moisture Ratio:	100.0%
FMC :	18.6 %	Material > 19.0mm:	0%	Moulded Moisture :	21.3%

Moisture Content	Wet Density	Dry Density	Resistivity
(% Dry Weight)	(t/m3)	(t/m3)	(mK/W)
21.3	1.919	1.582	0.650
13.8	1.801	1.582	0.830
6.7	1.689	1.582	1.210
0.0	1.583	1.582	1.970



Reported By: Brett Bellingham - Ph: 0409 780 620 | email: brett@allgeo.com.au

Alliance Geotechnical Pty Ltd

Phone: 1800 288 188 | Website: allgeo.com.au | Email:office@allgeo.com.au Office & Laboratory Address: 10 Welder Road, Seven Hills NSW 2147

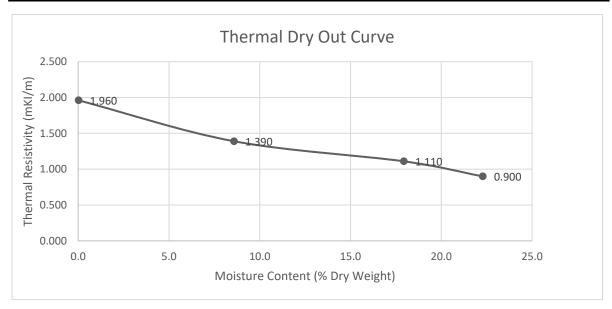


Manage the earth, eliminate the risk

Remoulded Thermal Resistivity With Dry Out Curve

Rep	oort Number :	18087-29 Report Date :			13/06/2018
Р	roject Name :	132kV Feeder Sydney So	Page 1 of 1		
(Client Name :	RCA Laboratories			
Proj	ect Location :	Sydney South to Revesby	′		
Sam	ple Location :	BH309 (0.8-1.5m)			
Sam	ple Number :	#29			
Da	ate Sampled :	14-17/05/2018			
Material	Description:	ription : Brown Silty CLAY			
Samp	ling Method:	d: AS 1289.1.2.1.6.5.4 Machine excavated pit/trench			
SMDD:	1.64 t/m3	Target Density Ratio: 90% Moulded Density Ratio:			90.1%
OMC :	22.3 %	Target Moisture Ratio:	100%	Moulded Moisture Ratio:	99.9%
FMC :	22.6 %	Material > 19.0mm :	0%	Moulded Moisture :	22.3%

Moisture Content	Wet Density	Dry Density	Resistivity
(% Dry Weight)	(t/m3)	(t/m3)	(mK/W)
22.3	1.806	1.477	0.900
17.9	1.742	1.477	1.110
8.6	1.604	1.477	1.390
0.0	1.477	1.477	1.960



Reported By: Brett Bellingham - Ph: 0409 780 620 | email: brett@allgeo.com.au

Alliance Geotechnical Pty Ltd

Phone: 1800 288 188 | Website: allgeo.com.au | Email:office@allgeo.com.au Office & Laboratory Address: 10 Welder Road, Seven Hills NSW 2147

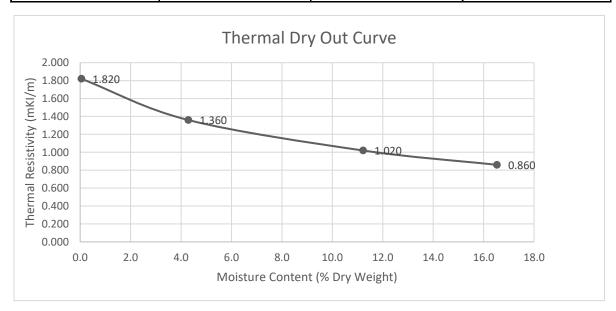


Manage the earth, eliminate the risk

Remoulded Thermal Resistivity With Dry Out Curve

Rep	oort Number :	18087-30 Report Date :		13/06/2018		
Р	roject Name :	132kV Feeder Sydney So	132kV Feeder Sydney South to Revesby			
(Client Name :	RCA Laboratories				
Proj	ect Location :	Sydney South to Revesby	,			
Sam	ple Location :	BH310 (0.8-1.5m)				
Sam	ple Number :	#30				
Da	ate Sampled :	14-17/05/2018				
Material	Description:	Brown Silty CLAY				
Samp	oling Method:	AS 1289.1.2.1.6.5.4 Mach	ine excava	ted pit/trench		
SMDD:	1.77 t/m3	Target Density Ratio :	Target Density Ratio: 90% Moulded Density Ratio:			
OMC :	16.4 %	Target Moisture Ratio:	100%	Moulded Moisture Ratio:	100.7%	
FMC :	16.7 %	Material > 19.0mm:	0%	Moulded Moisture :	16.5%	

Moisture Content	Wet Density	Dry Density	Resistivity
(% Dry Weight)	(t/m3)	(t/m3)	(mK/W)
16.5	1.871	1.605	0.860
11.2	1.786	1.605	1.020
4.3	1.674	1.605	1.360
0.0	1.606	1.605	1.820



Reported By: Brett Bellingham - Ph: 0409 780 620 | email: brett@allgeo.com.au

Alliance Geotechnical Pty Ltd

Phone: 1800 288 188 | Website: allgeo.com.au | Email:office@allgeo.com.au Office & Laboratory Address: 10 Welder Road, Seven Hills NSW 2147

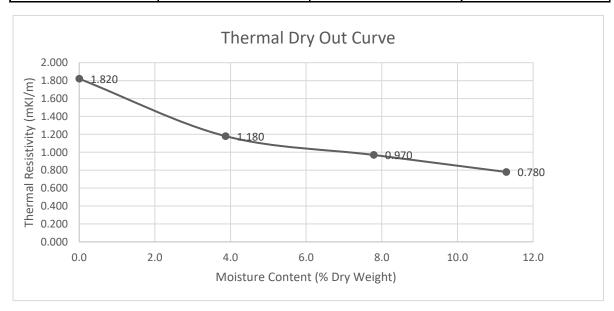


Manage the earth, eliminate the risk

Remoulded Thermal Resistivity With Dry Out Curve

Rep	oort Number:	18087-31		Report Date :	13/06/2018	
Pi	roject Name :	132kV Feeder Sydney South to Revesby			Page 1 of 1	
(Client Name :	RCA Laboratories				
Project Location : Sydney South to Revesby						
Sam	ple Location :	BH311 (0.35-0.7m)				
Sam	ple Number :	#31				
Da	ate Sampled :	14-17/05/2018				
Material Description :		Clayey Silty Sand - Clayey Gravely Sand				
Sampling Method:		AS 1289.1.2.1.6.5.4 Machine excavated pit/trench				
SMDD:	2.03 t/m3	Target Density Ratio:	90%	Moulded Density Ratio:	90.0%	
OMC :	11.3 %	Target Moisture Ratio:	100%	Moulded Moisture Ratio:	99.9%	
FMC :	11.3 %	Material > 19.0mm:	0%	Moulded Moisture :	11.3%	

Moisture Content	Wet Density	Dry Density	Resistivity
(% Dry Weight)	(t/m3)	(t/m3)	(mK/W)
11.3	2.033	1.826	0.780
7.8	1.969	1.826	0.970
3.9	1.897	1.826	1.180
0.0	1.826	1.826	1.820



Reported By: Brett Bellingham - Ph: 0409 780 620 | email: brett@allgeo.com.au

Alliance Geotechnical Pty Ltd

Phone: 1800 288 188 | Website: allgeo.com.au | Email:office@allgeo.com.au Office & Laboratory Address: 10 Welder Road, Seven Hills NSW 2147

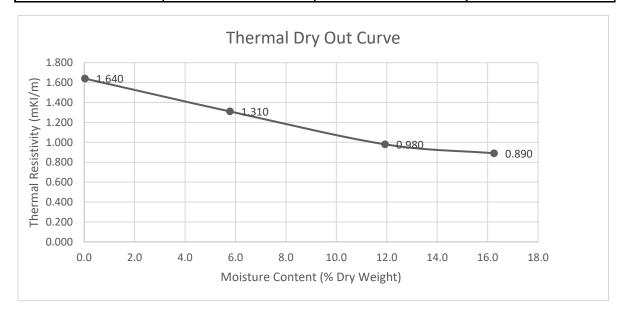


Manage the earth, eliminate the risk

Remoulded Thermal Resistivity With Dry Out Curve

Rep	oort Number :	nber : 18087-32		Report Date :	13/06/2018		
Р	roject Name :	132kV Feeder Sydney So	uth to Reve	esby	Page 1 of 1		
(Client Name :	RCA Laboratories					
Proj	ect Location :	Sydney South to Revesby					
Sam	ple Location :	BH312 (0.8-1.5m)	BH312 (0.8-1.5m)				
Sam	ple Number :	#32					
Da	ate Sampled :	14-17/05/2018					
Material	Description:	Brown Silty CLAY (w Sand and Gravel)					
Samp	oling Method:	AS 1289.1.2.1.6.5.4 Machine excavated pit/trench					
SMDD:	1.75 t/m3	Target Density Ratio:	96%	Moulded Density Ratio:	96.2%		
OMC :	16.2 %	Target Moisture Ratio:	100%	Moulded Moisture Ratio:	100.3%		
FMC :	19.2 %	Material > 19.0mm:	0%	Moulded Moisture :	16.2%		

Moisture Content	loisture Content Wet Density		Resistivity	
(% Dry Weight)	(% Dry Weight) (t/m3)		(mK/W)	
16.2	1.957	1.684	0.890	
11.9	1.885	1.684	0.980	
5.8	1.781	1.684	1.310	
0.0	1.684	1.684	1.640	



Reported By: Brett Bellingham - Ph: 0409 780 620 | email: brett@allgeo.com.au

Alliance Geotechnical Pty Ltd

Phone: 1800 288 188 | Website: allgeo.com.au | Email:office@allgeo.com.au Office & Laboratory Address: 10 Welder Road, Seven Hills NSW 2147

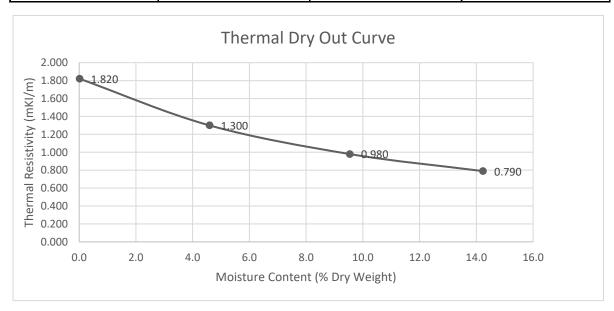


Manage the earth, eliminate the risk

Remoulded Thermal Resistivity With Dry Out Curve

Rep	oort Number:	18087-33		Report Date :	13/06/2018		
Р	roject Name :	132kV Feeder Sydney So	uth to Reve	esby	Page 1 of 1		
	Client Name :	RCA Laboratories					
Proj	ect Location :	Sydney South to Revesby					
Sam	ple Location :	BH313 (0.13-1.5m)	BH313 (0.13-1.5m)				
Sam	ple Number :	#33					
Da	ate Sampled :	14-17/05/2018					
Material	Description:	Brown Siltstone					
Samp	oling Method:	AS 1289.1.2.1.6.5.4 Machine excavated pit/trench					
SMDD:	1.85 t/m3	Target Density Ratio :	90%	Moulded Density Ratio:	90.4%		
OMC :	14.2 %	Target Moisture Ratio:	100%	Moulded Moisture Ratio:	100.2%		
FMC :	9.2 %	Material > 19.0mm:	0%	Moulded Moisture :	14.2%		

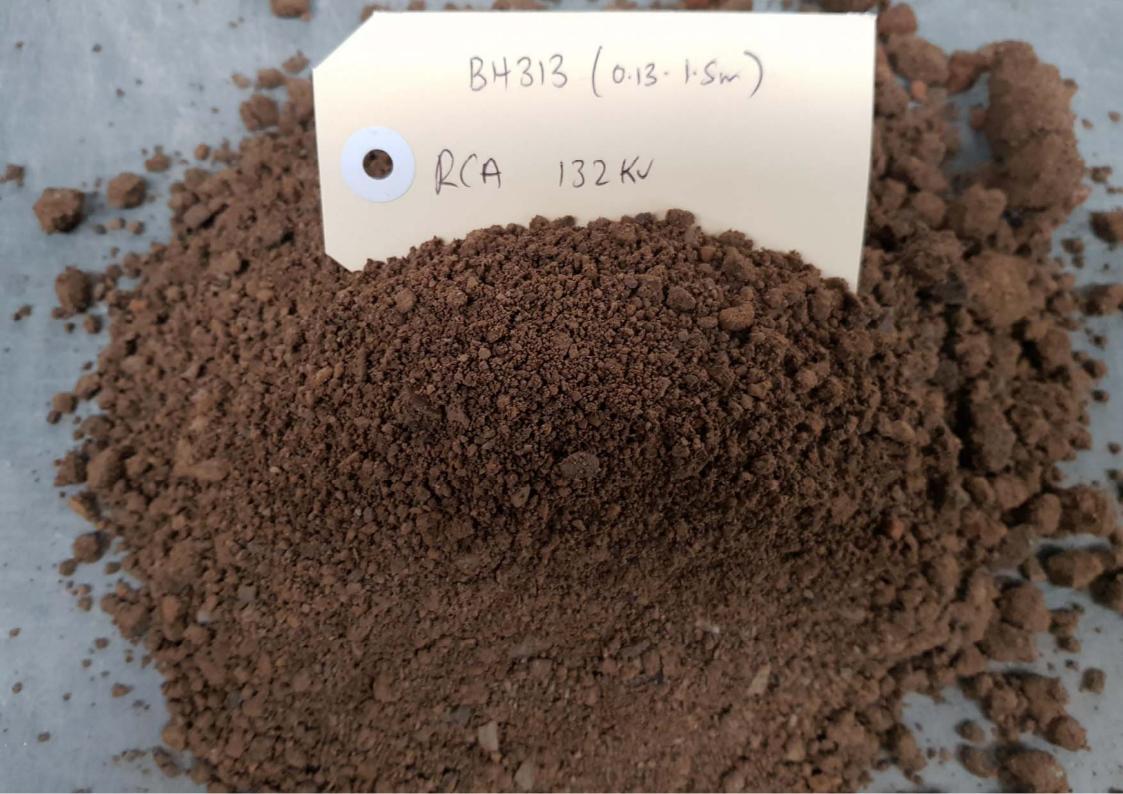
Moisture Content	Wet Density	Dry Density	Resistivity	
(% Dry Weight)	% Dry Weight) (t/m3)		(mK/W)	
14.2	1.911	1.673	0.790	
9.5	1.832	1.673	0.980	
4.6	1.750	1.673	1.300	
0.0	1.673	1.673	1.820	



Reported By: Brett Bellingham - Ph: 0409 780 620 | email: brett@allgeo.com.au

Alliance Geotechnical Pty Ltd

Phone: 1800 288 188 | Website: allgeo.com.au | Email:office@allgeo.com.au Office & Laboratory Address: 10 Welder Road, Seven Hills NSW 2147

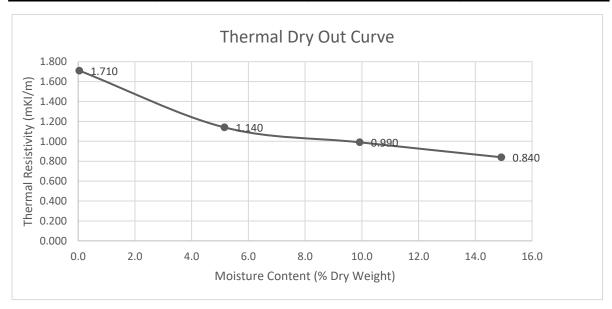


Manage the earth, eliminate the risk

Remoulded Thermal Resistivity With Dry Out Curve

Report Number :		18087-34 Report Date		13/06/2018		
Р	roject Name :	132kV Feeder Sydney So	Page 1 of 1			
(Client Name :	RCA Laboratories				
Proj	ect Location :	Sydney South to Revesby	′			
Sam	ple Location :	BH314 (0.8-1.5m)				
Sam	ple Number :	#34				
Da	ate Sampled :	14-17/05/2018				
Material	Description:	Silty Clay & EW Siltstone				
Samp	ling Method:	AS 1289.1.2.1.6.5.4 Machine excavated pit/trench				
SMDD:	1.86 t/m3	Target Density Ratio: 90% Moulded Density Ratio:			90.1%	
OMC :	14.9 %	Target Moisture Ratio:	100%	Moulded Moisture Ratio:	100.1%	
FMC :	10.8 %	Material > 19.0mm :	0%	Moulded Moisture :	14.9%	

