MACKA'S SAND & SOIL SUPPLIES

Screened Sand for Asphalt & Concrete

Williamtown Quarry 2014

Specification Compliance with: AS2758.1, AS4058, B80, R53, R82, AS2758.5, RMS 3152

VALLEY CIVILAB
Geotechnical, Testing & Engineering Services
Unit 3, 62 Sandringham Ave, Thornton 2322 P (02) 4966 1844 F (02) 4966 1855
ABN: 50 103 355 531 www.valleycivilab.com.au

16/10/2014
VC Ref: P203 – Williamtown Screened Sand – Site 218

Attn: Robert Mackenzie

Macka's Sand Pty Ltd
2684 Nelson Bay Rd
Salt Ash
NSW 2318

RE: Concrete & Asphalt Sand

Dear Robert,

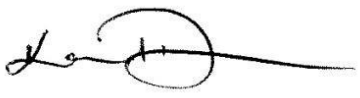
Please find the reports and related documents attached.

Should you require any further information regarding the outlined reports, please do not hesitate to contact the undersigned.

Sincerely,

James Wyatt
Quarry Materials - 0402566615

Report reviewed by:



Karl Dawes
General Manager - 0429496618

PO Box 3127 THORNTON NSW 2322 Ph: 02 4966 1844 Fax: 02 4966 1855
A.B.N. 50 103 355 531 A.C.N. 103 355 531
Email: karl.dawes@valleycivilab.com.au, james.wyatt@valleycivilab.com.au

Introduction

Valley Civilab were commissioned on the 28th of August 2014 to conduct testing & construction material evaluation of screened sand delivered from Macka's Sand located at the Williamtown sand quarry deposit known as site 218. The purpose of the testing was to evaluate the material for use as fine aggregate for concrete and asphalt production.

Specifications

- AS 2758.1-1998 - Aggregates and Rock for Engineering Purposes, Part 1: Concrete Aggregates
- AS/NZ 4058:2007 – Pre-Cast Concrete Pipes (Pressure and Non-pressure)
- RMS B80, July 2013, Edition 6 / Revision 5 – Concrete Work for Bridges
- RMS R82, October 2010, Edition 3 / Revision 7 – Lean-mix Concrete Subbase
- R53, June 2013, Edition 2 / Revision 2 – Concrete (for General Use), Mortar and Grout
- AS 2758.5-2009 - Aggregates and Rock for Engineering Purposes, Part 5: Asphalt Aggregates
- RMS 3152, January 2014, Edition 2 / Revision 1 – Aggregates for Asphalt

Results

The sand tested well with conformity in regards to Particle Density, Water Absorption, Organic Impurities, Sugar, Light Particles & Sodium Sulphate Soundness.

The sand conforms to AS 2758.1 – Concrete Aggregates, subsequently providing conformance with R53 as the required AAR assessment had also been conducted. Conformance has also been demonstrated with specifications AS 4058 & RMS R82.

The sand conforms to asphalt specifications AS 2758.5 & RMS 3152.

The material is non-conforming to the B80 particle size requirements (PSD); however the principal can still approve the use of the material under clause 2.4.1 as all other requirements of the B80 specification are met.

Testing & Limitations

Testing has been conducted in accordance with ISO/IEC 17025 "General Requirements for Testing & Calibration Laboratories" in a NATA endorsed facility. Test results should be assessed using precision in terms of repeatability, reproducibility, measurement uncertainty and effects of sampling.

VALLEY CIVILAB	*Macka's Sand - Williamtown Screened Sand - 2014 - Result Summary - Asphalt Aggregate Specification Compliance*				
Property	**Units**	**Test Method**	**Result**	**Specification**	
				AS2758.5	**RMS 3152**
				Asphalt Aggregates	**Aggregates for Asphalt**
Uncompacted Bulk Density	t/m3	AS1141.4	1.50		
Compacted Bulk Density	t/m3	AS1141.4	1.63		
Particle Density (SSD)	t/m3	AS1141.5	2.64	Project Specification	Report
Particle Density (Dry)	t/m3	AS1141.5	2.62	Project Specification	Report
Water Absorption	%	AS1141.5	0.6	Project Specification	max 1.5% (quartz sands)
Particle Size Distribution:					
% Finer Than 2.36 mm	%	AS1141.11.1 /T201	100	+/-6% from nominated	+/-6% from nominated
% Finer Than 1.18 mm	%	AS1141.11.1 /T201	100	+/-6% from nominated	+/-6% from nominated
% Finer Than 0.600 mm	%	AS1141.11.1 /T201	100	+/-5% from nominated	+/-5% from nominated
% Finer Than 0.425 mm	%	AS1141.11.1 /T201	92	+/-5% from nominated	+/-5% from nominated
% Finer Than 0.300mm	%	AS1141.11.1 /T201	42	+/-5% from nominated	+/-5% from nominated
% Finer Than 0.150mm	%	AS1141.11.1 /T201	1	+/-3% from nominated	+/-3% from nominated
% Finer Than 0.075mm	%	AS1141.11.1 /T201	0	+/-2% from nominated	+/-2% from nominated
% Finer Than 0.075mm	%	AS1141.12 / T201	0.4	-	Report
% Finer Than 0.002mm	%	AS1141.13	n/a	-	-
Sodium Sulphate Soundness	%	AS1141.24	0.0	max 16	max 12
Light Particles	%	AS1141.31	0		
Clay & Fine Silt	%	AS1141.33	2		
Organic Impurities		AS1141.34	Pass		
Organic Matter Content	%	AS1289.4.1.1	<0.1		
Sugar		AS1141.35	Absent		
Acid Soluble Salts:					
Chlorides	%	AS1012.20	< 0.001		
Sulfates	%	AS1012.20	< 0.001		
Alkali Aggregate Reactivity		T363	Non-reactive		
Petrographic Analysis		ASTM C295	Report		
Moisture	%	T120	5.5		
Linear Shrinkage	%	AS1289.3.4.1	Not Obtainable (Non-Plastic)		
Plasticity Index	%	T109	NP		
Maximum Dry Density	t/m3	AS1289.5.5.1	1.69		
Resistivity	Ω.m	AS1289.4.4.1	1845		
Salinity	mS/cm	APHA 2510B	TBA		
pH Value	pH	AS1289.4.3.1	6.2		

