

Kahuna No. 1 Pty Ltd

Stage 2 Site Contamination Assessment

Proposed Residential Development

52-54 Miles Street, Yamba

Report No. RGS31546.1-AL

10 March 2020



RGS31546.1-AL

10 March 2020

Kahuna No. 1 Pty Ltd
C/o: Garrard Building Pty Limited
PO Box 538
YAMBA NSW 2464

Attention: Neil Garrard

Dear Neil

**RE: Proposed Residential Development – 52-54 Miles Street, Yamba
Stage 2 Site Contamination Assessment**

As requested, Regional Geotechnical Solutions Pty Ltd (RGS) has undertaken a Stage 2 Site Contamination Assessment at 52-54 Miles Street, Yamba NSW (Lots 46 and 47 DP751395) where a residential development is proposed on the approximately 42ha lot.

The results of the assessment are presented herein.

The work presented herein was reviewed by Dr David Tully CEnvP SC. A copy of Dr Tully's letter pertaining to the review is appended to the report.

If you have any questions regarding this project, please contact the undersigned.

For and on behalf of **Regional Geotechnical Solutions Pty Ltd**

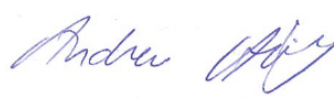
Prepared by



Simon Keen

Senior Geotechnical Engineer

Reviewed by



Andrew Hills

Senior Environmental Engineer



Table of Contents

1	INTRODUCTION.....	4
2	METHODOLOGY	4
3	SITE CONDITIONS.....	5
3.1	Surface Conditions	5
3.2	Subsurface Conditions & Geology	7
4	GUIDELINES & ASSESSMENT CRITERIA	8
5	INTRUSIVE INVESTIGATION	9
5.1	Investigations, Sampling & Laboratory Testing.....	9
5.2	Quality Control	10
5.3	Soil Sampling.....	11
5.4	Results of Analysis.....	12
6	ASSESSMENT & CONCLUSIONS REGARDING SITE CONTAMINATION.....	12
7	LIMITATIONS	13

Figures

Figure 1 Areas of Environmental Concern

Figure 2 Sample Location Plan

Appendices

Appendix A Laboratory Test Results

Appendix B Report Review by Certified Environmental Practitioner Site Contamination Specialist



1 INTRODUCTION

This report presents the results of a Stage 2 Site Contamination Assessment (SCA) undertaken by Regional Geotechnical Solutions Pty Ltd (RGS) for a residential subdivision that is proposed at 52-54 Miles Street, Yamba (Lots 46 & 47 DP751395).

The development will occupy the full approximately 21.2ha of Lot 46 and approximately 10.9ha of Lot 47. The remaining approximately 10.5ha in the east and southeast of the site (as illustrated on Figure 2) will remain undeveloped. A fill pad is to be constructed within the developed areas of the lots which will raise site levels by between about 1.0 to 2.8m.

RGS has previously prepared a Stage 1 SCA (RGS Report No. RGS31546.1-AJ, dated 18 July 2019) that identified five areas of environmental concern (AEC) where sampling and testing were recommended. The location and extent of the identified AEC are shown on Figure 1. Clarence Valley Council have requested that a Stage 2 SCA be undertaken that implements the recommendations presented within Section 4 of the Stage 1 SCA report. The recommendations were:

- Sampling and testing across AEC-1 (including topsoil stockpiles from AEC-3 filled area), AEC-2, AEC4 and AEC-5. The site history assessment presented herein indicates that there is a low potential for residual contamination at the site and therefore it is recommended that limited judgemental sampling be undertaken rather than systematic grid sampling as defined by the EPA 'Sampling Design Guidelines' (1995); and
- Confirm that all of the imported fill that has been placed in AEC-3 and is currently being, or is to be placed on the site has been classified as Excavated Natural Material in accordance with the *Resource Recovery Exemption under Part 9, Clauses 91 and 92 of the Protection of the Environment Operations (Waste) Regulation 2014* in accordance with the *Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 – the Excavated Natural Material (ENM) Order 2014*).

2 METHODOLOGY

The Stage 2 SCA was undertaken in accordance with the relevant sections of the NSW EPA, *Guidelines for Consultants Reporting on Contaminated Sites*, and involved the following process:

- A review of the Stage 1 SCA (RGS Report No. RGS31546.1-AJ, dated 18 July 2019);
- Site walkover to assess visible surface conditions and identify potential evidence of contamination, or past activities that may cause contamination;
- Collection of samples within three of the five Areas of Concern identified within the Stage 1 SCA report (AEC-1, AEC-2 and AEC-5). A summary of the AEC is presented in Table 1 and the extents are presented on Figure 1. The following was noted:
 - Sampling and testing were not undertaken within AEC-3 where imported fill has been and is currently being placed in the west of the site. As outlined within RGS proposal RGS31546.1-AK, it is understood that confirmation is to be sought by others to ensure that the imported fill has been classified as either Virgin Excavated Natural Material (VENM) as defined within the *Protection of the Environment Operations Act 1997 (POEO Act)*, or as Excavated Natural Material in accordance with the *Resource Recovery Exemption under Part 9, Clauses 91 and 92 of the Protection of the Environment Operations (Waste) Regulation 2014* in accordance with the *Resource Recovery Order under Part 9, Clause 93 of the Protection of the*



Environment Operations (Waste) Regulation 2014 – the Excavated Natural Material (ENM) Order 2014);

- AEC-4 is not within the development footprint and sampling and analysis was therefore not required; and
- Laboratory testing of recovered samples for the Chemicals of Concern (CoC) identified within the Stage 1 SCA. A summary of the Areas of Environmental Concern (AEC) and the CoC is presented in Table 1. The extents of the AEC are reproduced in Figure 1.

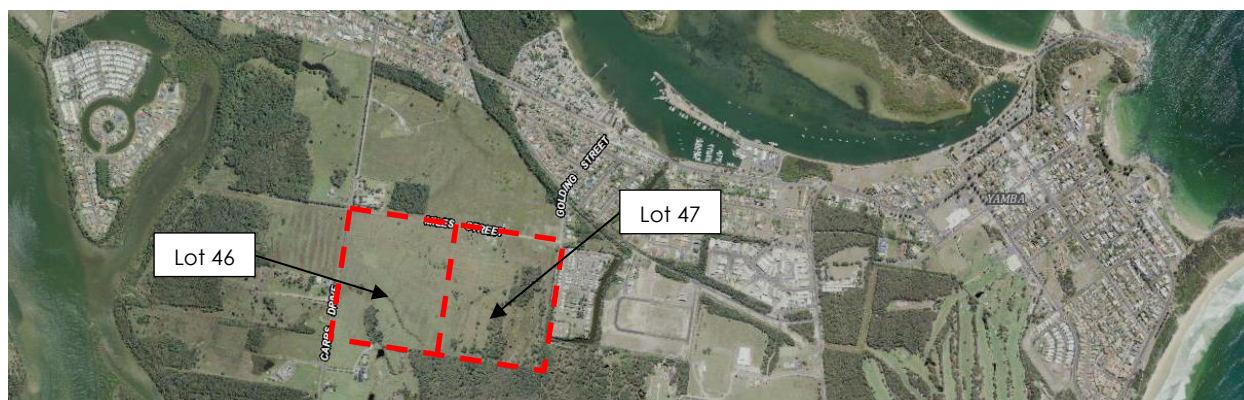
Table 1: Areas of Environmental Concern & Chemicals of Concern

Areas of Environmental Concern		Mode of Potential Contamination	Chemicals of Concern
AEC-1	Soils used of agricultural or grazing purposes	Spraying, spillage or storage of pesticides.	Heavy metals, pesticides
AEC-2	Building materials, including potential asbestos containing linings (Fibro sheeting), lead based paints etc., Parked cars and plant	Building materials from construction of house and any renovations. Oil spills or fuel spills.	Asbestos, heavy metals, hydrocarbons
AEC-3	Imported fill	Contamination prior to arrival onsite	Unknown
AEC-4	Portion of site where fill was placed between 2004 and 2017	Unknown	Unknown
AEC-5	Potential former market garden	Spraying, spillage or storage of pesticides.	Heavy metals, pesticides

3 SITE CONDITIONS

3.1 Surface Conditions

The approximately 42ha rectangular site is bound by Miles Street to the north, Carrs Drive to the west, Golding Street to the east, and by rural-residential lots and bushland to the south. A satellite image that illustrates the site location and site setting is shown below.