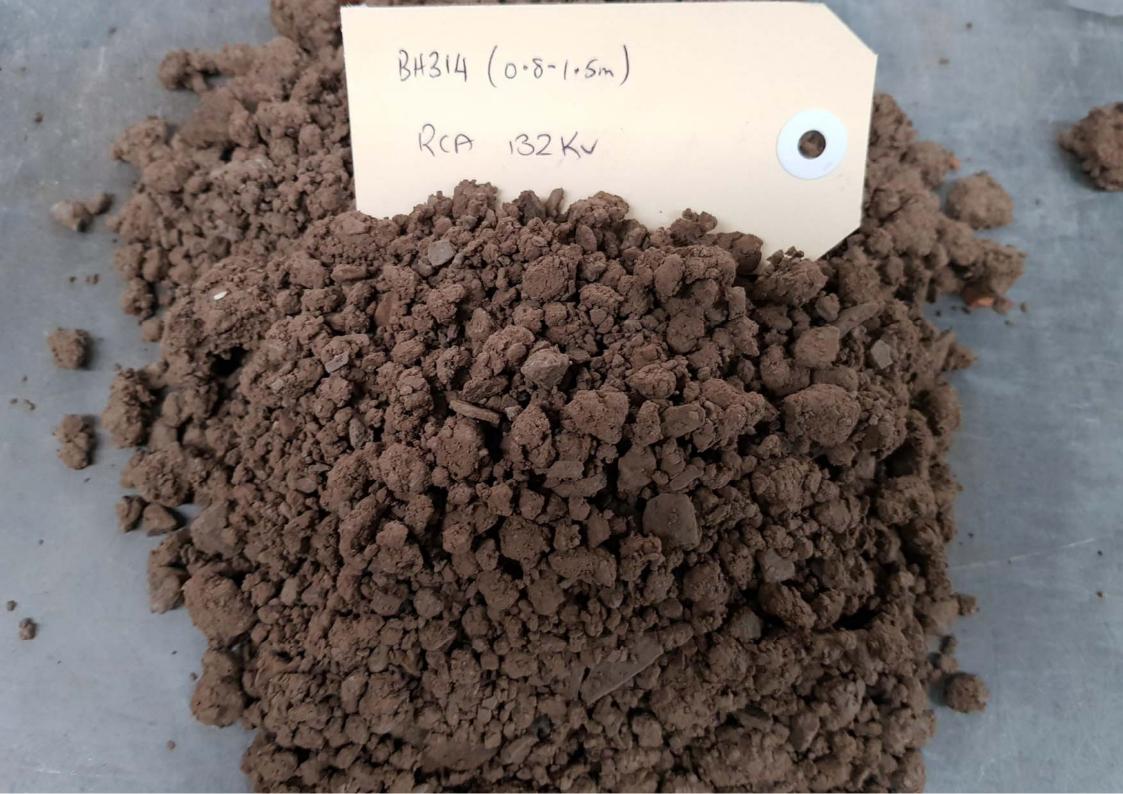
Moisture Content	Moisture Content Wet Density		Resistivity	
(% Dry Weight)	(% Dry Weight) (t/m3)		(mK/W)	
14.9	1.926	1.676	0.840	
9.9	1.842	1.676	0.990	
5.2	1.762	1.676	1.140	
0.0	1.676	1.676	1.710	



Reported By: Brett Bellingham - Ph: 0409 780 620 | email: brett@allgeo.com.au

Alliance Geotechnical Pty Ltd

Phone: 1800 288 188 | Website: allgeo.com.au | Email:office@allgeo.com.au Office & Laboratory Address: 10 Welder Road, Seven Hills NSW 2147

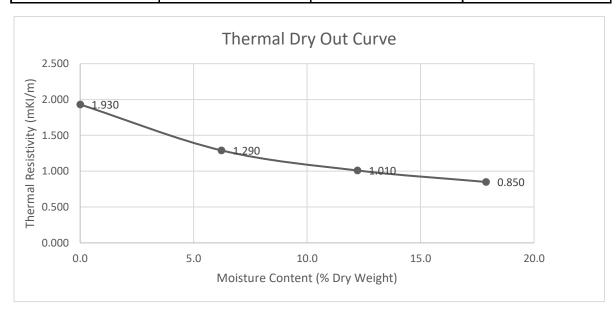


Manage the earth, eliminate the risk

Remoulded Thermal Resistivity With Dry Out Curve

Report Number : 18087-35		18087-35		Report Date :	13/06/2018		
Pi	roject Name :	132kV Feeder Sydney So	uth to Reve	esby	Page 1 of 1		
(Client Name :	RCA Laboratories					
Proj	ect Location :	Sydney South to Revesby	1				
Sam	ple Location :	BH315 (0.8-1.5m)	BH315 (0.8-1.5m)				
Sam	ple Number :	#35					
Da	ate Sampled :	14-17/05/2018					
Material	Description:	Silty Clay & EW Sandstone					
Samp	ling Method:	AS 1289.1.2.1.6.5.4 Machine excavated pit/trench					
SMDD:	D: 1.81 t/m3 Target Density Ratio: 90		90%	Moulded Density Ratio:	89.8%		
OMC :	17.8 %	Target Moisture Ratio:	100%	Moulded Moisture Ratio:	100.4%		
FMC :	15.2 %	Material > 19.0mm:	0%	Moulded Moisture :	17.9%		

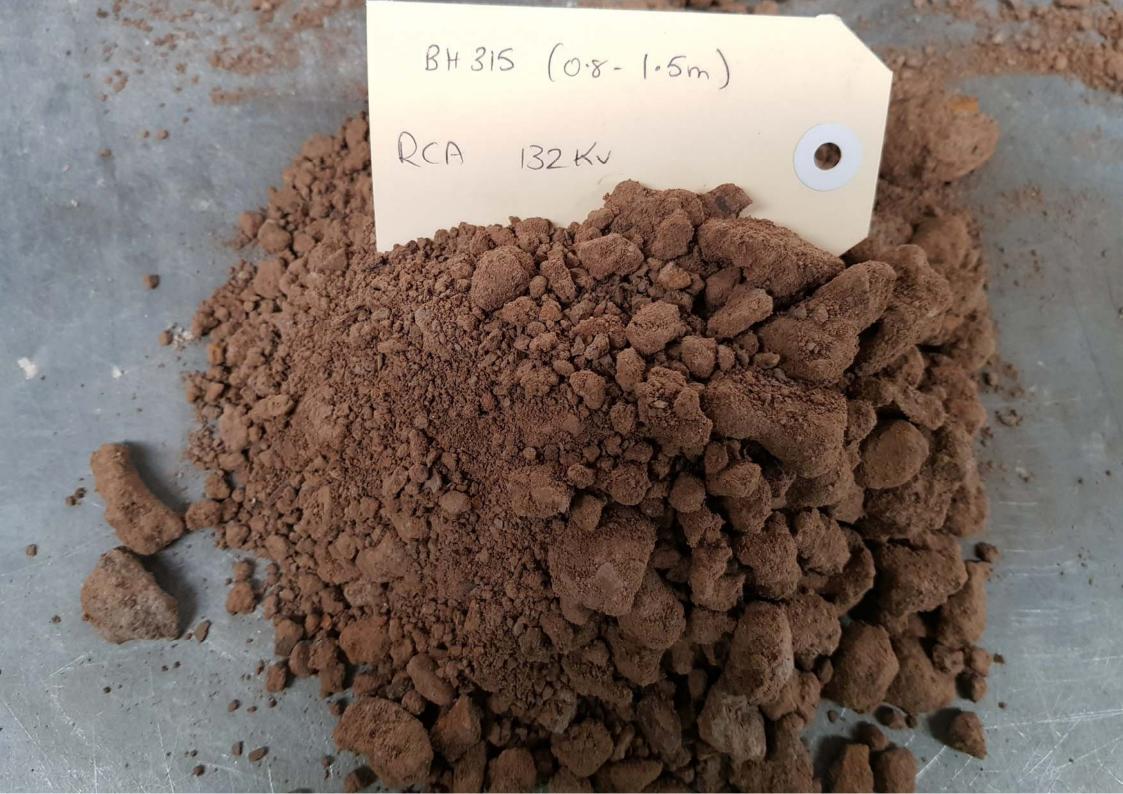
Moisture Content	Moisture Content Wet Density		Resistivity	
(% Dry Weight)	% Dry Weight) (t/m3)		(mK/W)	
17.9	1.917	1.626	0.850	
12.2	1.825	1.626	1.010	
6.2	1.727	1.626	1.290	
0.0	1.626	1.626	1.930	



Reported By: Brett Bellingham - Ph: 0409 780 620 | email: brett@allgeo.com.au

Alliance Geotechnical Pty Ltd

Phone: 1800 288 188 | Website: allgeo.com.au | Email:office@allgeo.com.au Office & Laboratory Address: 10 Welder Road, Seven Hills NSW 2147

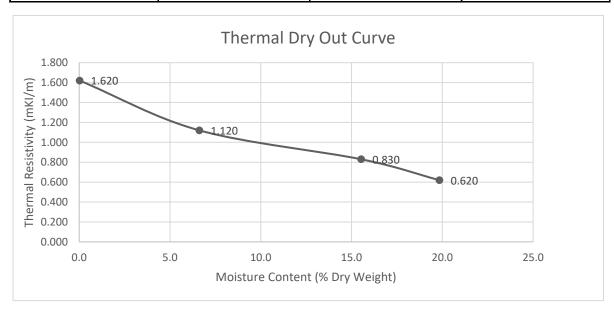


Manage the earth, eliminate the risk

Remoulded Thermal Resistivity With Dry Out Curve

Rep	oort Number :	18087-36		Report Date :	13/06/2018		
Р	roject Name :	132kV Feeder Sydney So	uth to Reve	esby	Page 1 of 1		
(Client Name :	RCA Laboratories					
Proj	ect Location :	Sydney South to Revesby	,				
Sam	ple Location :	BH316 (0.8-1.2m)	BH316 (0.8-1.2m)				
Sam	ple Number :	#36					
Da	ate Sampled :	14-17/05/2018					
Material	Description:	Brown Silty CLAY					
Samp	oling Method:	AS 1289.1.2.1.6.5.4 Machine excavated pit/trench					
SMDD:	1.7 t/m3	Target Density Ratio :	99%	Moulded Density Ratio :	98.5%		
OMC :	19.8 %	Target Moisture Ratio:	100%	Moulded Moisture Ratio:	100.2%		
FMC :	22.0 %	Material > 19.0mm:	0%	Moulded Moisture :	19.8%		

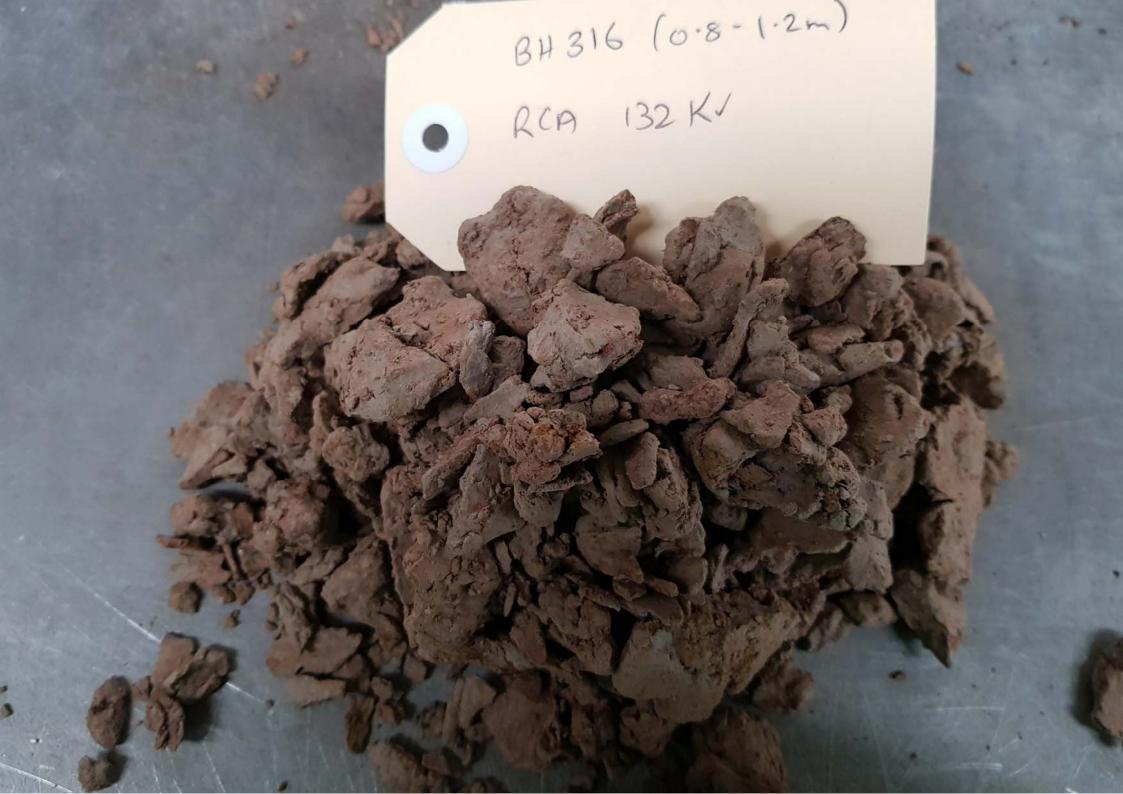
Moisture Content	Wet Density	Dry Density	Resistivity	
(% Dry Weight)	(% Dry Weight) (t/m3)		(mK/W)	
19.8	2.007	1.674	0.620	
15.5	1.934	1.674	0.830	
6.6	1.785	1.674	1.120	
0.0	1.675	1.674	1.620	



Reported By: Brett Bellingham - Ph: 0409 780 620 | email: brett@allgeo.com.au

Alliance Geotechnical Pty Ltd

Phone: 1800 288 188 | Website: allgeo.com.au | Email:office@allgeo.com.au Office & Laboratory Address: 10 Welder Road, Seven Hills NSW 2147







Robert Carr & Associates 92 Hill Street Carrington NSW 2294

Attention: Mr Mark Allman

Project: RCA ref 13529-601/0

Date: 8/06/2018

Client reference: Sydney Ausgrid

Received date: 1/06/2018 Number of samples: 49

Client order number: n/a Testing commenced: 7/06/2018

CERTIFICATE OF ANALYSIS

1 ANALYTICAL TEST METHODS

ANALYSIS	METHOD	UNITS	ANALYSING LABORATORY	NATA ANALYSIS / NON NATA	Measurement of Uncertainty Coverage Factor 2
Acid Sulphate Soil	ENV-LAB032	рН	RCA Laboratories - Environmental	NATA	±0.54

^{*} The analytical procedures used by RCA Laboratories - Environmental are based on established internationally recognised procedures such as APHA and Australian Standards

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



92 Hill Street - PO Box 175, Carrington NSW 2294 ABN 53 063 515 711 Ph 02 4902 9200 - Fax 02 4902 9299 Email: administrator@rca.com.au Web www.rca.com.au

Robert Carr & Associates Pty Ltd Trading as RCA Laboratories – Environmental



2 **RESULTS**

ANALYSIS	UNITS	BH103	BH105	BH106	BH107	BH108	BH109	BH110
Acid Sulfate Soil Screening Test								
Sample Number	-	061813529001	061813529002	061813529003	061813529004	061813529005	061813529006	061813529007
Date Sampled	-	29/5/18	21/5/18	22/5/18	21/5/18	22/5/18	22/5/18	22/5/18
pHF	pH unit	8.43	8.53	5.33	5.41	4.73	4.83	5.14
pHFOX		5.38	7.61	3.93	4.30	3.74	3.93	3.70
pHF – pHFOX		3.05	0.92	1.40	1.11	0.99	0.90	1.44
Reaction Rate^	-	1	4	2	1	4	1	4
Soil Type	-	Silty Clay	Clayey Gravelly SAND	Silty CLAY	Clayey SAND	Sandy CLAY	Sandy Silty CLAY	Sandy Silty CLAY

