Appendix B

Laboratory test results



Alstonville Laboratory

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Aggre	gate/Soil T	est Rep	ort		Re	port No: MAT:AL	ST08S-00018
Client:	Mr Jeff Champion Hazelmount Lane Tucki NSW 2480						
Principal:							
Job No:	LABTALST01597A	A					
Proiect:	General Testing 08						
Lot No:	gg	TRN:					
Sample D	Details				Particle Size	ze Distribution	ı
Sample ID:	ALST08	S-00018			Method:		
Field Sample	e: 0020				Drying by:		
Date Sample	ed: 22/01/20	08			Date resteu.		
Source:	BH2	~					
Material:	12.5-171	n					
Sampling M	ethod: Sampled	I from Drill Core	:		Sieve Size	% Passing	Limits
Other Tes	st Results						
Description		Method	Result	Limits			
Sample Histo	ory				_		
Preparation	(222)		Dry Sieved				
Linear Shrink	(age (%)		n/a				
Crumblin	a a a a a a a a a a a a a a a a a a a		No				
Curling	9		No				
Liquid Limit (%)		NO				
Method	,						
Plastic Limit	(%)		NO				
Plasticity Ind	ex (%)		NP		_		
Apparent Particle	e Density - Coarse (t/m ³)	AS 1141.6.1	2.52				
Particle Dens	sity Dry (t/m³)		2.27				
Water Absor	sity SSD (t/m^2)		2.37		Chart		
Nature of Sa	mple	AS 1141.22 sa	ndstone core		-		
Nominal Sam	nple Size (mm)		19				
Agg Size and	Crush Details	19	mm by hand				
Fraction Size	•		-26.5mm				
Wet Strength	i (kN)		15				
Dry Strength	(KN)		48				
Brookdown (ngth variation (%)		69 No				
Cylinder Size			150				
					-		
Comments Testing perform	med outside of AS1141.2	22 specification sc	ope. Sample prep	ared from Drill	Core for suitability a	ssessment only,	

Coffey Geosciences Pty Ltd A.C.N. 056 335 516

	Geotechnical	Resources Environmental Techn	ical Project Management
		4/6 Russalton Drive, Russellton Pa Ph: (02) 6628	rk, Alstonville, NSW, 2477 3224 Fax: (02)6628 1833
est results			
ent : JEFF CHAMPION ncipal : oject : MATERIAL ASSESSMENT eation : HAZELMOUNT QUARRY		job no : laboratory report date test report	NR1597/1 ALSTONVILLE March 01, 2006 A
t procedure : AS1289 3.6.1 , 3.1	.2 , 3.2.1 , 3.3.1	test date :	16 to 28/02/06
SAMPLE NUMBER	A7708		
SAMPLE IDENTIFICATION	SANDSTONE		
		SOIL PARTICLE SIZE DISTRIB	UTION
AS SIEVE SIZE		% PASSING AS SIEVE	
4.75 mm	100		
1.18 mm	95		
600 um	83 56		n an the second s
425 um	50		
300 um	41		
150 um	20		
75 um	17		
75 um	14		
		ATTERBERG LIMITS	
LIQUID LIMIT WI	30		
PLASTIC LIMIT Wp	18		
PLASTICITY INDEX	12		
SAMPLE HISTORY	AIR DRIED		
PREPERATION METHOD	DRY SIEVED		

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NATA Corporate No. 431 Date Authorised Signature: NC CHRISTOPHER MCNEIL, LABORATORY MANAGER

01/03/06

Coffey Geotechnics Pty Ltd coffey geotechnics ABN 93 056 929 483 4/6 Russelton Drive SPECIALISTS MANAGING THE EARTH Alstonville NSW 2477 Telephone: +61 2 6628 3224 Facsimile: +61 2 6628 1833 Report No: MAT:ALST07S-00868 **Aggregate/Soil Test Report** Issue No: 1 This report replaces all previous issues of report no 'MAT:ALST07S-00868'. This document is issued in accordance with NATAs Client: Mr Jeff Champion accreditation requirements. Accredited for compliance with ISO/IEC 17025. Hazelmount Lane Tucki NSW 2480 {This document may not be reproduced except in full.} ΝΔΤΔ Principal: Job No: LABTALST01597AA 11 NATO Project: **General Testing 07** Approved Signatory: Richard Rutter WORLD RECOGNISED Lot No: TRN: NATA Accredited Laboratory Number: 431 Date of Issue: 13/04/2007 **Other Test Results Sample Details** Description Sample ID: ALST07S-00868 Method Result Limits Sample History AS 1289.1.1 **Oven-dried** Field Sample: 0001 Preparation AS 1289.1.1 Dry Sieved Date Sampled: 03/04/2007 AS 1289.3.4.1 ource: Champions Quarry Linear Shrinkage (%) n/a AS 1289.3.1.2 Liquid Limit (%) .daterial: Current Stockpile 25 Method **One Point** Specification: AS Grading AS 1289.3.2.1 Sampling Method: Submitted by client Plastic Limit (%) 20 Plasticity Index (%) AS 1289.3.3.1 5 Location: **Particle Size Distribution** Method: AS 1289.3.6.1 Drying by: Oven % Passing Note: Sample Not Washed 100 90 Sieve Size % Passing Limits 37.5mm 80 100 26.5mm 96 70 19.0mm 87 13.2mm 83 60 9.5mm 79 6.7mm 75 50 4.75mm 73 70 2.36mm 40 1.18mm 60 600µm 39 30 425µm 27 300µm 19 20 150µm 12 75µm 11 10 ..75m m 3.2m m 19.0m m 50µm 300µm f25μm 600µm .18m m 2.36m m 6.7mm 9.5m m 26.5m m 37.5m m 75µm