Site location and setting is illustrated on the NSW Government 'Six Maps'. The approximate boundary of the site is shown by a red box



The site is located within a region characterised by low lying sand flats with localised swamp deposits in lower lying areas and depressions across the site. The provided survey indicates that site levels are generally between about RL1.0 to 1.4m (AHD) with lower lying depressions and drainage lines having elevations of between about 0.5 to 1.0m. The intermittent drainage lines drain to both the northeast towards the Clarence River and to the southwest towards Oyster Channel.

Two single storey residential dwellings and associated sheds/garages of cladded and fibrous sheeting construction are located in the northeast of the site. Timber stockyards, an ageing tractor and cattle troughs are located to the southwest of the dwellings. The remainder of the site (with the exception of that which is outlined below) was being used for grazing purposes.

Fill was being placed and worked on the western portion of Lot 46 during our site visit.

Typical site photographs are presented below.



*Looking west from the southeast corner of the site.
Groups of trees are scattered across this area.*



*Looking south across the northwest portion of the site
that was being used for grazing purposes in 2018*



*A row of trees can be seen which are located on
the edge of a drainage line in the southwest of the
site that drains into Oyster Channel*



*Looking north from the central portion of the site at
open farmland in June 2018*



Looking northeast at the two existing dwellings that are located along the northern boundary of Lot 47.



Looking west across the site from the cattle yards towards the earthworks being undertaken on Lot 46



Looking northeast at the dilapidated cattle yards that have been constructed with timber and corrugated steel sheeting



Disused tractor adjacent to stock yards

3.2 Subsurface Conditions & Geology

The 1:25,000 Yamba Quaternary Geology Map indicates that the site is predominantly underlain by a Holocene tidal-delta flat that comprises marine sand, silt, clay, shell and gravel. The lower lying drainage lines that are located at the site are underlain by a Holocene saline swamp that comprises organic mud, peat, clay, silt and sand, that overlies the tidal-delta flat outlined above.

RGS has previously undertaken geotechnical investigations which involved the excavation of eleven test pits. The test pit logs are presented in Report No. RGS31546.1-AB, dated 26 July 2018. The test pits generally encountered up to 0.25m of topsoil that overlies firm alluvial Silty CLAY and medium dense to dense alluvial SAND to at least the maximum depth of the investigation of 1.3m.

The investigation was undertaken shortly after a period of high rainfall and groundwater was encountered at a depth of between 0.65 and 1.0m. Subsequent investigations (summarised in



report nos. RGS31546.1-AD and RGS31546.1-AG) encountered the groundwater table between 1 and 1.3m depth.

4 GUIDELINES & ASSESSMENT CRITERIA

The assessment was carried out in accordance with the 'National Environment Protection (Assessment of Site Contamination) Measure (NEPM 2013)'. The NEPM document provides a range of guidelines for assessment of contaminants for various land uses. The development is a residential subdivision, therefore, the investigation levels for "Residential A" land use have been adopted as the primary investigation criteria. In accordance with the NEPM guidelines the following criteria were adopted for this assessment:

- Health investigation levels (HIL) for Residential A land use were used to assess the potential human health impact of heavy metals and polycyclic aromatic hydrocarbons (PAHs);
- Health Screening Levels (HSL) for coarse textured (sand) or fine textured (silt or clay) soils on a Residential A site were adopted as appropriate for the soils encountered to assess the potential human health impact of petroleum hydrocarbons reported as total recoverable hydrocarbons (TRH) in four fraction ranges and benzene, toluene, ethylbenzene and xylene (BTEX) compounds;
- Ecological Investigation Levels (EIL) for Residential A land use were used for evaluation of the potential ecological / environmental impact of heavy metals and PAH; and
- Ecological Screening Levels (ESL) for coarse textured (sand) or fine textured (silt or clay) soils on a Residential A site were adopted as appropriate for the soils encountered, to assess the potential ecological / environmental impact of petroleum hydrocarbons and BTEX compounds.

In accordance with NEPM 2013, exceedance of the criteria does not necessarily deem that remediation or clean-up is required but is a trigger for further assessment of the extent of contamination and associated risks. The adopted criteria are presented in Table 2 and Table 3.

Table 2: Adopted Site Investigation Criteria (ppm)

Analyte	Adopted Soil Investigation Criteria	Analyte	Adopted Soil Investigation Criteria
Benzene	0.5	Chlordane	50
Toluene	160	Heptachlor	6
Ethyl-benzene	55	Copper	6,000
Xylene	40	Lead	300
TRH C6 – C10 (F1)	180 ⁽¹⁾	Zinc	7,400
TRH >C10 – C16 (F2)	120 ⁽¹⁾	Cadmium	20
TRH >C16 – C34 (F3)	300 ⁽¹⁾	Chromium (VI)	100
TRH >C34 – C40 (F4)	2800 ⁽¹⁾	Arsenic	100
DDT+DDE+DDD	240	Nickel	400
Aldrin / Dieldrin	6	Mercury	40

Note: 1 Based on ecological screening levels (ESL)

Selected samples were composited a rate of 4 to 1 for analysis. In accordance with NEPM 2013, the criteria for analytes for these samples have been divided by the number of discrete samples



(four) that have been combined to create each composite sample. Therefore, the adopted criteria for composited samples are presented in Table 3.

Table 3: Adopted Soil Investigation Criteria for Samples Composited at 4:1

Analyte	Adopted Soil Investigation Criteria (mg/kg)
Copper	1,500
Lead	75
Zinc	1,850
Cadmium	5
Chromium (VI)	25
Arsenic	25
Nickel	100
Mercury	10

5 INTRUSIVE INVESTIGATION

5.1 Investigations, Sampling & Laboratory Testing

Field work was carried out 16 January 2020 and included:

- A site walkover assessment, observation and mapping of surface features and existing structures with aim of identifying areas of potential contamination concern; and
- Judgemental sampling within AEC-1, AEC-2 and AEC-5 as recommended within the Stage 1 SCA. The approximate sample locations are shown on Figure 1.

Samples were collected in acid-rinsed 125mL glass jars and placed in an ice-chilled cooler while on site and during transit to the laboratory where the samples were refrigerated.

Thirty nine soil samples were transported under chain-of-custody to ALS Laboratory Group (ALS), a NATA accredited specialist chemical testing laboratory. The samples included eight composited samples and six duplicate soil samples. Three triplicate samples were submitted to Environmental Analysis Laboratory (EAL), a NATA accredited laboratory.

A summary of the soil sampling and laboratory testing is presented in Table 4. Laboratory test results are presented in Appendix A.

Table 4: Soil Sampling Summary

Sample Location	Depth	Area of Environmental Concern	Chemicals of Concern Analysed	Sample Description
Composite C1 (S101, S102, S104, S105)	0 – 0.1m	AEC-1	Heavy metals, pesticides	Sandy TOPSOIL
Composite C2 (S106, S107, S108, S109)	0 – 0.1m			Sandy TOPSOIL
Composite C3 (S110, S111, S116, S117)	0 – 0.1m			Sandy TOPSOIL
Composite C4 (S112, S113, S118, S119)	0 – 0.1m			Sandy TOPSOIL
Composite C5	0 – 0.1m			Sandy TOPSOIL



Sample Location	Depth	Area of Environmental Concern	Chemicals of Concern Analysed	Sample Description
(S114, S115, S120, S121)				
S103				
D1 (S103 Duplicate)	0 – 0.1m			Sandy TOPSOIL
T1 (S103 Triplicate)				
Composite C8 (S147, S148, S149, S150)	0 – 0.1m	AEC-1 (Topsoil Stockpile stripped from filled area)	Heavy metals, pesticides	Sandy TOPSOIL
S133	0 – 0.1m			Sandy TOPSOIL
D5 (S133 Duplicate)	0 – 0.1m			Sandy TOPSOIL
S134	0 – 0.1m			Sandy TOPSOIL
S135	0 – 0.1m			Sandy TOPSOIL
S136	0 – 0.1m			Sandy TOPSOIL
S137	0 – 0.1m			Sandy TOPSOIL
S138	0 – 0.1m			Sandy TOPSOIL
D6 (S138 Duplicate)	0 – 0.1m			Sandy TOPSOIL
S139	0 – 0.1m			Sandy TOPSOIL
S140	0 – 0.1m			Sandy TOPSOIL
S141	0 – 0.1m			Sandy TOPSOIL
S142	0 – 0.1m			Sandy TOPSOIL
S143	0 – 0.1m			Sandy TOPSOIL
S144	0 – 0.1m			Sandy TOPSOIL
S145	0 – 0.1m			Sandy TOPSOIL
S146	0 – 0.1m			Sandy TOPSOIL
Composite C6 (S122, S123, S124, S125)	0 – 0.1m			Sandy TOPSOIL
Composite C7 (S128, S129, S131, S132)	0 – 0.1m			Sandy TOPSOIL
S126	0 – 0.1m			Sandy TOPSOIL
D2 (S126 Duplicate)	0 – 0.1m			Sandy TOPSOIL
T2 (S126 Triplicate)	0 – 0.1m			Sandy TOPSOIL
S127	0 – 0.1m			Sandy TOPSOIL
D3 (S127 Duplicate)	0 – 0.1m			Sandy TOPSOIL
S130	0 – 0.1m			Sandy TOPSOIL
D4 (S130 Duplicate)	0 – 0.1m			Sandy TOPSOIL
T3 (S130 Triplicate)	0 – 0.1m			Sandy TOPSOIL

5.2 Quality Control

Samples were obtained using industry accepted protocols for sample treatment, preservation, and equipment decontamination.



