## St Vincent's Foundation Pty Ltd

## **Geotechnical Site Classification**

## **Proposed Residential Subdivision**

Stage 2, Precinct B, Rainbow Beach, Ocean Drive, Lake Cathie

Report No. RGS20337.1-CN

22 August 2022





Manning-Great Lakes

Port Macquarie

Coffs Harbour

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RGS20337.1-CN

22 August 2022

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

**Attention: Steve Kipreotis** 

Dear Steve,

RE: Proposed Residential Subdivision – Stage 2, 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 28 proposed residential lots located in Stage 2 of Precinct B, Rainbow Beach, Ocean Drive, Lake Cathie. Stage 2 of Precinct B comprises Lot No's 300 to 327 as shown on the supplied plan titled "PLAN OF SUBDIVISION OF LOT 238 DP 1278887".

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 or reclassified as **Class S** (Slightly Reactive), 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 a site classification in accordance with AS2870-2011 Residential Slabs and Footings for the 28 proposed residential lots in Stage 2 of Precinct B, Rainbow Beach, Ocean Drive, Lake Cathie. Stage 2 of Precinct B comprises Lot No's 300 to 327 as shown on Figure 1.

The majority of the residential lots have been modified by site regrading works comprising up to approximately 2m cut, or, placement of up to approximately 0.75m 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 19 and 26 July 2022 and was based on the supplied drawing titled "ROADWORKS AND DRAINAGE PLAN 01". Fieldwork was undertaken by a Geotechnical Engineer from RGS and included:

- Observation of site features and surrounding features relevant to the geotechnical conditions of the site;
- 16 boreholes undertaken by a 4WD mounted drilling rig logged and sampled by a Geotechnical Engineer; 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.

#### 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 four U50 samples. Results are presented in Appendix B and summarised in Table 1.



Table 1: Laboratory Testing Summary

Location	Depth (m)	Lot	Material	Shrink Swell Index (%)
BHB208	0.3 – 0.6	313/314	Residual	1.1
BHB213	3213 0.5 – 0.8 323/324 EW Dolerite			
BHB215	0.4 – 0.7	319/320	Residual	1.5
BHB216	0.35 – 0.55	312/313	Residual	1.4

#### 4 SITE CONDITIONS

#### 4.1 Surface Conditions

Stage 2 of Precinct B is located in the Rainbow Beach Residential Subdivision and is situated in an area of moderately undulated terrain on the south-west facing mid to toe slopes of a broad rounded southeast plunging ridgeline. Surface elevations range from 17m AHD at the upper slopes of the ridge in the north-east corner to approximately 9m AHD in the south-west corner at the completion of site regrading works. Surface slopes following site regrading range from  $2-5^{\circ}$  across the site to the south-west.

An image of the site taken from technology one spatial 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 2 was modified by site regrading earthworks including cut of up to 2m and placement of up to 0.75m fill.



The regrading works have included areas of cut and placement of fill. The fill typically comprised a blend of site won crushed rock and clays. Lot filling works were undertaken under Level 1 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.



Looking north from near BH1 across Lots 300 to 307.



Looking south-east from near BH7. Stage 2, Precinct B is located on the mid to lower slopes of broad ridgeline.

#### 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 2: 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	Sandy to Clayey GRAVEL, fine to coarse grained, pale brown / brown / grey, with fine to coarse sand and trace to some cobbles
UNIT 2	SLOPEWASH	Sandy to Silty CLAY, medium plasticity, red/brown, gravel fine to medium grained, subrounded, friable
UNIT 3	RESIDUAL	Sandy CLAY, medium to high plasticity, pale brown/orange, traces of gravel, fine to medium grained, subangular, very stiff
UNIT 4A	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 4B	HW – MW DOLERITE	Highly Weathered to Moderately Weathered DOLERITE, fine to medium grained, pale grey - white, inferred low to high strength. Recovered as Sandy GRAVEL. Bands of higher strength rock resulted in auger refusal.



Table 3: Summary of Subsurface Profiles - Depth to Base of Material Layer (m)

ВН	Lot	Unit 1A Topsoil	Unit 1B Fill – Gravel	UNIT 2 Slopewash	UNIT 3 Residual	UNIT 4A EW Dolerite	UNIT 4B HW – MW Dolerite
BHB201	306/307	0.15	0.25				≥0.7*
BHB202	308/309	0.25*					
BHB203	303/304	0.2					≥0.4*
BHB204	301/302	0.4			≥0.5*		
BHB205	301	0.2	0.4				≥1.5
BHB206	305	0.2	0.35*				
BHB207	311/312	0.3				0.8	≥1.5
BHB208	313/314	0.15		0.3	0.6		≥1.5
BHB209	315/316	0.15			0.5		≥1.5
BHB210	317/318	0.35*					
BHB211	326/327	0.15	0.65*				
BHB212	325/326	0.25					≥0.9*
BHB213	323/324	0.15				0.85	≥1.5
BHB214	321/322	0.15	0.4			0.6	≥0.75*
BHB215	319/320	0.25		0.4	0.7		≥1.5
BHB216	312/313	0.1		0.35	0.55		≥1.5

Note: ≥ Indicates that base of material layer was not encountered

Indicates that the test was terminated due to practical refusal on rock

<sup>--</sup> 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<sub>s</sub>) values the following has been adopted:

- All clay and gravel fill of > 0.4m 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 Iss for residual clay of 1.1% to 1.5%;
- Characteristic Iss for extremely weathered dolerite as clay of 2.0%;
- Characteristic Iss for mixed gravel fill of 0.5% based on previous experience with similar materials at the site; and
- Highly weathered rock (Unit 4B) was encountered at depths ranging from 0.25 m to 0.85m.
   Where bands of moderately weathered dolerite of higher strength were encountered, they typically resulting in auger refusal.

The proposed building area for 325 to 327 as shown on Figure 2 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<sub>s</sub>) estimated for the profiles encountered during the field investigation in the building areas in each lot are summarised in Table 4.

Table 4: Site Re-classification Summary

Lots	Site Classification	Site Re-classification	Expected Surface Movement (mm)
300 to 324	\$		<20mm
325 to 327	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 4B) 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 any 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 3) 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