Alstonville Laboratory

Comments N/A

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lient:	Mr Jeff Cha Hazelmour Tucki NSV	ampion nt Lane V 2480					This document accreditation re with ISO/IEC 1	is issued in accorda equirements. Accredi 7025.	nce with NATA ted for complia
rincipal: >b No: roject: ot No:	LABTALST General Te	01597AA esting 07	TRN:			WORLD RECOGNISED	full.) Approved Sig NATA Accrea	gnatory: Richard R	utter umber: 431
ample ID: ield Sampl ate Sampl ource: aterial: pecificatio ampling M ocation:	Details ALS le: 0002 ed: 03/0 Cha Wes on: AS 0 lethod: Sub	T07S-00872 2 94/2007 Impions Quarr st Face Grading mitted by clier	'y nt		Other Test R Description Sample History Preparation Linear Shrinkage Liquid Limit (%) Method Plastic Limit (%) Plasticity Index (%	esults	ethod 5 1289.1.1 5 1289.3.4.1 5 1289.3.4.1 5 1289.3.1.2 5 1289.3.2.1 5 1289.3.3.1	Result Oven-dried Dry Sieved n/a 26 One Point 24 2	Limit
article : %Pas: 100⊺・・・	Size Distr	ibution	l	l.		Method: Drying k Note:	AS 1 y: Over Sam	289.3.6.1 n ple Not Washed	
% Pass 100 90 90 80 70 60 50 40 30 10	Size Distr	ibution				Method: Drying to Note: Sieve Si 26.5mm 19.0mm 13.2mm 9.5mm 6.7mm 4.75mm 2.36mm 1.18mm 600µm 425µm 300µm 150µm 75µm	AS 1 by: Over Sam ze %	I289.3.6.1 n ple Not Washec 6 Passing 100 93 87 83 81 79 77 63 38 21 11 4 1	Limits

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Service States and States



Comments N/A



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Principal: Job No: Project: Lot No:	LABTALST0159 General Testing	97AA g 07	TRN:				WORLD RECOGNISED ACCREDITATION	Approved Signator	y: Richard R	utter umber: 431
Sample [Details			Oth	ər To	əst R	esults	Date of Issue. 20/	0//200/	
Field Sampl Date Sample Source: Material: Specificatio Sampling M Location:	e: 0010 ed: 23/07/20 Sandstor n: AS Grad lethod: Submitte Champic)07 ne ling ed by clien ons Quarry	t ⁄ Tucki.,,,,							
Particle	Size Distribu			 	PP	••• • •••	Method: Drying b	AS 1289. by: Oven Sample M	3.6.1	
Particle \$	Size Distribu	ition	, , ,				Method: Drying t Note:	AS 1289. y: Oven Sample W	3.6.1 /ashed	
Particle 100 90 80 80 80 80 80 80 80 80 80 80 80 80 80	Size Distribu						Method: Drying k Note: Sieve Si 26.5mm 19.0mm 13.2mm 9.5mm 6.7mm 4.75mm 2.36mm 1.18mm 600µm 425µm	AS 1289. by: Oven Sample W ze % Pa	3.6.1 /ashed 5500 99 98 98 98 98 98 98 97 94 79 60	Limits
Particle 100 90 80 70 50 80 70 80 80 70 80 80 80 80 80 80 80 80 80 80 80 80 80	Size Distribu						Method: Drying to Note: Sieve Si 26.5mm 19.0mm 13.2mm 9.5mm 6.7mm 4.75mm 2.36mm 1.18mm 600µm 425µm 300µm 150µm 75µm	AS 1289. vy: Oven Sample W ze % Pa	3.6.1 /ashed ssing 100 99 99 98 98 98 98 98 98 97 94 79 60 49 31 27	Limits
Particle 1 100 90 80 70 50 80 70 80 70 80 70 80 70 80 70 80 70 80 70 80 70 80 70 80 70 80 70 80 70 80 70 80 70 80 70 80 80 70 80 80 70 80 80 80 80 80 80 80 80 80 80 80 80 80	Size Distribu						Method: Drying b Note: Sieve Si 26.5mm 19.0mm 13.2mm 9.5mm 6.7mm 4.75mm 2.36mm 1.18mm 600µm 425µm 300µm 150µm 75µm	AS 1289. by: Oven Sample W ze % Pa	3.6.1 /ashed 5sing 100 99 98 98 98 98 97 94 79 60 49 31 27	Limits