Six duplicate samples were submitted to ALS along with the primary samples, and three triplicated samples were submitted to EAL for analysis as shown below.

Table 5: Summary of Duplicate & Triplicate Samples

Primary Sample (ALS)	Duplicate Sample (ALS)	Triplicate Sample (EAL)
S103	D1	T1
S126	D2	T2
S127	D3	--
S130	D4	T3
S133	D5	--
S138	D6	--

A comparison between the primary, duplicate and triplicate sample results is presented within Table A2 in Appendix A. The table indicates that the Relative Percentage Difference (RPD) is below 30% where the concentrations are above 10 times the limit of analysis and below 50% where the concentrations are below 10 times the limit of analysis, except for one sample (Duplicate D5). Duplicate D5 recorded an RPD for TRH (>C10-C40) of 82%, however, it is considered that the variation is likely to be due to heterogeneity of the soil as outlined below.

The following is noted regarding field sampling QA/QC:

- Samples were obtained using industry accepted protocols for sample treatment, preservation, and equipment decontamination;
- The samples were recovered from test pits and the retained material did not directly come into contact with the sampling equipment and it is therefore considered that rinsate sampling and testing was not necessary;
- Although all due care and attention was taken to obtain samples containing the same material, it is feasible that exceedances between the samples (which were all collected from or close to the surface within topsoil) may have been caused by heterogeneity of the soil; and
- A trip spike was not taken during the investigation, however, given the generally low concentrations of volatile hydrocarbons encountered during the assessment, the absence of which is not expected to affect the usability of the data.

All laboratory quality control data where concentrations were detected above the detectable limits are within acceptable limits for the tests carried out.

Therefore, on the basis of the results of the field and laboratory quality control procedures and testing, the data is considered to reasonably represent the concentrations of contaminants in the soils at the sample locations at the time of sampling and the results can be adopted for this assessment.

5.3 Soil Sampling

In consideration of the site conditions and assessed AEC's identified within the Stage 1 SCA, a judgemental sampling plan was prepared with the aim of targeting these areas of concern. Approximate sampling locations are shown on Figure 2. A summary of the soils present at the sampled locations is presented in Table 4.



5.4 Results of Analysis

An evaluation of the laboratory test results against the adopted soil assessment criteria as presented in Table 2 and Table 3 is provided below:

- Asbestos was not detected in any of the samples tested;
- Results of heavy metal analysis revealed some elevated levels of chromium, copper, lead and zinc, however, the concentrations encountered were below the adopted health assessment criteria in all samples;
- Results of TRH (F1, F2, F3 and F4) analysis revealed some elevated petroleum hydrocarbon levels, however, with the exception of Sample S138 (and corresponding duplicate D6), the concentrations encountered were below the adopted ecological screening level for all samples tested. Sample S138 (and corresponding Duplicate D6) both exceeded the adopted ecological screening assessment criteria for the F3 hydrocarbon fraction (>C16-C34);
- Results of BTEX analysis revealed concentrations below the level of reporting in all samples tested; and
- Results of organochlorine and organophosphorus pesticide analysis revealed concentrations below the level of reporting in all samples tested.

6 ASSESSMENT & CONCLUSIONS REGARDING SITE CONTAMINATION

For all but two samples (a primary sample and the corresponding duplicate), sample analysis found that heavy metals, TRH, BTEX, OC/OP pesticides and the presence of asbestos were either at concentrations below the laboratory detection limits or at concentrations below the adopted health assessment criteria and ecological screening level for Residential A land use.

The ecological screening level for the F3 hydrocarbon fraction (>C16-C34) was exceeded at one location (S138) adjacent to an old parked up unregistered car near the northern site boundary between two existing dwellings. The hydrocarbon source is likely to be from the parked car and it is likely that the extents would be limited to the immediate area surrounding the vehicle. This portion of the site is to be overlain by up to 1.8m of imported fill or is to be located beneath the fill batter, and is beyond the northern boundary of the proposed residential lots. The elevated hydrocarbon concentration may present a potential risk to some ecological receptors which may result in slow or reduced plant growth in this area. However, the risk of human exposure to the hydrocarbon impacted soil in this location is considered to be very low given its inaccessibility due to the overlying layer of emplaced fill.

Based on the assessment undertaken, the site soils are considered to meet with the requirements for a Residential A site as detailed in the NEPM 2013 guidelines.

It is recommended that a hazardous materials survey be undertaken prior to demolition of the existing dwellings at the site. An asbestos clearance certificate should also be obtained by the demolition contractor to certify that all asbestos (if present) has been appropriately removed from the site. Should asbestos be encountered during demolition works, it is recommended that validation soil sampling be undertaken for the presence of asbestos from within the former dwelling footprints.

Based on the assessment as presented herein, the site is considered to be suitable for the proposed residential development from a contamination perspective provided the recommendations of this report are adhered to.



7 LIMITATIONS

The findings presented in the report and used as the basis for recommendations presented herein were obtained using normal, industry accepted geotechnical and pavement design practises and standards. To our knowledge, they represent a reasonable interpretation of the general condition of the site. Under no circumstances, however, can it be considered that these findings represent the actual state of the site at all points. If site conditions encountered during construction vary significantly from those discussed in this report, Regional Geotechnical Solutions Pty Ltd should be contacted for further advice.

This report alone should not be used by contractors as the basis for preparation of tender documents or project estimates. Contractors using this report as a basis for preparation of tender documents should avail themselves of all relevant background information regarding the site before deciding on selection of construction materials and equipment.

If you have any questions regarding this project, or require any additional consultations, please contact the undersigned.