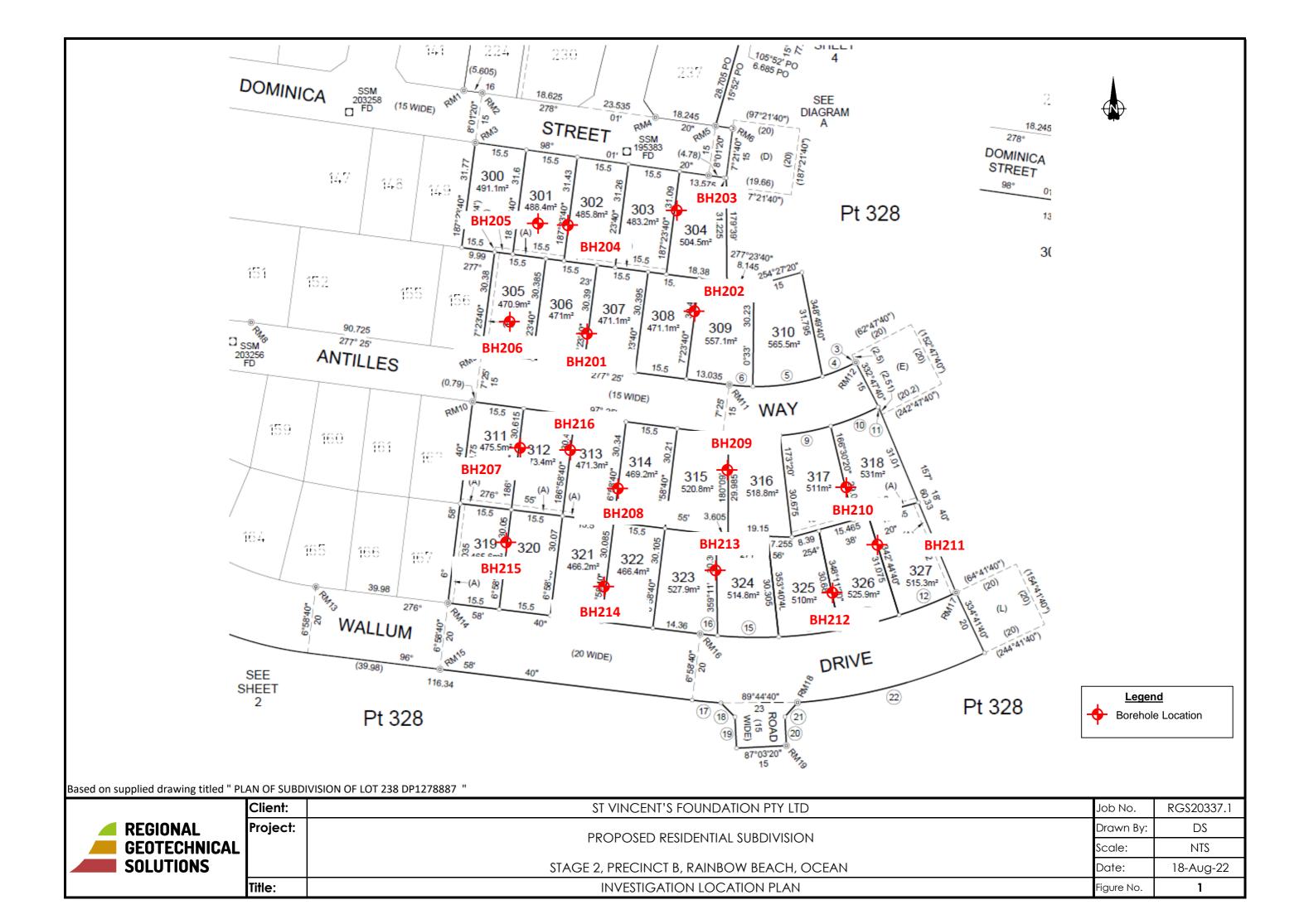
Prepared by

**Tim Morris** 

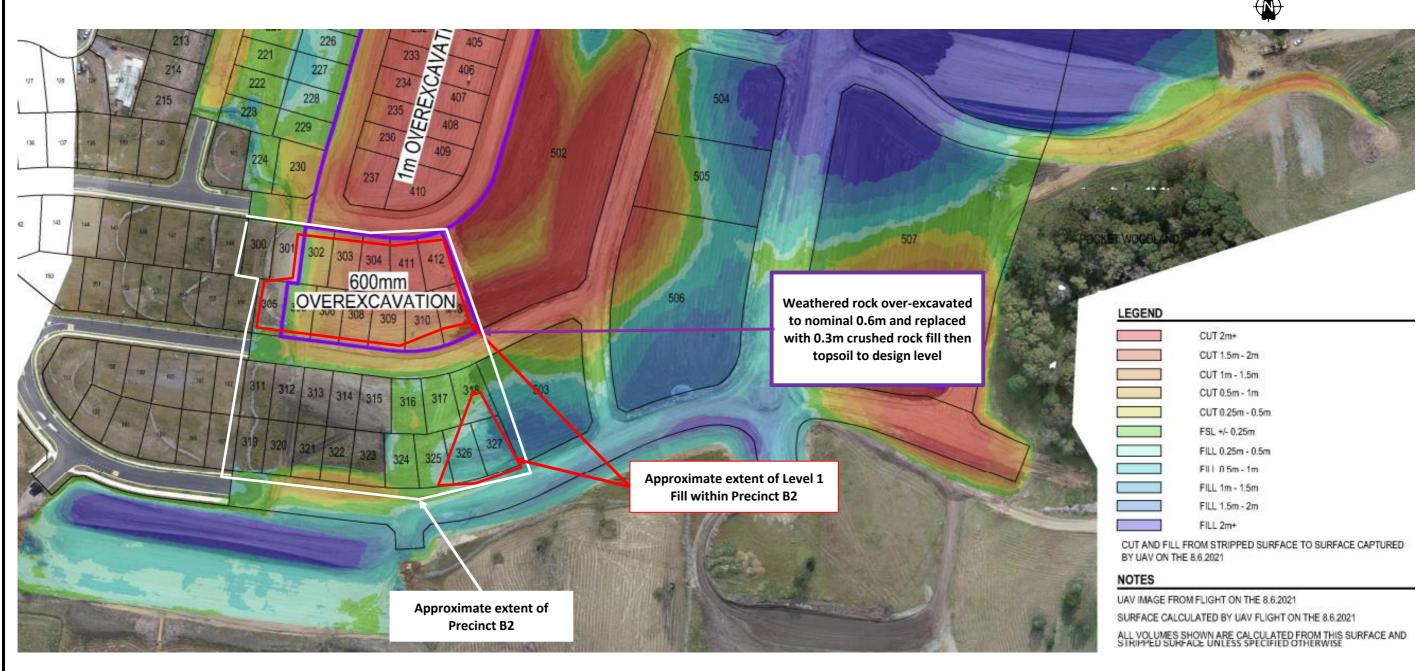
Associate Engineering Geologist



# **Figures**







Based on supplied drawing titled "TOTAL CUT FILL BC"



	Client:	ST VINCENT'S FOUNDATION PTY LTD	Job No.	RGS20337.1
	Project:	DDODOSED DESIDENTIAL SUBDIVISION	Drawn By:	DS
AL		PROPOSED RESIDENTIAL SUBDIVISION	Scale:	NTS
		STAGE 2, PRECINCT B, RAINBOW BEACH, OCEAN	Date:	18-Aug-22
	Title:	LEVEL 1 FILLING PLAN	Figure No.	2



# Appendix A Results of Field Investigations



CLIENT:

St Vincents Foundation

PROJECT NAME: Proposed Residential Subdivision

SITE LOCATION: Precinct B2 Rainbow Beach Estate Lake Cathie LOGGED BY:

**TEST LOCATION:** Lots 306/307 **DATE:** 19/7/22

BOREHOLE NO: BHB201

1 of 1

DS

RGS20337.1

PAGE:

JOB NO:

DRILL TYPE: RGS Ute Mounted Drill Rig EASTING: 483966 m SURFACE RL:

	Drilling and S		DEPTH	<u>o</u>	Z O	Material description and p	rofile information				Field	Test	
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			-		ML	FILL: Sandy SILT, low p	lasticity, dark brow	n-black					FILL/TOPSOIL
4	ot Encour		0.2		GP	0.15m FILL: Sandy GRAVEL,	fine to coarse grain	 ed,	D			-	FILL
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			-			0.70m							
			0.8			Hole Terminated at 0.70 Refusal	m						
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	Changes		Field Test	s				Fb F Density	riable V	\/a	ery Loos	se	Density Index <15%
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St Vincents Foundation

PROJECT NAME: Proposed Residential Subdivision

SITE LOCATION: Precinct B2 Rainbow Beach Estate Lake Cathie

Lots 308/309 TEST LOCATION:

**CLIENT:** 

DATE:

SURFACE RL:

PAGE:

JOB NO:

LOGGED BY:

19/7/22

RGS20337.1

1 of 1

DS

BOREHOLE NO: BHB202

**DRILL TYPE:** RGS Ute Mounted Drill Rig **EASTING:** 484000 m

ВС	REH	OLE DIAM	ETER:	100 n	nm	IN	CLINATION: 90° NORTHING:	650728	6 m <b>[</b>	DATU	M:		AHD
	Drill	ing and San	npling	ı			Material description and profile information				Field	d Test	
МЕТНОБ	WATER	SAMPLES	RL (Not measured	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plastic characteristics, colour, minor componer	ity/particle its	MOISTURE	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
AD/T	Not Encountered			0.2		ML	FILL: Sandy SILT, low plasticity, brown, fir coarse grained sand	ne to					FILL/TOPSOIL
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Wa Wa	. Wat (Dat - Wat ■ Wat ata Cha 	er Level e and time sh er Inflow er Outflow anges radational or ansitional strat efinitive or dis rata change	own)	U <sub>50</sub> CBR E ASS B Field Test PID DCP(x-y) HP	50mm Bulk s Enviro Acid S Bulk S Photoi Dynan	Diamei ample fi nmenta ulfate S ample onisatio	er tube sample or CBR testing I sample oil Sample oil Sample n detector reading (ppm) etrometer test (test depth interval shown) meter test (UCS kPa)	S F St VSt H	Very Soft Soft Firm Stiff Very Stiff Hard Friable	Ve Lo	25 50 10 20 >4 ery Lo	5 - 50 0 - 100 00 - 200 00 - 400	D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit  Density Index <15% Density Index 15 - 35%



