

St Vincent's Foundation Pty Ltd

Geotechnical Site Classification

Proposed Residential Subdivision

Stage 1, Precinct B, Rainbow Beach, Ocean Drive, Lake Cathie

Report No. RGS20337.1-CF

22 February 2022



RGS20337.1-CF

22 February 2022

St Vincent's Foundation Pty Ltd
c/ King & Campbell Pty Ltd
PO Box 243
PORT MACQUARIE NSW 2444

Attention: Scott Marchant

Dear Scott,

RE: Proposed Residential Subdivision – Stage 1, Precinct B, Rainbow Beach, Ocean Drive, Lake Cathie

Geotechnical Site Classification

As requested, Regional Geotechnical Solutions Pty Ltd (RGS) has undertaken a geotechnical a site classification in accordance with AS2870-2011 *Residential Slabs and Footings* for the 38 proposed residential lots located in Stage 1 of Precinct B, Rainbow Beach, Ocean Drive, Lake Cathie. Stage 1 of Precinct B comprises Lot No's 200 to 237 as shown on the supplied plan titled "ROADWORKS AND DRAINAGE PLAN 01".

Based on the existing profiles encountered at the time of the field investigations and on the basis that all fill present was placed under Level One Inspection and Testing as defined in AS3798-2007, the building areas within the lots present would be classified as **Class S** (Slightly Reactive), **Class M** (Moderately Reactive) or **Class P**, in accordance with AS2870-2011 as detailed in the attached 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



Tim Morris

Associate Engineering Geologist



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1 INTRODUCTION

Regional Geotechnical Solutions Pty Ltd has undertaken a geotechnical site classification in accordance with AS2870-2011 *Residential Slabs and Footings* for the 38 proposed residential lots in Stage 1 of Precinct B, Rainbow Beach, Ocean Drive, Lake Cathie. Stage 1 of Precinct B comprises Lot No's 200 to 237 as shown on Figure 1.

The majority of the residential lots have been modified by site regrading works comprising up to approximately 5m cut, or, placement of up to approximately 1.0m of mixed clay and gravel fill. The approximate extent of lot filling works for Stage 1 is shown on Figure 2.

Filling works was undertaken by Kazac Civil Pty Ltd, with Level One Inspection and Testing of the works undertaken by AC Testing Services Pty Ltd on behalf of RGS. The Level 1 Report was prepared by RGS (Report Ref: RGS20337.1-BW, dated 19 October 2021).

The work was commissioned by Scott Marchant on behalf of King & Campbell Pty Ltd and was undertaken in accordance with proposal number RGS20337.1-BR dated 31 August 2020.

2 METHODOLOGY

Field work for the assessment was undertaken on 29 October and 10 November 2021 and was based on the supplied drawing titled "ROADWORKS AND DRAINAGE PLAN 01". Fieldwork was undertaken by an Engineering Geologist and a Geotechnical Engineer from RGS and included:

- Observation of site features and surrounding features relevant to the geotechnical conditions of the site;
- 20 boreholes undertaken by a 4WD mounted drilling rig logged and sampled by an Engineering Geologist; and
- U50 tube samples collected from soil horizons considered representative of cohesive soil profiles.

Engineering logs of the boreholes are presented in Appendix A. Investigation locations are shown on Figure 1 and were obtained by approximate measurements to prominent site features. Coordinates of investigation locations were recorded using a handheld GPS and the coordinates are shown on the engineering logs. Reduced levels at the borehole locations were estimated from the supplied drawings and are shown on the engineering logs.

3 LABORATORY TESTING

Samples considered representative of foundation soils were submitted to a NATA accredited laboratory for the measurement of soil volume change over an extreme range of moisture content (shrink / swell index) on six U50 samples. Results are presented in Appendix B and summarised in Table 1. Atterberg's Limits testing was undertaken on one sample that crumbled during extraction from the U50 tube.



Table 1: Laboratory Testing Summary

Location	Depth (m)	Lot	Material	Shrink Swell Index (%)	Linear Shrinkage (%)	Plasticity Index (%)
BH401	0.6 – 0.8	200/201	Residual: Sandy CLAY, dark grey	-	11	26*
BH403	0.3 – 0.5	204/205	EW DOLERITE	2.7	-	-
BH405	0.5 – 0.8	209/210	Residual: CLAY, yellow	2.1	-	-
BH407	0.2 – 0.4	214/215	Colluvial: Gravelly Sandy CLAY, red	0.9	-	-
BH408	0.6 – 0.9	223/224	Residual: CLAY, yellow	3.4	--	--
BH410	0.3 – 0.5	232/233	FILL: Crushed Rock	-	-	23
BH413	0.3 – 0.8	221/222	Residual: CLAY, yellow	3.5	--	--
BH420	0.4 – 0.9	227	FILL: Silty Sandy CLAY	1.6	--	--

Note: * Atterberg Limits testing undertaken on U50 sample that crumbled upon extraction

Particle Size Distribution (PSD) and Atterberg's Limits testing was undertaken on a bulk sample of the over-excavated and replaced material from BH410. Results are presented in Appendix B and summarised in Table 2.

Table 2: Laboratory Testing Summary

Particle Size Distribution % Passing	BH410: 0.3 – 0.5m Lot 232/233
Passing 19 mm (%)	98
Passing 6.7 mm (%)	76
Passing 2.36 mm (%)	59
Passing 0.6 mm (%)	44
Passing 0.425 mm (%)	41
Passing 0.3 mm (%)	39
Passing 75 µm (%)	31
Material*	Clayey Sandy GRAVEL with medium plasticity fines

Note: * Classification from AS1726 – 2017 Geotechnical Site Investigations.



4 SITE CONDITIONS

4.1 Surface Conditions

Stage 1 of Precinct B is located in the Rainbow Beach Residential Subdivision and is situated in an area of moderately undulated terrain on the crest and south-west facing upper slopes of a broad rounded southeast plunging ridgeline. Surface elevations range from 23.5 m AHD at the crest of the ridge in the north-east corner to approximately 11.5 m AHD in the south-west corner at the completion of site regrading works. Surface slopes range from 2 – 8° across the site with a convex profile fall to the south-west.

An image of the site taken from Google Earth that shows the location of the site and the site setting is reproduced in Plate 1.



Plate 1: Satellite image dated July 2021 obtained from Google Earth that illustrates the site location and setting. The approximate site boundaries are outlined in red. Stage 1 was modified by site regrading earthworks including cut of up to 5m and fill of up to 1m.

The regrading works have included areas of cut, placement of fill and construction of retaining walls. High strength rock was exposed at design earthworks level in Lot No's 231 to 237 and these lots were subsequently over-excavated using a D11 bulldozer in combination with a large excavator mounted hydraulic rock hammer to approximately 1000 mm below design surface level and the excavated material then replaced with a blend of site won crushed rock to finish level.

Lots 216 to 223 on the west facing slopes have been cut into residual soils and extremely to highly weathered rock, to terrace the sloping terrain with a continuous retaining wall, up to approximately



1.5m in height to retain the cut. The retaining wall comprised metal posts and concrete sleepers. Lot No's 224 to 230 on the upside of the retaining wall were backfilled with blended clay and weathered rock fill.

Lot filling works were undertaken under Level One inspection and monitoring as defined in AS3798-2007 *Guidelines on Earthworks for Commercial and Residential Developments* by AC Testing Services Pty Ltd. The Level 1 Report was prepared by RGS (Report Ref: RGS20337.1-BW, dated 19 October 2021). The approximate extent of earthworks is shown on Figure 2, based on the supplied drawing titled "Total Cut Fill BC".

Drainage of the site would be via a combination of overland flow, surface infiltration and collected stormwater through kerb and gutter drainage in roadways.

Typical site photographs are presented below.



Replaced crushed rock fill in over-excavation area in Lot No's 231 to 237.



Looking east towards the continuous retaining wall across Lot No's 216 to 223.



D11 bulldozer ripping weathered rock in over-excavation area.



Bands of high strength rock in over-excavation area being broken up by hydraulic rock hammer.



4.2 Subsurface Conditions

The site is situated in an area underlain by undifferentiated rocks of the Watonga Formation which can include slate, chert, mudstone and the intrusive Karikeree Meta-dolerite.

RGS has previously undertaken geotechnical assessments of the site, including Report RGS20337.1-AR, dated 1 June 2018 and Report RGS20337.1-BE, dated 26 March 2019. The previous investigations were undertaken prior to bulk earthworks and encountered variable profiles with colluvial clays overlying high plasticity residual clay grading into extremely weathered to fresh meta-dolerite rock in areas of proposed deep excavations.

The materials encountered during the investigation are summarised in Table 2 and 3. Further details are presented on the engineering logs in Appendix B.

Table 3: Summary of Geotechnical Units

Unit	Material	Material Description
UNIT 1A	TOPSOIL/ FILL	Sandy SILT to Clayey SAND, low plasticity, dark brown
UNIT 1B	FILL – GRAVEL	Clayey GRAVEL, fine to coarse grained, pale brown / brown / grey, with fine to coarse sand and trace to some cobbles
UNIT 1C	FILL – CLAY	Sandy to Sandy Gravelly CLAY, medium plasticity, mixed brown/grey/yellow, traces of gravel, very stiff
UNIT 2	TOPSOIL	Clayey SILT, low plasticity, dark brown / black
UNIT 3	COLLUVIAL	Gravelly Sandy CLAY, medium plasticity, red/brown, gravel fine to medium grained, subrounded, friable
UNIT 4A	RESIDUAL, grey	Sandy CLAY, medium to high plasticity, dark green/dark grey, traces of gravel, fine to medium grained, subangular, very stiff
UNIT 4B	RESIDUAL, yellow	Silty CLAY to CLAY, medium to high plasticity, yellow with grey mottling, stiff, firm when saturated
UNIT 5A	EW DOLERTITE	Gravelly Sandy Clay to Sandy CLAY, medium plasticity, pale brown/pale yellow, traces of rock fabric, gravel is fine to medium grained, subangular dolerite, very stiff
UNIT 5B	HW – MW DOLERITE	DOLERITE, fine to medium grained, pale brown, inferred low to very low strength. Recovered as Sandy GRAVEL



Table 4: Summary of Subsurface Profiles - Depth to Base of Material Layer (m)

BH	Lot	Unit 1A Topsoil	Unit 1B Fill - Gravel	Unit 1C Fill - Clay	UNIT 2 Topsoil	UNIT 3 Colluvial	UNIT 4A Residual (Grey)	UNIT 4B Residual (Yellow)	UNIT 5A EW Dolerite	UNIT 5B HW - MW Dolerite
401	200/201	--	0.0 – 0.1	0.1 – 0.35	0.35 – 0.4	0.4 – 0.6	0.6 – 1.0	--	--	1.0 ≥ 1.3*
402	202/203	0.0 – 0.05	--	--	--	0.05 – 0.3	--	--	0.3 – 0.5	0.5 ≥ 1.0*
403	204/205	0.0 – 0.15	--	--	--	--	--	--	0.15 ≥ 0.6*	--
404	206/207	0.0 – 0.1	--	--	--	--	--	--	0.1 – 0.5	0.5 ≥ 1.1*
405	209/210	0.0 – 0.1	--	--	--	0.1 – 0.5	--	0.5 ≥ 1.5	--	--
406	212/213	0.0 – 0.4	--	--	--	0.4 – 0.7	--	0.7 ≥ 1.5	--	--
407	214/215	0.0 – 0.2	--	--	--	0.2 – 1.0	--	1.0 ≥ 1.5	--	--
408	223/224	--	0.0 – 0.1	0.1 – 0.6	--	--	--	0.6 – 0.95	0.95 – 1.2	1.2 ≥ 1.8
409	231	--	0.2 ≥ 1.3*	0.0 – 0.2	--	--	--	--	--	--
410	232/233	--	0.25 ≥ 0.9*	0.0 – 0.25	--	--	--	--	--	--
411	234/235	--	0.0 ≥ 0.8^	--	--	--	--	--	--	--
412	237	--	0.0 ≥ 0.7^	--	--	--	--	--	--	--
413	221/222	0.0 – 0.15	--	0.15 – 0.3	--	--	--	0.3 – 0.8	0.8 – 0.9	0.9 ≥ 1.8
414	219/220	--	0.0 – 0.25	--	--	--	--	--	--	0.25 ≥ 0.7*
415	216	--	--	0.0 – 0.3	--	--	--	--	0.3 – 0.4	0.4 ≥ 1.4*
416	217/218	--	--	0.0 – 0.35	--	--	--	--	--	0.35 ≥ 0.7*
417	225	--	0.0 – 0.25	0.25 – 0.5	--	--	0.5 – 0.65	--	0.65 – 0.8	0.8 ≥ 1.6*