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Aggreg	gate/Soil 7	lest Rep	oort	R This report replaces	eport no: MAT:A all previous issues of report n	LST07S-02240 Issue No: 1 o 'MAT.ALST07S-02240'
Client:	Mr Jeff Champion Hazelmount Lane Tucki NSW 2480				This document is issued in accreditation requirements with ISO/IEC 17025.	accordance with NATAs . Accredited for compliance
Principal:				NATA	full.}	reproduced except in
Job No:	LABTALST01597A	A			6 allor	
Project:	General Testing 07	7			C. MERM.	
Lot No:		TRN:		WORLD RECOGNISED	Approved Signatory: Cr	
					NATA Accredited Labo Date of Issue: 16/08/2	ratory Number: 431 007
Sample D	etails			Particle S	ize Distributio	n
Sample ID:	ALST07	S-02240		Method:		
Field Sample	: 0011			Drying by:		
Date Sample	d: 01/08/20	007		Date Tested:		
Source:	Champi	ons Quarry				
Material:	Sandsto	one Stockpile				
Specification Sampling Me Location:	n: ethod: AS1141 Champie	.3.1 Clause 6.9. ons Quarry . Tue	3 cki	Sieve Size	% Passing	Limits
Optimum Dry Optimum Moi Oversize Sample Histo Preparation Linear Shrink Mould Ler Crumbling	sture Content (%) Sieve (mm) Material (%) ry age (%) ngth (mm)	AS 1289.1.1 AS 1289.1.1 AS 1289.1.1 AS 1289.3.4.1	1.90 13.1 19.0 Oven-dried Dry Sieved 7.0 250 No	 		
Uring	2	AS 1289.3.1.2	NO 30			
Method	/0)		One Point			
Plastic Limit (%)	AS 1289.3.2.1	18	Chart		Star
Plasticity Inde	ex (%)	AS 1289.3.3.1	12	 		
CBR At 2.5		AS 1289.6.1.1	25.0			
CBR At 5.0	alatura Datia		25.0			
Laboratory No	oisture Ratio		91			
Moisture Cont	tent Top 30mm (%)		14.8			
Moisture Content	of Remaining Depth (%)		11.0			
Swell (%)			0.5			
Dry Density A	fter Soaking (t/m³)		1.900			
Oversize Excl	uded		False			
Material Overs	size (%)		0.0			
Surcharge Ma	iss (g) iffort		4.5 STD			
Period of Soa	king (Days)		4			
				_		
_						
Comments N/A						







washing procedures. Atterberg limits assessed prior to removal of fines. Grading envelope as specified in Table 3 of AS2758.1 - Aggregates and Rock for Engineering Purposes - Part 1, Concrete Aggregates.

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ample Deta	ils				Other Test Re	esults	Date of Iss	ue: 8/11/2007	
mple ID:	ALST07	S-02506			Description	<u> </u>	lethod	Result	Limit
eld Sample: te Sampled:	0015 15/10/2	007			Ratio A Ratio B	R	CIA [107	34 53	35 - 5 35 - 5
urce: iterial:	Vals Ha DGB 20	rdrock Qua (Raw Fee	arry ed)		Ratio C Observations			58	35 - 6
ecification:	DBG20	2(a) - RTA 3 1 Claus	3051.1 (ED5	5)	Sample History	A	S 1289.1.1 S 1289.1.1	Oven-dried	
cation:	Vals Ha	rdrock Qua	arry,,,,		Linear Shrinkage (%) R	TA T113	n/a	~20
					Method		TA T/00	One Point	S20
					BI (1 11 11 (0/)	H		24	
article Size	Distribu	ıtion			Plastic Limit (%) Plasticity Index (%)) R	TA T109	4 1106 DTA 11	≤20 ≤6
article Size % Passing 100 T · · · · · · · · · · · · · · · · · ·	Distribu	ition			Plastic Limit (%) Plasticity Index (%)) R Method Drying I	: RT 59 :	9 A T106, RTA T1	≤20 ≤6 07
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**************************************			article Size	2.36mm	Plastic Limit (%) Plasticity Index (%)) R Method Drying I Sieve S 26.5mm 19.0mm 13.2mm 6.7mm 2.36mm 425µm 300µm 75µm 13.5µm	: RT jy:	9 A T106, RTA T1 % Passing 100 100 88 49 20 7.0 5.5 3.5 2.0	≤ 20 ≤ 6 07 Limits =100 95 - 100 70 - 90 50 - 70 35 - 55
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Page 1 of 1