**CLIENT:** 

St Vincents Foundation

PROJECT NAME: Proposed Residential Subdivision

SITE LOCATION: Precinct B2 Rainbow Beach Estate Lake Cathie

**TEST LOCATION:** Lots 303/304 **DATE:** 19/7/22

BOREHOLE NO: BHB203

1 of 1

DS

RGS20337.1

PAGE:

JOB NO:

LOGGED BY:

DRILL TYPE: RGS Ute Mounted Drill Rig EASTING: 484946 m SURFACE RL:

		YPE: OLE DIAM		te Mour 100 n		_	EASTING: CLINATION: 90° NORTHING	484946 6: 6507317		SURF.		KL:	AHD
	Drilli	ng and Sar	npling				Material description and profile information				Fiel	d Test	
METHOD	WATER	SAMPLES	RL (Not measured)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plastic characteristics,colour,minor compone		MOISTURE	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
AD/T	Not Encountered			- -		ML	<b>FILL:</b> Sandy SILT, low plasticity, dark bro coarse grained sand	wn, fine to					FILL/TOPSOIL
	Not En			0. <u>2</u> - -			n.20m  HIGHLY WEATHERED DOLERITE: Exca Gravelly SAND, fine to coarse grained, pa grey-pale brown, fine to coarse grained an gravel, low plasticity fines, inferred very lo	ale ngular					HIGHLY WEATHERED DOLERITE
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				-			Hole Terminated at 0.40 m Refusal						
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itra	Wate ta Cha	er Outflow		В	Bulk S			1	Hard Friable		>4	100	
<u> a</u>	Gr	adational or		Field Test	_	onicatio	on detector reading (nom)	Density	V L		ery Lo	ose	Density Index <15%
		nsitional stra finitive or dis		OCP(x-y)	Dynan	nic pen	on detector reading (ppm) etrometer test (test depth interval shown)		MI	O M	lediun	n Dense	•
		ata change		HP	Hand I	Penetro	meter test (UCS kPa)		D VE		ense ery De	ense	Density Index 65 - 85% Density Index 85 - 100%



St Vincents Foundation

**PAGE:** 1 of 1

BOREHOLE NO: BHB204

PROJECT NAME: Proposed Residential Subdivision

JOB NO:

RGS20337.1

**SITE LOCATION:** Precinct B2 Rainbow Beach Estate Lake Cathie **TEST LOCATION:** Lots 301/302

**CLIENT:** 

LOGGED BY:

DATE:

DS 19/7/22

**DRILL TYPE:** RGS Ute Mounted Drill Rig **EASTING:** 483962 m **SURFACE RL:** 

		YPE: OLE DIAN		ite Mour 100 m		-	CLINATION: 90° NORTHING:	483962 6507312		DATU		KL:	AHD
	Drill	ing and Sar	npling				Material description and profile information					d Test	
METHOD	WATER	SAMPLES	RL (Not measured	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticit characteristics,colour,minor component		MOISTURE	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
AD/T	Not Encountered			0.2		ML	FILL: Sandy SILT, low plasticity, dark brow fine to coarse grained sand	n-black,					FILL/TOPSOIL
				0.4		CI	Sandy CLAY: Medium plasticity, pale brown/orange, fine to medium grained sand  1.50m  Hole Terminated at 0.50 m  Refuel on Highly Woodbored Delegite		M ~ W <sub>P</sub>	Fr			RESIDUAL
				0.6 - - 0.8			Refusal on Highly Weathered Dolerite						
LEG Wat				1.0 -									
				1.2_ -									
				1.4									
				1.6_ - - - 1.8_									
LEG	END:			Notes, Sa	mples ar	nd Test	<u>s</u>	Consister	ncy ery Soft		<u>U(</u>	CS (kPa	Moisture Condition D Dry
_	Water Level (Date and time shown)  Water Inflow  U₅₀ CBR E ASS					ample fo nmenta	ter tube sample or CBR testing il sample soil Sample	S S F F St S VSt V H H Fb F	oft irm tiff ery Stiff lard riable		25 50 10 20 >4	5 - 50 0 - 100 00 - 200 00 - 400 100	M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	Gradational or transitional strata Definitive or distict  Field Tests PID DCP(x-y)					nic pene	on detector reading (ppm) etrometer test (test depth interval shown) meter test (UCS kPa)	<u>Density</u>	V L ME D VD	Lo M De	ery Lo oose edium ense ery De	n Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%



**CLIENT:** 

St Vincents Foundation

**PAGE**: 1 of 1

**PROJECT NAME:** Proposed Residential Subdivision

JOB NO: RGS20337.1 LOGGED BY: DS

BOREHOLE NO: BHB205

**SITE LOCATION:** Precinct B2 Rainbow Beach Estate Lake Cathie **TEST LOCATION:** Lots 301

**DATE:** 19/7/22

DRILL TYPE: RGS Ute Mounted Drill Rig EASTING: 483952 m SURFACE RL:

		YPE: OLE DIAM		te Mour 100 n		_	EASTING: CLINATION: 90° NORTHING:	483952 6507313		SURF. DATU		KL:	AHD
	Drill	ing and Sar	mpling				Material description and profile information				Fiel	d Test	
METHOD	WATER	SAMPLES	RL (Not measured)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plastic characteristics, colour, minor componer		MOISTURE	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
AD/T	Not Encountered			- - -		ML	FILL: Sandy SILT, low plasticity, grey, fine coarse grained sand	· to					FILL/TOPSOIL
	Not En			0. <u>2</u> - -		GC	FILL: Clayey GRAVEL, fine to coarse grai angular, grey-blue, low plasticity fines, with medium grained sand		_				FILL
				0. <u>4</u> - - -	**************************************		DOLERITE: Excavated as Gravelly SAND coarse grained, pale brown/orange, fine to grained gravel, inferred very low strength	 , fine to medium					HIGHLY WEATHERED DOLERITE
				0.6_ - - - - 0.8_	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \								
				1.0_ - -	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		Trace moisture from 1.0-1.2m						
				- 1.2_ - - -	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \								
				1. <u>4</u> - -	<b>* * *</b>		1.50m Hole Terminated at 1.50 m						
				1. <u>6</u> - -			Tiole Terrimided at 1.00 m						
				1.8_ - - -									
Wate	Wate (Date Wate Wate	er Level e and time sh er Inflow er Outflow	nown)	U <sub>50</sub> CBR E ASS B	50mm Bulk s Enviro	Diamet ample f nmenta ulfate S	s er tube sample or CBR testing sample oil Sample	S S S S S S S S S S S S S S S S S S S	Pency Very Soft Soft Firm Stiff Very Stiff Hard Friable		-25 50 10 20	CS (kPa 25 5 - 50 0 - 100 00 - 200 00 - 400 400	D Dry M Moist W Wet W <sub>p</sub> Plastic Limit
<u>otra</u>	tra — De	adational or nsitional stra efinitive or dis ata change	ıta   -	Field Test PID DCP(x-y) HP	Photoi Dynan	nic pene	n detector reading (ppm) etrometer test (test depth interval shown) meter test (UCS kPa)	Density	V L MI D VC	Lo D D	ery Lo cose lediun ense ery De	n Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%



**CLIENT:** 

SITE LOCATION:

St Vincents Foundation

PROJECT NAME: Proposed Residential Subdivision

Precinct B2 Rainbow Beach Estate Lake Cathie

LOGGED BY: DS TEST LOCATION: Lots 305 19/7/22 DATE:

BOREHOLE NO: BHB206

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RGS20337.1

PAGE:

JOB NO:

**DRILL TYPE:** RGS Ute Mounted Drill Rig **EASTING:** 483950 m SURFACE RL:

		YPE: OLE DIAM		ite Mour 100 m		-	EASTING: CLINATION: 90° NORTHING:	483950 6507280		DATU			AHD
	Drilli	ing and Sar	npling			Material description and profile information					Field	d Test	
METHOD	WATER	SAMPLES	RL (Not measured	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plastic characteristics, colour, minor componer		MOISTURE	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
AD/T	Not Encountered			-		ML	FILL: Sandy SILT, low plasticity, dark brow	vn-black					FILL/TOPSOIL
	Not			0.2		GC	6.20m  FILL: Clayey GRAVEL, fine to coarse grain angular, brown-grey  0.35m	ned,				_	FILL-GRAVEL
				0.4			Hole Terminated at 0.35 m Refusal on Highly Weathered Dolerite						
				0.6									
				0.8									
				- - 1.0									
				- - -									
				1.2									
				1.4									
				1. <u>6</u>									
				1. <u>8</u>									
				-									
	END:		<u> </u>	Notes, Sa	mples a	nd Test	<u>s</u>	Consister		<u> </u>	_	CS (kPa	
	Water   U₅₀  CDD						er tube sample	s s	ery Soft oft			5 - 50	D Dry M Moist
(Date and time shown)				E	Enviro	nmenta	or CBR testing I sample	St S	rm tiff		10	) - 100 )0 - 200	W Wet W <sub>p</sub> Plastic Limit
Water Inflow ASS  ✓ Water Outflow B					Acid S Bulk S		oil Sample	1	ery Stiff ard			00 - 400 100	W <sub>L</sub> Liquid Limit
	ta Cha	inges		Field Test				1	riable V	\/,	ery Lo	ose	Density Index <15%
	tra — De	adational or nsitional stra efinitive or dis ata change	ıta	PID DCP(x-y) HP	Photoi Dynan	nic pene	n detector reading (ppm) strometer test (test depth interval shown) meter test (UCS kPa)	Density	L ME D VD	Lo M De	oose	n Dense	Density Index 15 - 35%



CLIENT:

St Vincents Foundation

PROJECT NAME: Proposed Residential Subdivision

**SITE LOCATION:** Precinct B2 Rainbow Beach Estate Lake Cathie

**TEST LOCATION:** Lots 311/312 **DATE:** 19/7/22

BOREHOLE NO: BHB207

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DS

RGS20337.1

PAGE:

JOB NO:

LOGGED BY:

DRILL TYPE: RGS Ute Mounted Drill Rig EASTING: 483947 m SURFACE RL:

				Ite Mour		_		EASTING:	483947		SURF		RL:	ALID
냳		HOLE DIAM		100 m	nm 	IN	CLINATION: 90°	NORTHING:	6507247	m L	DATU	_	d Toot	AHD
$\vdash$	Dri	illing and Sar	npling			_	Material description ar	a profile information				riel	d Test	
METHOD	WATER	SAMPLES	RL (Not measured	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTI characteristics,co	ON: Soil type, plasticit olour,minor component	y/particle s	MOISTURE	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
AD/T	red			_	XX	ML	FILL: Sandy SILT, lo	w plasticity, dark brown	n-grey,					FILL/TOPSOIL
7	Not Encountered			0.2		CI	0.30m Silty Sandy CLAY: I	Medium plasticity, pale to medium grained sal	_ — — — nd	M < W <sub>P</sub>	Fr			EXTREMELY WEATHERED DOLERITE
Pŋ: RG 2.00.0 2021-06-30				0.6			0.80m					HP	220	
222 US 22 TUUS UUUS DAIGELLAD AND IN SITU 1001 - LUGU   LID: KG ZUUS ZUZZUS-US PJ; KG ZUUU ZUZI-UD-SI				1.0	* * * * * * * * * * * * * * * * * * * *		DOLERITE: Excavat	ed as Gravelly SAND, grey, fine to medium gr ow strength	fine to rained					HIGHLY WEATHERED DOLERITE
24/0/2022				-	¥									
NGSZUSSY, I BIBZUU SEMIES LOGS, GFO TALIFAMIRJINGSY	GEND			1.6	mnles a	nd Tas	Hole Terminated at 1	.50 m	Consiste	nev		110	CS (kD+	a) Moisture Condition
	EGEND ater	:		Notes, Sa	mples aı	nd Test	<u>s</u>		Consiste  VS \	ncy /ery Soft		<u>U(</u>	<b>CS (kPa</b> 25	Moisture Condition  D Dry
€I —		ater Level		U <sub>50</sub> CBR			er tube sample or CBR testing		s s	Soft Firm			5 - 50 ) - 100	M Moist W Wet
ONED L		ate and time sh	nown)	E	Enviro	nmenta	sample		St S	Stiff		10	0 - 200	W <sub>p</sub> Plastic Limit
		ater Inflow ater Outflow		ASS B	Acid S Bulk S		oil Sample			/ery Stiff Hard			00 - 400 100	W <sub>L</sub> Liquid Limit
2	rata Ch	nanges							Fb F	riable				Density Is dev. 4450/
- SLB L		Gradational or ransitional stra	- 1	Field Test PID	_	onisatio	n detector reading (ppm)		<u>Density</u>	V L		ery Lo oose	ose	Density Index <15% Density Index 15 - 35%
0.3 LIB.		Definitive or dis		DCP(x-y)	Dynan	nic pene	trometer test (test depth interva	al shown)		ME	) M	ediun	n Dense	Density Index 35 - 65%
KG 2.00	s	trata change		HP	Hand	enetro	meter test (UCS kPa)			D VD		ense ery De	ense	Density Index 65 - 85% Density Index 85 - 100%



**CLIENT:** St Vincents Foundation

PROJECT NAME: Proposed Residential Subdivision

SITE LOCATION: Precinct B2 Rainbow Beach Estate Lake Cathie

**TEST LOCATION:** Lots 313/314 **DATE:** 19/7/22

BOREHOLE NO: BHB208

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DS

RGS20337.1

PAGE:

JOB NO:

LOGGED BY:

DRILL TYPE: RGS Ute Mounted Drill Rig EASTING: 483977 m SURFACE RL:

				te Mour		_		STING:	483977		SURF		RL:	ALID
BO		OLE DIAM		100 n	nm	IN		RTHING:	6507237	m [	DATUI		I	AHD
	Drill	ing and Sar	npling			_	Material description and profile inf	ormation				Field	d Test	
МЕТНОD	WATER	SAMPLES	RL (Not measured	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil ty characteristics,colour,minor	pe, plasticity components	y/particle s	MOISTURE	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
AD/T	red			_	$\bigotimes$	ML	FILL: Sandy SILT, low plasticity.	dark brown	n-black					FILL/TOPSOIL
4	Not Encountered	0.30m		0.2	× _ × × _ × × _ × _ × × _ ×	CL	0.15m  Silty CLAY: Low plasticity, dark fine grained rounded gravel			M ~ W <sub>P</sub>	VSt	HP	250	SLOPEWASH
		U		0.4	x x x x x x x x x _ x	CI	Silty CLAY: Medium plasticity, p grey, with fine to medium grained	oale brown-p d sand	oale			HP	300	RESIDUAL
nza disza tronsocio de unigentaria anni mistar none: d'ocupi lactros escos actrosocios Pri Pros. 2000 alza chesa		0.60m		0.6 - - - 0.8 - - - -			DOLERITE: Excavated as Sand coarse grained, grey/white, fine t gravel, inferred low strength	y GRAVEL, o medium g	, fine to grained					HIGHLY WEATHERED —— DOLERITE
24/0/27				1.2	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		1.50m							
THE RESCUSSIVE BRIDGES ELGOSOGY OF LANGUIGNESS				1.6 <u>-</u>			Hole Terminated at 1.50 m							
	END: ter		\[\bar{\partial}{2}\]	Notes, Sa	mples a	nd Test	<u></u>		Consiste VS V	ncy 'ery Soft		<u>U(</u>	<b>CS (kPa</b> 25	Moisture Condition  D Dry
íl —		er Level		U <sub>50</sub> CBR			er tube sample or CBR testing		S S	oft irm			5 - 50 0 - 100	M Moist W Wet
	•	e and time sh er Inflow	nown)	E	Enviro	nmenta	l sample		St S	tiff		10	00 - 200	W <sub>p</sub> Plastic Limit
żΙ		er Inflow er Outflow	'	ASS B	Acid S Bulk S		oil Sample			ery Stiff lard			00 - 400 100	W <sub>L</sub> Liquid Limit
2	ta Cha	anges				•			Fb F	riable V	1/2			Density Index <15%
Z.00.3 LIB. SELD. 1	tra — De	radational or ansitional stra efinitive or dis rata change	ta	Field Test PID DCP(x-y) HP	Photoi Dynan	nic pen	n detector reading (ppm) etrometer test (test depth interval shown) meter test (UCS kPa)		<u>Density</u>	L MD D	Lo M De	ense	n Dense	Density Index 65 - 85%
2										VD	Ve	ery De	ense	Density Index 85 - 100%