BH	Lot	Unit 1A Topsoil	Unit 1B Fill - Gravel	Unit 1C Fill - Clay	UNIT 2 Topsoil	UNIT 3 Colluvial	UNIT 4A Residual (Grey)	UNIT 4B Residual (Yellow)	UNIT 5A EW Dolerite	UNIT 5B HW - MW Dolerite
418	227/228	--	0.0 - 0.9	--	--	--	0.9 - 1.1	--	--	1.1 ≥ 1.3*
419	229/230	0.0 - 0.35	--	0.35 - 0.4	--	--	--	--	--	0.4 ≥ 0.5*
420	227	0.0 - 0.4	--	0.4 - 0.9	--	0.9 - 1.1	--	1.1 ≥ 1.5	--	--

Note: ≥ Indicates that base of material layer was not encountered
 * Indicates that the test was terminated due to practical refusal on rock
 ^ Indicates that the test was terminated due to practical refusal on gravel/ cobbles within fill
 -- Indicates that the material was not encountered at the test location



Groundwater not encountered within boreholes. It should be noted that fluctuations in groundwater levels can occur as a result of seasonal variations, temperature, rainfall and other similar factors, the influence of which may not have been apparent at the time of the assessment

5 SITE CLASSIFICATION

For structures or components that are similar in construction, performance expectation, and loading to a typical domestic structure, the guidance provided in AS2870-2011 “Residential Slabs and Footings” would be appropriate.

In assessing the estimated characteristic surface movement (y_s) values the following has been adopted:

- All clay and gravel fill of > 0.4 m thickness was placed under Level 1 Inspection and Testing as defined in AS3798-2007, and can therefore be considered as Controlled Fill;
- Where there was cut undertaken the depth of cracked zone was reduced by the depth of cut;
- Suction change at ground surface of pf 1.2;
- Depth of suction change of 1.5m;
- Characteristic I_{ss} for residual yellow clay of 3.5% based on laboratory testing and previous experience with similar soils;
- Characteristic I_{ss} for residual dark grey / dark green clay of 2.7%;
- Characteristic I_{ss} for colluvial clay of 1.5% based on laboratory testing and previous experience with similar soils;
- Characteristic I_{ss} for clay fill of 1.6%;
- Characteristic I_{ss} for mixed gravel fill of 0.5%; and
- Highly weathered rock was encountered at depths ranging from 0.4 m to 1.5m.

The proposed building area for Lots 223 – 229 and Lots 231 - 237 as shown on Figure 1 have been modified by filling works of >0.4m thickness. These lots are classified as Class P in accordance with AS2870-2011, Clause 2.5.3 Section (a) due to the presence of fill >0.4 m, requiring footings to be designed in accordance with engineering principles.

The building area for these lots modified by filling works undertaken under Level 1 supervision have been reclassified as summarised in Table 4 in accordance with Clause 2.5.3 Section C of AS2870-2011, based on the existing profile at the time of field investigation, the properties of the Controlled Fill that was placed under Level 1 supervision as defined by AS3798-2007, the properties of the underlying natural profile and the estimated surface movement (y_s).

The site classifications and expected shrink-swell related characteristic free surface movements (y_s) estimated for the profiles encountered during the field investigation in the building areas in each lot are summarised in Table 4.



Table 5: Site Re-classification Summary

Lots	Site Classification	Site Re-classification	Expected Surface Movement (mm)
200 to 208	M	M	20 – 30mm
209 to 222	M	M	30 – 40mm
223 to 230	P (Controlled Fill - Mixed)	M	30 – 40mm
231 to 237	P (Controlled Fill – Crushed Rock)	S	<20mm

6 CONSTRUCTION AND SITE MAINTENANCE CONSIDERATIONS

All structural footings should be founded as follows:

- All footings should be founded in Controlled Fill, colluvial, residual soils or highly weathered rock below all topsoil and uncontrolled fill materials;
- Footings can be designed on the basis of a maximum allowable base bearing pressure of **100 kPa** for footings founded within the Controlled Fill, colluvial, residual soils or extremely weathered rock of at least very stiff strength;
- Footings founded within highly weathered rock (Unit 5B) can be designed on the basis of a maximum allowable base bearing pressure of **300 kPa**;
- All footings, edge beams and internal beams should be entirely founded on similar material and outside or below the zones of influence resulting from existing or future service trenches and other subsurface structures;
- The engineering design for the retaining walls present allows for any surcharge affecting the walls such as proposed footings, structures or sloping surfaces;
- Future earthworks may result in parts of some buildings being founded on weathered rock and other parts on residual clays or placed fill. Should differential shrink-swell related movements be of concern for the proposed dwelling it is recommended that all footings be deepened to found uniformly on the weathered rock profile;
- The soils in the Port Macquarie area, particularly the yellow residual clays (Unit 4B) are prone to fretting and softening on exposure to air and water. It is therefore recommended that concrete be poured as soon as possible after footing excavation. In the event that wet weather occurs prior to pouring of concrete, the base of footing excavations should be checked for the presence of loose or softened material, which should be removed prior to pouring concrete; and
- Prior to the placement of concrete we recommend that footings be observed and assessed by a suitably experienced geotechnical engineer to assess that the correct founding material has been achieved.

Where lot filling works are proposed, all fill for the support of structures should be placed and compacted in accordance with the recommendations outlined in AS3798-2007 *Guidelines on Earthworks for Residential and Commercial Developments*, under Level 1 supervision, for it to be considered Controlled Fill as defined in AS2870-2011. The founding of structures on fill that is not placed in accordance with Level 1 requirements is not recommended.



Site maintenance must comply with the recommendations and advice provided in CSIRO Sheet BTF18 "*Foundation Maintenance and Footing Performance: A Homeowners Guide*" a copy of which is available from the CSIRO website <http://www.publish.csiro.au/pid/7076.htm>

Shrink-swell related movements can be affected by alterations to the soil profile by cutting and filling, and by the suction related effects of trees close to the building area. The effects of any such cutting, filling or tree planting should be taken into account when selecting design values for differential movement across the building.

If further site regarding works are undertaken at the site, reclassification may be required once final cut and fill depths and fill material types are known.

7 LIMITATIONS

This report comprises the results of an investigation carried out for a specific purpose and client as defined in the document. The report should not be used by other parties or for purposes or projects other than those assumed and stated within the report, as it may not contain adequate or appropriate information for applications other than those assumed or advised at the time of its preparation. The contents of the report are for the sole use of the client and no responsibility or liability will be accepted to any third party. The report should not be reproduced either in part or in full, without the express permission of Regional Geotechnical Solutions Pty Ltd.

Geotechnical site investigation is based on data collection, judgment, experience, and opinion. By its nature, it is less exact than other engineering disciplines. The findings presented in this report and used as the basis for the recommendations presented herein were obtained using normal, industry accepted geotechnical 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.

The recommended depth and properties of any soil, rock, groundwater, or other material referred to in this report is an engineering estimate based on the information available at the time of its writing. The estimate is influenced and limited by the fieldwork method and testing carried out in the site investigation, and other relevant information as has been made available. In cases where information has been provided to Regional Geotechnical Solutions for the purposes of preparing this report it has been assumed that the information is accurate and appropriate for such use. No responsibility is accepted by Regional Geotechnical Solutions for inaccuracies within any data supplied by others.