VALLEY CIVILAB
GEOTECHNICAL, TESTING & ENGINEERING SERVICES

Macka's Sand - Williamtown Screened Sand - 2014 - Result Summary - Concrete Aggregate Specification Compliance

Property	Units	Test Method	Result	Specification		
				AS2758.1	**B80**	**R82**
				Concrete Aggregates	**Concrete Work for Bridges**	**Lean-Mix Concrete Subbase**
Uncompacted Bulk Density	t/m3	AS1141.4	1.50			min 1.2
Compacted Bulk Density	t/m3	AS1141.4	1.63			min 1.2
Particle Density (SSD)	t/m3	AS1141.5	2.64			
Particle Density (Dry)	t/m3	AS1141.5	2.62	Normal weight aggregate min 2.1 , max 3.2	Normal weight aggregate min 2.1 , max 3.2	Normal weight aggregate min 2.1 , max 3.2
Water Absorption	%	AS1141.5	0.6	max 2	max 2.5	max 5
Particle Size Distribution:						
% Finer Than 2.36 mm	%	AS1141.11.1 / T201	100	60 to 100, +/- 5% from nominated	65 to 95, +/- 10% from nominated	60 to 100, +/- 5% from nominated
% Finer Than 1.18 mm	%	AS1141.11.1 / T201	100	30 to 100, +/- 10% from nominated	40 to 85, +/- 10% from nominated	30 to 100, +/- 10% from nominated
% Finer Than 0.600 mm	%	AS1141.11.1 / T201	100	15 to 100, +/- 15% from nominated	24 to 60, +/- 10% from nominated	15 to 100, +/- 15% from nominated
% Finer Than 0.425 mm	%	AS1141.11.1 / T201	92			
% Finer Than 0.300mm	%	AS1141.11.1 / T201	42	5 to 50, +/- 10% from nominated	8 to 25, +/- 5% from nominated	5 to 50, +/- 10% from nominated
% Finer Than 0.150mm	%	AS1141.11.1 / T201	1	0 to 20, +/- 5% from nominated	1 to 8, +/- 2% from nominated	0 to 20, +/- 5% from nominated
% Finer Than 0.075mm	%	AS1141.11.1 / T201	0	0 to 5	0 to 5	0 to 5
% Finer Than 0.075mm	%	AS1141.12 / T201	0.4	0 to 5	0 to 5	0 to 5
% Finer Than 0.002mm	%	AS1141.13	n/a	max 1	max 1	max 1
Sodium Sulphate Soundness	%	AS1141.24	0.0	max 12	max 12	max 12
Light Particles	%	AS1141.31	0	max 12	max 12	max 12
Clay & Fine Silt	%	AS1141.33	2			
Organic Impurities		AS1141.34	Pass	Pass (lighter in Colour to Reference)	PASS (lighter in Colour to Reference)	1 part in 10000
Organic Matter Content	%	AS1289.4.1.1	<0.1			max 0.5
Sugar		AS1141.35	Absent	Absent	Negative (No Sugar)	Negative (No Sugar)
Acid Soluble Salts:						
Chlorides	%	AS1012.20	< 0.001	Report if > 0.01, Reinforced concrete max 0.4, Plain concrete max 0.15	Report if > 0.01, Reinforced concrete max 0.4, Plain concrete max 0.15	max 0.3 kg / m3
Sulfates	%	AS1012.20	< 0.001	Report if > 0.01, max 5 of portland cement	Report if > 0.01, max 5 of portland cement	max 5
Alkali Aggregate Reactivity		T363	Non-reactive	Report for assessment of reactivity	Report for assessment of reactivity, classification &	Report for assessment of reactivity
Petrographic Analysis		ASTM C295	Report	Report for assesment of reactivity and classification of material	Report for assesment of reactivity & classification	Report for assesment of reactivity and classification of material
Moisture	%	T120	5.5			
Linear Shrinkage	%	AS1289.3.4.1	Not Obtainable (Non-Plastic)			
Plasticity Index	%	T109	NP			
Maximum Dry Density	t/m3	AS1289.5.5.1	1.69			
Resistivity	Ω.m	AS1289.4.4.1	1845			
Salinity	mS/cm	APHA 2510B	TBA			
pH Value	pH	AS1289.4.3.1	6.2			