St Vincents Foundation

**PAGE**: 1 of 1

BOREHOLE NO: BHB209

PROJECT NAME: Proposed Residential Subdivision

JOB NO:

DATE:

RGS20337.1

**SITE LOCATION:** Precinct B2 Rainbow Beach Estate Lake Cathie **TEST LOCATION:** Lots 315/316

**CLIENT:** 

LOGGED BY:

19/7/22

DS

**DRILL TYPE**: RGS Ute Mounted Drill Rig **EASTING**: 484005 m **SURFACE RL**:

		YPE: OLE DIAM		te Mour 100 m		_	EASTING: CLINATION: 90° NORTHING:	484005 6507239		SURF/ DATUI		RL:	AHD
	Drilli	ing and Sar	npling				Material description and profile information				Field	d Test	
METHOD	WATER	SAMPLES	RL (Not measured)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticit characteristics,colour,minor component		MOISTURE	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
AD/T	untered			-		ML	FILL: Sandy SILT, low plasticity, dark brown fine to coarse grained sand	n-grey,					FILL/TOPSOIL
	Not Encountered			0.2_ - - - - 0.4_		CI	0.15m  Silty CLAY: Medium plasticity, pale brown-brown/orange, fine to medium graine grading sharply to Extremely Weathered DC	 d sand DLERITE	M > W	St	НР	180	RESIDUAL — — — — -
				0.6 			DOLERITE: Excavated as Gravelly SAND, coarse grained, grey/white, fine to medium gravel, inferred very low strength	fine to grained					HIGHLY WEATHERED DOLERITE
				1.4	* * * * * * * * * * * * * * * * * * *		1.50m Hole Terminated at 1.50 m						
Wate	Wate (Date Wate Wate	er Level e and time sh er Inflow er Outflow	nown)	1.8	50mm Bulk s Enviro	Diame ample f nmenta ulfate S	set tube sample or CBR testing	S S F F St S VSt V H F	ery Soft Soft Firm Stiff ery Stiff		25 50 10 20	CS (kP2 55 6 - 50 0 - 100 00 - 200 00 - 400	D Dry M Moist W Wet W <sub>p</sub> Plastic Limit
Stra	tra — De	inges adational or insitional stra afinitive or dis ata change	ıta   -	Field Test PID DCP(x-y) HP	Photoi Dynan	nic pen	on detector reading (ppm) etrometer test (test depth interval shown) meter test (UCS kPa)	Fb F Density	riable V L ME D VD	Lo M De	ery Lo oose edium ense ery De	n Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%



**CLIENT:** 

SITE LOCATION:

St Vincents Foundation

**PROJECT NAME:** Proposed Residential Subdivision

Precinct B2 Rainbow Beach Estate Lake Cathie

**TEST LOCATION:** Lots 317/318 **DATE:** 19/7/22

BOREHOLE NO: BHB210

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DS

RGS20337.1

PAGE:

JOB NO:

LOGGED BY:

**DRILL TYPE:** RGS Ute Mounted Drill Rig **EASTING:** 484043 m **SURFACE RL:** 

	REH(	OLE DIAM		Ite Mour 100 m		-	EASTING: CLINATION: 90° NORTHING:	484043 6507237		OATUI		NL.	AHD
	Drill	ing and Sar	npling				Material description and profile information				Field	d Test	
METHOD	WATER	SAMPLES	RL (Not measured	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticit characteristics, colour, minor componen		MOISTURE	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
AD/T	Not Encountered			0.2		ML	FILL: Sandy SILT, low plasticity, brown-gre coarse grained sand, with fine to coarse grayel						FILL/TOPSOIL
LEG Wat				0.4			Hole Terminated at 0.35 m Refusal on Highly Weathered Dolerite						
	Wate (Date Wate Wate		nown)	Notes, Sal U <sub>50</sub> CBR E ASS B	50mm Bulk sa Enviro Acid S Bulk S	Diamet ample fo nmenta ulfate S	<b>s</b> er tube sample or CBR testing I sample oil Sample	S S F F St S VSt V H H	ery Soft oft irm tiff ery Stiff ard riable	\/a	25 50 10 20	5 - 50 0 - 100 00 - 200 00 - 400	Moisture Condition D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit  Density Index <15%
	transitional strata			PID DCP(x-y)	Photoi Dynan	nic pene	n detector reading (ppm) strometer test (test depth interval shown) meter test (UCS kPa)	Delisity	V L ME D VD	Lo Mi De	ose	n Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%



**CLIENT:** 

St Vincents Foundation

PROJECT NAME: Proposed Residential Subdivision JOB NO:

SITE LOCATION: Precinct B2 Rainbow Beach Estate Lake Cathie LOGGED BY:

**TEST LOCATION:** Lots 326/322 **DATE:** 19/7/22

BOREHOLE NO: BHB211

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DS

RGS20337.1

PAGE:

**DRILL TYPE:** RGS Ute Mounted Drill Rig **EASTING:** 484052 m **SURFACE RL:** 

		YPE: OLE DIAN		ite Mour 100 m		_	EASTING: CLINATION: 90° NORTHING:	484052 6507208		DATU		NL.	AHD
	Drill	ing and Sar	npling				Material description and profile information				Field	d Test	
METHOD	WATER	SAMPLES	RL (Not measured	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plastici characteristics,colour,minor componen		MOISTURE	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
AD/T	untered			-		ML	FILL: Sandy SILT, low plasticity, dark brow fine to medium grained sand	n-black,					FILL/TOPSOIL
	Not Encountered			0.2		GP	0.15m  FILL: Sandy GRAVEL, fine to medium gra angular blue Dolerite, fine to coarse grained sand, with low plasticity clay		_				FILL-GRAVEL — — — —
				0.6			0.65m						
LEG Watu				0. <u>8</u>			Hole Terminated at 0.65 m Refusal						
				-									
				1. <u>0</u>									
				1. <u>2</u>									
				- - 1.4_									
				- - -									
				1. <u>6</u>									
				1.8_ - -									
LEG	END:			Notes, Sa	mples ar	nd Test	<u> </u>	Consiste	ncy		U	CS (kPa	Moisture Condition
	Wate (Date Wate Wate	er Level e and time sher Inflow er Outflow	nown)	U <sub>50</sub> CBR E ASS B	Bulk sa Enviro	ample f nmenta ulfate S	ter tube sample or CBR testing Il sample ioil Sample	S S F F St S VSt V H H	ery Soft oft irm ctiff ery Stiff lard iriable		50 10 20	25 5 - 50 0 - 100 00 - 200 00 - 400 400	D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	Definitive or distict DCP(x-y)			Photoi Dynan	nic pen	on detector reading (ppm) etrometer test (test depth interval shown) meter test (UCS kPa)	Density	V L ME D VD	Lo M De	ery Lo oose edium ense ery De	n Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



CLIENT:

St Vincents Foundation

PROJECT NAME: Proposed Residential Subdivision JOB NO:

SITE LOCATION: Precinct B2 Rainbow Beach Estate Lake Cathie LOGGED BY:

**TEST LOCATION:** Lots 325/326 **DATE:** 19/7/22

BOREHOLE NO: BHB212

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DS

RGS20337.1

PAGE:

DRILL TYPE: RGS Ute Mounted Drill Rig EASTING: 484038 m SURFACE RL:

				Ite Mour		-		EASTING:	484038		SURF/	ACE RL:	
F		OLE DIAM		100 m	ım	IN	CLINATION: 90°	NORTHING:	0507196	) [[]	DAIU		AHD
$\vdash$	Uril	ling and San	ipiing			7	Material description and	profile information				Field Te	51
METHOD	WATER	SAMPLES	RL (Not measured	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTIO characteristics,colo	N: Soil type, plasticit ur,minor component		MOISTURE	CONSISTENCY DENSITY	Test Type Result	Structure and additional observations
AD/T	Not Encountered			0.2		ML	<b>FILL:</b> Sandy SILT, low fine to medium grained	plasticity, dark brow sand	n-black,				FILL/TOPSOIL
	Z			0.4	× ×		DOLERITE: Excavated grey-blue, fine to coars medium grained dolerit	e grained sand, fine	pale to				HIGHLY WEATHERED —— DOLERITE
2-03-03 Prj. Rts z.ut., 0 zuzn-u6-30				0.6	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		Trace seams of Extren excavated as Sandy C mottled red, inferred ve	LAY, medium plastic	ity, brown				
RG 2.003 LB CLB Log RGNON-CORED BORRHOLL - TEST PIT RGS20337 1 BH200 SERIEE LOGS GPJ - < Drawing File>				1.0 			Hole Terminated at 0.9 Refusal	0 m					
LE William Sternore S	(Da – Wa <b>⊲</b> Wa <u>rata Ch</u>	ter Level te and time sh ter Inflow ter Outflow anges	nown)	U <sub>50</sub> CBR E ASS B	50mm Bulk s Enviro Acid S Bulk S	Diame ample f onmenta	s  er tube sample or CBR testing I sample oil Sample		S S F F St S VSt \ H H Fb F	/ery Soft Soft Firm Stiff /ery Stiff Hard	f	UCS (k <25 25 - 50 50 - 10 100 - 2 200 - 4 >400	D Dry M Moist W Wet W <sub>ρ</sub> Plastic Limit W <sub>L</sub> Liquid Limit
RG 2:00.3 LIB.GLB L	tr	radational or ansitional stra efinitive or dis trata change	ta	Field Test PID DCP(x-y) HP	Photoi Dynar	nic pen	n detector reading (ppm) etrometer test (test depth interval meter test (UCS kPa)	shown)	<u>Density</u>	V L MI D VE	Lo D M Do	ery Loose bose edium Der ense ery Dense	Density Index <15% Density Index 15 - 35% use Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%



CLIENT:

St Vincents Foundation

**PROJECT NAME:** Proposed Residential Subdivision

**SITE LOCATION:** Precinct B2 Rainbow Beach Estate Lake Cathie

**TEST LOCATION:** Lots 323/324 **DATE:** 19/7/22

BOREHOLE NO: BHB213

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DS

RGS20337.1

PAGE:

JOB NO:

LOGGED BY:

DRILL TYPE: RGS Ute Mounted Drill Riq EASTING: 484007 m SURFACE RL:

				Jte Moui		_		EASTING:	484007		SURF		RL:	4115
B		OLE DIAN		100 n	nm	IN	CLINATION: 90°	NORTHING:	6507210	m l	DATU	1	-	AHD
	Dril	ling and Sar	npling I				Material description and pro	file information				Fiel	d Test	
METHOD	WATER	SAMPLES	RL (Not measured	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: S characteristics,colour,r	Soil type, plasticit ninor component	y/particle s	MOISTURE	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
AD/T	ountered			-		ML	FILL: Sandy SILT, low plamedium grained sand	sticity, dark brow	n, fine to					FILL/TOPSOIL
> 24482/2022 09.23 10.03 00.09 Datget Lab and in Stu Tool - DGD   Lib: RG 2.00.3 2022/55-03 Prj: RG 2.00.0 2/221-06-30	Not Encountered	0.50m U 0.80m		0.2_ 0.4_ 0.6_ 0.8_ 1.0_ 1.2_ 1.4_		CI	Silty CLAY: Indistinct folia brown/orange/red and grey grained sand, trace fine grey inclusions  DOLERITE: Excavated as medium grained, angular be medium grained sand, with	, with fine to mediained blue dolerit	ium e gravel ,, fine to	M ~ Wp	Н	НР	420	EXTREMELY WEATHERED DOLERITE  HIGHLY WEATHERED DOLERITE
IEST FIT 1692/03/7.1 BTBZ00 SENES LOGS.GFG *CURWINGFIRST				1. <u>6</u>			Hole Terminated at 1.50 m							
	GEND:	I		Notes, Sa	mples a	nd Test	<u>s</u>		Consister	ncy	1	U	CS (kPa	Moisture Condition
S INCH-CORED BOXEROLE -	ter Wat (Dai - Wat ■ Wat	ter Level te and time sl ter Inflow ter Outflow anges	nown)	U <sub>50</sub> CBR E ASS B	50mm Bulk s Enviro Acid S Bulk S	Diametample for	er tube sample or CBR testing I sample oil Sample		VS V S S F F St S VSt V H H	ery Soft oft irm tiff ery Stiff lard riable		25 50 10 20	25 5 - 50 0 - 100 00 - 200 00 - 400 400	D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit  Density Index <15%
RG 2:00:3 LIB.GLB	tra D	radational or ansitional stra efinitive or dis rata change	ata	PID DCP(x-y) HP	Photoi Dynan	nic pene	n detector reading (ppm) strometer test (test depth interval show meter test (UCS kPa)	vn)	Pensity	V L MI D VC	Lo D D	ose	n Dense	Density Index 15 - 35%



**CLIENT:** 

PROJECT NAME:

St Vincents Foundation

Proposed Residential Subdivision JOB NO: RGS20337.1

BOREHOLE NO: BHB214

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DS

PAGE:

LOGGED BY:

SITE LOCATION: Precinct B2 Rainbow Beach Estate Lake Cathie

**TEST LOCATION:** Lots 321/322 **DATE:** 19/7/22

**DRILL TYPE:** RGS Ute Mounted Drill Rig **EASTING:** 484971 m **SURFACE RL:** 

		YPE: OLE DIAN		Ite Mour 100 m		_	EASTING: CLINATION: 90° NORTHING:	484971 6507206		DATU		NL.	AHD
	Drill	ing and Sar	npling				Material description and profile information				Fiel	d Test	
METHOD	WATER	SAMPLES	RL (Not measured	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plastici characteristics,colour,minor componen		MOISTURE	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
AD/T	ntered			-		ML	FILL: Sandy SILT, low plasticity, dark brow medium grained sand	n, fine to					FILL/TOPSOIL
	Not Encountered			0.2		CI	FILL: Sandy GRAVEL, fine to medium gra angular, pale brown/orange-brown, fine to grained sand, trace low plasticity fines		D				FILL-GRAVEL — — — —
				0.4	X   X   X   X   X   X   X   X   X   X	CI	Silty CLAY: Medium plasticity, pale brown grey, fine to medium grained sand, trace find dolerite gravel	 -pale ne grained	M > W <sub>P</sub>	VSt	HP	220	EXTREMELY WEATHERED DOLERITE
				0.6	*   *   *		DOLERITE: Excavated as Gravelly SAND coarse grained, pale brown-blue, fine to me grained dolerite gravel fragments, inferred strength	edium					HIGHLY WEATHERED DOLERITE
				0.8	_		Hole Terminated at 0.75 m Refusal						
				1.0									
				1.2									
				- - -									
				1. <u>4</u>									
				1. <u>6</u>									
				1.8									
				-									
LEG	END:			Notes, Sa	mples ar	nd Test	<u> </u> <u>s</u>	Consiste			_	CS (kPa	
Wate		er Level		U <sub>50</sub>			ter tube sample	s s	ery Soft oft			5 - 50	D Dry M Moist
<del>*</del>		er Lever e and time sl		CBR E			or CBR testing I sample	1	irm stiff			) - 100 )0 - 200	W Wet W <sub>p</sub> Plastic Limit
	► Water Inflow ASS Ac					ulfate S	oil Sample	VSt V	ery Stiff lard		20	00 - 400 100	P
	Strata Changes							Fb F	riable V	\ /.			Density Index <15%
	Gradational or transitional strata Definitive or distict strata change			Photoi Dynan	nic pen	on detector reading (ppm) etrometer test (test depth interval shown) meter test (UCS kPa)	<u>Density</u>	L ME D	Lo M D	ery Lo oose edium ense	ose n Dense	Density Index 15 - 35%	
	stı	rata change		חר	riano i	enetro	THERE LEST (UCS KFA)		VD		ense ery De	ense	Density Index 65 - 85% Density Index 85 - 100%