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**

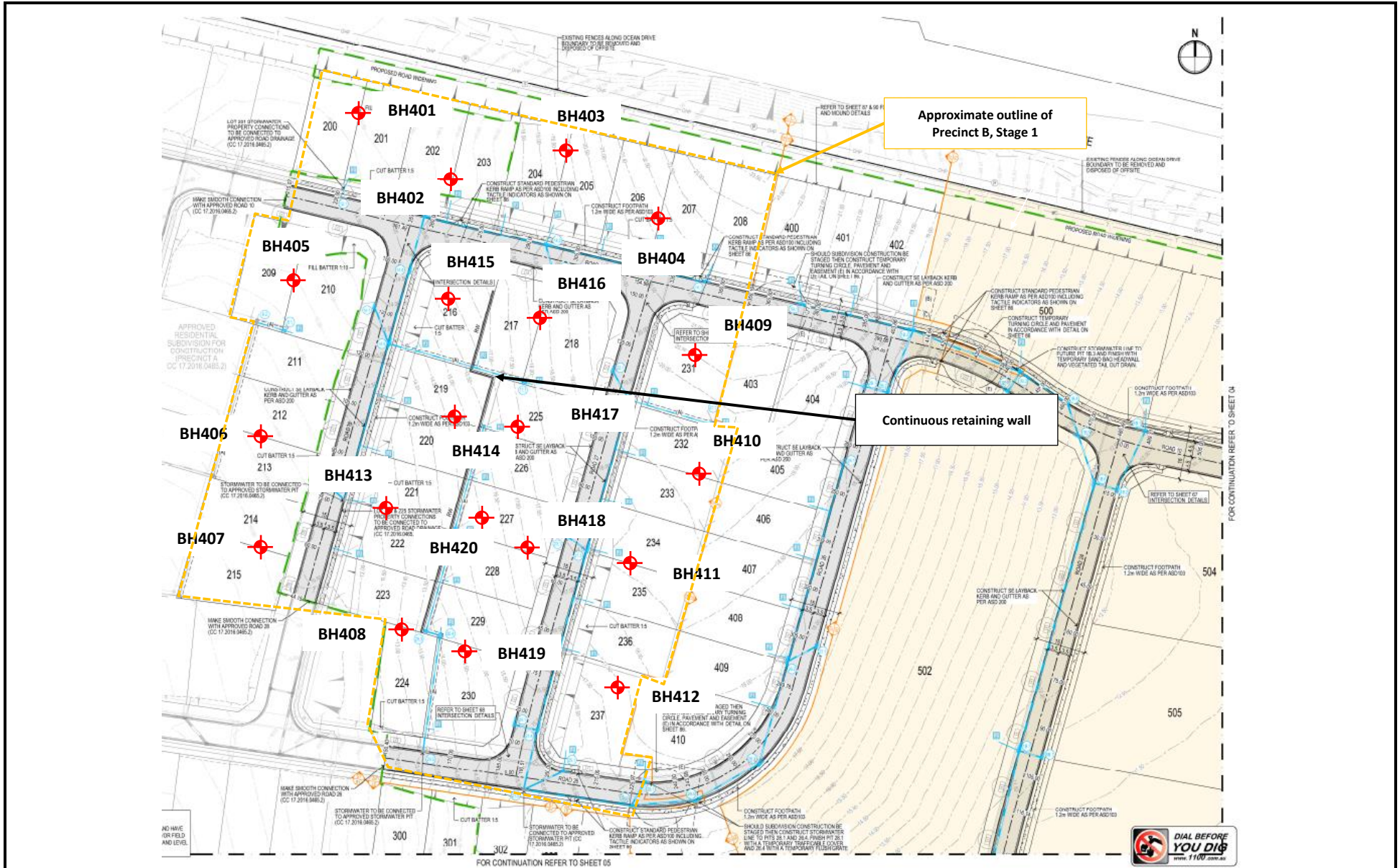
Prepared by

Tim Morris

Associate Engineering Geologist

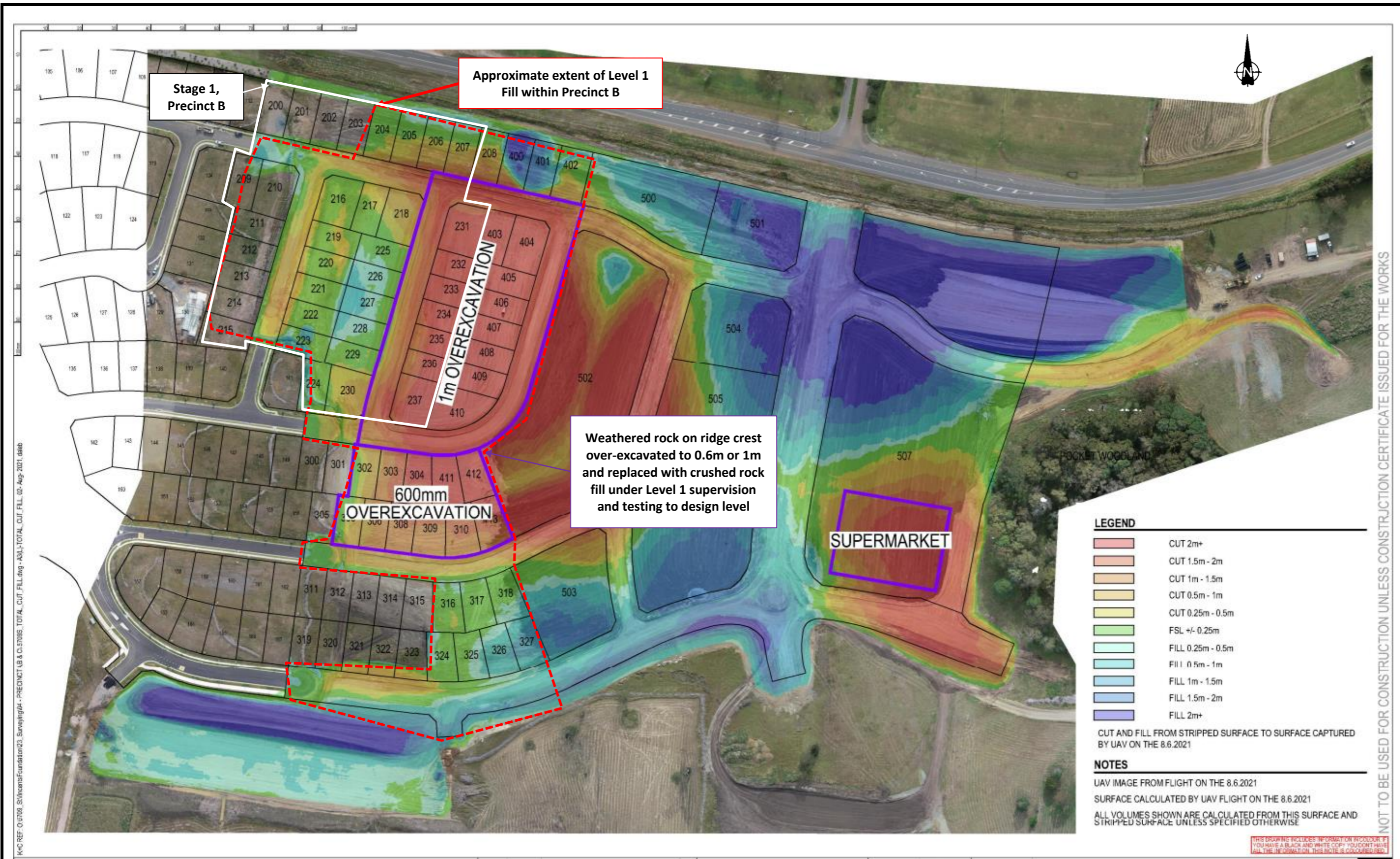


Figures



Based on supplied drawing titled " ROAD WORKS AND DRAINAGE PLAN "

	Client:	KING & CAMPBELL	Job No.:	RGS20337.1
	Project:	STAGE 1, PRECINCT B SITE CLASSIFICATION	Drawn By:	DS
	Title:	RAINBOW BEACH ESTATE INVESTIGATION PLAN	Scale:	NTS
			Date:	13-Dec-21
			Figure No.:	1



Based on supplied drawing titled " TOTAL CUT FILL BC "

	Client:	KING & CAMPBELL	Job No.	RGS20337.1
	Project:	STAGE 1, PRECINCT B SITE CLASSIFICATION	Drawn By:	TM
	Title:	RAINBOW BEACH ESTATE EXTENT OF LEVEL 1 FILLING	Scale:	NTS
			Date:	13-Dec-21
			Figure No.	2



Appendix A

Results of Field Investigations



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH401**






CLIENT: King & Campbell
 PROJECT NAME: Proposed Residential Subdivision
 SITE LOCATION: Precinct B, Stage 1 Rainbow Beach
 TEST LOCATION: Lot 200/201

PAGE: 1 of 1
 JOB NO: RGS20337.1
 LOGGED BY: GC
 DATE: 29/10/21

DRILL TYPE: RGS 4WD Mounted Drill Rig EASTING: 483927 m SURFACE RL: 14.5 m
 BOREHOLE DIAMETER: 120 mm INCLINATION: 90° NORTHING: 6507535 m DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result	
AD/TC	Not Encountered	U50	14.0	0.5		GP	FILL: Sandy GRAVEL, fine to medium grained, subangular, grey	D		HP	250	FILL-GRAVEL	
						CH	FILL: Sandy CLAY, medium plasticity, mixed brown/grey/yellow, traces of gravel	M < Wp	Fb / VSt			FILL-CLAY	
						MH	TOPSOIL: Clayey SILT	D				TOPSOIL	
						CH	Gravelly Sandy CLAY: Medium plasticity, red/brown, gravel fine to medium grained, subrounded	M < Wp	Fb			COLLUVIAL	
						CH	Sandy CLAY: Medium to high plasticity, dark green/dark grey, traces of gravel, fine to medium grained, subangular	Fb / VSt				RESIDUAL	
			13.5	1.0			DOLERITE: Fine to medium grained, pale brown, inferred low to very low strength. Recovered as Sandy GRAVEL					HIGHLY TO MODERATELY WEATHERED DOLERITE	
			13.0	1.5			Hole Terminated at 1.30 m Refusal due to Rock						

RG.LIB.1.05.0.GLB. Log_RG_NON-CORED BOREHOLE - TEST PIT_RGS20337.1_BH401-420 PRECINCT B.LOGS.GPJ <-DrawingFile>> 22/02/2022 11:20 10.03.00.09 D:\gel Lab and In Situ Tool

LEGEND: Water  Water Level (Date and time shown)  Water Inflow  Water Outflow Strata Changes  Gradational or transitional strata  Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose Density Index <15% L Loose Density Index 15 - 35% MD Medium Dense Density Index 35 - 65% D Dense Density Index 65 - 85% VD Very Dense Density Index 85 - 100%		



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH402**

CLIENT: King & Campbell
 PROJECT NAME: Proposed Residential Subdivision
 SITE LOCATION: Precinct B, Stage 1 Rainbow Beach
 TEST LOCATION: Lot 202/203

PAGE: 1 of 1
 JOB NO: RGS20337.1
 LOGGED BY: GC
 DATE: 29/10/21

DRILL TYPE: RGS 4WD Mounted Drill Rig EASTING: 483954 m SURFACE RL: 17.0 m
 BOREHOLE DIAMETER: 120 mm INCLINATION: 90° NORTHING: 6507520 m DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result	
AD/TC	Not Encountered		16.5	0.5		SC	FILL: Clayey SAND, fine to medium grained, dark grey	D		HP	250	FILL/TOPSOIL	
						CH	Gravelly Sandy CLAY: Medium plasticity, red, fine to coarse grained and and gravel	M < Wp	Fb			COLLUVIAL	
						CH	Sandy CLAY: Medium plasticity, pale brown/pale yellow, traces of rock fabric, fine to medium grained sand	Fb / VSt				EXTREMELY WEATHERED DOLERITE	
							DOLERITE: Fine to medium grained, pale brown, inferred low to very low strength. Recovered as Sandy GRAVEL					HIGHLY TO MODERATELY WEATHERED DOLERITE	
			16.0	1.0			Hole Terminated at 1.00 m Refusal due to Rock						
			15.5	1.5									

RGS20337.1_BH401-420 PRECINCT B LOGS.GPJ - DrawingFile -> 22/02/2022 11:20 10.03.00.09 Datgel Lab and In Situ Tool

LEGEND: Water Water Level (Date and time shown) Water Inflow Water Outflow Strata Changes Gradational or transitional strata Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH403**

CLIENT: King & Campbell
 PROJECT NAME: Proposed Residential Subdivision
 SITE LOCATION: Precinct B, Stage 1 Rainbow Beach
 TEST LOCATION: Lot 204/205

PAGE: 1 of 1
 JOB NO: RGS20337.1
 LOGGED BY: GC
 DATE: 29/10/21

DRILL TYPE: RGS 4WD Mounted Drill Rig EASTING: 483988 m SURFACE RL: 20.0 m
 BOREHOLE DIAMETER: 120 mm INCLINATION: 90° NORTHING: 6507530 m DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
AD/TC	Not Encountered					SC	FILL: Sandy CLAY , low plasticity, dark grey	M < WP	Fb			FILL/TOPSOIL
		0.30m			CH	Gravelly Sandy CLAY : Medium plasticity, pale brown, traces of rock fabric, gravel is fine to medium grained, subangular dolerite	Fb / VSt					EXTREMELY WEATHERED DOLERITE
		U50	19.5	0.5						HP	220	
		0.50m								HP	250	
							Hole Terminated at 0.60 m Refusal due to Rock					
			19.0	1.0								
			18.5	1.5								

RGS20337.1.BH401-420.PRECINCT B.LOGS.GPJ -<DrawingFile>> 22/02/2022 11:20 10.03.00.09 D:\gel Lab and In Situ Tool

LEGEND: Water Water Level (Date and time shown) Water Inflow Water Outflow Strata Changes Gradational or transitional strata Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH404**

CLIENT: King & Campbell
 PROJECT NAME: Proposed Residential Subdivision
 SITE LOCATION: Precinct B, Stage 1 Rainbow Beach
 TEST LOCATION: Lot 206/207

PAGE: 1 of 1
 JOB NO: RGS20337.1
 LOGGED BY: GC
 DATE: 29/10/21

DRILL TYPE: RGS 4WD Mounted Drill Rig EASTING: 484017 m SURFACE RL: 21.5 m
 BOREHOLE DIAMETER: 120 mm INCLINATION: 90° NORTHING: 6507507 m DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
AD/TC	Not Encountered					CL	FILL: Sandy CLAY, low plasticity, dark grey	M < Wp	Fb	HP	180	FILL/TOPSOIL
					CH	Gravelly Sandy CLAY: Medium to high plasticity, pale brown, gravel fine to medium grained, subangular, dolerite, traces of rock fabric	Fb / VSt		EXTREMELY WEATHERED DOLERITE			
								DOLERITE: Fine to medium grained, pale brown, inferred low to very low strength. Recovered as Sandy GRAVEL			HIGHLY TO MODERATELY WEATHERED DOLERITE	
			21.0	0.5								
			20.5	1.0								
			20.0	1.5			Hole Terminated at 1.10 m Refusal due to Rock					

RGS20337.1.BH404-1420.PRECINCT B.LOGS.GPJ - Drawing File -> 22/02/2022 11:20 10.03.00.09 D:\gel\Lab and In Situ Tool

LEGEND: Water Water Level (Date and time shown) Water Inflow Water Outflow Strata Changes Gradational or transitional strata Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH405**

CLIENT: King & Campbell
 PROJECT NAME: Proposed Residential Subdivision
 SITE LOCATION: Precinct B, Stage 1 Rainbow Beach
 TEST LOCATION: Lot 209/210