ANALYSIS	UNITS	BH111	BH112	BH115	BH116	BH117	BH118	BH119
Acid Sulfate Soil Screening Test								
Sample Number	-	061813529008	061813529009	061813529010	061813529011	061813529012	061813529013	061813529014
Date Sampled	-	23/5/18	23/5/18	24/5/18	24/5/18	24/5/18	28/5/18	24/5/18
pHF	pH unit	4.50	5.10	7.10	4.94	6.03	4.76	5.80
pHFOX		3.52	4.36	6.62	4.18	4.00	3.84	4.65
pHF – pHFOX		0.98	0.74	0.48	0.76	2.03	0.92	1.15
Reaction Rate^	-	1	1	4	2	1	2	1
Soil Type	-	Silty SAND	Clayey SAND	Gravelly SAND	SANDSTONE	Silty SAND (XW SANDSTONE)	Silty SAND	Sandy CLAY / Clayey SAND



Robert Carr & Associates Pty Ltd Trading as RCA Laboratories – Environmental 92 Hill Street - PO Box 175, Carrington NSW 2294 ABN 53 063 515 711 Ph 02 4902 9200 - Fax 02 4902 9299 Email: administrator@rca.com.au Web www.rca.com.au

NATA
1
WORLD RECOGNISED
ACCREDITATION

ANALYSIS	UNITS	BH121	BH122	BH123	BH124	BH125	BH201	BH202
Acid Sulfate Soil Screening Test								
Sample Number	-	061813529015	061813529016	061813529017	061813529018	061813529019	061813529020	061813529021
Date Sampled	-	25/5/18	24/5/18	28/5/18	28/5/18	29/5/18	7/5/18	8/5/18
pHF	pH unit	5.11	5.50	4.65	5.42	5.77	6.44	7.59
pHFOX		4.49	3.68	3.57	4.21	4.53	5.07	6.24
pHF – pHFOX		0.62	1.82	1.08	1.21	1.24	1.37	1.35
Reaction Rate^	-	1	1	1	1	1	1	2
Soil Type	-	Silty SAND (XW SANDSTONE)	Silty CLAY	Silty SAND with clay	Clayey SAND	SANDSTONE	SAND	SAND

ANALYSIS	UNITS	BH203A	BH204	BH205	BH206	BH207	BH208	BH209
Acid Sulfate Soil Screening Test								
Sample Number	-	061813529022	061813529023	061813529024	061813529025	061813529026	061813529027	061813529028
Date Sampled	-	8/5/18	7/5/18	9/5/18	9/5/18	17/5/18	9/5/18	11/5/18
pHF	pH unit	5.56	7.69	7.82	7.25	6.71	5.73	5.54
pHFOX		4.92	5.90	5.58	5.31	4.08	4.48	4.32
pHF – pHFOX		0.64	1.79	2.24	1.94	2.63	1.25	1.22
Reaction Rate^	-	1	1	1	1	3	2	2
Soil Type	-	SAND	SAND	SAND	SAND	Silty SAND	SAND	SAND

WORLD RECOGNISED
ACCREDITATION



Robert Carr & Associates Pty Ltd Trading as RCA Laboratories – Environmental 92 Hill Street - PO Box 175, Carrington NSW 2294 ABN 53 063 515 711 Ph 02 4902 9200 - Fax 02 4902 9299 Email: administrator@rca.com.au Web www.rca.com.au

ANALYSIS	UNITS	BH210	BH211	BH212	BH213	BH215	BH301	BH302
Acid Sulfate Soil Screening Test								
Sample Number	-	061813529029	061813529030	061813529031	061813529032	061813529034	061813529035	061813529036
Date Sampled	-	11/5/18	11/5/18	10/5/18	10/5/18	9/5/18	14/5/18	14/5/18
pHF	pH unit	5.05	4.36	5.45	6.65	4.88	5.33	6.84
pHFOX		4.36	3.71	4.50	6.60	3.73	4.26	5.40
pHF – pHFOX		0.69	0.65	0.95	0.05	1.15	1.07	1.44
Reaction Rate^	-	1	1	2	1	1	1	3
Soil Type	-	SAND	SAND	SAND	Silty SAND	SAND	Sandy CLAY	Silty Gravelly SAND

ANALYSIS	UNITS	BH303	BH304	BH305	BH306	BH307	BH308	BH309
Acid Sulfate Soil Screening Test								
Sample Number	-	061813529037	061813529038	061813529039	061813529040	061813529041	061813529042	061813529043
Date Sampled	-	14/5/18	14/5/18	15/5/18	15/5/18	15/5/18	15/5/18	15/5/18
pHF	pH unit	7.16	6.05	8.08	5.68	5.05	5.04	6.14
pHFOX		6.05	4.58	6.97	4.49	3.92	4.20	5.00
pHF – pHFOX		1.11	1.47	1.11	1.19	1.13	0.84	1.14
Reaction Rate^	-	4	1	1	2	1	2	1
Soil Type	-	Gravelly SAND	Gravelly SAND	Gravelly Sandy CLAY	SANDSTONE	Silty CLAY	SILTSTONE	Silty CLAY

NATA Accredited Laboratory 9811 Corporate Site Number 18077 Accredited for compliance with ISO/IEC 17025 - Testing



ANALYSIS	UNITS	BH310	BH311	BH312	BH313	BH314	BH315	BH316
Acid Sulfate Soil Screening Test								
Sample Number	-	061813529044	061813529045	061813529046	061813529047	061813529048	061813529049	061813529050
Date Sampled	-	16/5/18	16/5/18	17/5/18	16/5/18	16/5/18	16/5/18	17/5/18
pHF	pH unit	7.52	5.06	8.17	4.74	7.10	5.00	4.17
pHFOX		7.05	3.81	7.14	3.96	6.07	3.86	3.11
pHF – pHFOX		0.47	1.25	1.03	0.78	1.03	1.14	1.06
Reaction Rate^	-	4	4	4	1	4	4	3
Soil Type	-	Silty CLAY	Clayey Silty SAND	Silty CLAY	SILTSTONE	Silty CLAY	CLAY	Silty CLAY



Acid Sulphate Soil Screening

Note: This screening test only provides an indication of the likely presence and severity of Acid Sulfate Soils. This test should not be used as a substitute for laboratory analysis which would positively identify the presence of Acid Sulfate Soils (ASS) for assessment purposes.

NATA Scope of Accreditation does not cover the sampling of soils by the client or by RCA Employee's.

Analysis for pH and Acid Sulphate Screen Testing is covered by RCA Laboratories - Environmental NATA Scope of Accreditation.

Analysis on samples is on an as received basis.

Acid Soil Screening Test Reaction Rate

^Reaction Rate: 1 = Slight, 2 = Moderate, 3 = High, 4 = Very Vigorous

Note: Due to the subjectivity the assessment of the Reaction Rate is not covered by our NATA Scope of Accreditation.

60:

NATA Scope of Accreditation does not cover the sampling of soil by the client or by RCA.

Analysis on samples is on an as received basis.

3 QUALITY CONTROL RESULTS

Acid Sulphate Soil Screening Test Quality Control

DATE	ANALYSIS	METHOD	UNITS	QUALITY CONTROL STANDARD VALUE	QUALITY CONTROL ACCEPTANCE CRITERIA	QUALITY CONTROL STANDARD RESULT
7/06/2018	pH – Acid Sulfate Soil	ENV- LAB032	рН	7.00	6.95 - 7.05	7.00

Acid Sulphate Soil Screening Test Duplicate Analysis

SAMPLE NUMBER	DATE	ANALYSIS	METHOD	UNITS	LOR	SAMPLE RESULT	SAMPLE DUPLICATE RESULT
061813529001	7/06/2018	pH – Acid Sulfate Soil	ENV- LAB032	рН	N/A	8.43	8.42
061813529011	7/06/2018	pH – Acid Sulfate Soil	ENV- LAB032	рН	N/A	4.94	4.98
061913529030	7/06/2018	pH – Acid Sulfate Soil	ENV- LAB032	рН	N/A	4.36	4.38
061813529031	7/06/2018	pH – Acid Sulfate Soil	ENV- LAB032	рН	N/A	5.45	5.50
061813529040	7/06/2018	pH – Acid Sulfate Soil	ENV- LAB032	рН	N/A	5.68	5.63
061813529050	7/06/2018	pH – Acid Sulfate Soil	ENV- LAB032	рН	N/A	4.17	4.22

Please contact the undersigned if you have any queries.

Yours sincerely

Laura Schofield Environmental Laboratory Manager Robert Carr & Associates Pty Ltd Trading as RCA Laboratories - Environmental Approved Signatory

Dr Neena Tewari Senior Environmental Microbiologist Robert Carr & Associates Pty Ltd Trading as RCA Laboratories- Environmental

Robert Carr and Associates Pty Ltd shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company resulting from the use of any information or interpretation given in this report. In no case shall RCA limited be liable for consequential damages including, but not limited to, loss profits damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples are received. Sampled dates quoted in this report are those listed on the COC or sample jars; if no sample dates are noted, the date the samples are received at the laboratory have been used. The Laboratory is accredited for compliance with ISO/IEC 17025. The results of the tests, calibrations &/or measurements included in this document are traceable to Australian / National Standards.



RCA Internal Quality Review

General

- Laboratory QC results for Method Blanks, Duplicates and Laboratory Control Samples are included in this QC report where applicable. Additional QC data maybe available on request.
- 2. RCA QC Acceptance / Rejection Criteria are available on request.
- Proficiency Trial results are available on request.
- Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
- 5. When individual results are qualified in the body of a report, refer to the qualifier descriptions that follow.
- 6. Samples were analysed on an 'as received' basis.
- Sampled dates in this report are those listed on the COC or sample jars; if no sample dates are noted, the date the samples are received at the laboratory have been used.
- 8. All soil results are reported on a dry basis, unless otherwise stated. (ACID SULPHATE SOILS)
- This report replaces any interim results previously issued.

Holding Times

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 Acknowledgment.

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 rang/e NOT as RPD

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%

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. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data.

Glossary

UNITS

mg/kg: milligrams per Kilogram

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion %: Percentage

org/100ml: Organisms per 100 millilitres

NTU: Units

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

mg/L: milligrams per Litre

TERMS

Dry Where moisture has been determined on a solid sample the result is expressed on a dry basis.

LOR Limit of Reporting.

RPD Relative Percent Difference between two Duplicate pieces of analysis can be obtained upon request.

QCS Quality Control Sample - reported as value 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

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.

USEPA United States Environment Protection Authority

APHA American Public Health Association

COC Chain of Custody

 $\ensuremath{\mathsf{CP}}$ 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

< indicates less than

> Indicates greater than

ND Not Detected



CERTIFICATE OF ANALYSIS

Work Order : EB1814706

Client : ROBERT CARR & ASSOCIATES P/L

Contact : MR MARK ALLMAN

Address : P O BOX 175

CARRINGTON NSW, AUSTRALIA 2294

Telephone : +61 02 4902 9200

Project : 13529

Order number :

C-O-C number : ----Sampler : ----

Site : AUSGRID

Quote number : SYBQ/400/17

No. of samples received : 3
No. of samples analysed : 3

Page : 1 of 4

Laboratory : Environmental Division Brisbane

Contact : Customer Services EB

Address : 2 Byth Street Stafford QLD Australia 4053

Telephone : +61-7-3243 7222

Date Samples Received : 20-Jun-2018 08:50

Date Analysis Commenced : 25-Jun-2018

Issue Date : 26-Jun-2018 19:11



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

Ben Felgendrejeris Senior Acid Sulfate Soil Chemist Brisbane Acid Sulphate Soils, Stafford, QLD

Page : 2 of 4
Work Order : EB1814706

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529

ALS

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.
- ASS: EA029 (SPOCAS): Excess ANC not required because pH OX less than 6.5.
- ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m3 in-situ soil, multiply reported results x wet bulk density of soil in t/m3.

Page : 3 of 4
Work Order : EB1814706

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529

Analytical Results



ub-Matrix: SOIL Matrix: SOIL)		Clie	ent sample ID	BH106 0.55 - 0.80	BH211 0.4 -0.5	BH316 1.0 - 1.3	
	CI	lient sampli	ng date / time	22-May-2018 00:00	11-May-2018 00:00	17-May-2018 00:00	
Compound	CAS Number	LOR	Unit	EB1814706-001	EB1814706-002	EB1814706-003	
				Result	Result	Result	
A026 : Chromium Reducible Sulfur							
Chromium Reducible Sulphur		0.005	%	0.006	<0.005	<0.005	
A029-A: pH Measurements							
pH KCI (23A)		0.1	pH Unit	3.9	5.3	3.5	
pH OX (23B)		0.1	pH Unit	4.4	4.5	4.2	
A029-B: Acidity Trail							
Titratable Actual Acidity (23F)		2	mole H+/t	59	4	42	
Titratable Peroxide Acidity (23G)		2	mole H+/t	224	5	199	
Titratable Sulfidic Acidity (23H)		2	mole H+ / t	165	<2	157	
sulfidic - Titratable Actual Acidity (s-23F)		0.020	% pyrite S	0.095	<0.020	0.068	
sulfidic - Titratable Peroxide Acidity		0.020	% pyrite S	0.359	<0.020	0.319	
(s-23G)							
sulfidic - Titratable Sulfidic Acidity (s-23H)		0.020	% pyrite S	0.264	<0.020	0.251	
A029-C: Sulfur Trail							
KCI Extractable Sulfur (23Ce)		0.020	% S	<0.020	<0.020	<0.020	
Peroxide Sulfur (23De)		0.020	% S	<0.020	<0.020	<0.020	
Peroxide Oxidisable Sulfur (23E)		0.020	% S	<0.020	<0.020	<0.020	
acidity - Peroxide Oxidisable Sulfur (a-23E)		10	mole H+ / t	<10	<10	<10	
EA029-D: Calcium Values							
KCI Extractable Calcium (23Vh)		0.020	% Ca	0.030	<0.020	<0.020	
Peroxide Calcium (23Wh)		0.020	% Ca	0.046	<0.020	<0.020	
Acid Reacted Calcium (23X)		0.020	% Ca	<0.020	<0.020	<0.020	
acidity - Acid Reacted Calcium (a-23X)		10	mole H+ / t	<10	<10	<10	
sulfidic - Acid Reacted Calcium (s-23X)		0.020	% S	<0.020	<0.020	<0.020	
A029-E: Magnesium Values		0.020	,,,				
KCI Extractable Magnesium (23Sm)		0.020	% Mg	<0.020	<0.020	0.072	
Peroxide Magnesium (23Tm)		0.020	% Mg	<0.020	<0.020	0.072	
Acid Reacted Magnesium (23U)		0.020	% Mg	<0.020	<0.020	<0.020	
Acidity - Acid Reacted Magnesium (a-23U)		10	mole H+ / t	<10	<10	<10	
sulfidic - Acid Reacted Magnesium		0.020	% S	<0.020	<0.020	<0.020	
(s-23U)		0.020	""	-0.020	-0.020	-0.020	
A029-G: Retained Acidity							
HCI Extractable Sulfur (20Be)		0.020	% S	<0.020		<0.020	
Net Acid Soluble Sulfur (20Je)		0.020	% S	<0.020		<0.020	