Material complies with R53 if the material complies with AS2758.1. & ASTM C295 with reference to SAAHB 79 & T363 is conducted for AAR. Material complies with AS4058 if the material complies with AS2758.1.

Note: The material is non-conforming to B80 PSD requirements, however under clause 2.4.1 the principal may approve PSD's outside the specified limits if evidence is provided that concrete made with this PSD meets all other requirments of the B80 specification. The maximum value for the acid-soluble chloride ion content has been been expressed in percentage weight of oven dried concrete as per the note in B80 table B80.5 (the minimum listed in the table kg/m3 is 0.3, divided by 0.1 kg/m3 mutiplied by 0.0042 = 0.0126%).

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Aggregate Report for Engineering Purposes

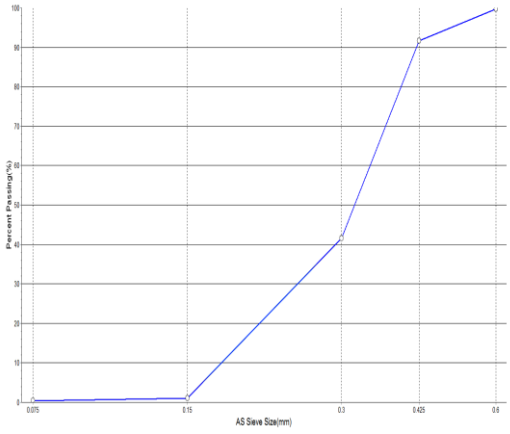
Client :	**Macka's Sand Pty Ltd**	Report Number:	**P203 - 48/1**
Address :	**2684 Nelson Bay Rd, Salt Ash, NSW**	Report Date :	**15/09/2014**
Project Name :	**Material Evaluation**	Order Number :	
Project Number :	**P203**	Test Method :	**AS1141.11.1**
Location:	**Salt Ash Quarry , Salt Ash NSW**		**Page 1 of 1**

Sample Number :	S14-2346	Sampling Method :	Sampled by Client
Date Sampled :	28/08/2014	Material Source:	Macka's Sand - Williamtown
Date Tested:	3/09/2014	Material Type:	Fine to Medium Screened Sand
Sampled By:	Sampled by Client	Remarks	

SAMPLE LOCATION: Williamtown Site 218 , - , - , -

Lot Number: - Test Number: - Specification Number:

AS Sieve Size (mm)	Sieve Analysis Percent Passing	Specification Limits
100		
75		
63		
53		
37.5		
26.5		
19		
16		
13.2		
9.5		
6.7		
4.75		
2.36		
1.18		
0.600	100	
0.425	92	
0.300	42	
0.150	1	
0.075	0	



Nominal Size of Aggregate	425 micron	Test Method	Result	Specification Limits
Nature of Bulk Sample				
Material Finer than 75µm		AS1141.12	0.4	
Density & Water Absorption (Coarse)				
Apparent Particle Density	t/m^3			
Particle Density (on a dry basis)	t/m^3			
Particle Density (on a SSD basis)	t/m^3			
Water Absorption	%			
Density & Water Absorption (Fine)		AS1141.5		
Apparent Particle Density	t/m^3		**2.66**	
Particle Density (on a dry basis)	t/m^3		**2.62**	
Particle Density (on a SSD basis)	t/m^3		**2.64**	
Water Absorption	%		**0.6**	
Bulk Density (Loose)	t/m^3		**1.50**	
Bulk Density (Compacted)	t/m^3		**1.63**	
Moisture Condition of Aggregate			**DRY**	
Particle Shape % Total Mishappen	2:1			
Flat	%			
Elongated	%			
Flat and Elongated	%			
Particle Shape % Total Mishappen	3:1			
Flat	%			
Elongated	%			
Flat and Elongated	%			
Wet / Dry Strength Variation				
Wet Strength	kN			
Dry Strength	kN			
Wet / Dry Strength Variation				
% Size Fraction of Test portion Breakdown				
Average Least Dimension	mm			
Weak Particles	%			
Flakiness Index				
Organic Impurities other than Sugar		AS1141.34	**PASS**	
Method of Determination			**Visual**	