PAGE: 1 of 1
 JOB NO: RGS20337.1
 LOGGED BY: GC
 DATE: 29/10/21

DRILL TYPE: RGS 4WD Mounted Drill Rig EASTING: 483909 m SURFACE RL: 13.0 m
 BOREHOLE DIAMETER: 120 mm INCLINATION: 90° NORTHING: 6507483 m DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
AD/TC	Not Encountered					SC	FILL: Clayey SAND, fine to medium grained, dark grey, traces of grass roots to 5mm					FILL/TOPSOIL
		0.50m	12.5	0.5		CH	Gravelly Sandy CLAY: Medium plasticity, red/dark brown, gravel fine grained, subrounded	M < W _p	Fb			COLLUVIAL
		U50				CH	CLAY: Medium to high plasticity, yellow with grey mottling	M > W _p	St	HP	180	RESIDUAL
		0.80m							HP	170		
			12.0	1.0					HP	200		
			11.5	1.5			Hole Terminated at 1.50 m					

RGS20337.1.BH401-420.PRECINCT B.LOGS.GPJ - DrawingFile -> 22/02/2022 11:20 10.03.00.09 D:\gel Lab and In Situ Tool

LEGEND: Water Water Level (Date and time shown) Water Inflow Water Outflow Strata Changes Gradational or transitional strata Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH406**

CLIENT: King & Campbell
 PROJECT NAME: Proposed Residential Subdivision
 SITE LOCATION: Precinct B, Stage 1 Rainbow Beach
 TEST LOCATION: Lot 212/213

PAGE: 1 of 1
 JOB NO: RGS20337.1
 LOGGED BY: GC
 DATE: 29/10/21

DRILL TYPE: RGS 4WD Mounted Drill Rig EASTING: 483901 m SURFACE RL: 11.0 m
 BOREHOLE DIAMETER: 120 mm INCLINATION: 90° NORTHING: 6507452 m DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
AD/TC	Not Encountered					SC	FILL: Sandy CLAY, low plasticity, dark grey, traces of grass roots to 5mm	M < Wp	Fb			FILL/TOPSOIL
			10.5	0.5		CH	Gravelly Sandy CLAY: Medium plasticity, red/brown, gravel fine grained, subangular	M > Wp				COLLUVIAL
			10.0	1.0		CH	CLAY: Medium to high plasticity, yellow with grey mottling		St	HP	180	RESIDUAL
										HP	170	
			9.5	1.5			Hole Terminated at 1.50 m			HP	190	

RG.LIB.1.05.0.GLB. Log_RG_NON-CORED BOREHOLE - TEST PIT_RGS20337.1_BH401-420 PRECINCT B.LOGS.GPJ -<DrawingFile>> 22/02/2022 11:20 10.03.00.09 Datagel Lab. and In Situ Tool

LEGEND: Water Water Level (Date and time shown) Water Inflow Water Outflow Strata Changes Gradational or transitional strata Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH407**

CLIENT: King & Campbell
 PROJECT NAME: Proposed Residential Subdivision
 SITE LOCATION: Precinct B, Stage 1 Rainbow Beach
 TEST LOCATION: Precinct B, Stage 1 Rainbow Beach

PAGE: 1 of 1
 JOB NO: RGS20337.1
 LOGGED BY: GC
 DATE: 29/10/21

DRILL TYPE: RGS 4WD Mounted Drill Rig EASTING: 483848 m SURFACE RL: 10.5 m
 BOREHOLE DIAMETER: 120 mm INCLINATION: 90° NORTHING: 6507414 m DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
AD/TC	Not Encountered	U50	10.0	0.20m		CL	FILL: Sandy CLAY, low plasticity, dark grey	M < Wp				FILL/TOPSOIL
				0.40m		CH	Gravelly Sandy CLAY: Medium plasticity, red, gravel fine grained, subrounded, ironstone	M > Wp	Fb / St	HP 190	COLLUVIAL	
						CH	CLAY: Medium to high plasticity, yellow with grey mottling			HP 150	RESIDUAL	
						CH	CLAY: Medium to high plasticity, yellow with grey mottling			HP 170		
			9.0	1.50m			Hole Terminated at 1.50 m					

RGS20337.1_BH407-1420_PRECINCT B LOGS.GPJ - Drawing File -> 22/02/2022 11:20 10.03.00.09 Datagel Lab and In Situ Tool

LEGEND: Water Water Level (Date and time shown) Water Inflow Water Outflow Strata Changes Gradational or transitional strata Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH408**

CLIENT: King & Campbell
 PROJECT NAME: Proposed Residential Subdivision
 SITE LOCATION: Precinct B, Stage 1 Rainbow Beach
 TEST LOCATION: Lot 223/224

PAGE: 1 of 1
 JOB NO: RGS20337.1
 LOGGED BY: DS
 DATE: 10/11/21

DRILL TYPE: RGS 4WD Mounted Drill Rig EASTING: 483939 m SURFACE RL: 13.0 m
 BOREHOLE DIAMETER: 100 mm INCLINATION: 90° NORTHING: 6507383 m DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result	
AD/TC	Not Encountered	U50	12.5	0.5		CL	FILL: Gravelly CLAY, low plasticity, pale brown, fine to coarse crushed rock					FILL	
						CI	FILL: Gravelly Sandy CLAY, medium plasticity, red/brown, fine to coarse grained gravel, becoming pale brown with depth, fine to coarse grained sand	M < Wp	VSt				
								M < Wp		HP	280		
									St / Fb				
								M > Wp	VSt	HP	100	RESIDUAL	
		0.90m	12.0	1.0		CH	Silty CLAY: High plasticity, yellow	M > Wp	VSt	HP	110		
			12.0	1.0		CI	Sandy CLAY: Medium plasticity, pale brown foliated with pale grey, fine to medium grained sand, grading to highly weathered rock	M ~ Wp					EXTREMELY WEATHERED DOLERITE
			11.5	1.5			DOLERITE: Highly weathered, fine to medium grained, inferred low strength						HIGHLY WEATHERED DOLERITE
							Hole Terminated at 1.80 m						

RGS20337.1.BH401-420.PRECINCT B.LOGS.GPJ - Drawing File -> 22/02/2022 11:20 10.03.00.09 D:\gel\Lab and In Situ Tool

LEGEND: Water Water Level (Date and time shown) Water Inflow Water Outflow Strata Changes Gradational or transitional strata Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit	
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%		



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH409**

CLIENT: King & Campbell
 PROJECT NAME: Proposed Residential Subdivision
 SITE LOCATION: Precinct B, Stage 1 Rainbow Beach
 TEST LOCATION: Lot 231

PAGE: 1 of 1
 JOB NO: RGS20337.1
 LOGGED BY: RW
 DATE: 10/11/21

DRILL TYPE: RGS 4WD Mounted Drill Rig EASTING: SURFACE RL: 20.5 m
 BOREHOLE DIAMETER: 100 mm INCLINATION: 90° NORTHING: DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result	
AD/TC	Not Encountered		20.0	0.5		CH	FILL: Gravelly CLAY, medium to high plasticity, pale orange-brown/grey, gravel, fine to coarse grained, trace of sand, fine to medium grained	M > Wp	VSt	HP	250	FILL	
						GC	FILL: Clayey GRAVEL, fine to coarse grained, pale brown/brown/grey, with some sand, fine to coarse grained	M	VD				
			19.5	1.0									
			19.0	1.5			Hole Terminated at 1.30 m Refusal on Weathered Rock						

RG.LIB.1.05.0.GLB. Log_RG_NON-CORED BOREHOLE - TEST PIT_RGS20337.1_BH401-420 PRECINCT B.LOGS.GPJ <-DrawingFile>> 22/02/2022 11:20 10.03.00.09 Datgel Lab and In Situ Tool

LEGEND: Water Water Level (Date and time shown) Water Inflow Water Outflow Strata Changes Gradational or transitional strata Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH410**

CLIENT: King & Campbell
 PROJECT NAME: Proposed Residential Subdivision
 SITE LOCATION: Precinct B, Stage 1 Rainbow Beach
 TEST LOCATION: Lot 232/233

PAGE: 1 of 1
 JOB NO: RGS20337.1
 LOGGED BY: RW
 DATE: 10/11/21

DRILL TYPE: RGS 4WD Mounted Drill Rig EASTING: 483939 m SURFACE RL: 19.3 m
 BOREHOLE DIAMETER: 100 mm INCLINATION: 90° NORTHING: 6507383 m DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result	
AD/TC	Not Encountered	B	19.0	0.30m	[Cross-hatched pattern]	CH	FILL: Gravelly CLAY, high plasticity, pale orange/pale orange-brown, gravel, fine to coarse grained, trace of sand, fine to medium grained	M > WP	VSt	HP	220	FILL	
						GC	FILL: Clayey GRAVEL, fine to coarse grained, pale brown/brown/grey, with some sand, fine to coarse grained	M	VD				
			18.5	0.5									
			17.5	0.90m			Hole Terminated at 0.90 m Refusal on Weathered Rock						

RG.LIB.1.05.0.GLB.Log.RG.NON-CORED.BOREHOLE-TEST.PIT.RGS20337.1.BH401-420.PRECINCT.B.LOGS.GPJ <-DrawingFile>> 22/02/2022 11:20 10.03.00.09 Dajgel Lab. and In Situ Tool

LEGEND: Water Water Level (Date and time shown) Water Inflow Water Outflow Strata Changes Gradational or transitional strata Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH411**

CLIENT: King & Campbell
 PROJECT NAME: Proposed Residential Subdivision
 SITE LOCATION: Precinct B, Stage 1 Rainbow Beach
 TEST LOCATION: Lot 234/235

PAGE: 1 of 1
 JOB NO: RGS20337.1
 LOGGED BY: RW
 DATE: 10/11/21

DRILL TYPE: RGS 4WD Mounted Drill Rig EASTING: SURFACE RL: 18.5 m
 BOREHOLE DIAMETER: 100 mm INCLINATION: 90° NORTHING: 6507394 m DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
AD/TC	Not Encountered		18.0	0.5		GC	FILL: Clayey GRAVEL, fine to coarse grained, pale brown/brown/grey, with some sand, fine to coarse grained, trace of cobbles and boulders	M	VD			FILL Boulders around 200mm diameter
			17.5	1.0		GC	FILL: Clayey GRAVEL, fine to coarse grained, brown, with some sand, fine to medium grained					
			17.0	1.5			Hole Terminated at 0.80 m Refusal on rock fill					

RGS20337.1_BH411-420 PRECINCT B LOGS.GPJ <-DrawingFile>> 22/02/2022 11:20 10.03.00.09 Dajgel Lab. and In Situ Tool

LEGEND: Water Water Level (Date and time shown) Water Inflow Water Outflow Strata Changes Gradational or transitional strata Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH412**

CLIENT: King & Campbell
 PROJECT NAME: Proposed Residential Subdivision
 SITE LOCATION: Precinct B, Stage 1 Rainbow Beach
 TEST LOCATION: Lot 237

PAGE: 1 of 1
 JOB NO: RGS20337.1
 LOGGED BY: RW
 DATE: 10/11/21

DRILL TYPE: RGS 4WD Mounted Drill Rig EASTING: SURFACE RL: 17.0 m
 BOREHOLE DIAMETER: 100 mm INCLINATION: 90° NORTHING: 6507359 m DATUM: AHD

Drilling and Sampling				Material description and profile information						Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
AD/TC	Not Encountered		16.5	0.5		GC	FILL: Clayey GRAVEL, fine to coarse grained, brown/pale brown/grey, with some sand, fine to coarse grained, trace of cobbles	M	D - VD			FILL
						GC	FILL: Clayey GRAVEL, fine to coarse grained, brown, with some sand, fine to medium grained		VD			
			16.0	1.0			Hole Terminated at 0.70 m Refusal on rock fill					
			15.5	1.5								

RGS20337.1_BH412-420 PRECINCT B LOGS.GPJ -<DrawingFile>> 22/02/2022 11:20 10.03.00.09 D:\gel\Lab and In Situ Tool

LEGEND: Water Water Level (Date and time shown) Water Inflow Water Outflow Strata Changes Gradational or transitional strata Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	




ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH413**






CLIENT: King & Campbell
 PROJECT NAME: Proposed Residential Subdivision
 SITE LOCATION: Precinct B, Stage 1 Rainbow Beach
 TEST LOCATION: Lot 221/222