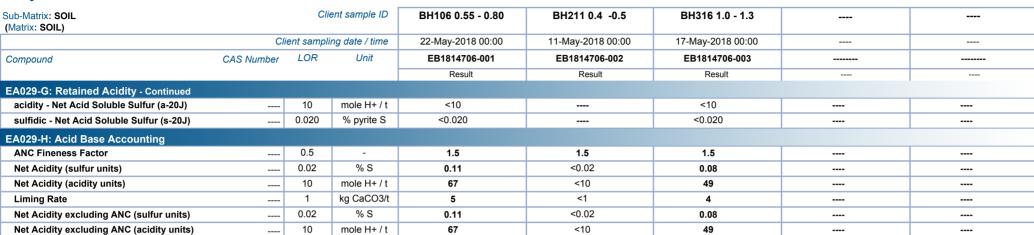
Page : 4 of 4 Work Order : EB1814706

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529

Liming Rate excluding ANC

Analytical Results



<1

4

kg CaCO3/t

5



Appendix D

Pavement Details Table

Project: South Sydney to Revesby 132KV Feeder Project

Date:	19/06/2018			T		Ch. C.		
Borehole	Location	Easting	Northing		T	Subsurface	Depth to Rock	Depth to GWT
No.	Address	(m)	(m)	Pavement Wearing Course	Pavement Material	Subgrade	(m)	(m)
BH301	Access track off southen end of Kennedy St, Picnic Point	316461	6238616	Not Encountered	Not Encountered	FILL, Gravelly Silty SAND to 0.7m depth, overlying Residual Sandy CLAY to >1.5m depth	Not Encountered	Not Encountered
BH302	Access track off southen end of Kennedy St, Picnic Point	316322	6238769	Not Encountered	Not Encountered	FILL/TOPSOIL Silty Gravelly Sand to 0.7m depth, overlying Residual Sandy CLAY to 0.9m depth, overlying Extremely weathered SANDSTONE to >1.45m depth	0.9	Not Encountered
BH303	Access track off southen end of Kennedy St, Picnic Point	316197	6238934	Not Encountered	Not Encountered	FILL, Silty Gravelly SAND to 0.4m depth, overlying Silty SAND (EW Material) to 0.6m depth, overlying SANDSTONE to >1.5m depth	0.4	Not Encountered
BH304	Access track off southen end of Kennedy St, Picnic Point	316061	6239027	Not Encountered	Not Encountered	Residual Gravelly SAND to 0.6m depth, overlying SANDSTONE to >1.48m depth	0.6	Not Encountered
BH305	130 Kennedy St, Picnic Point	315909	6239097	AC7 (30mm thick), overlying AC14 (30mm thick)	Silty Sandy GRAVEL to 0.42m depth	Residual Gravelly Sandy CLAY to 0.8m depth, overlying Residual Clayey SAND/Sandy CLAY to 0.9m depth, overlying SANDSTONE to 1.4m depth, overlying Silty CLAY to >1.5m depth	0.9	Not Encountered
BH306	110 Kennedy St, Picnic Point	315938	6239298	AC7 (35mm thick), overlying AC7 (25mm thick), overlying AC10 (20mm thick)	Silty Sandy GRAVEL to 0.45m depth	Residual Sandy CLAY to 0.9m depth, overlying Extremely weathered SANDSTONE to >1.5m depth	0.9	Not Encountered
BH307	99A Kennedy St, Picnic Point	315977	6239505	AC7 (30mm thick), overlying AC7 (50mm thick), overlying AC14 (70mm thick)	Silty Sandy GRAVEL / Silty Gravelly SAND to 0.35m depth	Residual Silty CLAY to >1.5m depth	Not Encountered	Not Encountered
BH308	70-72 Kennedy St, Picnic Point	316001	6239705	AC7 (40mm thick), overlying AC10 (30mm thick)	Sandy Silty GRAVEL to 0.35m depth	FILL, Sandy CLAY to 0.45m depth, overlying Residual Silty CLAY to 1.1m depth, overlying SILTSTONE to >1.4m depth	1.1	Not Encountered
BH309	50A Kennedy St, Picnic Point	316029	6239885	AC7 (30mm thick), overlying AC14 (70mm thick)	Silty Sandy GRAVEL to 0.7m depth	Residual Silty CLAY to >1.5m depth	Not Encountered	Not Encountered
BH310	32 Kennedy St, Panania	316054	6240094	AC7 (30mm thick), overlying AC7 (50mm thick)	ASPHALT stabilised Sandy GRAVEL to 0.14m depth, overlying Silty Sandy GRAVEL to 0.4m depth	FILL, Silty CLAY to 0.8m depth, overlying Residual Silty CLAY to >1.5m depth	Not Encountered	Not Encountered
BH311	14-16 Kennedy St, Picnic Point	316078	6240251	AC7 (40mm thick), overlying AC7 (40mm thick), overlying AC20 (80mm thick)	Silty Sandy GRAVEL to 0.35m depth	FILL, Clayey Silty SAND to 0.8m depth *Hole abandoned - refusal on concrete at 0.8m	Not Encountered	Not Encountered
BH311a	14-16 Kennedy St, Picnic Point	316078	6240251	AC7 (40mm thick), overlying AC7 (40mm thick), overlying AC20 (80mm thick)	Silty Sandy GRAVEL to 0.35m depth	FILL, Clayey Silty SAND to 0.5m depth *Hole Abandoned - refusal on concrete at 0.5m	Not Encountered	Not Encountered
BH311b	14-16 Kennedy St, Picnic Point	316078	6240251	AC7 (40mm thick), overlying AC7 (40mm thick), overlying AC20 (80mm thick)	Silty Sandy GRAVEL to 0.25m depth	FILL, Silty Gravelly SAND to 0.4m depth, overlying FILL, Clayey Gravelly SAND to 0.7m depth *Hole abandoned - refusal on concrete at 0.7m	Not Encountered	Not Encountered
BH312	2C Kennedy St, Panania	316214	6240436	AC7 (35mm thick), overlying AC7 (20mm thick), overlying AC10 (35mm thick)	Silty Sandy GRAVEL to 0.35m depth	FILL, Silty Sandy GRAVEL to 0.5m depth, overlying FILL, Silty CLAY to >1.5m depth	Not Encountered	Not Encountered (Seepage at 0.4m)
BH313	46 Eastern Ave, Panania	316253	6240630	AC7 (25mm thick), overlying AC10 (55mm thick)	Bound Silty Sandy GRAVEL to 0.13m depth	SILTSTONE to to 0.85m depth, overlying Laminated SILTSTONE/SHALE to >1.5m depth	0.13	Not Encountered
BH314	25 Eastern Ave, Revesby	316306	6240818	AC7 (40mm thick), overlying AC10 (90mm thick)	Silty Sandy GRAVEL to 0.4m depth	Residual Silty CLAY to 0.9m depth, overlying Extremely weathered SILTSTONE to >1.5m depth	0.9	Not Encountered (Seepage at 0.4m)
BH315	1 Eastern Ave, Revesby	316316	6241030	AC7 (35mm thick), overlying AC14 (80mm thick)	Silty Sandy GRAVEL to 0.4m depth	Residual CLAY to 1.0m depth, overlying Extremely weathered SILTSTONE to >1.5m depth	1	Not Encountered
BH316	18 Tarro Ave, Revesby	316283	6241176	AC7 (30mm thick), overlying AC20 (70mm thick)	Stabilised Sandy GRAVEL to 0.22m depth	FILL Sandy CLAY to 0.6m depth, overlying Residual Silty Clay to >1.5m depth	Not Encountered	Not Encountered

Appendix E

Contamination Laboratory Results Indicative Waste Classification

TIER 1 - Total Concentrations WITHOUT Leaching Test

TIER 1 - Total Concen	Trations v							Samples				
Analyta	PQL	Total Cond						Samples		<u> </u>		1
Analyte	PQL	General Solid	Restricted Solid	BH301A	BH302B	BH304A	BH306A	BH308B	BH309B	BH312C	BH314B	BH316A
			ple Date	14/05/2018	14/05/2018	14/05/2018	15/05/2018	15/05/2018	15/05/2018	17/05/2018	16/05/2018	17/05/2018
		Sampl	le Depth	0	0.2	0	0.45	1.2	0.7	0.35	1.2	0.22
		Sampl	e Profile	Fill, gravelly silty sand, fine to medium grain, pale brown, gravel fine to coarse up to 40mm diameter comprising sandstone rock fragments, sub angular to angular	Fill/topsoil, silty gravelly sand, fine to medium grain, brown.	Gravelly sand, fine to medium grain, yellow-brown, gravel comprising very low strength sandstone fragments.	Sandy clay, medium plasticity, orange brown.	Siltstone, grey and brown, fine to medium grain.	Silty clay, medium to high plasticity, red and grey.	Fill, silty sandy gravel, sub angular, medium to coarse grain sand, grey, trace clay.	Extremely weathered siltstone, recovered as clayey gravelly silt. Lenses of very low strength siltstone.	Fill, sandy clay, medium t high plasticity, dark browr fine to coarse grain sand
		Sample l	Purpose	Classification	Classification	Classification	Classification	Classification	Classification	Classification	Classification	Classification
		Sample colle	ected by	RCA - TH	RCA - TH	RCA - TH	RCA - TH	RCA - TH	RCA - TH	RCA - TH	RCA - TH	RCA - TH
Benzene, Toluene, Ethylbe	nzene. Xvle	ene (BTEX)										
Benzene	0.2	10	40	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	0.5	288	1152	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5	600	2400	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene	1	1000	4000	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Recoverable Hydroc	arbons (TRI	H)										
TRH C ₆ -C ₉	10	650	2600	<10	<10	<10	<10	<10	<10	<10	<10	<10
TRH C ₁₀ -C ₃₆	250	10000	40000	125	325	125	125	125	125	125	125	125
Polycyclic Aromatic Hydro	carbons (P	AH)								I		
Benzo(a) pyrene	0.5	0.8	3.2	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sum of Reported PAH	8	200	800	4	8.4	4	4	5	4	4	4	4
Metals												
Arsenic	5	100	400	<5	<5	<5	<5	<5	6	<5	<5	8
Cadmium	1	20	80	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	2	100	400	8	17	33	46	12	45	119	6	29
Mercury	0.1	4	16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	5	100	400	10	29	14	10	11	16	5	20	27
Nickel	2	40	160	<2	16	<2	17	4	13	99	5	16
Asbestos (semple weight)	1	I		Nil (20)	Nil (30.3)	Nil (31.3)	Nil (24.4)	Nil (16.2)	Nii (4.4.4)	Nil (19.7)	Nil (15.2)	Nil (16.4)
Asbestos (sample weight) Pesticides and Polychlorin	ato hinhon	vle		INII (ZU)	INII (30.3)	INII (31.3)	INII (24.4)	INII (10.2)	Nil (14.4)		INII (13.2)	Nil (16.4)
Scheduled Chemicals	0.75	50	50	<0.75	<0.75	<0.75	<0.75	<0.75	<0.75	<0.75	<0.75	<0.75
PCB	0.73	50	50	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.13
Tier 1 Sample Classification				General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	Restricted Solid Waste	General Solid Waste	General Solid Waste

TIER 2a - Leachable Concentrations

Analyte	PQL	Leachable Concentrations B						Samples	Samples					
		General Solid	Restricted Solid	BH301A	BH302B	BH304A	BH306A	BH308B	BH309B	BH312C	BH314B	BH316A		
Metals														
Chromium	0.1	5	20			-	-	-		<0.1				
Nickel	0.1	2	8							<0.1				

TIER 2b - Total Concentrations WITH Leachable Concentrations as in Tier 2a

Analyte		Total Concentrations ^C		Samples									
	PQL	General Solid	Restricted Solid	BH301A	BH302B	BH304A	BH306A	BH308B	BH309B	BH312C	BH314B	BH316A	
Metals													
Chromium	2	1900	7600							119			
Nickel	2	1050	4200							99			
Final S	ample CI	assification		General Solid Waste									

All total results are in units of mg/kg.
All leachable results are in units of mg/L
PQL = Practical Quantitation Limit.

Blank Cell indicates no criterion available Results for TRH have been compared to TPH guidelines. Guidelines reported for Chromium are for Chromium VI Results shown in **BOLD** are in excess of the General Solid Waste criteria

Results shown in **shading** are in excess of the Restricted Solid Waste criteria

Where summation required (Xylene, TRH, PAH) calculation includes components reported as non detected as 1/2 PQL.

^A NSWEPA Waste Classification Guidelines, 2014. Table 1, CT1 & CT2

^B NSWEPA Waste Classification Guidelines, 2014. Table 2, TCLP1 & TCLP2

^C NSWEPA Waste Classification Guidelines, 2014. Table 2, SCC1 & SCC2



CERTIFICATE OF ANALYSIS

Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L

Contact : MS FIONA BROOKER

Address : P O BOX 175

CARRINGTON NSW, AUSTRALIA 2294

Telephone : +61 02 4902 9200

Project : 13529

Order number

C-O-C number : ----

Sampler : THOMAS HOSKING

Site : ---

Quote number : SYBQ/400/17

No. of samples received : 10

No. of samples analysed : 10

Page : 1 of 11

Laboratory : Environmental Division Sydney

Contact : Customer Services ES

Address : 277-289 Woodpark Road Smithfield NSW Australia 2164

Telephone : +61-2-8784 8555

Date Samples Received : 23-May-2018 14:32

Date Analysis Commenced : 24-May-2018

Issue Date : 29-May-2018 19:02



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
- Descriptive Results
- Surrogate Control Limits

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

Edwandy FadjarOrganic CoordinatorSydney Inorganics, Smithfield, NSWEdwandy FadjarOrganic CoordinatorSydney Organics, Smithfield, NSWIvan TaylorAnalystSydney Inorganics, Smithfield, NSWSanjeshni JyotiSenior Chemist VolatilesSydney Organics, Smithfield, NSW

Shaun Spooner Asbestos Identifier Newcastle - Asbestos, Mayfield West, NSW



CERTIFICATE OF ANALYSIS

Work Order : ES1815791

Client : ROBERT CARR & ASSOCIATES P/L

Contact : MS FIONA BROOKER

Address : P O BOX 175

CARRINGTON NSW, AUSTRALIA 2294

Telephone : +61 02 4902 9200

Project : 13529

Order number : ----

C-O-C number : ----

Sampler : Tom Hosking

Site : ---

Quote number : SYBQ/400/17

No. of samples received : 1

No. of samples analysed : 1

Page : 1 of 4

Laboratory : Environmental Division Sydney

Contact : Customer Services ES

Address : 277-289 Woodpark Road Smithfield NSW Australia 2164

Telephone : +61-2-8784 8555

Date Samples Received : 30-May-2018 15:45

Date Analysis Commenced : 01-Jun-2018

Issue Date : 05-Jun-2018 16:17



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

Ivan Taylor Analyst Sydney Inorganics, Smithfield, NSW

Page : 2 of 4
Work Order : ES1815791

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529

ALS

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

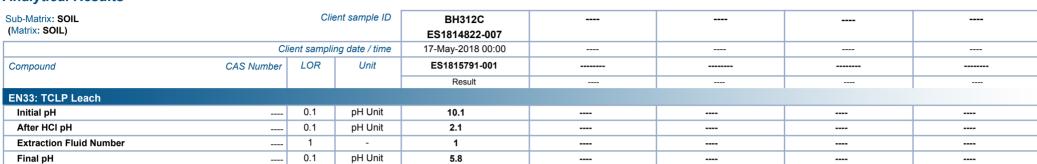
- ^ = This result is computed from individual analyte detections at or above the level of reporting
- ø = ALS is not NATA accredited for these tests.
- ~ = Indicates an estimated value.

Page : 3 of 4
Work Order : ES1815791

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529

Analytical Results



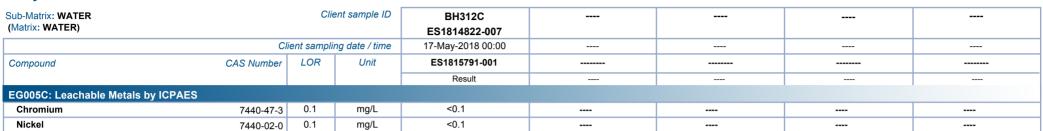


Page : 4 of 4 Work Order : ES1815791

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529

Analytical Results







QUALITY CONTROL REPORT

Work Order : ES1815791

Client : ROBERT CARR & ASSOCIATES P/L

Contact : MS FIONA BROOKER

Address : P O BOX 175

CARRINGTON NSW, AUSTRALIA 2294

Telephone : +61 02 4902 9200

 Project
 : 13529

 Order number
 : ---

 C-O-C number
 : ---

Sampler : Tom Hosking

Site · ---

Quote number : SYBQ/400/17

No. of samples received : 1
No. of samples analysed : 1

Page : 1 of 3

Laboratory : Environmental Division Sydney

Contact : Customer Services ES

Address : 277-289 Woodpark Road Smithfield NSW Australia 2164

Telephone : +61-2-8784 8555

Date Samples Received : 30-May-2018

Date Analysis Commenced : 01-Jun-2018

Issue Date : 05-Jun-2018



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 Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

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

Ivan Taylor Analyst Sydney Inorganics, Smithfield, NSW

Page : 2 of 3 Work Order : ES1815791

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529

ALS

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

Key: Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

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

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit: Result between 10 and 20 times LOR: 0% - 50%: Result > 20 times LOR: 0% - 20%.