Accredited for compliance with ISO/IEC 17025. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

APPROVED SIGNATORY

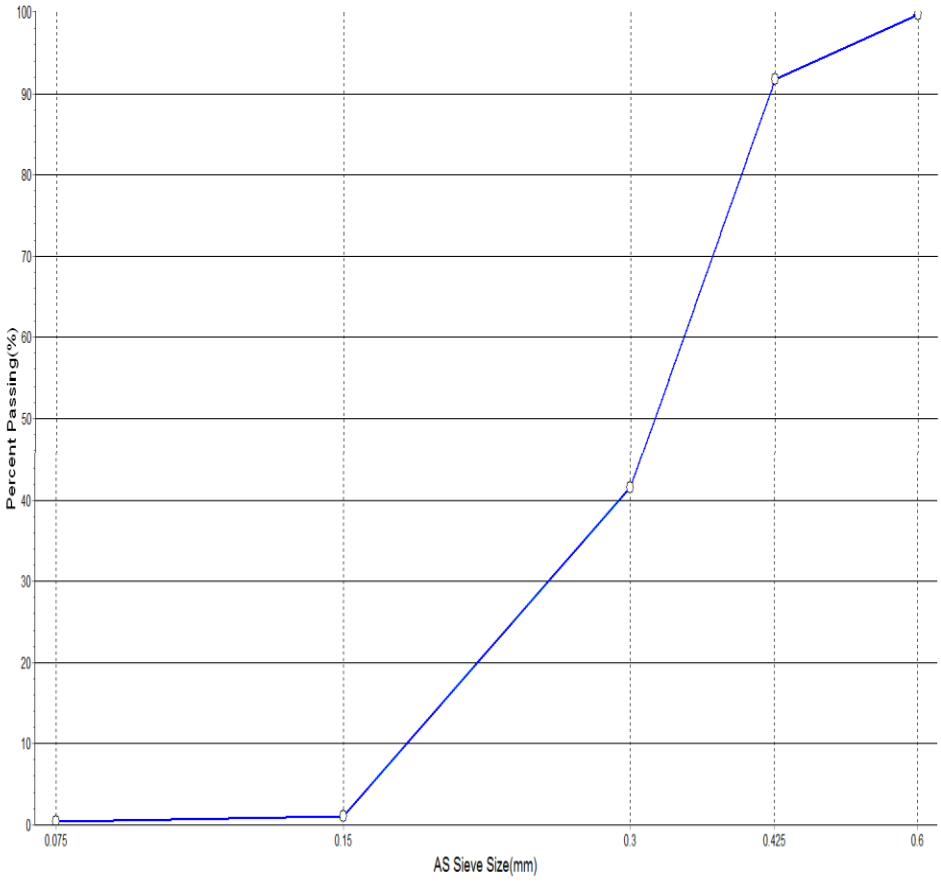
James Wyatt - Technician - Quarry Materials
NATA Accreditation Number
14975

Aggregate PSD Report

Client :	**Macka's Sand Pty Ltd**	Report Number:	**P203 - 53/1**
Address :	**2684 Nelson Bay Rd, Salt Ash, NSW**	Report Date :	**16/09/2014**
Project Name :	**Material Evaluation**	Order Number :	
Project Number :	**P203**	Test Method :	**T201**
Location:	**Salt Ash Quarry , Salt Ash NSW**	**Page 1 of 1**	

Sample Number :	S14-2346	SAMPLE LOCATION	
Date Sampled :	28/08/2014	**Williamtown Site 218**	
Date Tested :	3/09/2014	-	
Sampled By :	Sampled by Client	-	
Sampling Method :	Sampled by Client	-	
Material Source :	Macka's Sand - Williamtown	Lot Number :	-
Material Type :	Fine to Medium Screened Sand	Test Number :	-
Remarks	-	Specification Number :	

AS Sieve Size(mm)	Percent	Specification Limits
100		
75		
63		
53		
37.5		
26.5		
19		
16		
13.2		
9.5		
6.7		
4.75		
2.36		
1.18		
0.600	**100**	
0.425	**92**	
0.300	**42**	
0.150	**1**	
0.075	**0.4**	