PAGE: 1 of 1
 JOB NO: RGS20337.1
 LOGGED BY: DS
 DATE: 10/11/21

DRILL TYPE: RGS 4WD Mounted Drill Rig EASTING: 483936 m SURFACE RL: 12.5 m
 BOREHOLE DIAMETER: 100 mm INCLINATION: 90° NORTHING: 6507417 m DATUM: AHD

Drilling and Sampling				Material description and profile information						Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result		
AD/TC	Not Encountered	U50	12.0	0.5		ML	FILL: Sandy SILT, low plasticity, dark brown, with fine to coarse grained sand, with fine to medium gravel	M ~ WP				FILL	
						0.15m	CI	FILL: Sandy CLAY, medium plasticity, red/brown/orange, fine to medium grained sand	M > WP	St	HP	200	RESIDUAL
						0.30m	CH	Silty CLAY: High plasticity, pale brown/yellow foliated with pale grey, trace fine to medium grained, subrounded gravel		VSt	HP	380	
											HP	200	
											HP	250	
						0.80m	CI	Sandy CLAY: Medium plasticity, pale brown, fine to medium grained sand	M ~ WP	St - VSt		EXTREMELY WEATHERED DOLERITE	
			11.5	1.0			DOLERITE: Highly weathered, fine to coarse grained, inferred low strength				HIGHLY WEATHERED DOLERITE		
			11.0	1.5									
							Hole Terminated at 1.80 m						

RGS20337.1.BH401-420.PRECINCT B.LOGS.GPJ - Drawing File -> 22/02/2022 11:20 10.03.00.09 Dalgel Lab. and In Situ Tool

LEGEND: Water  Water Level (Date and time shown)  Water Inflow  Water Outflow Strata Changes  Gradational or transitional strata  Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit	
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%		



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH414**

CLIENT: King & Campbell
 PROJECT NAME: Proposed Residential Subdivision
 SITE LOCATION: Precinct B, Stage 1 Rainbow Beach
 TEST LOCATION: Lot 219/220

PAGE: 1 of 1
 JOB NO: RGS20337.1
 LOGGED BY: DS
 DATE: 10/11/21

DRILL TYPE: RGS 4WD Mounted Drill Rig EASTING: 483953 m SURFACE RL: 14.5 m
 BOREHOLE DIAMETER: 100 mm INCLINATION: 90° NORTHING: 6507446 m DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
AD/TC	Not Encountered					GP	FILL: Sandy GRAVEL, fine to coarse grained, pale brown/pale grey/brown, fine to coarse grained sand (crushed rock)	M	MD			FILL
			14.0	0.5			DOLERITE: Highly weathered, fine to coarse grained, pale brown, inferred low to medium strength					HIGHLY WEATHERED DOLERITE
			13.5	1.0			Hole Terminated at 0.70 m TC Bit refusal					
			13.0	1.5								

RG.LIB.1.05.0.GLB. Log_RG_NON-CORED BOREHOLE - TEST PIT_RGS20337.1.BH401-420.PRECINCT B.LOGS.GPJ <-DrawingFile>> 22/02/2022 11:20 10.03.00.09 D:\gel.Lab. and In Situ Tool

LEGEND: Water Water Level (Date and time shown) Water Inflow Water Outflow Strata Changes Gradational or transitional strata Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH415**

CLIENT: King & Campbell
 PROJECT NAME: Proposed Residential Subdivision
 SITE LOCATION: Precinct B, Stage 1 Rainbow Beach
 TEST LOCATION: Lot 216

PAGE: 1 of 1
 JOB NO: RGS20337.1
 LOGGED BY: DS
 DATE: 10/11/21

DRILL TYPE: RGS 4WD Mounted Drill Rig EASTING: 483947 m SURFACE RL: 15.5 m
 BOREHOLE DIAMETER: 100 mm INCLINATION: 90° NORTHING: 6507480 m DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
AD/TC	Not Encountered					CL	FILL: Silty Sandy CLAY, low plasticity, red/dark brown, fine to coarse grained sand					FILL
						CI	Sandy CLAY: Medium plasticity, pale brown/orange, fine to coarse grained sand, with fine to coarse grained, weathered inclusions grading sharply to highly weathered DOLERITE: Highly weathered, fine to coarse grained, pale brown, inferred low strength	M < w _p	VSt			EXTREMELY WEATHERED DOLERITE HIGHLY WEATHERED DOLERITE
			14.0	1.5			Hole Terminated at 1.40 m TC Bit refusal					

RGS20337.1.BH415-1420.PRECINCT B LOGS.GPJ - Drawing File -> 22/02/2022 11:20 10.03.00.09 D:\gel\Lab and In Situ Tool

LEGEND: Water Water Level (Date and time shown) Water Inflow Water Outflow Strata Changes Gradational or transitional strata Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH416**

CLIENT: King & Campbell
 PROJECT NAME: Proposed Residential Subdivision
 SITE LOCATION: Precinct B, Stage 1 Rainbow Beach
 TEST LOCATION: Lot 217/218

PAGE: 1 of 1
 JOB NO: RGS20337.1
 LOGGED BY: DS
 DATE: 10/11/21

DRILL TYPE: RGS 4WD Mounted Drill Rig EASTING: 483974 m SURFACE RL: 18.0 m
 BOREHOLE DIAMETER: 100 mm INCLINATION: 90° NORTHING: 6507475 m DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
AD/TC	Not Encountered					CL	FILL: Gravelly CLAY, low plasticity, pale brown/pale grey, fine to coarse grained, angular gravel, fine to coarse grained sand	M < WP	VSt / Fb			FILL
			17.5	0.5			DOLERITE: Highly weathered, pale grey/pale brown, fine to coarse grained, inferred low to medium strength Becoming pale grey with depth					HIGHLY WEATHERED DOLERITE
			16.5	1.5			Hole Terminated at 0.70 m Refusal					

RG.LIB.1.05.0.GLB. Log_RG_NON-CORED BOREHOLE - TEST PIT_RGS20337.1.BH401-420 PRECINCT B.LOGS.GPJ -<DrawingFile>> 22/02/2022 11:20 10.03.00.09 D:\gel\Lab. and In Situ Tool

LEGEND: Water Water Level (Date and time shown) Water Inflow Water Outflow Strata Changes Gradational or transitional strata Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	

ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH417**






CLIENT: King & Campbell
 PROJECT NAME: Proposed Residential Subdivision
 SITE LOCATION: Precinct B, Stage 1 Rainbow Beach
 TEST LOCATION: Lot 225

PAGE: 1 of 1
 JOB NO: RGS20337.1
 LOGGED BY: DS
 DATE: 10/11/21

DRILL TYPE: RGS 4WD Mounted Drill Rig EASTING: 483976 m SURFACE RL: 17.5 m
 BOREHOLE DIAMETER: 100 mm INCLINATION: 90° NORTHING: 6507446 m DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result	
AD/TC	Not Encountered					GP	FILL: Sandy GRAVEL, fine to coarse grained, angular, pale brown/brown/pale grey, fine to medium grained sand	M	MD			FILL	
			17.0	0.5		CI	FILL: Silty CLAY, medium plasticity, brown/mottled red/orange, with fine to medium grained sand	M > W _p	VSt	HP	400		
						CI	Silty Sandy CLAY: Medium plasticity, pale brown/mottled orange, trace foliations	M ~ W _p	H				RESIDUAL
						CI	Sandy CLAY: Medium plasticity, grey/pale brown, fine to coarse grained sand	M < W _p		HP	590		EXTREMELY WEATHERED DOLERITE
			16.5	1.0			DOLERITE: Highly weathered, fine to coarse grained, pale brown/pale grey, inferred low to medium strength						HIGHLY WEATHERED DOLERITE
			16.0	1.5									
							Hole Terminated at 1.60 m TC Bit refusal						

RGS20337.1_BH417-420 PRECINCT B LOGS.GPJ - TEST PIT - NON-CORED BOREHOLE - TEST PIT - RGS20337.1_BH417-420 PRECINCT B LOGS.GPJ - Drawing File - 22/02/2022 11:20 10.03.00.09 D:\gsl\lab and in situ\tool

LEGEND: Water  Water Level (Date and time shown)  Water Inflow  Water Outflow Strata Changes  Gradational or transitional strata  Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose Density Index <15% L Loose Density Index 15 - 35% MD Medium Dense Density Index 35 - 65% D Dense Density Index 65 - 85% VD Very Dense Density Index 85 - 100%		



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH418**

CLIENT: King & Campbell
 PROJECT NAME: Proposed Residential Subdivision
 SITE LOCATION: Precinct B, Stage 1 Rainbow Beach
 TEST LOCATION: Lot 227/228

PAGE: 1 of 1
 JOB NO: RGS20337.1
 LOGGED BY: DS
 DATE: 10/11/21

DRILL TYPE: RGS 4WD Mounted Drill Rig EASTING: 483975 m SURFACE RL: 17.0 m
 BOREHOLE DIAMETER: 100 mm INCLINATION: 90° NORTHING: 6507405 m DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
AD/TC	Not Encountered		16.5	0.5		GP	FILL: Sandy GRAVEL, fine to coarse grained, angular, pale brown/pale grey, fine to coarse grained sand Becoming with trace low plasticity fines	D	MD			FILL
			16.0	1.0		CI	Sandy CLAY: Medium plasticity, pale brown/orange, fine to coarse grained sand, trace subrounded fine to medium grained gravel					RESIDUAL
							DOLERITE: Highly weathered, fine to coarse grained, grey/pale grey, inferred low to medium strength					HIGHLY WEATHERED DOLERITE
			15.5	1.5			Hole Terminated at 1.30 m TC Bit refusal					

RG.LIB.1.05.0.GLB. Log_RG_NON-CORED BOREHOLE - TEST PIT_RGS20337.1_BH401-420 PRECINCT B.LOGS.GPJ <-DrawingFile>> 22/02/2022 11:20 10.03.00.09 Datigel Lab. and In Situ Tool

LEGEND: Water Water Level (Date and time shown) Water Inflow Water Outflow Strata Changes Gradational or transitional strata Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH419**

CLIENT: King & Campbell
 PROJECT NAME: Proposed Residential Subdivision
 SITE LOCATION: Precinct B, Stage 1 Rainbow Beach
 TEST LOCATION: Lot 229/230

PAGE: 1 of 1
 JOB NO: RGS20337.1
 LOGGED BY: DS
 DATE: 10/11/21

DRILL TYPE: RGS 4WD Mounted Drill Rig EASTING: 483957 m SURFACE RL: 14.5 m
 BOREHOLE DIAMETER: 100 mm INCLINATION: 90° NORTHING: 6507372 m DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
AD/TC	Not Encountered		14.0	0.5		ML	FILL: Sandy SILT, low plasticity, dark brown, with organics, fine to coarse grained sand	M ~ WP				FILL
						CI	0.35m FILL: Gravelly CLAY, medium plasticity, pale grey/pale brown, fine to coarse grained, angular gravel	M ^ WP	St / Fb			HIGHLY WEATHERED DOLERITE
			13.0	1.5			0.40m DOLERITE: Highly weathered, fine to coarse grained, pale brown/pale grey, inferred medium strength Hole Terminated at 0.50 m Refusal					

RG.LIB.1.05.0.GLB_Log_RG_NON-CORED BOREHOLE - TEST PIT_RGS20337.1.BH401-420 PRECINCT B.LOGS.GPJ <-DrawingFile>> 22/02/2022 11:20 10.03.00.09 Datgel Lab. and In Situ Tool

LEGEND: Water Water Level (Date and time shown) Water Inflow Water Outflow Strata Changes Gradational or transitional strata Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose Density Index <15% L Loose Density Index 15 - 35% MD Medium Dense Density Index 35 - 65% D Dense Density Index 65 - 85% VD Very Dense Density Index 85 - 100%		



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH420**

CLIENT: King & Campbell
 PROJECT NAME: Proposed Residential Subdivision
 SITE LOCATION: Precinct B, Stage 1 Rainbow Beach
 TEST LOCATION: Lot 227