Sub-Matrix: WATER					Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Client sample ID	sample ID Method: Compound CAS Numb		LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)			
EG005C: Leachable	EG005C: Leachable Metals by ICPAES (QC Lot: 1697200)											
ES1815791-001	BH312C ES1814822-007	EG005C: Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	0.00	No Limit			
		EG005C: Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	0.00	No Limit			
ES1815820-012	Anonymous	EG005C: Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	0.00	No Limit			
		EG005C: Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	0.00	No Limit			

Page : 3 of 3 Work Order : ES1815791

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529

Sub-Matrix: SOII



Laboratory Control Spike (LCS) Report

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Method Blank (MB)

Sub-Matrix. 301L									
				Report	Spike	Spike Recovery (%) Recover		ery Limits (%)	
Method: Compound	AS Number	LOR	Unit	Result	Concentration	LCS	Low	High	
EN33: TCLP Leach (QCLot: 1693994)									
EN33a: Initial pH		0.1	pH Unit	1.0					
EN33a: After HCl pH		0.1	pH Unit	1.0					
EN33a: Final pH		0.1	pH Unit	1.0					
Sub-Matrix: WATER				Method Blank (MB)	Laboratory Control Spike (LC	oratory Control Spike (LCS) Report			
				Report	Spike	Spike Recovery (%)	Recovery Limits (%)		
Method: Compound C	AS Number	LOR	Unit	Result	Concentration	LCS	Low	High	
EG005C: Leachable Metals by ICPAES (QCLot: 1697200)									
EG005C: Chromium	7440-47-3	0.1	mg/L	<0.1	0.1 mg/L	114	88	114	
EG005C: Nickel	7440-02-0	0.1	mg/L	<0.1	0.1 mg/L	97.0	83	115	

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: WATER		Matrix Spike (MS) Report					
				Spike	Spike SpikeRecovery(%) Recovery Limit		
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005C: Leachable	Metals by ICPAES (QCLot: 1697200)						
ES1815820-001	Anonymous	EG005C: Chromium	7440-47-3	1 mg/L	124	70	130
		EG005C: Nickel	7440-02-0	1 mg/L	106	70	130



QA/QC Compliance Assessment to assist with Quality Review

Work Order : **ES1815791** Page : 1 of 4

Client : ROBERT CARR & ASSOCIATES P/L Laboratory : Environmental Division Sydney

 Contact
 : MS FIONA BROOKER
 Telephone
 : +61-2-8784 8555

 Project
 : 13529
 Date Samples Received
 : 30-May-2018

 Site
 : --- Issue Date
 : 05-Jun-2018

Sampler : Tom Hosking No. of samples received : 1
Order number : ---- No. of samples analysed : 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers: Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- NO Method Blank value outliers occur.
- NO Duplicate outliers occur.
- NO Laboratory Control outliers occur.
- NO Matrix Spike outliers occur.
- For all regular sample matrices, NO surrogate recovery outliers occur.

Outliers: Analysis Holding Time Compliance

NO Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

• NO Quality Control Sample Frequency Outliers exist.

Page : 2 of 4 Work Order : ES1815791

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529



Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for <u>VOC in soils</u> vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive <u>or</u> Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: SOIL Evaluation: **x** = Holding time breach; ✓ = Within holding time. Method Sample Date Extraction / Preparation Analysis Container / Client Sample ID(s) Due for extraction Date extracted Evaluation Date analysed Due for analysis Evaluation EN33: TCLP Leach Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN33a) 13-Nov-2018 17-May-2018 01-Jun-2018 BH312C - ES1814822-007 Matrix: WATER Evaluation: * = Holding time breach: \checkmark = Within holding time. Method Extraction / Preparation Sample Date Analysis Container / Client Sample ID(s) Date extracted Due for extraction Evaluation Date analysed Due for analysis Evaluation EG005C: Leachable Metals by ICPAES Clear Plastic Bottle - Nitric Acid; Unfiltered (EG005C) 01-Jun-2018 04-Jun-2018 28-Nov-2018 04-Jun-2018 28-Nov-2018 BH312C - ES1814822-007

Page : 3 of 4
Work Order : ES1815791

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

o. oumoro.						
			Evaluation	n: 🗴 = Quality Co	ontrol frequency n	not within specification; ✓ = Quality Control frequency within specification.
	Co	unt		Rate (%)		Quality Control Specification
Method	OC	Regular	Actual Expected		Evaluation	
EN33a	1	11	9.09	9.09	✓	NEPM 2013 B3 & ALS QC Standard
			Evaluation	n: × = Quality Co	ontrol frequency n	not within specification ; ✓ = Quality Control frequency within specification
	Count		Rate (%)			Quality Control Specification
Method	OC	Regular	Actual	Expected	Evaluation	
EG005C	2	1	200.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
EG005C	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
EG005C	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
EG005C	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
	Method EN33a Method EG005C EG005C EG005C	EN33a 1 EN33a 1 Co Method OC EG005C 2 EG005C 1 EG005C 1	Count Method OC Reaular EN33a 1 11 Count Method OC Reaular EG005C 2 1 EG005C 1 1 EG005C 1 1	Count Method CO Regular Actual	Evaluation: x = Quality Co Rate (%)	Evaluation: x = Quality Control frequency Rate (%)

Page : 4 of 4 Work Order : ES1815791

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions					
Leachable Metals by ICPAES	aration Methods Method Matrix		In house: referenced to APHA 3120; USEPA SW 846 - 6010: The ICPAES technique ionises leachate sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (2013) Schedule B(3)					
Preparation Methods	Method	Matrix	Method Descriptions					
Digestion for Total Recoverable Metals in TCLP Leachate	EN25C	SOIL	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)					
TCLP for Non & Semivolatile Analytes	EN33a	SOIL	In house QWI-EN/33 referenced to USEPA SW846-1311: The TCLP procedure is designed to determine the mobility of both organic and inorganic analytes present in wastes. The standard TCLP leach is for non-volatile and Semivolatile test parameters.					

Fadi Soro

From:

Loren Schiavon

Sent:

Wednesday, 30 May 2018 3:13 PM

To:

Fadi Soro

Subject:

FW: Additional Testing from ES1814822

Hi Fadi.

Can you please arrange this rebatch?

Thanks.

Kind Regards

Loren Schiavon

Client Services Officer, Environmental

Environmental Division Sydney Work Order Reference ES1815791



Please note that my working hours are 1pm-6pm on Tuesday to Friday. For assistance outside of these times please contact ALSEnviro.Sydney@alsglobal.com or call (02) 8784 8555.



T +61 2 8784 8555 F+61 2 8784 8500 Loren.schiavon@alsglobal.com 277-289 Woodpark Road Smithfield NSW 2164 AUSTRALIA

We are keen for your feedback! Please click here for your 1 question survey

EnviroMail™ 115 - Rapid MALDI-TOF MS confirmation on standard and low level Legionella culture methods

EnviroMail™ 114 - Asbestos Fibre Identification by SEM/EDS

EnviroMail™ 113 - Amoeba Confirmation PCR

EnviroMail™ 112 - Algal Capabilities

EnviroMailTM 111 - Analysis of VOCs by Thermal Desorption Analysis

EnviroMailTM 110 - Identifying Hidden PFAS Chemicals in Environmental Samples and Firefighting Foams

Summary of all EnviroMails™ by Category

Subscribe to EnviroMail™ in Follow us on LinkedIn

Right Solutions · Right Partner www.alsglobal.com

From: Fiona Brooker <fionab@rca.com.au>
Sent: Wednesday, 30 May 2018 2:56 PM
To: Dyllan Bass <dyllan.bass@ALSGlobal.com>

Cc: Loren Schiavon < loren.schiavon@alsglobal.com>

Subject: Additional Testing from ES1814822

Hi Dyllan and Loren



Can you please arrange for TCLP to be undertaken on BH312C with chromium and nickel testing of the leachate. Standard turnaround will be fine.

Thanks and regards



Fiona Brooker Associate Environmental Engineer

t: 02 4902 9225 | f: 02 4902 9299 | m: 0408 687 529

e: fionab@rca.com.au | w: www.rca.com.au

a: PO Box 175 / 92 Hill Street, Carrington NSW 2294

A division of Robert Carr & Associates Pty. Ltd.

Please consider the environment prior to printing this e-mail

Any views or opinions presented in this email are solely those of the author and do not necessarily represent those of Robert Carr & Associates Pty. Ltd. If you have received this communication in error, please reply to this email to notify the sender of its incorrect delivery, and then delete both it and your reply.



SAMPLE RECEIPT NOTIFICATION (SRN)

: ES1815791 Work Order

: ROBERT CARR & ASSOCIATES P/L Client Laboratory : Environmental Division Sydney

Contact : MS FIONA BROOKER Contact : Customer Services ES

Address : P O BOX 175 Address : 277-289 Woodpark Road Smithfield CARRINGTON NSW, AUSTRALIA 2294

NSW Australia 2164

E-mail E-mail : ALSEnviro.Sydney@alsglobal.com : fionab@rca.com.au

Telephone : +61 02 4902 9200 Telephone : +61-2-8784 8555 Facsimile Facsimile : +61-2-8784 8500 : +61 02 4902 9299

Project : 13529 Page · 1 of 2

Order number Quote number : ES2017ROBCAR0004 (SYBQ/400/17) C-O-C number QC Level : NEPM 2013 B3 & ALS QC Standard

Sampler : Tom Hosking

Dates

Date Samples Received 30-May-2018 15:45 Issue Date : 31-May-2018 : 06-Jun-2018 Scheduled Reporting Date Client Requested Due : 06-Jun-2018

Date

Delivery Details

Mode of Delivery Security Seal : Samples On Hand : Not Available

No of coolers/hoxes Temperature : 4.1 Receipt Detail No. of samples received / analysed : 1/1

General Comments

This report contains the following information:

- Sample Container(s)/Preservation Non-Compliances
- Summary of Sample(s) and Requested Analysis
- Proactive Holding Time Report
- Requested Deliverables
- This is a rebatch of ES1814822.
- Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal Aqueous (3 weeks), Solid (2 months) from receipt of samples.

: 31-May-2018 Issue Date

Page

2 of 2 ES1815791 Amendment 0 Work Order

Client : ROBERT CARR & ASSOCIATES P/L



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

• No sample container / preservation non-compliance exists.

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

ES1815791-001 · [17-May-2018] · BH312C - ES1814822-007

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package. If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date eachable Metals by ICPAES is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component Matrix: SOIL SOIL - EN33a Client sample ID Laboratory sample Client sampling ID date / time ES1815791-001 17-May-2018 00:00 BH312C ES1814822-007

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ALL INVOICES

- A4 - AU Tax Invoice (INV)	Email	administrator@rca.com.au
FIONA BROOKER		
- *AU Certificate of Analysis - NATA (COA)	Email	fionab@rca.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	fionab@rca.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	fionab@rca.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	fionab@rca.com.au
- Chain of Custody (CoC) (COC)	Email	fionab@rca.com.au
- EDI Format - ENMRG (ENMRG)	Email	fionab@rca.com.au
- EDI Format - ESDAT (ESDAT)	Email	fionab@rca.com.au

Page : 2 of 11 Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529

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.
- EP071: Results of sample BH302B have been confirmed by re-extraction and re-analysis.
- EA200: As only one sample container was submitted for multiple tests, at the client's request, sub sampling was conducted prior to Asbestos analysis. As this has the potential to understate detection, results should be scrutinised accordingly.
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: Negative results for vinyl tiles should be confirmed by an independent analytical technique.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.