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APPROVED SIGNATORY

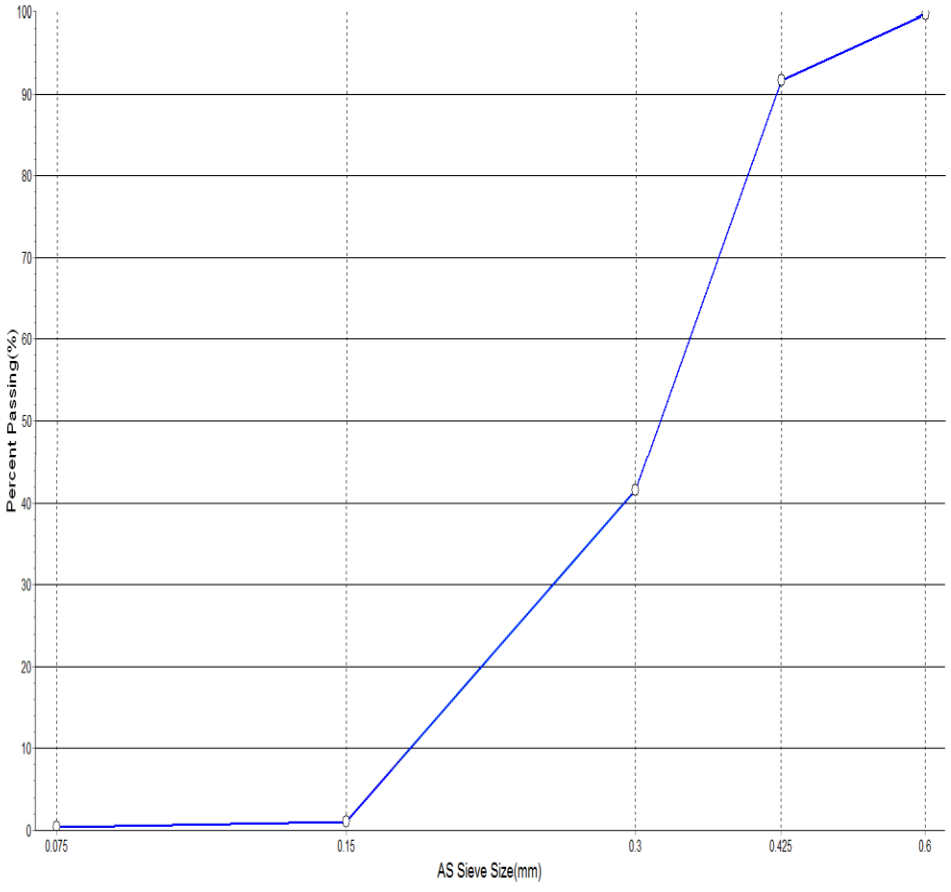
James Wyatt - Technician - Quarry Materials
NATA Accreditation Number
14975

Particle Size Distribution Report

Client :	**Macka's Sand Pty Ltd**	Report Number:	**P203 - 52/1**
Address :	**2684 Nelson Bay Rd, Salt Ash, NSW**	Report Date :	**16/09/2014**
Project Name :	**Material Evaluation**	Order Number :	
Project Number :	**P203**	Test Method :	**AS1289.3.6.1**
Location:	**Salt Ash Quarry , Salt Ash NSW**	**Page 1 of 1**	

Sample Number :	S14-2346	SAMPLE LOCATION	
Sampling Method :	Sampled by Client	**Williamtown Site 218**	
Sampled By :	Sampled by Client	-	
Date Sampled :	28/08/2014	-	
Date Tested :	3/09/2014	-	
Material Type :	Fine to Medium Screened Sand	Test Number :	-
Material Source :	Macka's Sand - Williamtown	Lot Number :	-
Remarks :	-	Specification Number :	

AS Sieve Size(mm)	Percent Passing	Specification Limits
100		
75		
63		
53		
37.5		
26.5		
19.0		
16.0		
13.2		
9.5		
6.7		
4.75		
2.36		
1.18		
0.600	**100**	
0.425	**92**	
0.300	**42**	
0.150	**1**	
0.075	**0**	



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James Wyatt - Technician - Quarry Materials
NATA Accreditation Number
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Sample Number :	S14-2346			
Test Number :	-			
Sampling Method :	Sampled by Client			
Date Sampled :	28/08/2014			
Date Tested :	8/09/2014			
Material Type :	Fine to Medium Screened Sand			
Material Source :	Macka's Sand - Williamtown			
Lot Number :	-			
Sample Location :	Williamtown Site 218 - - -			
Percent Loss 53.0 to 37.5mm:	-			
Percent Loss 37.5 to 26.5mm:	-			
Percent Loss 26.5 to 19.0mm:	-			
Percent Loss 19.0 to 13.2mm:	-			
Percent Loss 13.2 to 9.5mm:	-			
Percent Loss 9.5 to 4.75mm:	-			
Percent Loss 4.75 to 2.36mm:	-			
Percent Loss 2.36 to 1.18mm:	-			
Percent Loss 1.18 to 0.60mm:	-			
Percent Loss 0.60 to 0.30mm:	0.0			
Sodium Sulphate Soundness (%) :	**0.0**			
Remarks :	-			

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Light Particles

Client:	Macka's Sand	Project No:	P203
Principle:	-	Report No:	P203-(S14-2346)-LP
Project:	Materials Evaluation	Sample No:	S14-2346
Location:	Williamtown Screened Sand Site 218	Sample Date:	28/08/2014

Test Method AS1141.31

Sample Detail

Material Source:	Macka's Sand - Williamtown Screened Sand Site 218
Material Description:	Fine to Medium Screened Sand
Nominal Size (mm):	425 micron

Result

Light Particles (%) = 0

This document is issued in accordance with NATA Accreditation Requirements.
Accreditated for compliance with ISO/IEC 17025.
NATA Accredited Laboratory # 14975.