PAGE: 1 of 1
 JOB NO: RGS20337.1
 LOGGED BY: DS
 DATE: 10/11/21

DRILL TYPE: RGS 4WD Mounted Drill Rig EASTING: 483962 m SURFACE RL: 16.0 m
 BOREHOLE DIAMETER: 100 mm INCLINATION: 90° NORTHING: 6507416 m DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
AD/TC	Not Encountered					ML	FILL: Sandy SILT, low plasticity, dark brown, fine to coarse grained, with organics	M ~ WP				FILL
		0.40m		0.40m		CI	FILL: Silty Sandy CLAY, medium to high plasticity, pale brown/brown/orange/red, fine to medium grained sand Becoming pale grey with depth, with fine to coarse grained, angular gravel	St / Fb		HP	350	
		U50	15.5	0.5		CI	Sandy CLAY: Medium plasticity, red/brown mottled dark grey, fine to medium grained sand, with fine to medium grained, subrounded gravel	H		HP	400	RESIDUAL/COLLUVIAL
		0.90m	15.0	1.0		CI	Silty CLAY: Medium plasticity, pale brown/yellow, trace foliations					
			14.5	1.5			Hole Terminated at 1.50 m					

RGS20337.1.BH401-420.PRECINCT B.LOGS.GPJ - Drawing File -> 22/02/2022 11:20 10.03.00.09 D:\gel Lab and In Situ Tool

LEGEND: Water Water Level (Date and time shown) Water Inflow Water Outflow Strata Changes Gradational or transitional strata Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



Appendix B


Laboratory Test Result Sheets

Report No: MAT:NEW21W-4756-S01
Issue No: 1

Material Test Report

Client: Regional Geotechnical Solutions Pty Ltd
 44 Bent Street
 Wingham NSW 2429

Project No.: MNC16P-0001
Project Name: Various Testing
Project Location: Rainbow Beach, Lake Cathie, NSW



Accredited for compliance with ISO/IEC 17025-Testing.
 The results of the tests, calibrations and/or measurements
 included in this document are traceable to Australian/national
 standards.
 Results provided relate only to the items tested or sampled.

B. Cullen
 Approved Signatory: Brent Cullen
 (Senior Geotechnician)
 NATA Accredited Laboratory Number: 18686
 Date of Issue: 10/11/2021

Sample Details

Sample ID: NEW21W-4756-S01
Date Sampled: 29/10/2021
Date Received: 01/11/2021
Source: On Site
Material: Clay
Specification: No Specification

The results outlined below apply to the sample as received

TRN: RGS20337.1
Sample Location: BH401 - (0.6 - 0.8m)

Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	11.0	
Mould Length (mm)		250	
Crumbling		No	
Curling		No	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.1	46	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	20	
Plasticity Index (%)	AS 1289.3.3.1	26	
Date Tested		8/11/2021	

Comments

N/A

Material Test Report

Report Number: P21510-1
Issue Number: 1
Date Issued: 18/11/2021
Client: Regional Geotechnical Solutions Pty Ltd
 44 Bent Street, Wingham NSW 2429
Contact: Steve Morton
Project Number: P21510
Project Name: Proposed Residential Sub Division, Rainbow Beach Estate, Precinct B
Project Location: Rainbow Beach Estate, Precinct B
Client Reference: RGS20337.1
Work Request: 3798
Sample Number: 21-3798A
Date Sampled: 15/11/2021
Dates Tested: 15/11/2021 - 16/11/2021
Sampling Method: Sampled by Client
The results apply to the sample as received
Site Selection: Selected by Client
Sample Location: BH410 (0.3-0.9)
Material: Sand
Material Source: Insitu



Pacific Blue Metal Pty Ltd
 Possum Brush Laboratory
 113-116 Possum Brush Road Possum Brush NSW 2430
 Phone: (02) 6554 3206
 Fax: (02) 6554 3250
 Email: labmanager@pacificbluemetal.com.au

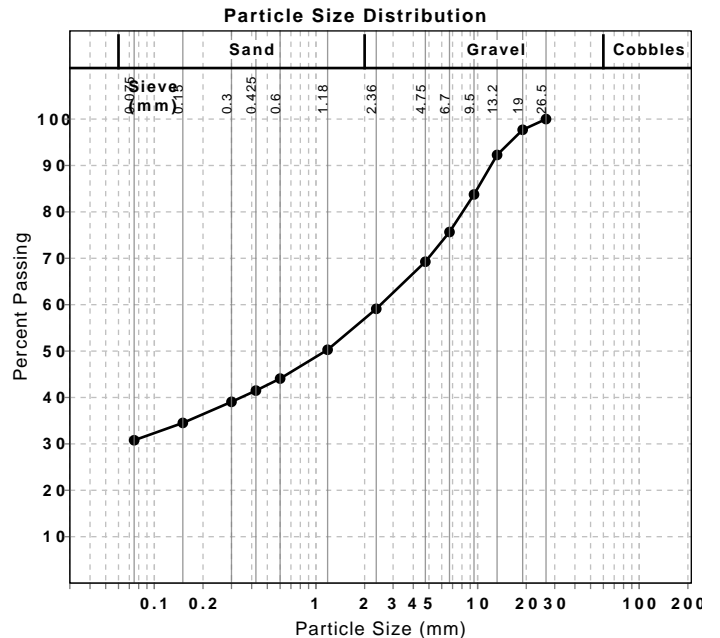
Accredited for compliance with ISO/IEC 17025 - Testing



Approved Signatory: Tom Paulsen
 Senior Tech

NATA Accredited Laboratory Number: 16993

Particle Size Distribution (AS1289 3.6.1)				
Sieve	Passed %	Passing Limits	Retained %	Retained Limits
26.5 mm	100		0	
19 mm	98		2	
13.2 mm	92		5	
9.5 mm	84		9	
6.7 mm	76		8	
4.75 mm	69		6	
2.36 mm	59		10	
1.18 mm	50		9	
0.6 mm	44		6	
0.425 mm	41		3	
0.3 mm	39		2	
0.15 mm	35		5	
0.075 mm	31		4	



Material Test Report

Report Number: P21510-2
Issue Number: 1
Date Issued: 23/12/2021
Client: Regional Geotechnical Solutions Pty Ltd
 44 Bent Street, Wingham NSW 2429
Contact: Steve Morton
Project Number: P21510
Project Name: Proposed Residential Sub Division, Rainbow Beach Estate, Precinct B
Project Location: Rainbow Beach Estate, Precinct B
Client Reference: RGS20337.1
Work Request: 3986
Sample Number: 21-3986A
Date Sampled: 14/12/2021
Dates Tested: 16/12/2021 - 16/12/2021
Sampling Method: Sampled by Client
The results apply to the sample as received
Sample Location: BH410B, Depth: 0.3 to 0.5m



Pacific Blue Metal Pty Ltd
 Possum Brush Laboratory
 113-116 Possum Brush Road Possum Brush NSW 2430
 Phone: (02) 6554 3206
 Fax: (02) 6554 3250
 Email: labmanager@pacificbluemetal.com.au

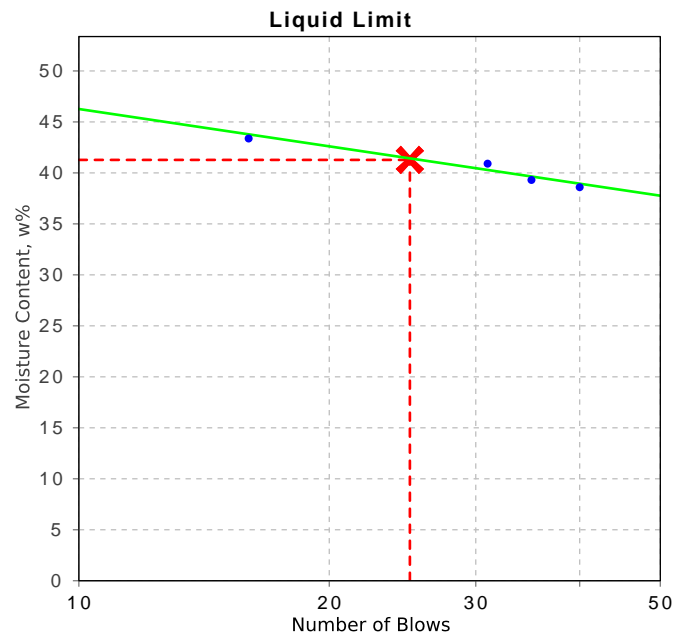


Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Anthony Symeoy
 pbm-Anthony

NATA Accredited Laboratory Number: 16993

Atterberg Limit (RMS T108 & T109)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	41		
Plastic Limit (%)	18		
Plasticity Index (%)	23		




Report No: SSI:NEW21W-4756-S02

Issue No: 1

Shrink Swell Index Report

Client: Regional Geotechnical Solutions Pty Ltd
 44 Bent Street
 Wingham NSW 2429

Project No.: MNC16P-0001
Project Name: Various Testing
Project Location: Rainbow Beach, Lake Cathie, NSW



Accredited for compliance with ISO/IEC 17025-Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
 Results provided relate only to the items tested or sampled.

B. Cullen
 Approved Signatory: Brent Cullen
 (Senior Geotechnician)
 NATA Accredited Laboratory Number: 18686
 Date of Issue: 9/11/2021

Sample Details

Sample ID: NEW21W-4756-S02 **Test Request No.:** RGS20337.1

Sampling Method: The results outlined below apply to the sample as received

Material: Clay **Date Sampled:** 29/10/2021

Source: On Site **Date Submitted:** 1/11/2021

Specification: No Specification

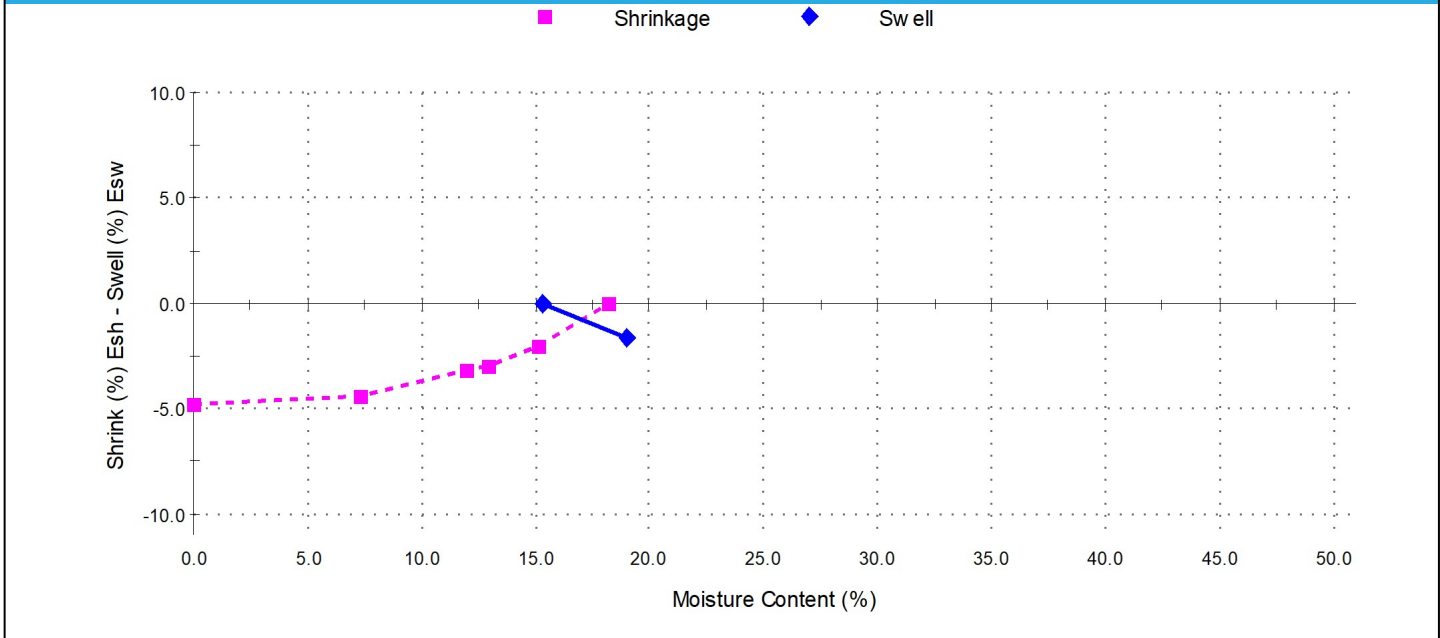
Project Location: Rainbow Beach, Lake Cathie, NSW

Sample Location: BH403 - (0.3 - 0.5m)

Date Tested: 3/11/2021

Swell Test AS 1289.7.1.1		Shrink Test AS 1289.7.1.1	
Swell on Saturation (%):	-1.6	Shrink on drying (%):	4.8
Moisture Content before (%):	15.3	Shrinkage Moisture Content (%):	18.2
Moisture Content after (%):	19.0	Est. inert material (%):	4%
Est. Unc. Comp. Strength before (kPa):	500	Crumbling during shrinkage:	Nil
Est. Unc. Comp. Strength after (kPa):	320	Cracking during shrinkage:	Major

Shrink Swell



Shrink Swell Index - Iss (%): 2.7

Comments


Report No: SSI:NEW21W-4756-S03

Issue No: 1

Shrink Swell Index Report

Client: Regional Geotechnical Solutions Pty Ltd
 44 Bent Street
 Wingham NSW 2429

Project No.: MNC16P-0001
Project Name: Various Testing
Project Location: Rainbow Beach, Lake Cathie, NSW



Accredited for compliance with ISO/IEC 17025-Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
 Results provided relate only to the items tested or sampled.