For and on behalf of **Regional Geotechnical Solutions Pty Ltd**

Prepared by

Simon Keen

Senior Geotechnical Engineer

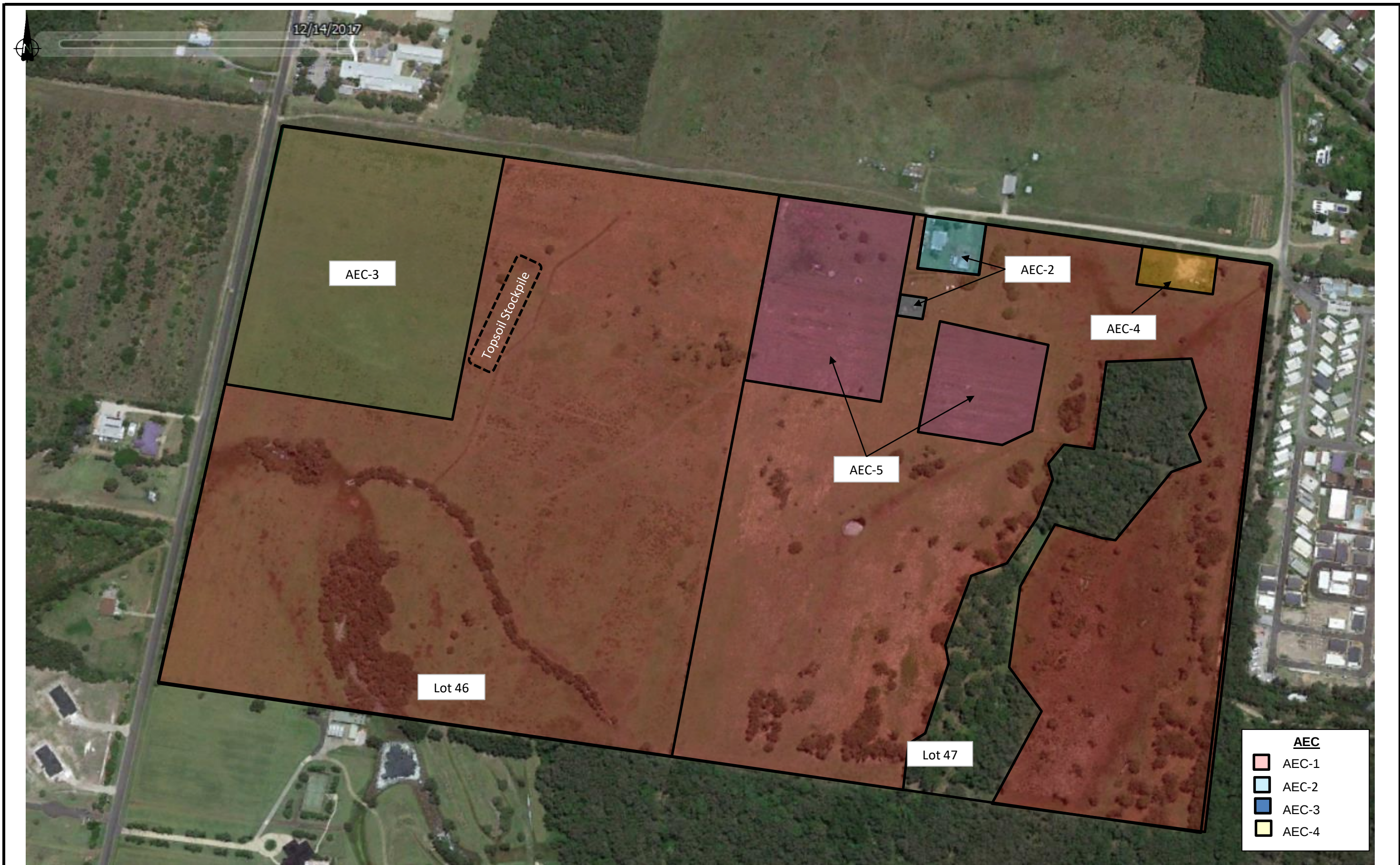
Reviewed by

Andrew Hills

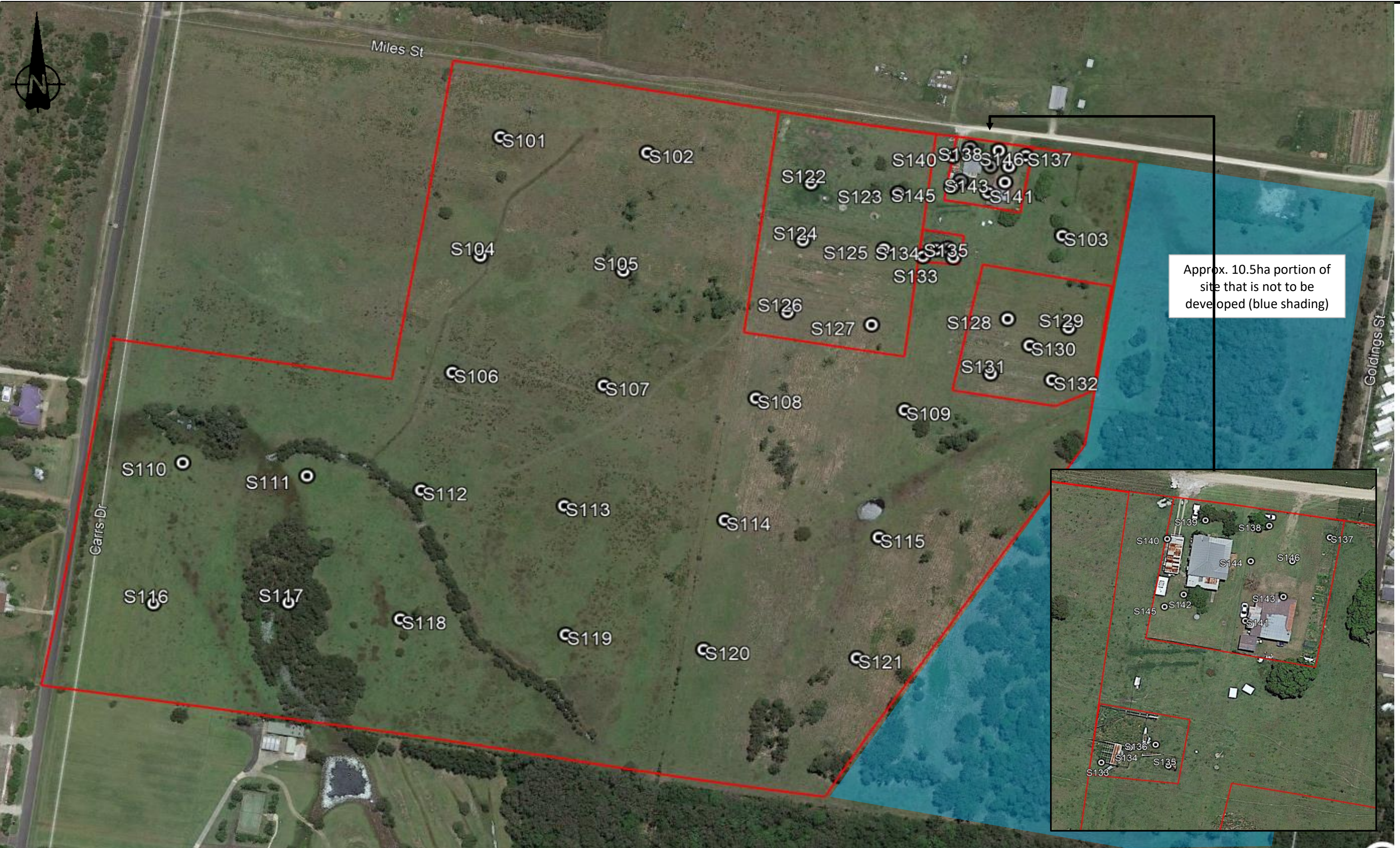
Senior Environmental Engineer



Figures



	Client:	Kahuna No. 1	Job No.	RGS31546.1
	Project:	Stage 2 Site Contamination Assessment	Drawn By:	SK
		52-54 Miles Street, Yamba	Scale:	NTS
	Title:	Areas of Environmental Concern	Date:	10-Mar-20
			Drawing No.	10-Mar-20



	Client:	Kahuna No. 1 Pty Ltd	Job No.	RGS31546.1-AL
	Project:	Proposed Residential Development	Drawn By:	SK
		52-54 Miles Street, Yamba	Scale:	NTS
	Title:	Sample Location Plan	Date:	26-Feb-20
			Drawing No.	Figure 2



Appendix A

Laboratory Test Results

TABLE A1 - RESULTS OF CHEMICAL ANALYSES (concentrations in mg/kg) 'Residential A' Site.

National Environmental Protection Measure (NEPM) 2013 – Volume 2: Schedule B1 – Guideline on Investigation Levels for Soil and Groundwater

Report No. RGS31546.1-AL

Site Location: 52-54 Miles Street, Yamba

Location	Depth (m)	Asebestos	TOTAL RECOVERABLE HYDROCARBONS					PAH		OC-OP PESTICIDE	BTEX	PCB	HEAVY METALS							
			C6-C10	C10-C16	C16-C34	C34-C40	TOTAL 10-40	Total	b-a-p				As	Cd	Cr*	Cu	Pb	Hg	Ni	Zn
Health Based Soil investigation Level								300	3	6	NL	1	100	20	100	6000	300	40	400	7400
Ecological Investigation Level (EIL):																				
Ecological Screening Level (ESL):			180	120	300	2800		0.7		50		Coarse grained soil in mg/kg								
			180	120	1300	5600		0.7		65		Fine grained soil in mg/kg								