Authorised Signatory:

James Wyatt

Date: 9/09/2014

Clay and Fine Silt Report Report

Client :	**Macka's Sand Pty Ltd**	Report Number:	**P203 - 49/1**
Address :	**2684 Nelson Bay Rd, Salt Ash, NSW**	Report Date :	**15/09/2014**
Project Name :	**Material Evaluation**	Order Number :	
Project Number :	**P203**	Test Method :	**AS1141.33**
Location:	**Salt Ash Quarry , Salt Ash NSW**	**Page 1 of 1**	

Sample Number :	S14-2346			
Test Number :	-			
Sampling Method :	Sampled by Client			
Date Sampled :	28/08/2014			
Date Tested :	8/09/2014			
Lot Number :	-			
Material Source :	Macka's Sand - Williamtown			
Material Type :	Fine to Medium Screened Sand			
Sample Location :	Williamtown Site 218 - - -			
Clay and Fine Silt (%) :	**2**			
Remarks :	-			

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Sugar in Aggregates

Client:	Macka's Sand	Project No:	P203
Principle:	-	Report No:	P203-(S14-2346)-LP
Project:	Materials Evaluation	Sample No:	S14-2346
Location:	Williamtown Site 218	Date:	28/08/2014

Test Method AS1141.35

Sample Detail

Date Sampled: 28/08/2014

Sample Description: Fine to Medium Screened Sand

Material Source: Macka's Sand - Screened Sand Williamtown Site 218

Client reference: -

Fraction Tested: As Received

Result

Presence of Sugar in Aggregate Detected (Yes/No): No

Remarks:

Accredited for compliance with ISO/IEC 17025. The results of the tests, calibrations and/or measurements included in this document are traceable Australian/National Standards.

Authorised Signatory:

James Wyatt

Date: 9/09/2014to

Atterberg Limits Report

Client :	**Macka's Sand Pty Ltd**	Report Number:	**P203 - 51/1**
Address :	**2684 Nelson Bay Rd, Salt Ash, NSW**	Report Date :	**15/09/2014**
Project Name :	**Material Evaluation**	Order Number :	
Project Number :	**P203**	Test Method :	**T109**
Location:	**Salt Ash Quarry , Salt Ash NSW**	**Page 1 of 1**	

Sample Number :	S14-2346			
Test Number :	-			
Date Sampled :	28/08/2014			
Date Tested :	2/09/2014			
Sampled By :	Sampled by Client			
Sampling Method :	Sampled by Client			
Material Source :	Macka's Sand - Williamtown			
Material Type :	Fine to Medium Screened Sand			
Sample Location :	Williamtown Site 218 - - -			
Lot Number :	-			
Moisture Method :	T120			
Sample History :	Oven Dried			
Sample Preparation :	Dry			
Notes :	-			
Mould Length (mm) :	-			
Liquid Limit (%) :	NP			
Plastic Limit (%) :	NP			
Plasticity Index (%) :	NP			
Linear Shrinkage (%) :				
SPECIFICATION DETAILS				
Specification Number :	-			
Liquid Limit - Max :	-			
Plasticity Index - Max :	-			
Linear Shrinkage - Max :	-			
Remarks :	-			

Atterberg Limits Report

Client :	**Macka's Sand Pty Ltd**	Report Number:	**P203 - 54/1**
Address :	**2684 Nelson Bay Rd, Salt Ash, NSW**	Report Date :	**16/09/2014**
Project Name :	**Material Evaluation**	Order Number :	
Project Number :	**P203**	Test Method :	**AS1289.3.1.2, 3.2.1, 3.3.1, 3.4.1**
Location:	**Salt Ash Quarry , Salt Ash NSW**		**Page 1 of 1**

Sample Number :	S14-2346			
Test Number :	-			
Date Sampled :	28/08/2014			
Date Tested :	2/09/2014			
Sampled By :	Sampled by Client			
Sampling Method :	Sampled by Client			
Material Source :	Macka's Sand - Williamtown			
Material Type :	Fine to Medium Screened Sand			
Sample Location :	Williamtown Site 218 - - -			
Lot Number :	-			
Moisture Method :	AS1289.2.1.1			
Sample History :	Oven Dried			
Sample Preparation :	Dry			
Notes :	-			
Mould Length (mm) :	250			
Liquid Limit (%) :	NP			
Plastic Limit (%) :	NP			
Plasticity Index (%) :	NP			
Linear Shrinkage (%) :	Not Obtainable			
SPECIFICATION DETAILS				
Specification Number :	-			
Liquid Limit - Max :	-			
Plasticity Index - Max :	-			
Linear Shrinkage - Max :	-			
Remarks :	-			