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	J	SPECIALI	STS MANAGI	ING THE EARTH	Alstonville NSW 2	/e 477		
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ample Deta	ails			Other Test R	lesults		<u>10. Vilinese</u>	
ample ID:	ALST07	S-02508		Description	1	Method	Result 45	Limits
ate Sampled:	15/10/20	007	0.4	Ratio B		•••••	47	35 - 55
aterial:	Blending	g Trial	3.1 (CDC)	Observations		00 4000 1 1		35-00
pecification: ampling Metho	d: AS1141	1 - RTA 3051. .3.1 Clause 6	.1 (ED5) .9.4	Sample History Preparation	//////////////////////////////////////	AS 1209.1.1 AS 1289.1.1	Dry Sieved	
ocation:	Champi	ons Quarry / V	/als Hard Rock	Linear Shrinkage Liquid Limit (%)	(%)	R1A 113	n/a 30	
				Method			One Point	<20
				Plastic Limit (%)	E	RTA T109	21	<u>54</u> 0
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article Size	Distribu	ition		Plastic Limit (%) Plasticity Index (%	6) Methoc Drying	RTA T109 RTA T109 I: RT/ by: Ove	21 9 A T106, RTA T1 en	≤ <u>2</u> 0 ≤6
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Particle Size % Passing 100) Distribu	Ition		Plastic Limit (%) Plasticity Index (%	6) Methoc Drying	rta t109 RTA T109 	21 9 A T106, RTA T1 en	<u>≤20</u> ≤6
Particle Size) Distribu	ution		Plastic Limit (%) Plasticity Index (%	6) Methoc Drying Sieve S 26.5mn	RTA T109 RTA T109 d: RT/ by: Ove Size	21 9 A T106, RTA T1 en % Passing 100	≤6 07 Limits =100
% Passing 100) Distribu	Ition		Plastic Limit (%) Plasticity Index (%	6) Methoc Drying Sieve S 26.5mn 19.0mn 13.2mn	RTA T109 RTA T109 d: RT/ by: Ove Size n n	21 9 A T106, RTA T1 en % Passing 100 100 91	≤6 07 Limits =100 95 - 100 70 - 90
* Passing) Distribu	Ition		Plastic Limit (%) Plasticity Index (%	6) Methoc Drying Sieve S 26.5mn 19.0mn 13.2mn 6.7mm 2.36mn	RTA T109 RTA T109 J: RT/ by: Ove Size n n n	21 9 A T106, RTA T1 m % Passing 100 100 91 68 39	≤6 Limits =100 95 - 100 70 - 90 50 - 70 35 - 55
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*article Size	Distribu			Plastic Limit (%) Plasticity Index (%	6) Method Drying Sieve S 26.5mn 19.0mn 13.2mn 6.7mm 2.36mn 425μm 300μm 75μm 13.5μm	RTA T109 RTA T109 J: RT/ by: Ove Size n n	21 9 A T106, RTA T1 n % Passing 100 100 91 68 39 17 14 8.0 6.0	≤6 Limits =100 95 - 100 70 - 90 50 - 70 35 - 55
* Passing 100	Distribu			Plastic Limit (%) Plasticity Index (%	6) Methoc Drying Sieve S 26.5mn 19.0mn 13.2mn 6.7mm 2.36mn 425μm 300μm 75μm 13.5μm	RTA T109 RTA T109 J: RT/ by: Ove Size n n n	21 9 A T106, RTA T1 n % Passing 100 100 91 68 39 17 14 8.0 6.0	≤6 Limits =100 95 - 100 70 - 90 50 - 70 35 - 55
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Passing % Passing 100 90 80 70 70 80 70 70 80 70 70 80 70 70 70 70 70 70 70 70 70 7	Distribu		Euger Size	Plastic Limit (%) Plasticity Index (%	6) Methoc Drying Sieve S 26.5mn 19.0mn 13.2mn 6.7mm 2.36mn 425μm 300μm 75μm 13.5μm	RTA T109 RTA T109 J: RT/ by: Ove Size n n n	21 9 A T106, RTA T1 n % Passing 100 100 91 68 39 17 14 8.0 6.0	≤6 Limits =100 95 - 100 70 - 90 50 - 70 35 - 55

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Pai	% Passing 100 90 90 70 60	ize D	AS1141. Champic	tion	e 6.9.4 y / Vals Hard	Prep Line Liqu Plas Plas	paration ar Shrinka id Limit (% Method tic Limit (% ticity Index	ge (%)) (%) (%)	A R R Method Drying I Sieve S 26.5mm 19.0mm 13.2mm 6.7mm 2.36mm 425µm 300µm	S 1289.1.1 TA T113 TA T109 TA T109 : RT : RT	"A T106, RTA T "A T106, RTA T	Lin 1 : 1 : 107 Lin 107 Lin -1 95 - 70 - 50 - 35 -
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Project:	Gene	ral Test	ing 0	~~ 7											100 oved Sig	natory: Richard R	utter
Lot No:					TRN:	:						ACCI	REDITATION	NAT Date	A Accred	lited Laboratory N	umber: 431
Sample D	etails	S						Ot	her	٢Te	est R	lesulf	ts	Duit	01 15500.	0/11/2007	
Sample ID:		ALST)7S-0	2622				Des	scrip		1 tony			Metho S 128	od	Result	Limits
Date Sample	d:	11/04/	2007					Pre	para	tion		(0.(.)		S 128	9.1.1	Dry Sieved	
Source: laterial:		Sands	tone					Liq	ear S uid L	imit.	ikage (%)	(%)	, ,	AS 128 AS 128	9.3.4.1 9.3.1.2	n/a NO	
Specification	thod:	AS Gr Submi	ading tted b	nv clier	nt			Pla	Met stic l	hod Limi [,]	t (%)		ļ	S 128	9.3.2.1	One Point 21	
Location:	uiou.	Cham	pions	Quarr	y.,,,,,			Pla	sticit	y In	dex (%	6)	ŀ	S 128	9.3.3.1	NP	
Particle S	ize C)istrik	outic	on						1925							
													Methoo Drying	l: by:	AS 12 Oven	289.3.6.1	
% Passing	ł												Note:		Samp	le Not Washed	l
100										 							
90 +	••••	• • • • • • • • •			//								Sieve S	ize	%	Passing	Limits
80	••••	• • • • • • • •		/	••••					····			13.2mm	1		99	
70	• • • • • • • • •												9.5mm 6.7mm			98 97	
60				/									4.75mm	1		97 96	
50+													1.18mm	1		92	
40													600µm 425µm			66 40	
			Λ										300µm			24 8	
30+		/				•••••			••••				75µm			4	
20			•••				• • • • • • • •	••••			····						
10				· ·····	· · · <i>·</i> · · · ·		•••••										
0																	
75µn	150µл	300µп	425µn	600µn	l.18mn	2.36m rr	75	лшс/-+	6./mr	9.5mr	13.2mr 9.0mr						
				P	article Siz	e		•			=						
omments																	