C1	0-0.1									<0.2			<5	<1	<2	<5	<5	<0.1	<2	9
C2	0-0.1									<0.2			<5	<1	<2	<5	<5	<0.1	<2	9
C3	0-0.1									<0.2			<5	<1	10	6	6	<0.1	5	34
C4	0-0.1									<0.2			<5	<1	10	<5	6	<0.1	4	16
C5	0-0.1									<0.2			<5	<1	5	<5	<5	<0.1	2	10
S103	0-0.1									<0.2			6	<1	18	<5	8	<0.1	5	29
D1 (S103 Dupl.)	0-0.1									<0.2			6	<1	19	<5	9	<0.1	6	27
T1 (S103 Trip.)	0-0.1												7	<0.5	20	6	10	<0.1	7	32
C8	0-0.1									<0.2			<5	<1	4	<5	<5	<0.1	<2	8
S133	0-0.1	No	<10	<50	120	<100	120				<0.2		<5	<1	3	14	35	<0.1	2	450
D5 (S133 Dupl.)	0-0.1	----	<10	<50	<100	<100	<50				<0.2		<5	<1	3	13	33	<0.1	3	429
S134	0-0.1	No	<10	<50	<100	<100	<50				<0.2		<5	<1	3	6	102	<0.1	<2	235
S135	0-0.1	No	<10	<50	<100	<100	<50				<0.2		<5	<1	42	11	62	<0.1	4	111
S136	0-0.1	No	<10	<50	<100	<100	<50				<0.2		<5	<1	5	10	58	<0.1	<2	212
S137	0-0.1	No	<10	<50	<100	<100	<50				<0.2		5	<1	14	8	15	<0.1	5	65
S138	0-0.1	No	<10	<50	470	170	640				<0.2		<5	<1	9	6	15	<0.1	3	49
D6 (S138 Dupl.)	0-0.1	----	<10	<50	720	140	860				<0.2		<5	<1	9	5	13	<0.1	4	42
S139	0-0.1	No	<10	<50	<100	<100	<50				<0.2		<5	<1	5	6	10	<0.1	2	45
S141	0-0.1	No	<10	<50	<100	<100	<50				<0.2		<5	<1	5	13	23	<0.1	<2	74
S142	0-0.1	No	<10	<50	<100	<100	<50				<0.2		<5	<1	7	61	107	0.6	3	272
S140	0-0.1	----	<10	<50	<100	<100	<50				<0.2		<5	<1	4	26	16	<0.1	<2	99
S143	0-0.1	No	<10	<50	<100	<100	<50				<0.2		<5	<1	8	20	54	<0.1	3	132
S144	0-0.1	----	<10	<50	<100	<100	<50				<0.2		<5	<1	4	7	124	0.1	<2	349
S145	0-0.1	No	<10	<50	<100	<100	<50				<0.2		<5	<1	4	8	25	<0.1	<2	89
S146	0-0.1	No	<10	<50	<100	<100	<50				<0.2		<5	<1	5	<5	<5	<0.1	<2	26
C6	0-0.1									<0.2			<5	<1	2	<5	<5	<0.1	<2	11
C7	0-0.1									<0.2			<5	<1	3	<5	<5	<0.1	<2	8
S126	0-0.1									<0.2			<5	<1	<2	<5	<5	<0.1	<2	6
D2 (S126 Dupl.)	0-0.1									<0.2			<5	<1	<2	<5	<5	<0.1	<2	7
T2 (S126 Trip.)	0-0.1												<2	<0.2	<2	2	2	<0.1	<1	6

BLUE - Denotes concentration exceeds health based guideline for Residential A

GREEN - Denotes concentration exceeds ecological guideline for Residential A

ORANGE - Denotes concentration exceeds health and ecological based guideline

TABLE A1 - RESULTS OF CHEMICAL ANALYSES (concentrations in mg/kg) 'Residential A' Site.**Report No.** RGS31546.1-AL

National Environmental Protection Measure (NEPM) 2013 – Volume 2: Schedule B1 – Guideline on Investigation Levels for Soil and Groundwater

Site Location: 52-54 Miles Street, Yamba

Location	Depth (m)	Asebestos	TOTAL RECOVERABLE HYDROCARBONS					PAH		OC-OP PESTICIDE	BTEX	PCB	HEAVY METALS							
			C6-C10	C10-C16	C16-C34	C34-C40	TOTAL 10-40	Total	b-a-p				As	Cd	Cr*	Cu	Pb	Hg	Ni	Zn
S127	0-0.1									<0.2			<5	<1	2	<5	<5	<0.1	<2	7
D3 (S127 Dupl.)	0-0.1									<0.2			<5	<1	2	<5	<5	<0.1	<2	8
S130	0-0.1									<0.2			<5	<1	4	<5	<5	<0.1	<2	6
D4 (S130 Dupl.)	0-0.1									<0.2			<5	<1	4	<5	<5	<0.1	<2	6
T3 (S130 Trip.)	0-0.1												<2	<0.5	4	2	3	<0.1	2	6

BLUE - Denotes concentration exceeds health based guideline for Residential A

GREEN - Denotes concentration exceeds ecological guideline for Residential A

ORANGE - Denotes concentration exceeds health and ecological based guideline

TABLE A2 - Relative Percentage Difference (RPD)

Report No. RGS31546.1-AL
 Site Location: 52-54 Miles Street, Yamba

Location	Depth (m)	Asebestos	TOTAL RECOVERABLE HYDROCARBONS					PAH		OC-OP PESTICIDE	BTEX	PCB	HEAVY METALS							
			C6-C10	C10-C16	C16-C34	C34-C40	TOTAL 10-40	Total	b-a-p				As	Cd	Cr*	Cu	Pb	Hg	Ni	Zn
Limit of Reporting			10	50	100	100	100						5	1	2	5	5	0	2	5
S103	0-0.1									<0.2			6	<1	18	<5	8	<0.1	5	29
D1 (S103 Dupl.)	0-0.1									<0.2			6	<1	19	<5	9	<0.1	6	27
T1 (S103 Trip.)	0-0.1												7	<0.5	20	6	10	<0.1	7	32
RPD (D1)										0%			0%	0%	5%	0%	12%	0%	18%	7%
RPD (T1)													15%	0%	11%	18%	22%	0%	33%	10%
S133	0-0.1	No	<10	<50	120	<100	120				<0.2		<5	<1	3	14	35	<0.1	2	450
D5 (S133 Dupl.)	0-0.1	----	<10	<50	18	<100	<50				<0.2		<5	<1	3	13	33	<0.1	3	429
RPD (D5)			0%	0%	148%	0%	82%				0%		0%	0%	0%	7%	6%	0%	40%	5%
S138	0-0.1	No	<10	<50	470	170	640				<0.2		<5	<1	9	6	15	<0.1	3	49
D6 (S138 Dupl.)	0-0.1	----	<10	<50	720	140	860				<0.2		<5	<1	9	5	13	<0.1	4	42
RPD (D6)			0%	0%	42%	19%	29%				0%		0%	0%	0%	18%	14%	0%	29%	15%
S126	0-0.1									<0.2			<5	<1	<2	<5	<5	<0.1	<2	6
D2 (S126 Dupl.)	0-0.1									<0.2			<5	<1	<2	<5	<5	<0.1	<2	7
T2 (S126 Trip.)	0-0.1												<2	<0.2	<2	2	2	<0.1	<1	6
RPD (D2)										0%			0%	0%	0%	0%	0%	0%	0%	15%
RPD (T2)													0%	0%	0%	0%	0%	0%	0%	0%
S127	0-0.1									<0.2			<5	<1	2	<5	<5	<0.1	<2	7
D3 (S127 Dupl.)	0-0.1									<0.2			<5	<1	2	<5	<5	<0.1	<2	8
RPD (D3)										0%			0%	0%	0%	0%	0%	0%	0%	13%
S130	0-0.1									<0.2			<5	<1	4	<5	<5	<0.1	<2	6
D4 (S130 Dupl.)	0-0.1									<0.2			<5	<1	4	<5	<5	<0.1	<2	6
T3 (S130 Trip.)	0-0.1												<2	<0.5	4	2	3	<0.1	2	6
RPD (D4)										0%			0%	0%	0%	0%	0%	0%	0%	0%
RPD (T3)													0%	0%	0%	0%	0%	0%	0%	0%

BLUE - Denotes concentration exceeds health based guideline for Residential A
 GREEN - Denotes concentration exceeds ecological guideline for Residential A
 ORANGE - Denotes concentration exceeds health and ecological based guideline

CERTIFICATE OF ANALYSIS

Work Order : **ES2001976**
Client : **REGIONAL GEOTECHNICAL SOLUTION**
Contact : JOEL BABBAGE
Address : Unit 14 25-27 Hurley Drive
 COFFS HARBOUR NSW, AUSTRALIA 2450
Telephone : ----
Project : RGS31546.1 Carrs Drive
Order number : ----
C-O-C number : ----
Sampler : ----
Site : Yamba
Quote number : EN/222
No. of samples received : 16
No. of samples analysed : 16

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 : 22-Jan-2020 13:45
Date Analysis Commenced : 29-Jan-2020
Issue Date : 31-Jan-2020 17:05



Accreditation No. 825
 Accredited for compliance with
 ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- 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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alana Smylie	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- 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: 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.