Moisture Content Report

Client :	**Macka's Sand Pty Ltd**	Report Number:	**P203 - 50/1**
Address :	**2684 Nelson Bay Rd, Salt Ash, NSW**	Report Date :	**15/09/2014**
Project Name :	**Material Evaluation**	Order Number :	
Project Number :	**P203**	Test Method :	**T120**
Location:	**Salt Ash Quarry , Salt Ash NSW**	**Page 1 of 1**	

Sample Number :	S14-2346			
Test Number :	-			
Sampling Method :	Sampled by Client			
Date Sampled :	28/08/2014			
Date Tested :	29/08/2014			
Material Type :	Fine to Medium Screened Sand			
Material Source :	Macka's Sand - Williamtown			
Lot Number :	-			
Sample Location :	Williamtown Site 218 - - -			
Oven Temperature (°C) :	105-110			
Soil Description :	Fine to Medium Screened Sand			
Moisture Content (%) :	**5.5**			
Remarks :				

pH Value Report

Client :	**Macka's Sand Pty Ltd**	Report Number:	**P203 - 56/1**
Address :	**2684 Nelson Bay Rd, Salt Ash, NSW**	Report Date :	**17/09/2014**
Project Name :	**Material Evaluation**	Order Number :	
Project Number :	**P203**	Test Method :	**AS1289.4.3.1**
Location:	**Salt Ash Quarry , Salt Ash NSW**	**Page 1 of 1**	

Sample Number :	S14-2346			
Test Number :	-			
Sampling Method :	Sampled by Client			
Date Sampled :	28/08/2014			
Date Tested :	17/09/2014			
Material Type :	Fine to Medium Screened Sand			
Material Source :	Macka's Sand - Williamtown			
Lot Number :	-			
Sample Location :	Williamtown Site 218 - - -			
pH Value :	6.2			
Remarks :	-			

Minimum Maximum Report

Client :	**Macka's Sand Pty Ltd**	Report Number:	**P203 - 57/1**
Address :	**2684 Nelson Bay Rd, Salt Ash, NSW**	Report Date :	**19/09/2014**
Project Name :	**Material Evaluation**	Order Number :	
Project Number :	**P203**	Test Method :	**AS1289.5.5.1**
Location:	**Salt Ash Quarry , Salt Ash NSW**	**Page 1 of 1**	

Sample Number :	S14-2346			
Test Number :	-			
Sampling Method :	Sampled by Client			
Sampled By :	Sampled by Client			
Date Sampled :	28/08/2014			
Date Tested :	18/09/2014			
Material Type :	Fine to Medium Screened Sand			
Material Source :	Macka's Sand - Williamtown			
Sample Location :	Williamtown Site 218 - - -			
Lot Number :	-			
Moisture Method :	AS1289.2.1.1			
Vibrating Table Type :	Vibratory			
Mould Size (cm³) :	997			
Tested By :	Sampled by Client			
Maximum Density (t/m³) :	**1.69**			
Minimum Density (t/m³) :	**1.51**			
Remarks :	-			

SOIL CHEMICAL PROPERTIES REPORT

Client:	Valley Civilab	**Source:**	S14-2346 Williamtown - Screen Sand - Site 218
Address:	Unit 3/62 Sandringham Ave Thornton NSW 2322	**Sample Description**	SAND
Project:	Williamstown Screened Sand Site 218 (P203)	**Report No.:**	S1118-SCP
Job No.:	14-636	**Lab No.:**	14593

Test Procedure:

AS1289 4.2.1	Soil Chemical Tests - Determination of a sulfate content of a natural soil and the sulfate content of the groundwater - Normal Method
AS1289 4.3.1	Soil Chemical Tests - Determination of the pH value of a soil - Electrometric method
AS 1289 4.4.1	Soil Chemical Tests - Determination of the electrical resistivity of a soil - Method for sands and granular material
RTA T123	pH value of a soil (electrometric method)
RTA T185	Resistivity of sands and granular road construction materials
RTA T200	Chloride content of roadbase
RTA T1010	Quantitative determination of chlorides in soil
RTA T1011	Quantitative determination of sulphates in soil
BS1377(1990 pt.3)	Water soluble sulphate content
TAI B117	Sulphides Present

Sampling:	Sampled by Client	**Date Sampled:**	28/08/2014
Preparation:	Prepared in accordance with AS1289 1.1		

Authorised Signatory:

30/09/2014

NATA Accredited Laboratory Number: 14874

Date:

Macquarie Geotechnical 3 Watt Drive

Northmead Laboratory
Holcim (Australia) Pty Ltd
ABN 87099732297
Unit D10, 23-25 Windsor Road
Northmead NSW 2152

Phone: (02) 9683-9200
Fax: (02) 9683-9222

Material Test Report

Accelerated Mortar Bar Test for the Assessment of Alkalai-Reactivity of Aggregate

Reported below are the test details for Accelerated Mortar Bar Test for the Assessment of Alkalai-Reactivity of Aggregate in accordance with the requirements of RMS T363 (unless otherwise noted).