NP = Non Plastic



Alstonville Laboratory

Geotechnics SPECIALISTS MANAGING THE EARTH

Telephone: +61 2 6628 3224 Facsimile: +61 2 6628 1833

Aggree	gate/S	Soil Test	Rep	oort		Re	port No: MAT:A	LST08S-00018
Client:	Mr Jeff C Hazelmo Tucki N	Champion Junt Lane SW 2480						
Principal:						•		
Job No:	LABTAL	ST01597AA						
Project:	General	Testing 08						
Lot No:			TRN:					
Sample D)etails					Particle Si	ze Distributio	n
Sample ID:		ALST08S-0001	8			Drving by:		
Field Sample	e:	0020				Date Tested		
Date Sample	ed:	22/01/2008				Date rested.		
Source:		0HZ 12517m						
Specification	n.	12.0-1710						
Sampling Me Location:	ethod:	Sampled from Champions Qu	Drill Core arry, Tuc	:ki,,,,		Sieve Size	% Passing	Limits
Other Tes	st Resul	ts Met	:hod	Result	Limits			
Sample Histo	ory			Dury Clayer				
Preparation	ago (%)			Dry Sleved				
Mould Lei	aye (%)			n/a				
Crumbling	ngur (mm) a			No	κ.			
Curling	9			No				
Liquid Limit (%)			NO				
Method	,							
Plastic Limit ((%)			NO				
Plasticity Inde	ex (%)			NP				
Apparent Particle	Density - Coa	arse (t/m ³) AS 1	141.6.1				· · · ·	
Particle Dens	ity Dry (t/m	l ³)						
Particle Dens	ity SSD (t/i	m³)				Chart		
Valer Absorp	2000 (%)	AS 1	141.22 0.00	adatana aara				
Nominal Sam	inple Size (n	nm)	501	19				
Agg Size and	Crush Det	ails	19	mm by hand				
Fraction Size				-26.5mm				
Wet Strength	(kN)			15				
Dry Strength	(kN)			48				
Wet/Dry Strer	ngth Variat	ion (%)		69				
Breakdown O	ccured			NO				
				150				
				· **				
Comments Testing perform	ned outside	of AS1141.22 spec	ification sc	ope. Sample pre	epared from Drill (Core for suitability a	assessment only,	
Form No: 18909.V1.00	0			(c) 2000-2007 QESTL	ab by SpectraQEST.cc	om		Page 1 of 1

And	and the second sec
	Australian Construction Materials
	MATERIALS TECHNICAL SERVICES
	ABN 51 000 756 507 Unit 4, 3-5 Gibbon Road Baulkham Hills NSW 2153 Australia PO Box 400, Winston Hills NSW 2153 Telephone 61 2 9624 9900 Facsimile 61 2 9624 9999
CLIENT: Coffey Geotechnics (Alstonville)	FILE NO: 56/07
PROJECT: Quality Control - Testing of Processed Sand ex Wyralla Quarry	
TEST PROCEDURE: AS1141 – Sampling and Testing Aggregates	
Laboratory Sample No:	75668
	CLIENT: Coffey Geotechnics (Alstonville) PROJECT: Quality Control – Testing of Processed Sand ex Wyralla Quarry TEST PROCEDURE: AS1141 – Sampling and Testing Aggregates Laboratory Sample No:

			/
	124		1
Approv	ved Signator	-	Ame
Dete	29.10.02	Casial Ma	65291

Richard Bawer

20.9.07

Results

2.8

10.1

2.5

1.7

Processed Sand

ACCREDITED FOR TECHNICAL COMPETENCE

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Date Received:

Test Method

AS1141.24

Sample Description:

Sample submitted by client.

R. Southon, QC File, File

Test

Fraction tested:

Sodium Sulphate Soundness Total weighted (% Loss)

-2.36+1.18mm (% Loss)

-1.18 + 600 micron (% Loss)

-600+300 micron (% Loss)

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MATERIALS TECHNICAL SERVICES

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Test Report

CLIENT: COFFEY GEOTECHNICS (Alstonville)

PROJECT: Testing of processed sand Ex. Wyralla Quarry

FILE NO: 56/07

DATE REC'D: Oct 2007

TEST METHOD:

Accelerated Mortar Bar Test for AAR Assessment to RTA T363

LAB SAMPLE NO:	MATERIAL	DESCRIPTION		
75668	Processed Sand	Wyralla		
ID # 39615	GP Cement	Berrima SL		

Results:

Age (days)	Expansion % (Ave. of 3 specimens)			
3	0.01			
7	0.03			
10	0.05			
14	0.08			
17	0.11			
21	0.14			

Aggregate reactivity classification:

% Expansion at 21 Days		Aggregate Reactivity Classification			
Coarse Fine Aggregate Aggregate					
<0.10	<0.15	Non Reactive			
≥0.10, <0.4	≥0.15, <0.45	Having Potential for Slow/Mild AAR			
≥0.40	≥0.45	Having Potential for Substantial AAR			

Rick Southon, Q.C. File, Mat. File. File



Approved Signatory ______ 65292

Muans Abdulnebe

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Australian Construction Materials



BORAL RESOURCES (NSW) PTY LTD ABN 51 000 756 507 Unit 4, 3-5 Gibbon Road Baulkham Hills NSW 2153 Australia PO Box 400, Winston Hills NSW 2153 Telephone 61 2 9624 9900 Facsimile 61 2 9624 9999

FILE NO: 56/07

CLIENT: Coffey Geotechnics (Alstonville)

PROJECT: Quality Control - Testing of processed sand ex Wyralia Quarry

TEST PROCEDURE: AS1141 - Sampling and Testing Aggregates

Laboratory Sample	75668	
Date Received:	20.9.07	
Sample Description	Processed Sand	
Test Method	Results	
AS1141.33	Silt Content (%)	8 •
AS1141.34	Organic impurities other than sugar The colour assessment was made visually using Coloured reference glass	Pass

Sample submitted by client.

R. Southon, QC File, File



Approved Signator n б 4 29 1 Date. 6 Ø Serial No.

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NATA Accredited Laboratory Number: **547**

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ABN 51 000 756 507 Unit 4, 3-5 Gibbon Road Baulkham Hills NSW 2153 Australia PO Box 400, Winston Hills NSW 2153 Telephone 61 2 9624 9900 Facsimile 61 2 9624 9999

MATERIAL STECHNICAL SERVICES

CLIENT: COFFEY GEOTECHNICS - Alstonville

FILE No: 56/07

PROJECT: Testing of Processed sand Ex. Wyralla Quarry.

TEST PROCEDURE: AS1012.20 (1992) - Determination of Chloride and Sulfate in Hardened Concrete & Concrete Aggregates AS1141.13 - Material Finer than 2 Micron AS1141.35 (1995) - Detection of Sugar AS1141.31 (1997) - Determination of Light Particles AS1289.4.1.1 (1997) - Organic Matter Content International Slurry Surfacing Association No.145 - Methylene Blue Adsorption Value

Laboratory Sample No:

Date Received:

75668

20.09.07

Sample Description: Field No:

Processed Sand 1

TEST RESULTS

% Chloride as Cl⁻ % Sulfate as SO₃ Material Finer than 2 Micron (µm) (%) Sugar % Light Particles % Organic Matter Methylene Blue Adsorbed (mg/g)

20.01%. 1510 · (0.01 % 0.002 、 0.15 Not Applicable Not Detected Nil 0.1 5.0 NA.V

Sample submitted by client.

R. Southon, Q.C. File, File

TECHNICAL COMPETENCE

		FRAN	K GRIMA	
\land	Approved Signatory	F. Gremin		
	Date 3-10-07	Serial No	64130	

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NATA Accredited Laboratory Number: 547

Geochempet Services

ABN 980 6945 3445 PETROLOGICAL and GEOCHEMICAL CONSULTANTS



Principals: K.E. Spring B.Sc. (Hons), MappSc H.M. Spring B.Sc. 19 Centenary Drive MALENY Q 4552 Telephone: (07) 5494 3288

Fax: (07) 5494 3288

Email: geochempet@bigpond.com.au

PETROGRAPHIC REPORT ON A PROCESSED SAND (75668) FROM WYRALLA QUARRY

prepared for

BORAL RESOURCES (NSW) Pty Ltd MATERIALS TECHNICAL SERVICES

Purchase Order No.: 4258606

Invoice Number: 00001882

Client Ref:

George Calvar

Issued by

H. M. Spring **B.** Sc. 14 November 2007

NOVEMBER, 2007 Bo071102t.doc

Sample Number :	75668	Date Supplied :	15/10/07
Sample Descrip. :	Processed Sand	Location Wyral	la Quarry
Order No :	4258608		
Work Requested :	Petrographic analysis in relat concrete sand	tion to suitability for u	se as
<u>Methods</u> :	Account taken of ASTM C 2 Assessment of Aggregates for 1996 joint publication of the of Australia and Standards A Reaction - Guidelines on M Concrete Structures in Austr	95 Standard Guide for <i>Concrete</i> and of the c Cement and Concrete Australia, entitled <i>Alka</i> <i>Animising the Risk of</i> <i>alia</i>	Petrographic content of the Association ali Aggregate f Damage to

Identification : Medium quartz lithic sand

Description :

The sample consisted of about 500 g of essentially clean, very pale orange to light brown with reddish fragments of iron stained quartz sand. In a crude test of a small subsample, about 23% of the sand passed a 0.3 mm sieve, 66% is coarser than 0.3 mm and finer than 1.18 mm, and 11% exceeds 1.18 mm (ranging from 1.18 mm up to about 4 mm in size) The coarse fraction carries many coarse grains of quartz, sandstone fragments, white feldspar and ironstone fragments. The quartz grains display moderate to high sphericity, but in detail there are angular indents and protrusions consistent with quartz overgrowth on former rounded grains in a precursor sandstone. No deleterious grain coatings are apparent, but all grains display specks of brown iron oxide trapped in surface indents.