B. Cullen
 Approved Signatory: Brent Cullen
 (Senior Geotechnician)
 NATA Accredited Laboratory Number: 18686
 Date of Issue: 9/11/2021

Sample Details

Sample ID: NEW21W-4756-S03 **Test Request No.:** RGS20337.1

Sampling Method: The results outlined below apply to the sample as received

Material: Clay **Date Sampled:** 29/10/2021

Source: On Site **Date Submitted:** 1/11/2021

Specification: No Specification

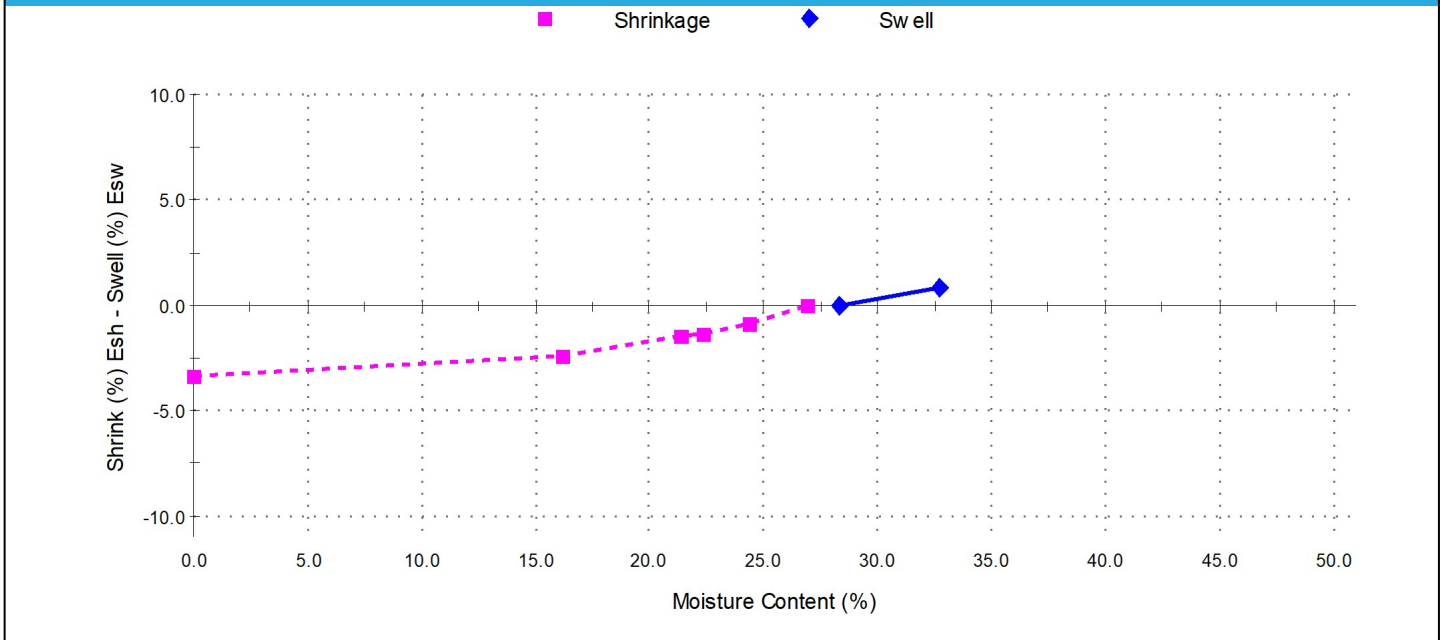
Project Location: Rainbow Beach, Lake Cathie, NSW

Sample Location: BH405 - (0.5 - 0.8m)

Date Tested: 3/11/2021

Swell Test AS 1289.7.1.1		Shrink Test AS 1289.7.1.1	
Swell on Saturation (%):	0.8	Shrink on drying (%):	3.4
Moisture Content before (%):	28.3	Shrinkage Moisture Content (%):	26.9
Moisture Content after (%):	32.7	Est. inert material (%):	4%
Est. Unc. Comp. Strength before (kPa):	120	Crumbling during shrinkage:	Nil
Est. Unc. Comp. Strength after (kPa):	50	Cracking during shrinkage:	Major

Shrink Swell



Shrink Swell Index - Iss (%): 2.1

Comments


Report No: SSI:NEW21W-4756-S04

Issue No: 1

Shrink Swell Index Report

Client: Regional Geotechnical Solutions Pty Ltd
 44 Bent Street
 Wingham NSW 2429

Project No.: MNC16P-0001
Project Name: Various Testing
Project Location: Rainbow Beach, Lake Cathie, NSW



Accredited for compliance with ISO/IEC 17025-Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
 Results provided relate only to the items tested or sampled.

B. Cullen
 Approved Signatory: Brent Cullen
 (Senior Geotechnician)
 NATA Accredited Laboratory Number: 18686
 Date of Issue: 9/11/2021

Sample Details

Sample ID: NEW21W-4756-S04 **Test Request No.:** RGS20337.1

Sampling Method: The results outlined below apply to the sample as received

Material: Clay **Date Sampled:** 29/10/2021

Source: On Site **Date Submitted:** 1/11/2021

Specification: No Specification

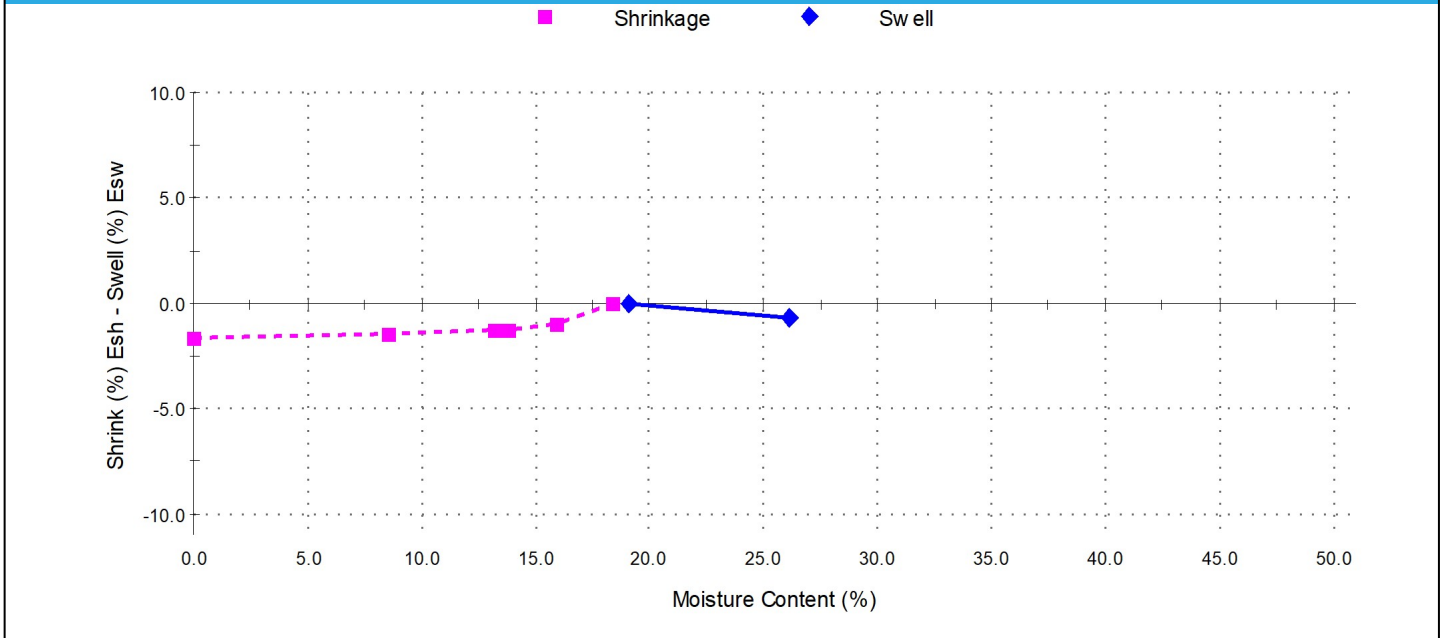
Project Location: Rainbow Beach, Lake Cathie, NSW

Sample Location: BH407 - (0.2 - 0.4m)

Date Tested: 3/11/2021

Swell Test AS 1289.7.1.1		Shrink Test AS 1289.7.1.1	
Swell on Saturation (%):	-0.7	Shrink on drying (%):	1.6
Moisture Content before (%):	19.1	Shrinkage Moisture Content (%):	18.4
Moisture Content after (%):	26.1	Est. inert material (%):	6%
Est. Unc. Comp. Strength before (kPa):	500	Crumbling during shrinkage:	Nil
Est. Unc. Comp. Strength after (kPa):	200	Cracking during shrinkage:	Minor

Shrink Swell



Shrink Swell Index - Iss (%): 0.9

Comments


Report No: SSI:NEW21W-5041-S01

Issue No: 1

Shrink Swell Index Report

Client: Regional Geotechnical Solutions Pty Ltd
 44 Bent Street
 Wingham NSW 2429

Project No.: MNC16P-0001
Project Name: Various Testing
Project Location: Rainbow Beach Estate, NSW



Accredited for compliance with ISO/IEC 17025-Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
 Results provided relate only to the items tested or sampled.