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				S133 0-0.1	S134 0-0.1	S135 0-0.1	S136 0-0.1	S137 0-0.1
Client sampling date / time				21-Jan-2020 00:00	21-Jan-2020 00:00	21-Jan-2020 00:00	21-Jan-2020 00:00	21-Jan-2020 00:00
Compound	CAS Number	LOR	Unit	ES2001976-001	ES2001976-002	ES2001976-003	ES2001976-004	ES2001976-005
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content	----	1.0	%	6.0	8.9	4.2	9.1	7.1
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No	No	No	No
Asbestos (Trace)	1332-21-4	5	Fibres	No	No	No	No	No
Asbestos Type	1332-21-4	-	--	-	-	-	-	-
Synthetic Mineral Fibre	----	0.1	g/kg	No	No	No	No	No
Organic Fibre	----	0.1	g/kg	No	No	No	No	No
Sample weight (dry)	----	0.01	g	115	64.9	60.9	79.7	35.0
APPROVED IDENTIFIER:	----	-	--	A. SMYIE	A. SMYIE	A. SMYIE	A. SMYIE	A. SMYIE
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	3	3	42	5	14
Copper	7440-50-8	5	mg/kg	14	6	11	10	8
Lead	7439-92-1	5	mg/kg	35	102	62	58	15
Nickel	7440-02-0	2	mg/kg	2	<2	4	<2	5
Zinc	7440-66-6	5	mg/kg	450	235	111	212	65
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	120	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	120	<50	<50	<50	<50



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				S133 0-0.1	S134 0-0.1	S135 0-0.1	S136 0-0.1	S137 0-0.1
Client sampling date / time				21-Jan-2020 00:00	21-Jan-2020 00:00	21-Jan-2020 00:00	21-Jan-2020 00:00	21-Jan-2020 00:00
Compound	CAS Number	LOR	Unit	ES2001976-001	ES2001976-002	ES2001976-003	ES2001976-004	ES2001976-005
				Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.2	%	92.0	95.6	99.6	99.1	93.1
Toluene-D8	2037-26-5	0.2	%	105	105	110	110	103
4-Bromofluorobenzene	460-00-4	0.2	%	92.4	89.5	97.6	95.9	91.6



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				S138 0-0.1	S139 0-0.1	S140 0-0.1	S141 0-0.1	S142 0-0.1
Client sampling date / time				21-Jan-2020 00:00	21-Jan-2020 00:00	21-Jan-2020 00:00	21-Jan-2020 00:00	21-Jan-2020 00:00
Compound	CAS Number	LOR	Unit	ES2001976-006	ES2001976-007	ES2001976-008	ES2001976-009	ES2001976-010
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content	----	1.0	%	10.6	11.4	3.7	5.8	3.5
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No	----	No	No
Asbestos (Trace)	1332-21-4	5	Fibres	No	No	----	No	No
Asbestos Type	1332-21-4	-	--	-	-	----	-	-
Synthetic Mineral Fibre	----	0.1	g/kg	No	No	----	No	No
Organic Fibre	----	0.1	g/kg	No	No	----	No	No
Sample weight (dry)	----	0.01	g	68.8	73.8	----	106	63.3
APPROVED IDENTIFIER:	----	-	--	A. SMYLIE	A. SMYLIE	----	A. SMYLIE	A. SMYLIE
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	9	5	4	5	7
Copper	7440-50-8	5	mg/kg	6	6	26	13	61
Lead	7439-92-1	5	mg/kg	15	10	16	23	107
Nickel	7440-02-0	2	mg/kg	3	2	<2	<2	3
Zinc	7440-66-6	5	mg/kg	49	45	99	74	272
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	0.6
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	350	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	220	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	570	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	470	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	170	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	640	<50	<50	<50	<50



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				S138 0-0.1	S139 0-0.1	S140 0-0.1	S141 0-0.1	S142 0-0.1
Client sampling date / time				21-Jan-2020 00:00	21-Jan-2020 00:00	21-Jan-2020 00:00	21-Jan-2020 00:00	21-Jan-2020 00:00
Compound	CAS Number	LOR	Unit	ES2001976-006	ES2001976-007	ES2001976-008	ES2001976-009	ES2001976-010
				Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.2	%	91.0	88.5	89.8	95.6	94.8
Toluene-D8	2037-26-5	0.2	%	102	97.9	97.7	103	104
4-Bromofluorobenzene	460-00-4	0.2	%	87.3	85.0	85.1	89.0	89.8



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				S143 0-0.1	S144 0-0.1	S145 0-0.1	S146 0-0.1	D5 0-0.1
Client sampling date / time				21-Jan-2020 00:00	21-Jan-2020 00:00	21-Jan-2020 00:00	21-Jan-2020 00:00	21-Jan-2020 00:00
Compound	CAS Number	LOR	Unit	ES2001976-011	ES2001976-012	ES2001976-013	ES2001976-014	ES2001976-015
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content	----	1.0	%	5.5	6.3	<1.0	4.5	11.8
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	----	No	No	----
Asbestos (Trace)	1332-21-4	5	Fibres	No	----	No	No	----
Asbestos Type	1332-21-4	-	--	-	----	-	-	----
Synthetic Mineral Fibre	----	0.1	g/kg	No	----	No	No	----
Organic Fibre	----	0.1	g/kg	No	----	No	No	----
Sample weight (dry)	----	0.01	g	88.1	----	91.0	122	----
APPROVED IDENTIFIER:	----	-	--	A. SMYLIE	----	A. SMYLIE	A. SMYLIE	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	8	4	4	5	3
Copper	7440-50-8	5	mg/kg	20	7	8	<5	13
Lead	7439-92-1	5	mg/kg	54	124	25	<5	33
Nickel	7440-02-0	2	mg/kg	3	<2	<2	<2	3
Zinc	7440-66-6	5	mg/kg	132	349	89	26	429
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				S143 0-0.1	S144 0-0.1	S145 0-0.1	S146 0-0.1	D5 0-0.1
Client sampling date / time				21-Jan-2020 00:00	21-Jan-2020 00:00	21-Jan-2020 00:00	21-Jan-2020 00:00	21-Jan-2020 00:00
Compound	CAS Number	LOR	Unit	ES2001976-011	ES2001976-012	ES2001976-013	ES2001976-014	ES2001976-015
				Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.2	%	97.9	80.8	99.6	97.4	98.7
Toluene-D8	2037-26-5	0.2	%	104	86.6	108	104	105
4-Bromofluorobenzene	460-00-4	0.2	%	91.6	72.9	95.4	88.2	91.5



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				D6 0-0.1	----	----	----	----
Client sampling date / time				21-Jan-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2001976-016	-----	-----	-----	-----
Result				----	----	----	----	----
EA055: Moisture Content								
Moisture Content	----	1.0	%	12.1	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	9	----	----	----	----
Copper	7440-50-8	5	mg/kg	5	----	----	----	----
Lead	7439-92-1	5	mg/kg	13	----	----	----	----
Nickel	7440-02-0	2	mg/kg	4	----	----	----	----
Zinc	7440-66-6	5	mg/kg	42	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg	<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg	560	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg	240	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	800	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	720	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	140	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	860	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	----	----	----
^ Sum of BTEX	----	0.2	mg/kg	<0.2	----	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	D6 0-0.1	----	----	----	----
Client sampling date / time					21-Jan-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2001976-016	-----	-----	-----	-----
					Result	----	----	----	----
EP080: BTEXN - Continued									
^ Total Xylenes		----	0.5	mg/kg	<0.5	----	----	----	----
Naphthalene		91-20-3	1	mg/kg	<1	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4		17060-07-0	0.2	%	90.8	----	----	----	----
Toluene-D8		2037-26-5	0.2	%	97.3	----	----	----	----
4-Bromofluorobenzene		460-00-4	0.2	%	83.6	----	----	----	----

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 in Soils		
EA200: Description	S1330-0.1 - 21-Jan-2020 00:00	Mid brown soil.
EA200: Description	S1340-0.1 - 21-Jan-2020 00:00	Mid brown soil.
EA200: Description	S1350-0.1 - 21-Jan-2020 00:00	Mid brown soil.
EA200: Description	S1360-0.1 - 21-Jan-2020 00:00	Mid brown soil.
EA200: Description	S1370-0.1 - 21-Jan-2020 00:00	Mid brown soil.
EA200: Description	S1380-0.1 - 21-Jan-2020 00:00	Mid brown soil.
EA200: Description	S1390-0.1 - 21-Jan-2020 00:00	Mid brown soil.
EA200: Description	S1410-0.1 - 21-Jan-2020 00:00	Mid brown soil.
EA200: Description	S1420-0.1 - 21-Jan-2020 00:00	Mid brown soil.
EA200: Description	S1430-0.1 - 21-Jan-2020 00:00	Mid brown soil.
EA200: Description	S1450-0.1 - 21-Jan-2020 00:00	Mid brown soil.
EA200: Description	S1460-0.1 - 21-Jan-2020 00:00	Mid brown soil.