When a sub-sample was swirled in water, it resulted in a very light turbidity which settled quickly implying a very little free silt and clay is present.

A thin section was prepared for microscopic examination in transmitted polarized light. A count of 100 widely spaced points falling within sectioned clasts gave the following composition:

- 68% quartz as single, free, unstrained to mildly strained grains (48%) and carrying 2% iron oxide coating or as simple composite crystalline aggregates of unstrained to mildly strained grains quartz (18%)
- 9% quartz as moderately strained single or more commonly crystalline composite grains
- <1% other mineral grains (including feldspar, ilmenite, mica, rutile, geothite and zircon)
- 4% lithic clasts of acid volcanic and/or tuffaceous rock
- 15% lithic clasts of quartz sandstone (8% quartz)
- 2% ironstone
- 2% argillized fragments

NOVEMBER, 2007 Bo071102t.doc 2

The free silica content (or total quartz plus chert content) of the sand is about 84%, with 1% as microcrystalline quartz and 8% as clasts of sandstone and the rest as single or crystalline composite quartz grains.

By far the most abundant component is quartz in the form of simple unstrained or mildly strained grains (48%) which are partly coated with firmly adhering secondary iron oxides (amounting to 2% and composed probably of hematite and goethite). About 18% consists of iron oxide coated single or crystalline composite grains of moderately strained quartz and a smaller amount consists of similarly iron oxide quartz as moderately strained single or more commonly crystalline composite grains (9%).

Much of the quartz sand clasts carry partial, thin coatings of brown secondary iron oxide (amorphous limonite and/or incipiently crystalline goethite), occurring mainly within indents in the surfaces of the grains.

Sand-sized fragments of quartz sandstone amount to 15% and occur in a slightly to less commonly moderately weathered (sericitic and limonite-pigmented) condition. They consist of tightly packed mostly sand size quartz grains and minor argillized feldspar cemented by a thin argillized matrix; some ferruginous matrix is also present. Approximately 3% of these quartz grains are moderately strained.

Other observed clasts comprise 4% clasts of acid volcanics (composed mainly of microcrystalline feldspars and quartz, along with some chlorite and fine mica, generally iron stained), and less than 1% other mineral grains (including feldspar, ilmenite, mica, rutile and zircon).

The sand also carries about 2% of argillized clasts of sand size (i.e. rock fragments now composed mainly of sericite, illite and clay), at least some of which appear likely to represent altered and weathered fragments feldspar. Other ferruginous fragments amount to 2%.

Comments and Interpretations:

Sample 75668 (described as a Processed Sand from Wyralla Quarry), is considered to be quartz and lithic sand which may be described broadly for engineering purposes as medium quartz sand. An orange/reddish colour is imparted by adhering incomplete coatings of iron oxide which are interpreted to be benign.

Grain shapes and the iron oxide coatings suggest that the sand has been recycled from a sandstone source.

The **free silica content** (or total **quartz plus chert content**) of the sand is about 84%, with 1% as microcrystalline quartz and 8% as clasts of sandstone and the rest as single or crystalline composite quartz grains.

Being composed almost entirely of quartz grains of high sphericity, this sand is interpreted to be **physically suitable for use** in concrete. It is also noted that the grains carry some adherent brown secondary iron oxide, but the oxide is interpreted to be benign. The sample carries 4% small, sand-sized, intensely argillized clasts variously

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liberated from or retained within fragments of source sandstone, which is expected to contribute to mildly elevated water demand.

The sand as a whole is predicted to have **potential for mild or slow deleterious alkali**silica reactivity in concrete. It carries about 1% of cherty or finely microcrystalline quartz and 12% of moderately stained quartz.

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Free Silica Content :

The free silica content is estimated to be about 84%.

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Appendix C

Resource assessment by J.E. Siemon Pty Ltd

J.E. Siemon Pty Ltd

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Geological Evaluation of Industrial Minerals, Aggregates & Gemstones Principal: John Siemon MSc MAIG

22 January 2008

Mr Tom Nicholson Coffey Geotechnics Pty Ltd 4/6Russelton Drive ALSTONVILLE NSW 2477

Dear Tom,

Re: Champions Quarry – Resource Assessment

At your request I have completed a review of the supplied data and compiled a Resource Assessment using MapInfo / Discover software.

Data supplied included files in AutoCAD format which were imported into MapInfo assuming that that the co-ordinate system was GDA94 Zone 56. Because of file size no orthophoto was available. Drill hole coordinates were supplied in an Excel spreadsheet (again assumed to be GDA 94) with RLs assumed to be AHD (Table 1). Although geological logs and core photos were supplied, lithological interpretations were also supplied by Coffey as an Excel file (Table 2).

After setting up the project files in MapInfo, advice was received that the height data was not AHD and that a correction of 1.219 m should be applied to all heights. Because of the data processing implications of this change, a decision was made to alter the quarry base level for calculations to 11.2 m instead of the 10 m AHD stipulated by Council.

Topographically the site is dominated by a northeast trending ridge on which BH1 was drilled and an easterly trending ridge on which holes BH3, 4, 5 and 6 were drilled; both ridges have a maximum elevation of about 50 m. The two ridges are separated by a valley containing an important stand of hoop pine.