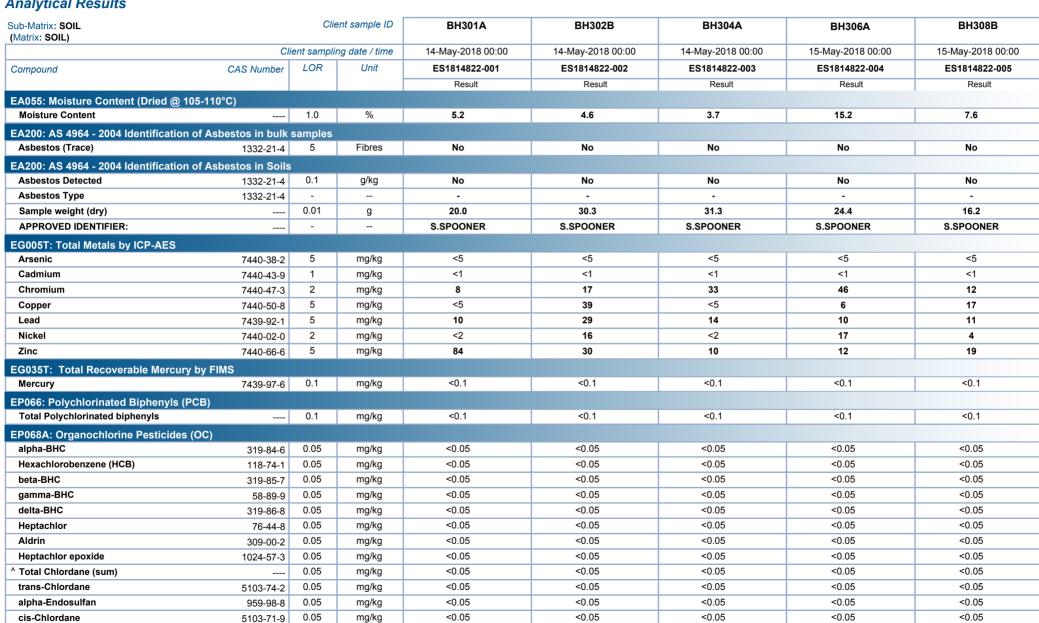
Page : 3 of 11 Work Order ES1814822

Client : ROBERT CARR & ASSOCIATES P/L

13529 **Project**

Analytical Results

Dieldrin



< 0.05

60-57-1

0.05

mg/kg

< 0.05

< 0.05

<0.05

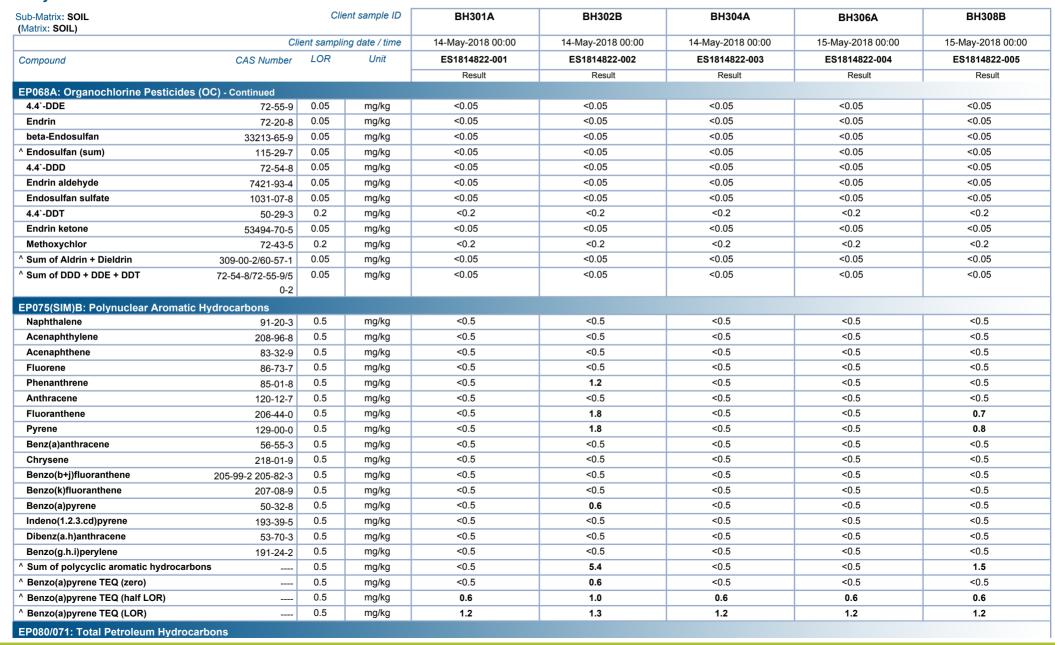
< 0.05



Page : 4 of 11 Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L

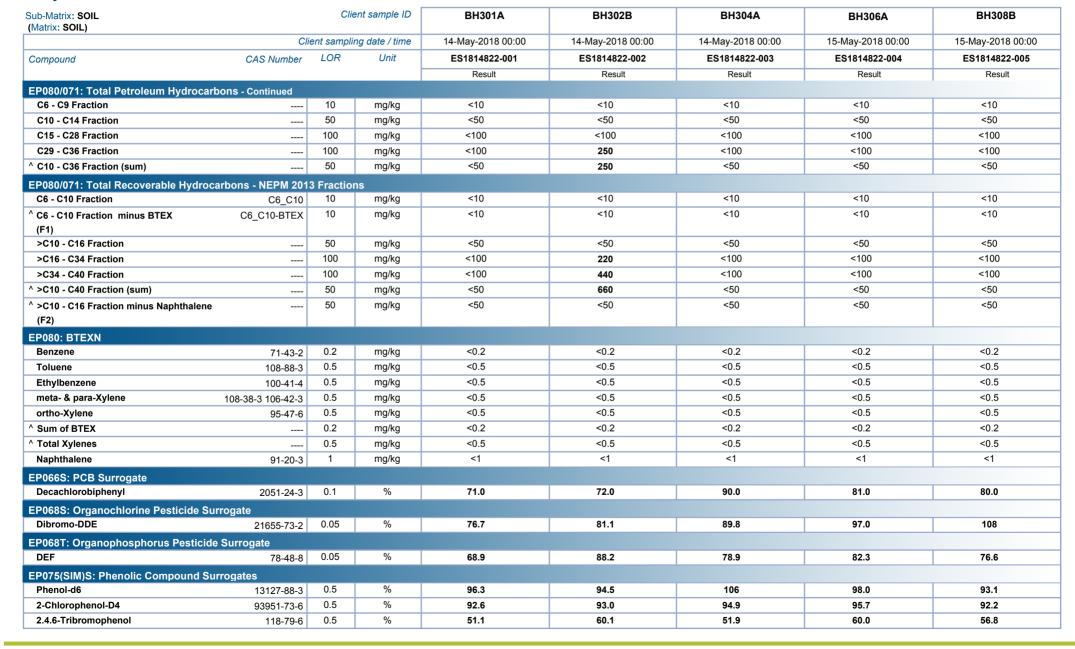
Project : 13529



Page : 5 of 11 Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529

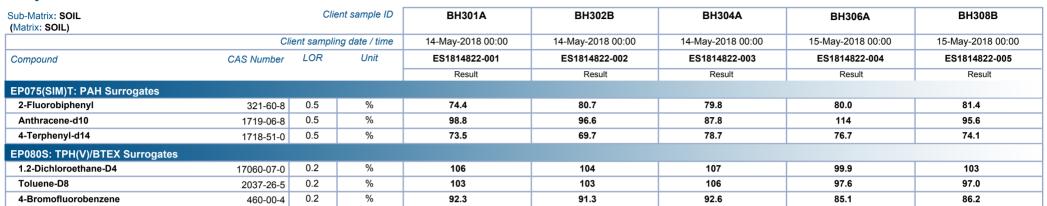




Page : 6 of 11 Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529





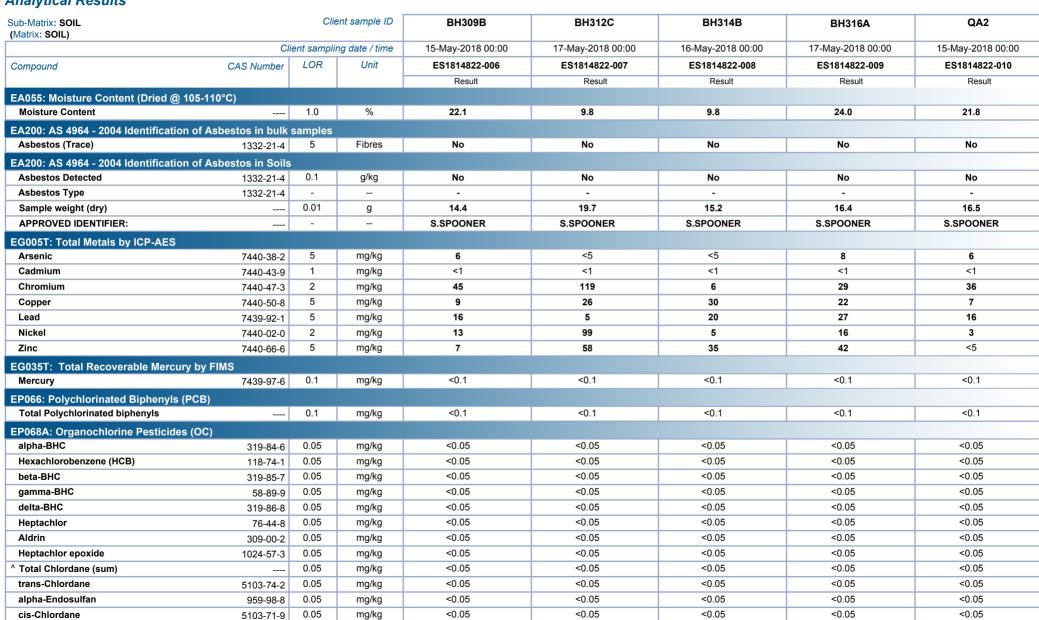
Page : 7 of 11 Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529

Analytical Results

Dieldrin



< 0.05

60-57-1

0.05

mg/kg

< 0.05

< 0.05

<0.05

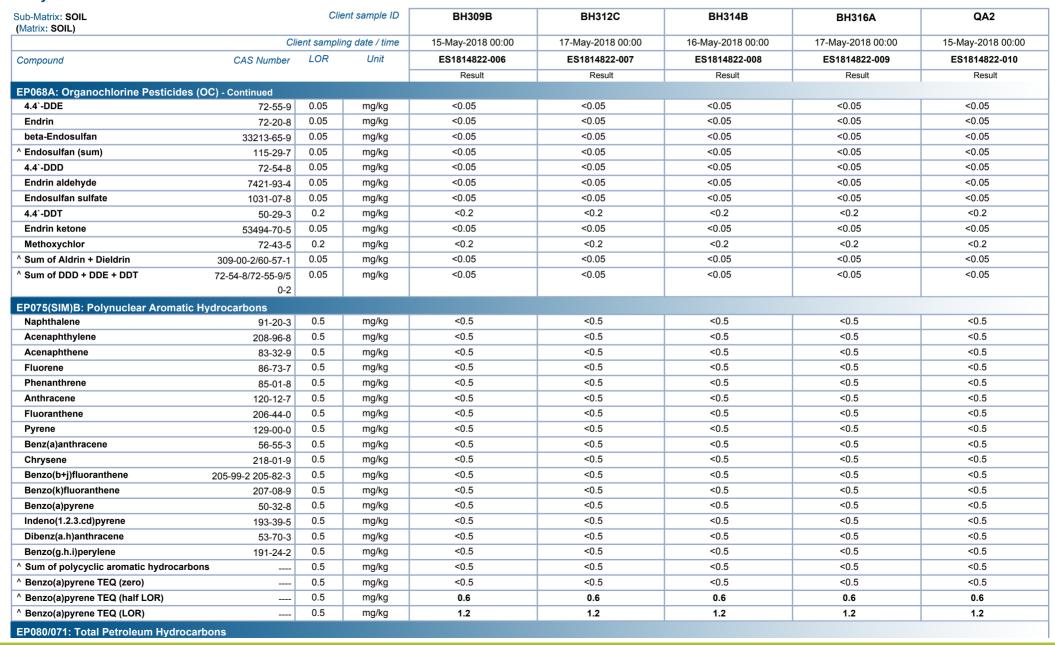
< 0.05



Page : 8 of 11 Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L

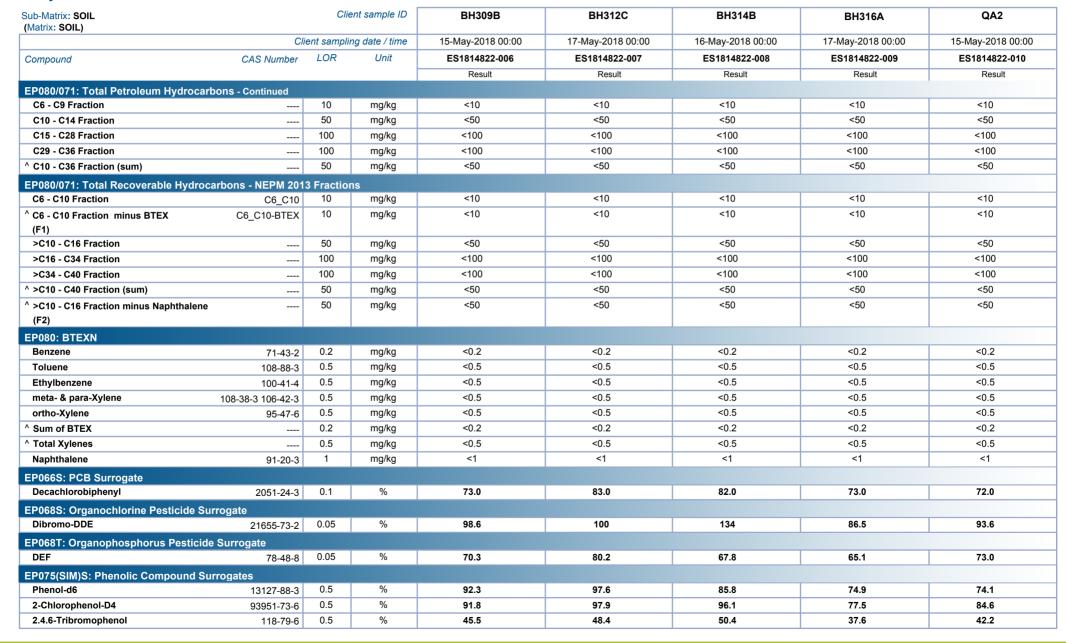
Project : 13529



Page : 9 of 11 Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529





Page : 10 of 11 Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529

Analytical Results



Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	вн309В	BH312C	BH314B	BH316A	QA2
	Cli	ent sampli	ing date / time	15-May-2018 00:00	17-May-2018 00:00	16-May-2018 00:00	17-May-2018 00:00	15-May-2018 00:00
Compound	CAS Number	LOR	Unit	ES1814822-006	ES1814822-007	ES1814822-008	ES1814822-009	ES1814822-010
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	83.0	91.6	89.7	73.0	72.7
Anthracene-d10	1719-06-8	0.5	%	98.8	112	93.2	89.6	96.7
4-Terphenyl-d14	1718-51-0	0.5	%	80.4	79.4	66.5	67.3	77.3
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	97.7	101	104	99.9	98.2
Toluene-D8	2037-26-5	0.2	%	98.9	105	113	101	105
4-Bromofluorobenzene	460-00-4	0.2	%	87.3	106	107	96.6	103

Analytical Results Descriptive Results

Sub-Matrix: SOIL

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos	s in Soils	
EA200: Description	BH301A - 14-May-2018 00:00	Mid brown sandy soil.
EA200: Description	BH302B - 14-May-2018 00:00	Mid brown sandy soil.
EA200: Description	BH304A - 14-May-2018 00:00	Mid brown sandy soil.
EA200: Description	BH306A - 15-May-2018 00:00	Mid brown clay soil.
EA200: Description	BH308B - 15-May-2018 00:00	Mid brown clay soil.
EA200: Description	BH309B - 15-May-2018 00:00	Mid brown clay soil.
EA200: Description	BH312C - 17-May-2018 00:00	Mid grey sandy soil.
EA200: Description	BH314B - 16-May-2018 00:00	Mid brown clay soil.
EA200: Description	BH316A - 17-May-2018 00:00	Mid brown clay soil.
EA200: Description	QA2 - 15-May-2018 00:00	Mid brown clay soil.

Page : 11 of 11 Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery	Limits (%)	
Compound	CAS Number	Low	High	
EP066S: PCB Surrogate				
Decachlorobiphenyl	2051-24-3	39	149	
EP068S: Organochlorine Pesticide Surre	ogate			
Dibromo-DDE	21655-73-2	49	147	
EP068T: Organophosphorus Pesticide S	Surrogate			
DEF	78-48-8	35	143	
EP075(SIM)S: Phenolic Compound Surre	ogates			
Phenol-d6	13127-88-3	63	123	
2-Chlorophenol-D4	93951-73-6	66	122	
2.4.6-Tribromophenol	118-79-6	40	138	
EP075(SIM)T: PAH Surrogates				
2-Fluorobiphenyl	321-60-8	70	122	
Anthracene-d10	1719-06-8	66	128	
4-Terphenyl-d14	1718-51-0	65	129	
EP080S: TPH(V)/BTEX Surrogates				
1.2-Dichloroethane-D4	17060-07-0	73	133	
Toluene-D8	2037-26-5	74	132	
4-Bromofluorobenzene	460-00-4	72	130	





QUALITY CONTROL REPORT

· ES1814822 Work Order

Client : ROBERT CARR & ASSOCIATES P/L

Contact : MS FIONA BROOKER Contact

Address Address : P O BOX 175

CARRINGTON NSW. AUSTRALIA 2294

Telephone : +61 02 4902 9200

: 13529 Project

Order number

C-O-C number

Sampler : THOMAS HOSKING

Site

Quote number : SYBQ/400/17

No. of samples received : 10 No. of samples analysed : 10 Page : 1 of 9

Laboratory : Environmental Division Sydney

: Customer Services ES

: 277-289 Woodpark Road Smithfield NSW Australia 2164

Telephone : +61-2-8784 8555 Date Samples Received : 23-May-2018 **Date Analysis Commenced** : 24-May-2018

Issue Date : 29-May-2018



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 Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

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
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW
Shaun Spooner	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW

Page : 2 of 9 Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529



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

Key: Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

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

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit: Result between 10 and 20 times LOR: 0% - 50%: Result > 20 times LOR: 0% - 20%.

Sub-Matrix: SOIL						Laboratory I	Duplicate (DUP) Report		
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Co	ntent (Dried @ 105-110°C)	(QC Lot: 1675944)							
ES1814822-003	BH304A	EA055: Moisture Content		0.1	%	3.7	3.9	6.42	No Limit
ES1814829-004	Anonymous	EA055: Moisture Content		0.1	%	8.6	10.0	15.1	0% - 50%
EG005T: Total Meta	s by ICP-AES (QC Lot: 16	80604)							
ES1814845-001	Anonymous	EG005T: Lead	7439-92-1	5	mg/kg	53100	44900	16.7	0% - 20%
ES1814822-001	BH301A	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	8	14	53.8	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	9	55.3	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	10	11	10.9	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	84	86	1.69	0% - 50%
ES1814845-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	1	2	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	9	11	14.7	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	10	12	19.1	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	37	42	12.2	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	2820	2990	5.74	0% - 20%
EG035T: Total Reco	overable Mercury by FIMS	(QC Lot: 1680603)							
ES1814822-001	BH301A	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1814845-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.1	0.2	0.00	No Limit
EP066: Polychlorina	ted Biphenyls (PCB) (QC	Lot: 1672777)							
ES1814822-001	BH301A	EP066: Total Polychlorinated biphenyls		0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1814897-001	Anonymous	EP066: Total Polychlorinated biphenyls		0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP068A: Organochl	orine Pesticides (OC) (QC	Lot: 1672774)							

Page : 3 of 9
Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L



Sub-Matrix: SOIL						Laboratory Duplicate (DUP) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP068A: Organochlo	orine Pesticides (OC) (QC	Lot: 1672774) - continued							
ES1814822-001	BH301A	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
ES1814897-001	Anonymous	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit

Page : 4 of 9
Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L



Sub-Matrix: SOIL					Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)	
EP068A: Organochl	orine Pesticides (OC) (0	QC Lot: 1672774) - continued								
ES1814897-001	Anonymous	EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit	
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.00	No Limit	
EP075(SIM)B: Polyr	uclear Aromatic Hydroc	carbons (QC Lot: 1672776)								
ES1814822-001	BH301A	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
	EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
	EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
	EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
	EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
			205-82-3							
	EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Sum of polycyclic aromatic		0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		hydrocarbons								
		EP075(SIM): Benzo(a)pyrene TEQ (zero)		0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
ES1814897-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
			205-82-3							
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	