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
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



CERTIFICATE OF ANALYSIS

Work Order	: ES2001977
Client	: REGIONAL GEOTECHNICAL SOLUTION
Contact	: JOEL BABBAGE
Address	: Unit 14 25-27 Hurley Drive COFFS HARBOUR NSW, AUSTRALIA 2450
Telephone	: ----
Project	: RGS31546.1 Carrs Drive
Order number	: ----
C-O-C number	: ----
Sampler	: ----
Site	: Yamba
Quote number	: EN/222
No. of samples received	: 16
No. of samples analysed	: 16

Page : 1 of 15
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 : 22-Jan-2020 13:45
Date Analysis Commenced : 23-Jan-2020
Issue Date : 29-Jan-2020 14:38



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
- 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
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EG005: Poor precision was obtained for Manganese on sample ES2001944-119. Results have been confirmed by re-extraction and reanalysis.



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				C1 0-0.1	C2 0-0.1	C3 0-0.1	C4 0-0.1	C5 0-0.1
Client sampling date / time				[22-Jan-2020]	[22-Jan-2020]	[22-Jan-2020]	[22-Jan-2020]	[22-Jan-2020]
Compound	CAS Number	LOR	Unit	ES2001977-001	ES2001977-002	ES2001977-003	ES2001977-004	ES2001977-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	7.3	7.9	17.9	13.2	7.0
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Barium	7440-39-3	10	mg/kg	<10	<10	20	20	20
Beryllium	7440-41-7	1	mg/kg	<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg	<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	<2	<2	10	10	5
Cobalt	7440-48-4	2	mg/kg	<2	<2	2	<2	<2
Copper	7440-50-8	5	mg/kg	<5	<5	6	<5	<5
Lead	7439-92-1	5	mg/kg	<5	<5	6	6	<5
Manganese	7439-96-5	5	mg/kg	16	17	69	27	20
Nickel	7440-02-0	2	mg/kg	<2	<2	5	4	2
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg	<5	<5	18	18	9
Zinc	7440-66-6	5	mg/kg	9	9	34	16	10
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05

Sub-Matrix: **SOIL** Client sample ID
 (Matrix: **SOIL**)

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID		C1 0-0.1	C2 0-0.1	C3 0-0.1	C4 0-0.1	C5 0-0.1			
Client sampling date / time				[22-Jan-2020]		[22-Jan-2020]		[22-Jan-2020]		[22-Jan-2020]			
Compound	CAS Number	LOR	Unit	ES2001977-001		ES2001977-002		ES2001977-003		ES2001977-004		ES2001977-005	
				Result		Result		Result		Result		Result	
EP068A: Organochlorine Pesticides (OC) - Continued													
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2		<0.2		<0.2		<0.2		<0.2	
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
Methoxychlor	72-43-5	0.2	mg/kg	<0.2		<0.2		<0.2		<0.2		<0.2	
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
EP068B: Organophosphorus Pesticides (OP)													
Dichlorvos	62-73-7	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2		<0.2		<0.2		<0.2		<0.2	
Dimethoate	60-51-5	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
Diazinon	333-41-5	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2		<0.2		<0.2		<0.2		<0.2	
Malathion	121-75-5	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
Fenthion	55-38-9	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
Parathion	56-38-2	0.2	mg/kg	<0.2		<0.2		<0.2		<0.2		<0.2	
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
Prothiofos	34643-46-4	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
Ethion	563-12-2	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
Carbophenothion	786-19-6	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05		<0.05		<0.05		<0.05		<0.05	
EP068S: Organochlorine Pesticide Surrogate													
Dibromo-DDE	21655-73-2	0.05	%	108		101		95.8		91.9		91.7	
EP068T: Organophosphorus Pesticide Surrogate													



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	C1 0-0.1	C2 0-0.1	C3 0-0.1	C4 0-0.1	C5 0-0.1
Client sampling date / time					[22-Jan-2020]	[22-Jan-2020]	[22-Jan-2020]	[22-Jan-2020]	[22-Jan-2020]
Compound	CAS Number	LOR	Unit		ES2001977-001	ES2001977-002	ES2001977-003	ES2001977-004	ES2001977-005
					Result	Result	Result	Result	Result
EP068T: Organophosphorus Pesticide Surrogate - Continued									
DEF	78-48-8	0.05	%		85.7	86.9	74.9	95.9	81.4



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				C6 0-0.1	C7 0-0.1	C8 0-0.1	S103 0-0.1	S126 0-0.1
Client sampling date / time				[22-Jan-2020]	[22-Jan-2020]	[22-Jan-2020]	[22-Jan-2020]	[22-Jan-2020]
Compound	CAS Number	LOR	Unit	ES2001977-006	ES2001977-007	ES2001977-008	ES2001977-009	ES2001977-010
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	6.8	9.4	2.8	19.0	12.1
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	6	<5
Barium	7440-39-3	10	mg/kg	<10	10	10	30	<10
Beryllium	7440-41-7	1	mg/kg	<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg	<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	2	3	4	18	<2
Cobalt	7440-48-4	2	mg/kg	<2	<2	<2	4	<2
Copper	7440-50-8	5	mg/kg	<5	<5	<5	<5	<5
Lead	7439-92-1	5	mg/kg	<5	<5	<5	8	<5
Manganese	7439-96-5	5	mg/kg	26	21	14	147	15
Nickel	7440-02-0	2	mg/kg	<2	<2	<2	5	<2
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg	<5	8	6	36	<5
Zinc	7440-66-6	5	mg/kg	11	8	8	29	6
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05

Sub-Matrix: **SOIL** Client sample ID
 (Matrix: **SOIL**)

EP068T: Organophosphorus Pesticide Surrogate



Analytical Results

Sub-Matrix: **SOIL**
 (Matrix: **SOIL**)

Client sample ID

				C6 0-0.1	C7 0-0.1	C8 0-0.1	S103 0-0.1	S126 0-0.1
Client sampling date / time				[22-Jan-2020]	[22-Jan-2020]	[22-Jan-2020]	[22-Jan-2020]	[22-Jan-2020]
Compound	CAS Number	LOR	Unit	ES2001977-006	ES2001977-007	ES2001977-008	ES2001977-009	ES2001977-010
				Result	Result	Result	Result	Result
EP068T: Organophosphorus Pesticide Surrogate - Continued								
DEF	78-48-8	0.05	%	110	84.3	70.2	108	95.1



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				S127 0-0.1	S130 0-0.1	D1 0-0.1	D2 0-0.1	D3 0-0.1
Client sampling date / time				[22-Jan-2020]	[22-Jan-2020]	[22-Jan-2020]	[22-Jan-2020]	[22-Jan-2020]
Compound	CAS Number	LOR	Unit	ES2001977-011	ES2001977-012	ES2001977-013	ES2001977-014	ES2001977-015
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	5.5	11.4	20.8	12.7	4.1
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	6	<5	<5
Barium	7440-39-3	10	mg/kg	<10	10	30	<10	<10
Beryllium	7440-41-7	1	mg/kg	<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg	<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	2	4	19	<2	2
Cobalt	7440-48-4	2	mg/kg	<2	<2	4	<2	<2
Copper	7440-50-8	5	mg/kg	<5	<5	<5	<5	<5
Lead	7439-92-1	5	mg/kg	<5	<5	9	<5	<5
Manganese	7439-96-5	5	mg/kg	13	10	117	18	20
Nickel	7440-02-0	2	mg/kg	<2	<2	6	<2	<2
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg	<5	8	38	<5	<5
Zinc	7440-66-6	5	mg/kg	7	6	27	7	8
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05

Sub-Matrix: **SOIL** Client sample ID
 (Matrix: **SOIL**)