Only six holes were drilled within the site, with no sub-surface information generated from the topographically lower parts of the site below RL 20. Consequently models of layer thickness (Overburden and General Fill) may not be representative, and it was not possible to model the siltstone layer intersected only at the base of BH5.

No laboratory test results were available for any of the materials intersected in the six drill holes. However verbal advice indicates that some of the material is suitable for General Fill and that the properties of some of the sandstone layer may not meet road base specifications.

Although the terrain along the central ridges is quite steep, the geology units appear to be stable. As a result an initial decision was made to model the proposed quarry site with a 60° batter. However, after noting that such an angle would reduce the quarry floor footprint by < 25 m in the steepest parts of the site, a decision was made to model on an *in situ* basis. This decision was supported by the limited distribution of the drill holes, and the absence of test data.

Geologically the rocks comprise part of the Kangaroo Creek Formation which crops out over a wide area from extending from near Coffs Harbour north to the Queensland border; rocks of equivalent age crop out widely in Southern Queensland.

Resource Estimation

In assessing the extent and quality of the deposit at Champions Quarry, the following definitions are applicable (JORC, 2004).

A 'Mineral Resource' is a concentration or occurrence of material of intrinsic economic interest in or on the Earth's crust in such form, quality and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge. Mineral Resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories.

An Inferred Mineral Resource is that part of a Mineral Resource for which tonnage, grade and mineral content can be assumed with a low level of confidence. It is inferred from geological evidence and assumed but not verified geological and /or grade continuity. It is based on information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes which may be limited or of uncertain quality and reliability.

Guidelines to the 2004 edition of the JORC Code (JORC, 2004) suggest that "Confidence in the estimate is sufficient to allow the application of technical and economic parameters and to enable an evaluation of economic viability"

As indicated above drill hole information is sparse, there is no sub-surface data for the low parts of the site and there is no analytical data. Consequently it is difficult to determine the aerial and vertical extent of the various materials within the site. As a result it is only possible to estimate the volume of in situ material within the Quarry Limits as defined by the Quarry Area boundary, the Topography and a Quarry Floor at RL 11 (Figure 1).

The contained material is therefore defined as an *in situ* Inferred Mineral Resource (JORC, 2004). Additional drilling and / or test pitting would be required to upgrade these Resources to Measured status. After consideration of analytical, mining, marketing, environmental, legal, social and governmental factors it should be possible to upgrade Measured Resources to Reserve status.

The total in situ Inferred Resources within the Quarry area (Figure 1) are estimated to be 5.4 Mm³.

Based on drilling data, the **Overburden** thickness within the site was estimated to average 1 m, with the Volume estimated by the Area times Thickness method to be 0.4 Mm³.

General Fill + Overburden was modelled as a layer with thickness determined from the six drill holes (Figure 2). Estimated Inferred Resources of General Fill + Overburden within the area modelled total approximately 2.3 Mm³. By difference the volume of General Fill is estimated to be 1.9 Mm³.

By difference, the volume of **SW Sandstone** (include the siltstone layer intersected in the base of hole BH5) is estimated to approximately 3.5 Mm³.

In summary, Resources are classified as in situ Inferred Mineral Resources, comprising:

TOTAL	5.4 Mm³
SW Sandstone (including siltstone in BH5)	3.1 Mm ³
General Fill	1.9 Mm ³
Overburden	0.4 Mm ³

References

JORC, 2004: Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (The JORC Code). Prepared by the Joint Ore Reserves Committee of the Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and Minerals Council of Australia (JORC).

RESOURCE STATEMENT

The information in this report that relates to Mineral Resources or Ore Reserves is based on information compiled by John Edward Siemon who is a Member of the Australian Institute of Geoscientists.

John Edward Siemon is employed by J.E. Siemon Pty Ltd.

John Edward Siemon has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity for which he is undertaking to qualify as a Competent Person as defined in the 2004 edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (The JORC Code). John Edward Siemon consents to the inclusion of the information contained above in a report in the form and context in which it appears.

(E) Jumon

J.E. Siemon B.Sc, M.Sc, MAIG

CHAMPIONS QUARRY

DRILL HOLE DATA

TABLE 1: Drill Hole Summary

Hole	Easting	Northing	Collar RL	TD m	Water_RL	Date	RL Base General	RL Base Hole
							Fill	
BH1	531336	6798300	28.1	16.9	17.65	23/10/2007	11.2	11.2
BH2	531199	6798403	27.5	16.3	24.2	23/10/2007	19.5	11.2
BH3	531657	6797945	35.0	23.8	24.67	23/10/2007	17.5	11.2
BH4	531440	6797931	49.0	37.8	39.48	23/10/2007	34.2	11.2
BH5	531105	6797994	48.0	36.8	42.2	23/10/2007	34.8	11.2
BH6	531450	6797729	28.0	16.8	10.2	23/10/2007	16.8	11.2

TABLE 2: Down hole lithology

BH	General Fill A		SW sandstone		Genera	al Fill B	RL Base of Quarry
	From	То	From	То	From	То	
1	0.5	16.9					16.9
2	1	8	8	16.3			16.3
3	1	17.5	17.5	23.8			23.8
4	1	14.8	14.8	37.8			37.8
5	1.3	13.2	13.2	27.75	27.75	36.8	36.8
6	1.3	11.2	11.2	16.8			16.8