CLIENT:

St Vincents Foundation

PROJECT NAME: Proposed Residential Subdivision

**SITE LOCATION:** Precinct B2 Rainbow Beach Estate Lake Cathie

**TEST LOCATION:** Lots 319/320 **DATE:** 19/7/22

BOREHOLE NO: BHB215

1 of 1

DS

RGS20337.1

PAGE:

JOB NO:

LOGGED BY:

DRILL TYPE: RGS Ute Mounted Drill Rig EASTING: SURFACE RL:

		YPE: OLE DIAN		Ite Mour 100 m		_	CLINATION: 90°	EASTING: NORTHING:			SURF.		RL:	AHD
	Dril	ling and Sai	mpling				Material description and	d profile information				Field	d Test	
METHOD	WATER	SAMPLES	RL (Not measured	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION characteristics,col	ON: Soil type, plasticit lour,minor component		MOISTURE	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
AD/T	Not Encountered			0.2		ML	FILL: Sandy SILT, low medium grained sand	w plasticity, dark browl	n, fine to					FILL/TOPSOIL
				-	× - ×	CL	Silty CLAY: Low plas with fine grained sand	ticity, dark brown mott	 iled red,	_				SLOPEWASH
:1-06-30		0.40m		0.4_ - - - 0.6_	X X	CI	Silty CLAY: Medium brown-pale grey mottle	to high plasticity, pale ed orange		M > W <sub>P</sub>	VSt	HP	340	RESIDUAL
RG 2.00 3.LBGLIB Log RCNON-CORED BORRHOLE - TEST PIT RGS20337 1 BHB200 SERIES LOGS GPJ <- Crawing-files> 24/8/2022 08:23 10:03:00:09 Datyse Lab and in Stur Tool - DGD   Lib. RG 2.00 3.2022-03-43 Py; RG 2.00 0.2021-06:30		0.70m		1.0 			DOLERITE: Excavate coarse grained, pale b grained dolerite fragm	prown-blue, fine to meents, inferred very low	dium					HIGHLY WEATHERED DOLERITE Rocky at 0.85m
ORED BOREHOLE - TEST PIT RGS20337.1 BHB200 SERIES LOGS GPJ - CDawingFile>	Wa (Da	er Level	hown)	1.6	50mm Bulk s Enviro	Diamet ample fo	er tube sample or CBR testing I sample	50 m	S S F F St S	ery Soft oft irm tiff		-25 25 50	CS (kPa 25 5 - 50 0 - 100 00 - 200	D Dry M Moist W Wet W <sub>p</sub> Plastic Limit
Stra	● Wat ata Ch G tra D	er Inflow er Outflow anges radational or ansitional stra efinitive or dis rata change	ata !	ASS B Field Test PID DCP(x-y) HP	Bulk S <u>s</u> Photo Dynar	sample onisatio nic pene	oil Sample  n detector reading (ppm) strometer test (test depth interva meter test (UCS kPa)	l shown)	н н	ery Stiff lard riable V L MC D VD	Lo M D	ery Lo	n Dense	Density Index <15% Density Index 15 - 35%



St Vincents Foundation

**PAGE**: 1 of 1

BOREHOLE NO: BHB216

**PROJECT NAME:** Proposed Residential Subdivision

JOB NO: RGS

RGS20337.1

**SITE LOCATION:** Precinct B2 Rainbow Beach Estate Lake Cathie **TEST LOCATION:** Lots 312/313

**CLIENT:** 

**LOGGED BY**: DS **DATE**: 19/7/22

DRILL TYPE: RGS Ute Mounted Drill Rig EASTING: 483962 m SURFACE RL:

		YPE: OLE DIAM		te Mour 100 n		_		sting: Rthing: (	483962 6507246		SURF/ DATUI		RL:	AHD
	Drill	ing and Sar	npling				Material description and profile inf	ormation				Fiel	d Test	
МЕТНОD	WATER	SAMPLES	RL (Not measured)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil tylocharacteristics,colour,minor			MOISTURE	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
AD/T	ered			_		ML	FILL: Sandy SILT, low plasticity, medium grained sand	, dark brown,	, fine to					FILL/TOPSOIL
	Not Encountered			0. <u>2</u>		CL	0.10m Sandy CLAY: Low plasticity, dar	rk brown mot	ttled red	M V W				SLOPEWASH
		0.35m		0.4	×	CI	0.35m Silty CLAY: Medium to high pla	. — — — — sticity, pale			St	_		RESIDUAL
		U		- - -	x x		brown/orange					HP	220	
		0.55m		0.6	— ×		DOLERITE: Excavated as Grave coarse grained, grey-blue, fine to dolerite fragments	elly SAND, fi medium gra	. — — — - ine to ained					HIGHLY WEATHERED DOLERITE Rocky at 0.85m
				0.8	<b>*</b>									
				1. <u>0</u>	\ \ \ \ \ \									
				1. <u>2</u>	\ \ \ \ \									
				- - - 1.4	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \									
				-	<b>+</b>		1.50m							
				1. <u>6</u> -			Hole Terminated at 1.50 m							
				1. <u>8</u> -										
LEG	END:			lotes, Sa	mnles a	nd Toet			Consister	ncv		114	CS (kPa	a) Moisture Condition
Wate	er Wate (Date Wate	er Level e and time sh er Inflow er Outflow anges	nown)	U <sub>50</sub> CBR E ASS B	50mm Bulk s Enviro Acid S	Diamel ample f	er tube sample or CBR testing sample oil Sample		VS Ve S So F Fi St St VSt Ve H Ha	ery Soft oft rm tiff ery Stiff ard		25 50 10 20		D Dry M Moist W Wet W <sub>p</sub> Plastic Limit W <sub>L</sub> Liquid Limit
	Gr tra	radational or insitional stra efinitive or dis rata change	ıta   -	Field Test PID DCP(x-y) HP	Photoi Dynan	nic pene	n detector reading (ppm) strometer test (test depth interval shown) meter test (UCS kPa)		Density	V L ME D VD	Lo M De	ery Lo oose edium ense ery De	n 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



02 4968 4468 02 4960 9775 E: admin@qualtest.com.au W: www.qualtest.com.au ABN: 98 153 268 896

# **Shrink Swell Index Report**

Regional Geotechnical Solutions Pty Ltd

44 Bent Street

Wingham NSW 2429

Project No.: MNC16P-0001 Project Name: Various Testing

Project Location: Precinct B2, Rainbow Beach, NSW

## Report No: SSI:NEW22W-2418-S01 Issue No: 1



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

Results provided relate only to the items tested or sampled.