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID		S127 0-0.1	S130 0-0.1	D1 0-0.1	D2 0-0.1	D3 0-0.1
Client sampling date / time				[22-Jan-2020]	[22-Jan-2020]	[22-Jan-2020]	[22-Jan-2020]	[22-Jan-2020]	[22-Jan-2020]	
Compound	CAS Number	LOR	Unit	ES2001977-011	ES2001977-012	ES2001977-013	ES2001977-014	ES2001977-015		
				Result	Result	Result	Result	Result		
EP068A: Organochlorine Pesticides (OC) - Continued										
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
4,4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
4,4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2		
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2		
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
EP068B: Organophosphorus Pesticides (OP)										
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2		
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2		
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2		
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05		
EP068S: Organochlorine Pesticide Surrogate										
Dibromo-DDE	21655-73-2	0.05	%	100	98.5	96.8	99.1	100		
EP068T: Organophosphorus Pesticide Surrogate										

Page : 11 of 15
 Work Order : ES2001977
 Client : REGIONAL GEOTECHNICAL SOLUTION
 Project : RGS31546.1 Carrs Drive



Analytical Results

Sub-Matrix: **SOIL**
 (Matrix: **SOIL**)

Client sample ID

				S127 0-0.1	S130 0-0.1	D1 0-0.1	D2 0-0.1	D3 0-0.1
Client sampling date / time				[22-Jan-2020]	[22-Jan-2020]	[22-Jan-2020]	[22-Jan-2020]	[22-Jan-2020]
Compound	CAS Number	LOR	Unit	ES2001977-011	ES2001977-012	ES2001977-013	ES2001977-014	ES2001977-015
				Result	Result	Result	Result	Result
EP068T: Organophosphorus Pesticide Surrogate - Continued								
DEF	78-48-8	0.05	%	122	98.0	88.4	89.7	129



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				D4 0-0.1	----	----	----	----
Client sampling date / time				[22-Jan-2020]	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2001977-016	-----	-----	-----	-----
Result				----	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	10.5	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	----	----	----	----
Barium	7440-39-3	10	mg/kg	10	----	----	----	----
Beryllium	7440-41-7	1	mg/kg	<1	----	----	----	----
Boron	7440-42-8	50	mg/kg	<50	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	4	----	----	----	----
Cobalt	7440-48-4	2	mg/kg	<2	----	----	----	----
Copper	7440-50-8	5	mg/kg	<5	----	----	----	----
Lead	7439-92-1	5	mg/kg	<5	----	----	----	----
Manganese	7439-96-5	5	mg/kg	10	----	----	----	----
Nickel	7440-02-0	2	mg/kg	<2	----	----	----	----
Selenium	7782-49-2	5	mg/kg	<5	----	----	----	----
Vanadium	7440-62-2	5	mg/kg	7	----	----	----	----
Zinc	7440-66-6	5	mg/kg	6	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	----	----	----	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	----	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	----	----	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	----	----	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	----	----	----	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	----	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	----	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	----	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	----	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	----	----	----	----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	----	----	----	----
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	----	----	----	----
Endrin	72-20-8	0.05	mg/kg	<0.05	----	----	----	----

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	D4 0-0.1	----	----	----	----
Client sampling date / time				[22-Jan-2020]	----	----	----	----	
Compound	CAS Number	LOR	Unit	ES2001977-016	-----	-----	-----	-----	
				Result	----	----	----	----	
EP068A: Organochlorine Pesticides (OC) - Continued									
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	----	----	----	----	
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	----	----	
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	----	----	----	----	
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	----	----	----	----	
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	----	----	----	----	
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	----	----	----	----	
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	----	----	----	----	
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	----	----	----	----	
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	----	----	----	
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	----	----	----	----	
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	----	----	----	----	
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	----	----	----	----	
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	----	----	----	----	
Dimethoate	60-51-5	0.05	mg/kg	<0.05	----	----	----	----	
Diazinon	333-41-5	0.05	mg/kg	<0.05	----	----	----	----	
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	----	----	----	----	
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	----	----	----	----	
Malathion	121-75-5	0.05	mg/kg	<0.05	----	----	----	----	
Fenthion	55-38-9	0.05	mg/kg	<0.05	----	----	----	----	
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	----	----	----	----	
Parathion	56-38-2	0.2	mg/kg	<0.2	----	----	----	----	
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	----	----	----	----	
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	----	----	----	----	
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	----	----	----	----	
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	----	----	----	----	
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	----	----	----	----	
Ethion	563-12-2	0.05	mg/kg	<0.05	----	----	----	----	
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	----	----	----	----	
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	----	----	----	----	
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%	98.5	----	----	----	----	
EP068T: Organophosphorus Pesticide Surrogate									

Page : 14 of 15
 Work Order : ES2001977
 Client : REGIONAL GEOTECHNICAL SOLUTION
 Project : RGS31546.1 Carrs Drive



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	D4 0-0.1	----	----	----	----
				Client sampling date / time	[22-Jan-2020]	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2001977-016	-----	-----	-----	-----
					Result	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate - Continued									
DEF	78-48-8	0.05	%		97.0	----	----	----	----



Surrogate Control Limits

Sub-Matrix: **SOIL**

		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143

RESULTS OF SOIL ANALYSIS

3 samples supplied by Regional Geotechnical Solutions Pty Ltd on 2/03/2020 . Lab Job No. J1296.

Samples submitted by Joel Babbage. Your Job: RGS31546.1.

44 Bent Street WINGHAM NSW 2429

	Method	Sample 1 T1 0-0.1	Sample 2 T2 0-0.1	Sample 3 T3 0-0.1
	Job No.	J1296/1	J1296/2	J1296/3
Silver (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	<1	<1	<1
Arsenic (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	7	<2	<2
Lead (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	10	2	3
Cadmium (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	<0.5	<0.5	<0.5
Chromium (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	20	<2	4
Copper (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	6	2	2
Manganese (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	146	21	12
Nickel (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	7	<1	2
Selenium (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	0.8	<0.5	<0.5
Zinc (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	32	7	6
Mercury (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	<0.1	<0.1	<0.1
Iron (%)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	2.46	0.08	0.38
Aluminium (%)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	1.57	0.20	0.59

Notes:

1. ppm = mg/Kg dried sample
2. All results as dry weight DW - samples were dried at 40oC for 24-48hrs prior to crushing and analysis.
3. Methods from Rayment and Lyons, Soil Chemical Methods - Australasia
4. Metals analysed by ICP-MS (Inductively Coupled Plasma - Mass Spectrometry)
5. Analysis conducted between sample arrival date and reporting date.
6. ** NATA accreditation does not cover the performance of this service.
7. .. Denotes not requested.
8. This report is not to be reproduced except in full.
9. All services undertaken by EAL are covered by the EAL Laboratory Services Terms and Conditions (refer scu.edu.au/eal or on request).
10. Results relate only to the samples tested.
11. This report was issued on 09/03/2020.



Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked:
Graham Lancaster
Laboratory Manager



Appendix B

Report Review by Certified Environmental Practitioner Site Contamination Specialist

Contaminated Land Solutions

12 March 2020

Ref: 0067.L02

Regional Geotechnical Solutions Pty Ltd
Unit 4
25-27 Hurley Drive
Coffs Harbour
NSW 2450

For the attention of Simon Keen

Dear Simon,

RE: Report Review Stage2 Site Contamination Assessment Report – Proposed Residential Development, 52-54 Miles Street, Yamba

I, Dr David Tully of Contaminated Land Solutions Pty Ltd, am a Certified Environmental Practitioner Site Contamination Specialist (General Certified Environmental Practitioner certification no. 1138 and Site Contamination Specialist certification no. SC40084).

I confirm I have reviewed the Regional Geotechnical Solutions report entitled "Stage 2 Site Contamination Assessment Report – *Proposed Residential Development, 52-54 Miles Street, Yamba*" (Ref: RGS31546.1-AL), dated 10 March 2020 and a copy of which I have retained.

I can confirm that on the basis of the information contained within the report, I support the conclusions and recommendations provided therein.

Should the client, regulator or local authority have any queries regarding the report review, I can be contacted by e-mail via david.tully@contaminatedlandsolutions.com.au. Specific queries regarding the content of the report should be addressed to Simon Keen at Regional Geotechnical Solutions.

For and on behalf of

Contaminated Land Solutions Pty Ltd

Dr David Tully CEnvP SC
Director

Contaminated Land Solutions Pty Ltd



Contaminated Land Solutions Pty Ltd
10 Heath Road
Crafrers West SA 5152
0410 012 292

david.tully@contaminatedlandsolutions.com.au