Page : 5 of 9
Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L



Sub-Matrix: SOIL						Laboratory I	Duplicate (DUP) Report		
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075(SIM)B: Polyn	uclear Aromatic Hydr	ocarbons (QC Lot: 1672776) - continued							
ES1814897-001	Anonymous	EP075(SIM): Sum of polycyclic aromatic		0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		hydrocarbons							
		EP075(SIM): Benzo(a)pyrene TEQ (zero)		0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Pe	troleum Hydrocarbon	s (QC Lot: 1671448)							
ES1814822-001	BH301A	EP080: C6 - C9 Fraction		10	mg/kg	<10	<10	0.00	No Limit
ES1814869-001	Anonymous	EP080: C6 - C9 Fraction		10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Pe	troleum Hydrocarbon	s (QC Lot: 1672775)							
ES1814822-001	BH301A	EP071: C15 - C28 Fraction		100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction		100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction		50	mg/kg	<50	<50	0.00	No Limit
ES1814897-001	Anonymous	EP071: C15 - C28 Fraction		100	mg/kg	<100	<100	0.00	No Limit
	-	EP071: C29 - C36 Fraction		100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction		50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Re	coverable Hydrocarbo	ons - NEPM 2013 Fractions (QC Lot: 1671448)							
ES1814822-001	BH301A	EP080: C6 - C10 Fraction	C6 C10	10	mg/kg	<10	<10	0.00	No Limit
ES1814869-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
	,	ons - NEPM 2013 Fractions (QC Lot: 1672775)			3 3				
ES1814822-001	BH301A	EP071: >C16 - C34 Fraction		100	mg/kg	<100	<100	0.00	No Limit
L01014022-001	BIISOIA	EP071: >C34 - C40 Fraction		100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction		50	mg/kg	<50	<50	0.00	No Limit
ES1814897-001	Anonymous	EP071: >C16 - C34 Fraction		100	mg/kg	<100	<100	0.00	No Limit
20.01.001.001	, anonymous	EP071: >C34 - C40 Fraction		100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction		50	mg/kg	<50	<50	0.00	No Limit
EP080: BTEXN (QC	Lot: 1671449)	El 071. 2010 - 0101 faction			99			0.00	110 2
ES1814822-001	BH301A	EDOGG D	71-43-2	0.2	ma/lea	<0.2	<0.2	0.00	No Limit
ES1014022-001	БПЗИТА	EP080: Benzene	108-88-3	0.2	mg/kg	<0.5	<0.2	0.00	No Limit
		EP080: Toluene	100-66-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene		0.5	mg/kg	<0.5	<0.5		No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.00	NO LITTIL
		ED090: ortho Vulono	106-42-3 95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1814869-001	Anonymous	EP080: Napritrialerie EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
201014000 001	, and injunious	EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Tolderie EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		LF 000. Hieta- & para-Aylette	106-36-3	0.0	9/119	-0.0	-5.0	0.00	140 Ellilli
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Page : 6 of 9
Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: SOIL				Method Blank (MB)	Laboratory Control Spike (LCS) Report				
				Report	Spike	Spike Recovery (%)	Recovery	Limits (%)	
Method: Compound	CAS Number	LOR Unit		Result	Concentration	LCS	Low	High	
EG005T: Total Metals by ICP-AES (QCLot: 168	0604)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	88.3	86	126	
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	96.5	83	113	
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	95.6	76	128	
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	94.6	86	120	
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	92.6	80	114	
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	102	87	123	
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	102	80	122	
EG035T: Total Recoverable Mercury by FIMS	(QCLot: 1680603)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	74.8	70	105	
P066: Polychlorinated Biphenyls (PCB) (QCL	.ot: 1672777)								
EP066: Total Polychlorinated biphenyls		0.1	mg/kg	<0.1	1 mg/kg	90.0	62	126	
EP068A: Organochlorine Pesticides (OC) (QCI	Lot: 1672774)								
P068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	87.2	69	113	
P068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	80.6	65	117	
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	88.9	67	119	
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	106	68	116	
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	89.9	65	117	
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	89.5	67	115	
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	104	69	115	
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	82.9	62	118	
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	75.9	63	117	
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	78.7	66	116	
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	76.8	64	116	
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	77.6	66	116	
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	98.9	67	115	
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	77.5	67	123	
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	79.9	69	115	
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	77.4	69	121	
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	86.0	56	120	
P068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	83.1	62	124	
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	84.1	66	120	
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	84.3	64	122	
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	81.4	54	130	

Page : 7 of 9
Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L



Sub-Matrix: SOIL	ix: SOIL			Method Blank (MB)		Laboratory Control Spike (LCS	S) Report		
				Report	Spike	Spike Recovery (%)	Recovery	Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC	Lot: 1672776) - co	ntinued							
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	94.8	77	125	
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	100	72	124	
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	97.4	73	127	
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	97.9	72	126	
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	98.1	75	127	
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	99.5	77	127	
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	101	73	127	
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	93.9	74	128	
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	89.9	69	123	
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	95.8	75	127	
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	91.0	68	116	
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	99.9	74	126	
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	99.5	70	126	
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	103	61	121	
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	102	62	118	
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	99.4	63	121	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 167	1448)								
EP080: C6 - C9 Fraction		10	mg/kg	<10	26 mg/kg	82.0	68	128	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 167	2775)								
EP071: C10 - C14 Fraction		50	mg/kg	<50	200 mg/kg	106	75	129	
EP071: C15 - C28 Fraction		100	mg/kg	<100	300 mg/kg	109	77	131	
EP071: C29 - C36 Fraction		100	mg/kg	<100	200 mg/kg	105	71	129	
EP080/071: Total Recoverable Hydrocarbons - NEPM 20	13 Fractions (QCL	ot: 1671448)							
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	87.5	68	128	
EP080/071: Total Recoverable Hydrocarbons - NEPM 20	13 Fractions (QCL	ot: 1672775)							
EP071: >C10 - C16 Fraction		50	mg/kg	<50	250 mg/kg	103	77	125	
EP071: >C16 - C34 Fraction		100	mg/kg	<100	350 mg/kg	106	74	138	
EP071: >C34 - C40 Fraction		100	mg/kg	<100	150 mg/kg	97.5	63	131	
EP080: BTEXN (QCLot: 1671448)									
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	100	62	116	
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	99.2	67	121	
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	94.3	65	117	
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	2 mg/kg	93.0	66	118	
	106-42-3								
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	94.1	68	120	
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	90.4	63	119	

Page : 8 of 9
Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529



Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: SOIL				Ma	atrix Spike (MS) Report		
				Spike	SpikeRecovery(%)	Recovery L	imits (%)
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005T: Total Met	als by ICP-AES (QCLot: 1680604)						
ES1814822-001	BH301A	EG005T: Arsenic	7440-38-2	50 mg/kg	108	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	115	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	118	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	114	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	114	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	116	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	122	70	130
EG035T: Total Red	coverable Mercury by FIMS (QCLot: 16806	603)					
ES1814822-001	BH301A	EG035T: Mercury	7439-97-6	5 mg/kg	75.2	70	130
EP066: Polychlorir	nated Biphenyls (PCB) (QCLot: 1672777)						
ES1814822-001	BH301A	EP066: Total Polychlorinated biphenyls		1 mg/kg	88.0	70	130
EP068A: Organoch	nlorine Pesticides (OC) (QCLot: 1672774)						
ES1814822-001	BH301A	EP068: gamma-BHC	58-89-9	0.5 mg/kg	93.9	70	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	106	70	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	95.1	70	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	86.2	70	130
		EP068: Endrin	72-20-8	2 mg/kg	86.0	70	130
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	99.9	70	130
EP075(SIM)B: Poly	nuclear Aromatic Hydrocarbons (QCLot:	1672776)					
ES1814822-001	BH301A	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	125	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	120	70	130
EP080/071: Total P	etroleum Hydrocarbons (QCLot: 1671448						
ES1814822-001	BH301A	EP080: C6 - C9 Fraction		32.5 mg/kg	79.3	70	130
EP080/071: Total P	etroleum Hydrocarbons (QCLot: 1672775						
ES1814822-001	BH301A	EP071: C10 - C14 Fraction		523 mg/kg	105	73	137
		EP071: C15 - C28 Fraction		2319 mg/kg	114	53	131
		EP071: C29 - C36 Fraction		1714 mg/kg	122	52	132
EP080/071: To <u>tal</u> R	Recoverable Hydrocarbons - NEPM 2013 Fr	ractions (QCLot: 1671448)					
ES1814822-001	BH301A	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	81.6	70	130
EP080/071: To <u>tal</u> R	Recoverable Hydrocarbons - NEPM 2013 Fr		_				1
ES1814822-001	BH301A	EP071: >C10 - C16 Fraction		860 mg/kg	103	73	137
		EP071: >C16 - C34 Fraction		3223 mg/kg	121	53	131

Page : 9 of 9 Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L



Sub-Matrix: SOIL				Ma	trix Spike (MS) Report	•	
				Spike	SpikeRecovery(%)	Recovery Li	mits (%)
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total F	Recoverable Hydrocarbons - NEPM 2013 Fractions (QCL	ot: 1672775) - continued					
ES1814822-001	BH301A	EP071: >C34 - C40 Fraction		1058 mg/kg	111	52	132
EP080: BTEXN (Q	CLot: 1671448)						
ES1814822-001	BH301A	EP080: Benzene	71-43-2	2.5 mg/kg	88.1	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	86.8	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	88.1	70	130
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	84.8	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	88.4	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	85.9	70	130



QA/QC Compliance Assessment to assist with Quality Review

Work Order : **ES1814822** Page : 1 of 8

Client : ROBERT CARR & ASSOCIATES P/L Laboratory : Environmental Division Sydney

 Contact
 : MS FIONA BROOKER
 Telephone
 : +61-2-8784 8555

 Project
 : 13529
 Date Samples Received
 : 23-May-2018

 Site
 : --- Issue Date
 : 29-May-2018

Sampler : THOMAS HOSKING No. of samples received : 10
Order number : No. of samples analysed : 10

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers: Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- NO Method Blank value outliers occur.
- NO Duplicate outliers occur.
- NO Laboratory Control outliers occur.
- NO Matrix Spike outliers occur.
- Surrogate recovery outliers exist for all regular sample matrices please see following pages for full details.

Outliers: Analysis Holding Time Compliance

NO Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

• NO Quality Control Sample Frequency Outliers exist.

Page : 2 of 8 ES1814822 Work Order

ROBERT CARR & ASSOCIATES P/L Client

Project



Regular Sample Surrogates

Sub-Matrix: SOIL

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted							
EP075(SIM)S: Phenolic Compound Surrogates	ES1814822-009	BH316A	2.4.6-Tribromophenol	118-79-6	37.6 %	40-138 %	Recovery less than lower data quality
			·				objective

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: SOIL

Evaluation: * = Holding time breach: \checkmark = Within holding time. Method Sample Date Extraction / Preparation Analysis Container / Client Sample ID(s) Date extracted Due for extraction Evaluation Date analysed Due for analysis Evaluation EA055: Moisture Content (Dried @ 105-110°C) Soil Glass Jar - Unpreserved (EA055) 14-May-2018 25-May-2018 28-May-2018 BH301A, BH302B, BH304A Soil Glass Jar - Unpreserved (EA055) 15-May-2018 25-May-2018 29-May-2018 BH306A, BH308B, BH309B. QA2 Soil Glass Jar - Unpreserved (EA055) 16-May-2018 25-May-2018 30-May-2018 BH314B Soil Glass Jar - Unpreserved (EA055) 17-May-2018 25-May-2018 31-May-2018 BH312C. BH316A EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples Snap Lock Bag - Subsampled by ALS (EA200) 14-May-2018 28-May-2018 10-Nov-2018 BH301A, BH302B, BH304A Snap Lock Bag - Subsampled by ALS (EA200) 11-Nov-2018 BH306A, BH308B, 15-May-2018 28-May-2018 BH309B. QA2 Snap Lock Bag - Subsampled by ALS (EA200) 16-May-2018 28-May-2018 12-Nov-2018 BH314B Snap Lock Bag - Subsampled by ALS (EA200) 13-Nov-2018 BH312C, BH316A 17-May-2018 28-May-2018

Page : 3 of 8 Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L



Matrix: SOIL					Evaluation	: × = Holding time	breach ; ✓ = Withi	n holding time.
Method		Sample Date	Ext	traction / Preparation			Analysis	_
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Snap Lock Bag - Subsampled by ALS (EA200) BH301A, BH304A	BH302B,	14-May-2018				28-May-2018	10-Nov-2018	✓
Snap Lock Bag - Subsampled by ALS (EA200) BH306A, B	3H308B, QA2	15-May-2018				28-May-2018	11-Nov-2018	✓
Snap Lock Bag - Subsampled by ALS (EA200) BH314B	une.	16-May-2018				28-May-2018	12-Nov-2018	√
Snap Lock Bag - Subsampled by ALS (EA200) BH312C, B	BH316A	17-May-2018				28-May-2018	13-Nov-2018	√
EG005T: Total Metals by ICP-AES Soil Glass Jar - Unpreserved (EG005T) BH301A, BH304A	BH302B,	14-May-2018	28-May-2018	10-Nov-2018	✓	28-May-2018	10-Nov-2018	✓
ВН309В,	BH308B, QA2	15-May-2018	28-May-2018	11-Nov-2018	✓	28-May-2018	11-Nov-2018	✓
Soil Glass Jar - Unpreserved (EG005T) BH314B		16-May-2018	28-May-2018	12-Nov-2018	✓	28-May-2018	12-Nov-2018	✓
Soil Glass Jar - Unpreserved (EG005T) BH312C, B	BH316A	17-May-2018	28-May-2018	13-Nov-2018	✓	28-May-2018	13-Nov-2018	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T) BH301A, BH304A	BH302B,	14-May-2018	28-May-2018	11-Jun-2018	✓	28-May-2018	11-Jun-2018	✓
	BH308B, DA2	15-May-2018	28-May-2018	12-Jun-2018	✓	28-May-2018	12-Jun-2018	✓
Soil Glass Jar - Unpreserved (EG035T) BH314B		16-May-2018	28-May-2018	13-Jun-2018	✓	28-May-2018	13-Jun-2018	✓
Soil Glass Jar - Unpreserved (EG035T) BH312C, B	BH316A	17-May-2018	28-May-2018	14-Jun-2018	1	28-May-2018	14-Jun-2018	✓
EP066: Polychlorinated Biphenyls (PCB)								
Soil Glass Jar - Unpreserved (EP066) BH301A, BH304A	BH302B,	14-May-2018	25-May-2018	28-May-2018	✓	26-May-2018	04-Jul-2018	✓
· ·	BH308B, QA2	15-May-2018	25-May-2018	29-May-2018	1	26-May-2018	04-Jul-2018	√
Soil Glass Jar - Unpreserved (EP066) BH314B		16-May-2018	25-May-2018	30-May-2018	1	26-May-2018	04-Jul-2018	✓
Soil Glass Jar - Unpreserved (EP066) BH312C, B	3H316A	17-May-2018	25-May-2018	31-May-2018	✓	26-May-2018	04-Jul-2018	✓

Page : 4 of 8 Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L



Matrix: SOIL					Evaluation	: × = Holding time	breach ; ✓ = Withi	n holding time
Method		Sample Date	Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068)								
BH301A,	BH302B,	14-May-2018	25-May-2018	28-May-2018	✓	26-May-2018	04-Jul-2018	✓
BH304A								
Soil Glass Jar - Unpreserved (EP068)				00.14			04 1 1 0040	
BH306A,	BH308B,	15-May-2018	25-May-2018	29-May-2018	✓	26-May-2018	04-Jul-2018	✓
BH309B,	QA2							
Soil Glass Jar - Unpreserved (EP068)		46 May 2049	25 May 2049	20 May 2010		20 May 2049	04 1 2019	
BH314B		16-May-2018	25-May-2018	30-May-2018	✓	26-May-2018	04-Jul-2018	✓
Soil Glass Jar - Unpreserved (EP068) BH312C,	BH316A	17-May-2018	25-May-2018	31-May-2018	1	26-May-2018	04-Jul-2018	1
,		17-may-2010	25-Way-2010	31-Way-2010	•	20-Way-2010	0 4 -3ul-2010	V
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))		44.84 0040	05.84	20 May 2040			04 11 0040	
BH301A,	BH302B,	14-May-2018	25-May-2018	28-May-2018	✓	26-May-2018	04-Jul-2018	✓
BH304A								
Soil Glass Jar - Unpreserved (EP075(SIM))	BURGER	45 May 2040	05 Mar. 0040	20 May 2010		00 May 0040	04-Jul-2018	
BH306A,	BH308B,	15-May-2018	25-May-2018	29-May-2018	✓	26-May-2018	04-Jui-2016	✓
BH309B,	QA2							
Soil Glass Jar - Unpreserved (EP075(SIM))		16-May-2018	25-May-2018	30-May-2018		26-May-2018	04-Jul-2018	
BH314B		10-IVIAY-2018	25-iviay-2016	30-Way-2016	√	20-iviay-2010	04-301-2010	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) BH312C,	BH316A	17-May-2018	25-May-2018	31-May-2018	1	26-May-2018	04-Jul-2018	1
,	BIISTOA	17-may-2010	20-May-2010	01 May 2010		20-May-2010	01 001 2010	
EP080/071: Total Petroleum Hydrocarbons							ı	
Soil Glass Jar - Unpreserved (EP080)	DUOGOD	44 May 2049	24 May 2049	28-May-2018		27-May-2018	28-May-2018	
BH301A,	BH302B,	14-May-2018	24-May-2018	20-Way-2010	✓	27-IVIAY-2016	20-iviay-2010	✓
BH304A								
Soil Glass Jar - Unpreserved (EP071) BH301A,	DLISOSD	14-May-2018	25-May-2018	28-May-2018	1	26-May-2018	04-Jul-2018	
	BH302B,	14-Way-2010	25-IVIAY-2010	20-Way-2010	•	20-iviay-2010	04-301-2010	✓
BH304A								
Soil Glass Jar - Unpreserved (EP080) BH306A,	BH308B,	15-May-2018	24-May-2018	29-May-2018	1	27-May-2018	29-May-2018	✓
BH309B,	QA2	10 may 2010	24 1110, 2010	20	•	27 11147 2010	20	,
Soil Glass Jar - Unpreserved (EP071)	QAZ							
BH306A,	BH308B,	15-May-2018	25-May-2018	29-May-2018	1	26-May-2018	04-Jul-2018	✓
BH309B.	QA2	10, 2010			•			Y
Soil Glass Jar - Unpreserved (EP080)	SU VE							
BH314B		16-May-2018	24-May-2018	30-May-2018	1	27-May-2018	30-May-2018	✓
Soil Glass Jar - Unpreserved (EP071)		,	,				,	*
BH314B		16-May-2018	25-May-2018	30-May-2018	1	26-May-2018	04-Jul-2018	✓
Soil Glass Jar - Unpreserved (EP080)								-
BH312C,	BH316A	17-May-2018	24-May-2018	31-May-2018	1	27-May-2018	31-May-2018	✓
Soil Glass Jar - Unpreserved (EP071)								
BH312C,	BH316A	17-May-2018	25-May-2018	31-May-2018	✓	26-May-2018	04-Jul-2018	✓