Apenar

Approved Signatory: Kyle Spencer

(Geotechnician)

NATA Accredited Laboratory Number: 18686 Date of Issue: 12/08/2022

Sample Details

Sample ID: NEW22W-2418-S01 Test Request No.: RGS20337.1

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

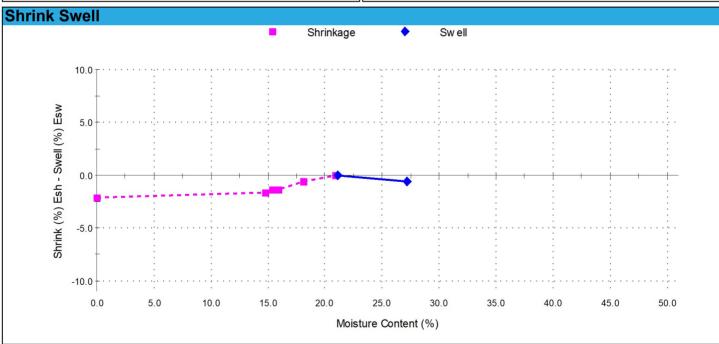
Material: **Date Sampled:** 21/07/2022 Source: **Date Submitted:** On-Site 21/07/2022

Specification: No Specification Sample Location: BHB208 - (0.3 - 0.6m)

**Date Tested:** 2/08/2022

Swell Test AS 1289.7.1.1 **Shrink Test** AS 1289.7.1.1 Swell on Saturation (%): Shrink on drying (%): -0.6 21 Moisture Content before (%): Shrinkage Moisture Content (%): 21.0 21.1 Moisture Content after (%): Est. inert material (%): 27 2

Est. Unc. Comp. Strength before (kPa): 290 Crumbling during shrinkage: Est. Unc. Comp. Strength after (kPa): Cracking during shrinkage: Moderate



Shrink Swell Index - Iss (%): 1.1



02 4968 4468 02 4960 9775

E: admin@qualtest.com.au W: www.qualtest.com.au ABN: 98 153 268 896

# **Shrink Swell Index Report**

Regional Geotechnical Solutions Pty Ltd

44 Bent Street

Wingham NSW 2429

Project No.: MNC16P-0001 Project Name: Various Testing

Project Location: Precint B2, Rainbow Beach, NSW

#### Report No: SSI:NEW22W-2657-S01 Issue No: 1



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

Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen

(Engineering Geologist)

NATA Accredited Laboratory Number: 18686

Date of Issue: 18/08/2022

Sample Details

Sample ID: Test Request No.: RGS20337.1 NEW22W-2657-S01

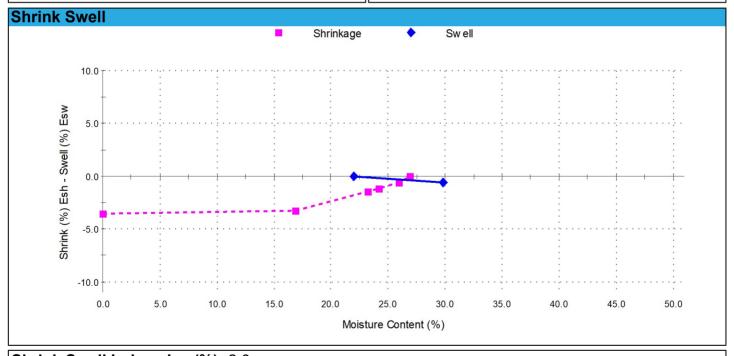
Sampling Method: The results outlined below apply to the sample as received

Material: **Date Sampled:** 28/07/2022 Source: **Date Submitted:** On-Site 3/08/2022

Specification: No Specification Sample Location: BHB213 - (0.5 - 0.8m)

**Date Tested:** 10/08/2022

Swell Test AS 1289.7.1.1 **Shrink Test** AS 1289.7.1.1 Swell on Saturation (%): Shrink on drying (%): -0.6 3.6 Moisture Content before (%): Shrinkage Moisture Content (%): 26.9 22.0 Moisture Content after (%): Est. inert material (%): 29.8 12% Est. Unc. Comp. Strength before (kPa): 580 Crumbling during shrinkage: Est. Unc. Comp. Strength after (kPa): Cracking during shrinkage: Moderate



Shrink Swell Index - Iss (%): 2.0



02 4968 4468 02 4960 9775 E: admin@qualtest.com.au W: www.qualtest.com.au ABN: 98 153 268 896

# **Shrink Swell Index Report**

Regional Geotechnical Solutions Pty Ltd

44 Bent Street

Wingham NSW 2429

Project No.: MNC16P-0001 Project Name: Various Testing

Project Location: Precint B2, Rainbow Beach, NSW

#### Report No: SSI:NEW22W-2657-S02 Issue No: 1



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

Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen

(Engineering Geologist)

NATA Accredited Laboratory Number: 18686

Date of Issue: 18/08/2022

Sample Details

Sample ID: Test Request No.: RGS20337.1 NEW22W-2657-S02

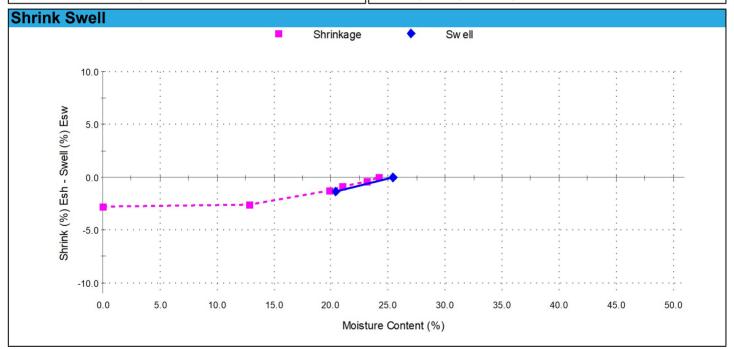
Sampling Method: The results outlined below apply to the sample as received

Material: **Date Sampled:** 28/07/2022 Source: **Date Submitted:** On-Site 3/08/2022

Specification: No Specification Sample Location: BHB215 - (0.4 - 0.7m)

**Date Tested:** 10/08/2022

Swell Test AS 1289.7.1.1 **Shrink Test** AS 1289.7.1.1 Swell on Saturation (%): Shrink on drying (%): -1.3 2.8 Moisture Content before (%): Shrinkage Moisture Content (%): 24.2 25.4 Moisture Content after (%): Est. inert material (%): 20.4 12% Est. Unc. Comp. Strength before (kPa): >600 Crumbling during shrinkage: Nil Est. Unc. Comp. Strength after (kPa): Cracking during shrinkage: Minor



Shrink Swell Index - Iss (%): 1.5



02 4968 4468 02 4960 9775

E: admin@qualtest.com.au W: www.qualtest.com.au ABN: 98 153 268 896

# **Shrink Swell Index Report**

Regional Geotechnical Solutions Pty Ltd

44 Bent Street

Wingham NSW 2429

Project No.: MNC16P-0001 Project Name: Various Testing

Project Location: Precint B2, Rainbow Beach, NSW

#### Report No: SSI:NEW22W-2657-S03 Issue No: 1



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

Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen

(Engineering Geologist) NATA Accredited Laboratory Number: 18686

Date of Issue: 18/08/2022

Sample Details

Sample ID: Test Request No.: RGS20337.1 NEW22W-2657-S03

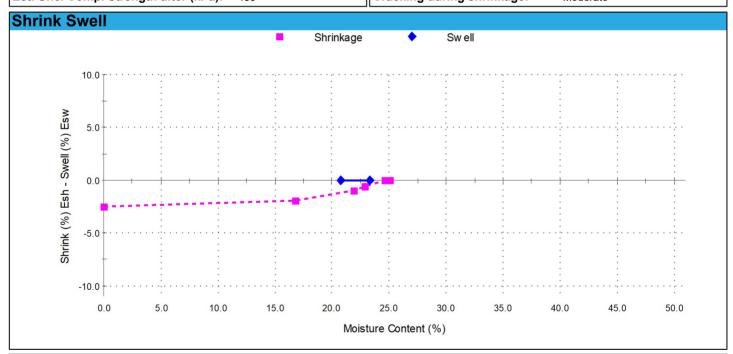
Sampling Method: The results outlined below apply to the sample as received

Material: **Date Sampled:** 28/07/2022 Source: **Date Submitted:** On-Site 3/08/2022

Specification: No Specification Sample Location: BHB216 - (0.35 - 0.55m)

**Date Tested:** 10/08/2022

Swell Test AS 1289.7.1.1 **Shrink Test** AS 1289.7.1.1 Swell on Saturation (%): Shrink on drying (%): 0.0 2.5 Moisture Content before (%): Shrinkage Moisture Content (%): 25.1 23.3 Moisture Content after (%): Est. inert material (%): 20.7 Est. Unc. Comp. Strength before (kPa): 450 Crumbling during shrinkage: Est. Unc. Comp. Strength after (kPa): Cracking during shrinkage: Moderate



Shrink Swell Index - Iss (%): 1.4