B. Cullen
 Approved Signatory: Brent Cullen
 (Senior Geotechnician)
 NATA Accredited Laboratory Number: 18686
 Date of Issue: 2/12/2021

Sample Details

Sample ID: NEW21W-5041-S01 **Test Request No.:** RGS20337.1

Sampling Method: The results outlined below apply to the sample as received

Material: Yellow Clay **Date Sampled:** 12/11/2021

Source: On Site **Date Submitted:** 22/11/2021

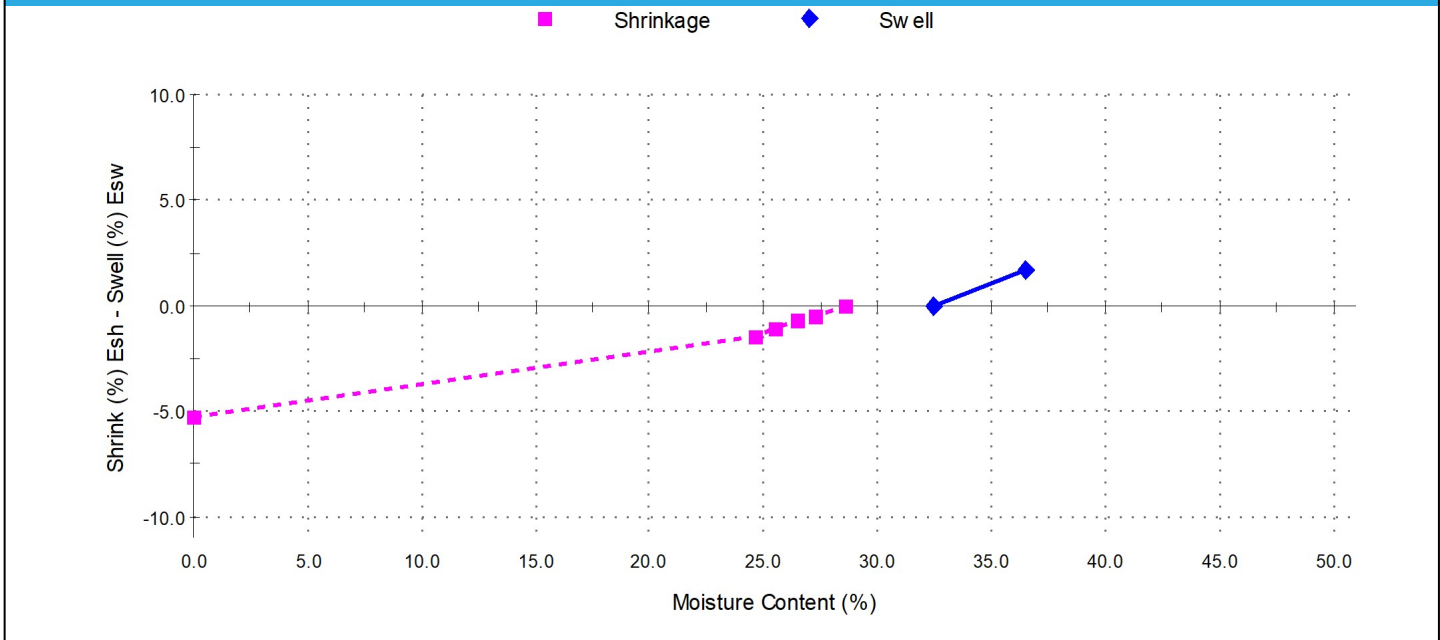
Specification: No Specification

Sample Location: BH408 - (0.6 - 0.9m)

Date Tested: 23/11/2021

Swell Test AS 1289.7.1.1		Shrink Test AS 1289.7.1.1	
Swell on Saturation (%):	1.7	Shrink on drying (%):	5.3
Moisture Content before (%):	32.5	Shrinkage Moisture Content (%):	28.6
Moisture Content after (%):	36.5	Est. inert material (%):	3%
Est. Unc. Comp. Strength before (kPa):	140	Crumbling during shrinkage:	Nil
Est. Unc. Comp. Strength after (kPa):	90	Cracking during shrinkage:	Moderate

Shrink Swell



Shrink Swell Index - Iss (%): 3.4

Comments


Report No: SSI:NEW21W-5041-S02

Issue No: 1

Shrink Swell Index Report

Client: Regional Geotechnical Solutions Pty Ltd
 44 Bent Street
 Wingham NSW 2429

Project No.: MNC16P-0001
Project Name: Various Testing
Project Location: Rainbow Beach Estate, NSW



Accredited for compliance with ISO/IEC 17025-Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
 Results provided relate only to the items tested or sampled.

B. Cullen
 Approved Signatory: Brent Cullen
 (Senior Geotechnician)
 NATA Accredited Laboratory Number: 18686
 Date of Issue: 29/11/2021

Sample Details

Sample ID: NEW21W-5041-S02 **Test Request No.:** RGS20337.1

Sampling Method: The results outlined below apply to the sample as received

Material: Residual **Date Sampled:** 12/11/2021
Source: On Site **Date Submitted:** 22/11/2021

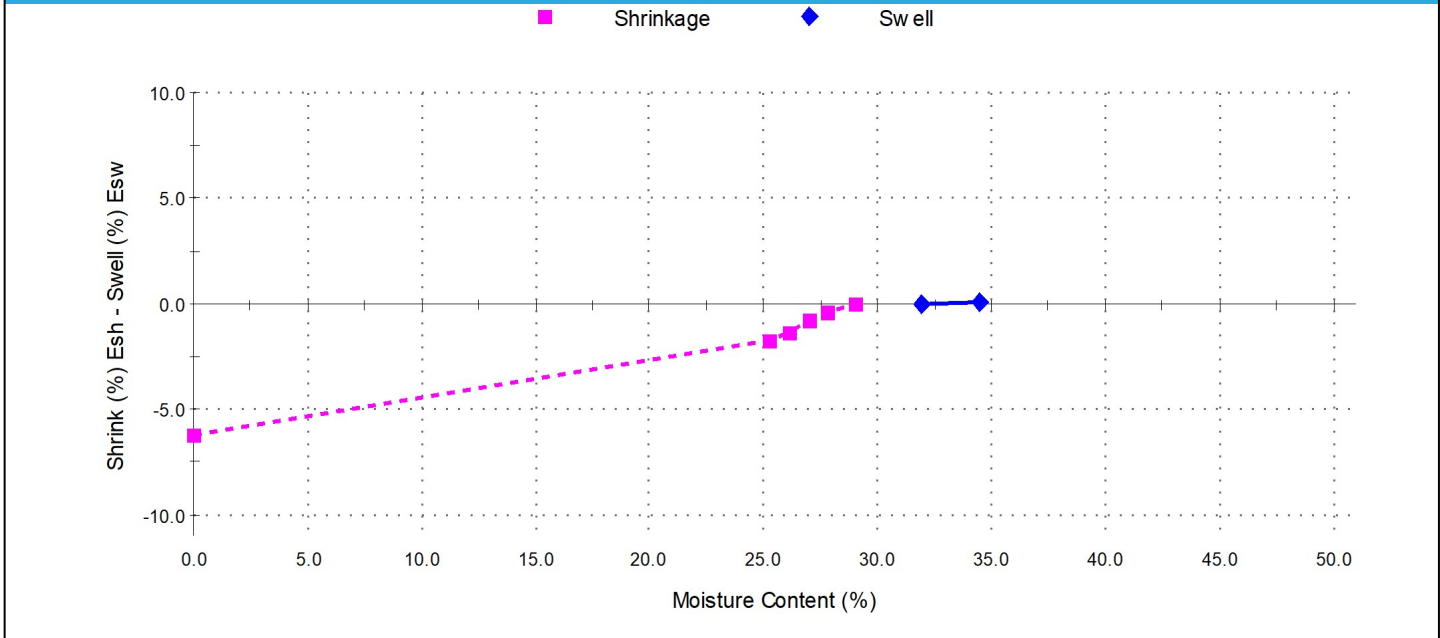
Specification: No Specification

Sample Location: BH413 - (0.3 - 0.8m)

Date Tested: 23/11/2021

Swell Test AS 1289.7.1.1		Shrink Test AS 1289.7.1.1	
Swell on Saturation (%):	0.1	Shrink on drying (%):	6.2
Moisture Content before (%):	31.9	Shrinkage Moisture Content (%):	29.0
Moisture Content after (%):	34.4	Est. inert material (%):	2%
Est. Unc. Comp. Strength before (kPa):	180	Crumbling during shrinkage:	Nil
Est. Unc. Comp. Strength after (kPa):	120	Cracking during shrinkage:	Minor

Shrink Swell



Shrink Swell Index - Iss (%): 3.5

Comments


Report No: SSI:NEW21W-5041-S03

Issue No: 1

Shrink Swell Index Report

Client: Regional Geotechnical Solutions Pty Ltd
 44 Bent Street
 Wingham NSW 2429

Project No.: MNC16P-0001
Project Name: Various Testing
Project Location: Rainbow Beach Estate, NSW



Accredited for compliance with ISO/IEC 17025-Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
 Results provided relate only to the items tested or sampled.

B. Cullen
 Approved Signatory: Brent Cullen
 (Senior Geotechnician)
 NATA Accredited Laboratory Number: 18686
 Date of Issue: 2/12/2021

Sample Details

Sample ID: NEW21W-5041-S03 **Test Request No.:** RGS20337.1

Sampling Method: The results outlined below apply to the sample as received

Material: Fill **Date Sampled:** 12/11/2021

Source: On Site **Date Submitted:** 22/11/2021

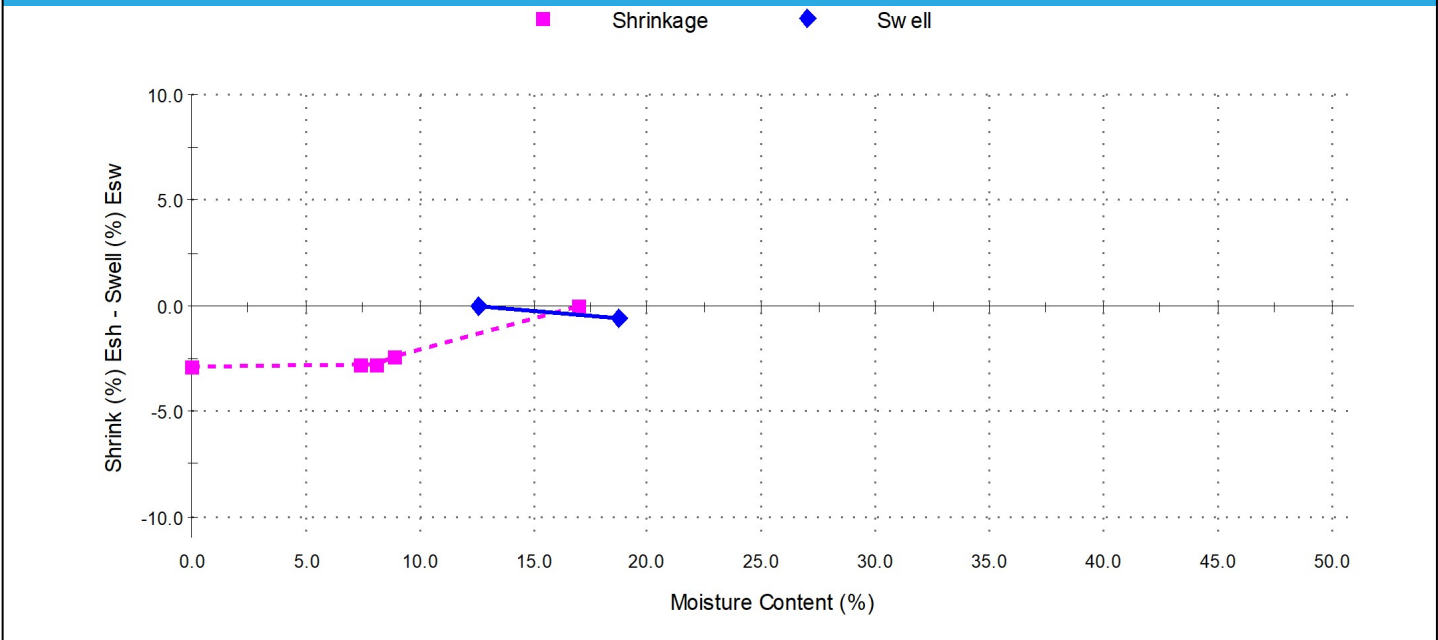
Specification: No Specification

Sample Location: BH420 - (0.4 - 0.9m)

Date Tested: 25/11/2021

Swell Test AS 1289.7.1.1		Shrink Test AS 1289.7.1.1	
Swell on Saturation (%):	-0.6	Shrink on drying (%):	2.9
Moisture Content before (%):	12.5	Shrinkage Moisture Content (%):	16.9
Moisture Content after (%):	18.7	Est. inert material (%):	8%
Est. Unc. Comp. Strength before (kPa):	350	Crumbling during shrinkage:	Nil
Est. Unc. Comp. Strength after (kPa):	>600	Cracking during shrinkage:	Moderate

Shrink Swell



Shrink Swell Index - Iss (%): 1.6

Comments