Page : 5 of 8
Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L



Matrix: SOIL					Evaluation	n: × = Holding time	breach ; ✓ = Withi	n holding time
Method		Sample Date	E	ktraction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons -	NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) BH301A, BH304A	BH302B,	14-May-2018	24-May-2018	28-May-2018	✓	27-May-2018	28-May-2018	✓
Soil Glass Jar - Unpreserved (EP071) BH301A, BH304A	внзо2в,	14-May-2018	25-May-2018	28-May-2018	✓	26-May-2018	04-Jul-2018	✓
Soil Glass Jar - Unpreserved (EP080) BH306A, BH309B.	BH308B, QA2	15-May-2018	24-May-2018	29-May-2018	1	27-May-2018	29-May-2018	✓
Soil Glass Jar - Unpreserved (EP071) BH306A, BH309B,	BH308B, QA2	15-May-2018	25-May-2018	29-May-2018	1	26-May-2018	04-Jul-2018	✓
Soil Glass Jar - Unpreserved (EP080) BH314B	W.L	16-May-2018	24-May-2018	30-May-2018	✓	27-May-2018	30-May-2018	√
Soil Glass Jar - Unpreserved (EP071) BH314B		16-May-2018	25-May-2018	30-May-2018	✓	26-May-2018	04-Jul-2018	✓
Soil Glass Jar - Unpreserved (EP080) BH312C,	BH316A	17-May-2018	24-May-2018	31-May-2018	✓	27-May-2018	31-May-2018	✓
Soil Glass Jar - Unpreserved (EP071) BH312C,	BH316A	17-May-2018	25-May-2018	31-May-2018	✓	26-May-2018	04-Jul-2018	✓
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080) BH301A, BH304A	BH302B,	14-May-2018	24-May-2018	28-May-2018	✓	27-May-2018	28-May-2018	✓
Soil Glass Jar - Unpreserved (EP080) BH306A, BH309B.	BH308B, QA2	15-May-2018	24-May-2018	29-May-2018	✓	27-May-2018	29-May-2018	✓
Soil Glass Jar - Unpreserved (EP080) BH314B	Qn2	16-May-2018	24-May-2018	30-May-2018	✓	27-May-2018	30-May-2018	√
Soil Glass Jar - Unpreserved (EP080) BH312C,	BH316A	17-May-2018	24-May-2018	31-May-2018	✓	27-May-2018	31-May-2018	√

Page : 6 of 8 Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529

TRH Volatiles/BTEX



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

1

EP080

19

5.26

5.00

NEPM 2013 B3 & ALS QC Standard

Quality Control Sample Type					D-4- (0/)		not within specification; = Quality Control frequency within specification
	Method		ount	4.4.4	Rate (%)	Evaluation	Quality Control Specification
Analytical Methods	Method	OC	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	10.00	10.00	√	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	3	20	15.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	√	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	16	6.25	5.00		NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	16	6.25	5.00	√	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00		NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00		NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	11	9.09	5.00	√	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00		NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	11	9.09	5.00	√	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	16	6.25	5.00		NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	<u>·</u> 1	16	6.25	5.00		NEPM 2013 B3 & ALS QC Standard
Fotal Mercury by FIMS	EG035T	1	20	5.00	5.00		NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	<u>√</u>	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	11	9.09	5.00		NEPM 2013 B3 & ALS QC Standard

Page : 7 of 8
Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L

Project : 13529



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C.
			This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 - 2004 Method for the qualitative identification of asbestos in bulk samples
			Analysis by Polarised Light Microscopy including dispersion staining
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate
			acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic
			spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix
			matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS)
			FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an
			appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then
			purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This
D. I. I. I. I. I. (DOD)		0011	method is compliant with NEPM (2013) Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is
			by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013)
Destinidas by COMC	FDOOD	COII	Schedule B(3) (Method 504)
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is
			by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013)
TRH - Semivolatile Fraction	EP071	SOIL	Schedule B(3) (Method 504,505)
TRH - Semivolatile Flaction	EPU/ I	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion
FAIT/FITETIOIS (STIVI)	EPU/3(SIIVI)	SOIL	Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is
			compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS.
, , , , , , , , , , , , , , , , , , , 			Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM
			amended 2013.
Preparation Methods	Method	Matrix	Method Descriptions
	EN69	SOIL	
Hot Block Digest for metals in soils	EINOA	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered
sediments and sludges			and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge,
			sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior
and Trap	ONGTO	JOIL	to analysis by Purge and Trap - GC/MS.
and map			to analysis by Funge and Trap - Gorivio.

Page : 8 of 8 Work Order : ES1814822

Client : ROBERT CARR & ASSOCIATES P/L



Preparation Methods	Method	Matrix	Method Descriptions
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.



CLIENT:

CHAIN OF CUSTODY

ALS Laboratory: please tick >

RCA Australia

□ Sydney: 277 Woodpark Rd, Smithfield NSW 2176
□ Brisbane: 32 Shand St, Stafford QLD 4053
Ph; 02 8784 8555 E:samples.sydney@alicentrino.com
Ph; 02 8784 8555 E:samples.sydney@alicentrino.com

Ph:02 4968 9433 E:samples.newcastle@alsenviro.com Ph:07 4796 0600 E: townsville.environmental@alsenviro.com

TURNAROUND REQUIREMENTS:

□ Newcastle: 5 Rosegum Rd. Warabrook NSW 2304 □ Townsville: 14-15 Desma Ct, Bohle QLD 4818

☐ Standard TAT (List due date): 31/5/18

☐ Metbourne: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.metbourne@alsenviro.com

☐ Adelaide: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com

☐ Perth: 10 Hod Way, Malaga WA 6090 Pir: 08 9209 7655 E; samples.perth@alsenviro.com

☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

FOR LABORATORY USE ONLY (Circle)

OFFICE:	92 Hill Street, Carrington		(Standard TAT e.g., Ultra Trad	may be longer for some tests ce Organics)								E-09/00/0	ody Seal Inlac		Y##	No /	N/A
RCA Ref No:		13529	ALS QUOT	E NO.: SY	BQ_400_17				COC SEQ	JENCE NUM	IBER (Circle	Free	loe / frozenyić ipt7	e bridgs prese	ntupon (ves)	140 /	-HA
								COC:	1			Ran	dom Sample T	emperature or	Receipt:	°C	
PROJECT MANAGER			PH: 02490292	25	.			OF:				, I	r comment		-10.5	<u> </u>	
SAMPLER: Tom Hosi	king	SAMPLER I	MOBILE:		RELINQUISHED B	ζ;) ~-	-st	REC	EIVED BY			RELINQU	ISHED BY:	15	RECEIVED BY:		
COC Emailed to ALS			AT (or default	t):	France 1	24 O	ريز) <i>– د</i> د		<u></u>				100m	ربر	DATE/TIME:	1913	Č
	ninistrator@rca.com.au + fionab@rca.	.com.au			DATE/TIME:	2.3	30	DAT	E/TIME:	8	4:20		デマノノダ	500	~ DATE/TIME:	1	Š.
Email invoice to: as a					12313			12	2121	10	M.3L	201	2/10	- /-	1251310	3 1	_
COMMENTS/SPECIA	L HANDLING/STORAGE OR DISPOS	SAL: 			•												
ALS USE ONLY		LE DETAILS Solid(S) Water(W)		CONTAINER INF	ORMATION	^				_	6 (NB. Suite Co				Additional In	ormation	
								•		Ť	T ,	1		T	Comments on likely conta		
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVAT (refer to codes below		L ES	Suite 26 (TRH, BTEX, PAH, 8 metals)	Suite 11 (OCP, PCB)	Asbastos						dilutions, or samples requ analysis etc.	ring specific QC	;
1	BH301a	14/05/2018	Soil	Jar	1	,	X	ኦ	>								
2	BH302b	14/05/2018	Soil	Jar	1		1 -	ζ	ľ								
3	BH304a	14/05/2018	Soil	Jar	1		T									-	
4	BH306a	15/05/2018	Soil	Jar	1												
5	ВН308Ь	15/5/18	Soil	Jar	1												
6	ВН309ь	15/5/18	Soil	Jar	, 1										onmental Divis	ion	
7	BH312c	17/05/2018	Soil	Jar	1									Sydne <u>Wo</u>	ey 'k Order Referend S18148	e	
8	BH314b	16/05/2018	Soil	Jar	1									E	S18148	22	
9	BH316a	17/05/2018	Soil	Jar	1											II II I	
10	QA2	15/5/18	Soil	Jar	1		i										
			-	- Jar -	4	-		2									
			Sol	Qar .	-1-	-					·			Telenho	ne: +61-2-8784 8555	= 1 11 1	
Water Container Codes:	P = Unpreserved Plastic; N = Nitric Preser	ved Plastic; ORC = Nitric Preserve	d ORC; SH = So	odium Hydroxide/Cd Preserved;	TOTAL D	reserved	D Plastic; A	\ D G = Ambe	(O	ORK	in reconstruction	served Plastic		1 88 50	1		1
V = VOA Vial HCI Preserve Z = Zinc Acetate Preserve	ed; VB = VOA Vial Sodium Bisulphate Prese d Bottle; E = EDTA Preserved Bottles; ST =	erved; VS = VOA Vial Sulfuric Preser Sterile Bottle; ASS = Plastic Bag for	ved; AV = Airfre Acid Sulphate 9	ight Unpreserved Vial SG = Sulf Soils; B = Unpreserved Bag.	furic Preserved Amber (lass; H	= HCI pre	served Plast	JEW.	preserved S	peciation bottle	SP = Sulfuir	Preserved.Pl	estic; F = For	naldehyde Preserved Glass	;	



SAMPLE RECEIPT NOTIFICATION (SRN)

: ES1814822 Work Order

: ROBERT CARR & ASSOCIATES P/L Client Laboratory : Environmental Division Sydney

Contact : MS FIONA BROOKER Contact : Customer Services ES

Address : P O BOX 175 Address : 277-289 Woodpark Road Smithfield CARRINGTON NSW, AUSTRALIA 2294

NSW Australia 2164

: ALSEnviro.Sydney@alsglobal.com E-mail F-mail : fionab@rca.com.au

Telephone : +61-2-8784 8555 Telephone : +61 02 4902 9200 Facsimile **Facsimile** : +61 02 4902 9299 : +61-2-8784 8500

Project : 13529 Page · 1 of 3

Order number Quote number : ES2017ROBCAR0004 (SYBQ/400/17) C-O-C number QC Level : NEPM 2013 B3 & ALS QC Standard

Sampler : THOMAS HOSKING

Dates

Date Samples Received Issue Date : 23-May-2018 23-May-2018 14:32 Scheduled Reporting Date : 29-May-2018 Client Requested Due 29-May-2018

Date

Delivery Details

Mode of Delivery Undefined Security Seal : Not Available

No of coolers/hoxes · 1 Temperature : 10.3 - Ice Bricks present

Receipt Detail No. of samples received / analysed : 10 / 10

General Comments

This report contains the following information:

- Sample Container(s)/Preservation Non-Compliances
- Summary of Sample(s) and Requested Analysis
- Proactive Holding Time Report
- Requested Deliverables
- Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.
- Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).
- Asbestos analysis will be conducted by ALS Newcastle.
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- EA200: As only one sample container was submitted for multiple tests, at the client's request, sub sampling was conducted prior to Asbestos analysis. As this has the potential to understate detection, results should be scrutinised accordingly.

Issue Date : 23-May-2018

Page

: 2 of 3 : ES1814822 Amendment 0 Work Order

Client : ROBERT CARR & ASSOCIATES P/L



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

Method Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
Asbestos Identification in Soils : E	EA200	
BH301A	- Snap Lock Bag - Subsampled by	- Snap Lock Bag - ACM/Asbestos Grab
	ALS	Bag
BH302B	- Snap Lock Bag - Subsampled by	- Snap Lock Bag - ACM/Asbestos Grab
	ALS	Bag
BH304A	- Snap Lock Bag - Subsampled by	- Snap Lock Bag - ACM/Asbestos Grab
	ALS	Bag
BH306A	- Snap Lock Bag - Subsampled by	- Snap Lock Bag - ACM/Asbestos Grab
	ALS	Bag
BH308B	- Snap Lock Bag - Subsampled by	- Snap Lock Bag - ACM/Asbestos Grab
	ALS	Bag
ВН309В	- Snap Lock Bag - Subsampled by	- Snap Lock Bag - ACM/Asbestos Grab
	ALS	Bag
BH312C	- Snap Lock Bag - Subsampled by	- Snap Lock Bag - ACM/Asbestos Grab
	ALS	Bag
BH314B	- Snap Lock Bag - Subsampled by	- Snap Lock Bag - ACM/Asbestos Grab
	ALS	Bag
BH316A	- Snap Lock Bag - Subsampled by	- Snap Lock Bag - ACM/Asbestos Grab
	ALS	Bag
QA2	- Snap Lock Bag - Subsampled by	- Snap Lock Bag - ACM/Asbestos Grab
	ALS	Bag

Summary of Sample(s) and Requested Analysis

process necessal tasks. Packages as the determin tasks, that are included in the sampling default 00:00 on	may contain ad ation of moisture uded in the package. time is provided, the date of sampling date wi	content and preparation the sampling time will g. If no sampling date	SOIL - EA055-103 Moisture Content	SOIL - EA200 Asbestos Identification in Soils -	SOIL - S-11 OC/PCB	SOIL - S-26 8 metals/TRH/BTEXN/PAH
ES1814822-001	14-May-2018 00:00	BH301A	✓	✓	✓	✓
ES1814822-002	14-May-2018 00:00	BH302B	✓	✓	✓	✓
ES1814822-003	14-May-2018 00:00	BH304A	✓	✓	✓	✓
ES1814822-004	15-May-2018 00:00	BH306A	✓	✓	1	✓
ES1814822-005	15-May-2018 00:00	BH308B	✓	✓	✓	✓
ES1814822-006	15-May-2018 00:00	BH309B	✓	1	1	✓
ES1814822-007	17-May-2018 00:00	BH312C	✓	✓	✓	✓
ES1814822-008	16-May-2018 00:00	BH314B	✓	1	1	✓
ES1814822-009	17-May-2018 00:00	BH316A	✓	✓	✓	✓
ES1814822-010	15-May-2018 00:00	QA2	1	1	1	1

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

: 23-May-2018 Issue Date

Page

3 of 3 ES1814822 Amendment 0 Work Order

Client : ROBERT CARR & ASSOCIATES P/L



Requested Deliverables

ALL INVOICES

- *AU Certificate of Analysis - NATA (COA)	Email	administrator@rca.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	administrator@rca.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	administrator@rca.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	administrator@rca.com.au
- A4 - AU Tax Invoice (INV)	Email	administrator@rca.com.au
- Chain of Custody (CoC) (COC)	Email	administrator@rca.com.au
- EDI Format - ENMRG (ENMRG)	Email	administrator@rca.com.au
- EDI Format - ESDAT (ESDAT)	Email	administrator@rca.com.au

FIONA BROOKER

- *AU Certificate of Analysis - NATA (COA)	Email	fionab@rca.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	fionab@rca.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	fionab@rca.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	fionab@rca.com.au
- A4 - AU Tax Invoice (INV)	Email	fionab@rca.com.au
- Chain of Custody (CoC) (COC)	Email	fionab@rca.com.au
- EDI Format - ENMRG (ENMRG)	Email	fionab@rca.com.au
- EDI Format - ESDAT (ESDAT)	Email	fionab@rca.com.au