Age	Test Date	Bar 1	Bar 2	Bar 3	Mean
1	20/09/2014	0.006	0.019	0.005	0.010
3	22/09/2014	0.006	0.007	0.006	0.006
7	26/09/2014	0.012	0.009	0.008	0.010
10	29/09/2014	0.010	0.010	0.011	0.010
14	03/10/2014	0.021	0.018	0.019	0.019
21	10/10/2014	0.032	0.032	0.032	0.032

Flow (%)	19
Water/Cement Ratio	0.40

Comments

Notes

SYDNEY
ANALYTICAL
LABORATORIES

Office:
PO BOX 48
ERMINGTON NSW 2115

Laboratory:
1/4 ABBOTT ROAD
SEVEN HILLS NSW 2147
Telephone: (02) 9838 8903
Fax: (02) 9838 8919
A.C.N. 003 614 695
A.B.N. 81 829 182 852
NATA No: 1884

ANALYTICAL REPORT for:

VALLEY CIVILAB

PO BOX 3127
THORNTON 2322

ATTN: JAMES WYATT

JOB NO: SAL25195C

CLIENT ORDER: P203

DATE RECEIVED: 04/09/14

DATE COMPLETED: 17/09/14

TYPE OF SAMPLES: SAND

NO OF SAMPLES: 1

Issued on 17/09/14
Lance Smith
(Chief Chemist)

SYDNEY
ANALYTICAL
LABORATORIES

ANALYTICAL REPORT

JOB NO: SAL25195C
CLIENT ORDER: P203

	SAMPLES	Cl %	804 %	O.M. %
1	814-2346	<0.001	<0.001	<0.1
MDL		0.001	0.001	0.1
Method Code		C32	C33	C48
Preparation		PS	PS	PS

RESULTS ON DRY BASIS
CLIENT: MACKA'S SAND
PROJECT: WILLIAMTOWN SCREENED SAND SITE 218
LOCATION: MACKA'S SAND- WILLIAMTOWN

ANALYTICAL REPORT

JOB NO: SAL25195C
CLIENT ORDER: P203

METHODS OF PREPARATION AND ANALYSIS

The tests contained in this report have been carried out on the samples as received by the laboratory.

PS	Sample dried, split and crushed to -150um
C32	Acid Soluble Chloride - AS1012.20
C33	Acid Soluble Sulphate - AS1012.20
C48	Total Organic Carbon - AS1289.4.1.1

Geochempet Services

ABN 980 6945 3445
PETROLOGICAL and GEOCHEMICAL CONSULTANTS
Principals: K.E. Spring BSc (Hons), MAppSc and H.M. Spring B.Sc

5/14RedcliffeGardensDrive
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www.geochempet.com

PETROGRAPHIC ANALYSIS ON A MACKAS SCREENED SAND SAMPLE (S14-2346) FROM MACKAS SAND - WILLIAMTOWN

prepared for

VALLEY CIVILAB
THORNTON, NSW

Purchase Order: VC00240

Invoice Number: 00006107

Client Ref: James Wyatt

Issued By:

L Pearson, B.Sc (Hons)
29 September, 2014

Sample Number: S14-2346 **Date Sampled**: 28/08/14

Client: Macka's Sand **Date Received**: 04/09/14

Project: Williamtown Screened Sand Site 218

Job Number: P203

Sample Source: Williamtown

Work Requested Petrographic analysis in relation to use in concrete; petrographic assessment of potential for alkali-silica reactivity

Methods Account taken of ASTM C295 Standard Guide for *Petrographic Assessment of Aggregates for Concrete*, the AS2758.1 – 1998 *Aggregates and rock for engineering purposes part 1; Concrete aggregates (Appendix B),* the AS1141 Standard Guide for the *Method for sampling and testing aggregates*, of the content of the 1996 joint publication of the Cement and Concrete Association of Australia and Standards Australia, (HB 79-1996) entitled *Alkali Aggregate Reaction - Guidelines on Minimising the Risk of Damage to Concrete Structures in Australia.*

Identification Fine to medium quartz sand

Description

The sample consisted of about 0.5 kg of greyish orange, quartzose, free flowing, fine, clean sand. Clasts are mainly sub-rounded to rounded. In a crude, dry sieving test of small subsample these results were tabulated;

Sieve Size	Wt % of sample
Coarse (>1.18mm)	<0.1%
Medium (>0.3mm)	73.0%
Fine (>0.075mm)	27.0%
Silt (<0.075mm)	<0.1%

Clasts range up to 5mm. Plant fragments were noted in the sand sample and medium fraction. The sand consists predominately of quartz. The sand is clean and binocular microscopy revealed no apparent deleterious grain coatings.

When swirled in water, the sand generated no turbidity, implying that there is no free clay or silt component present.

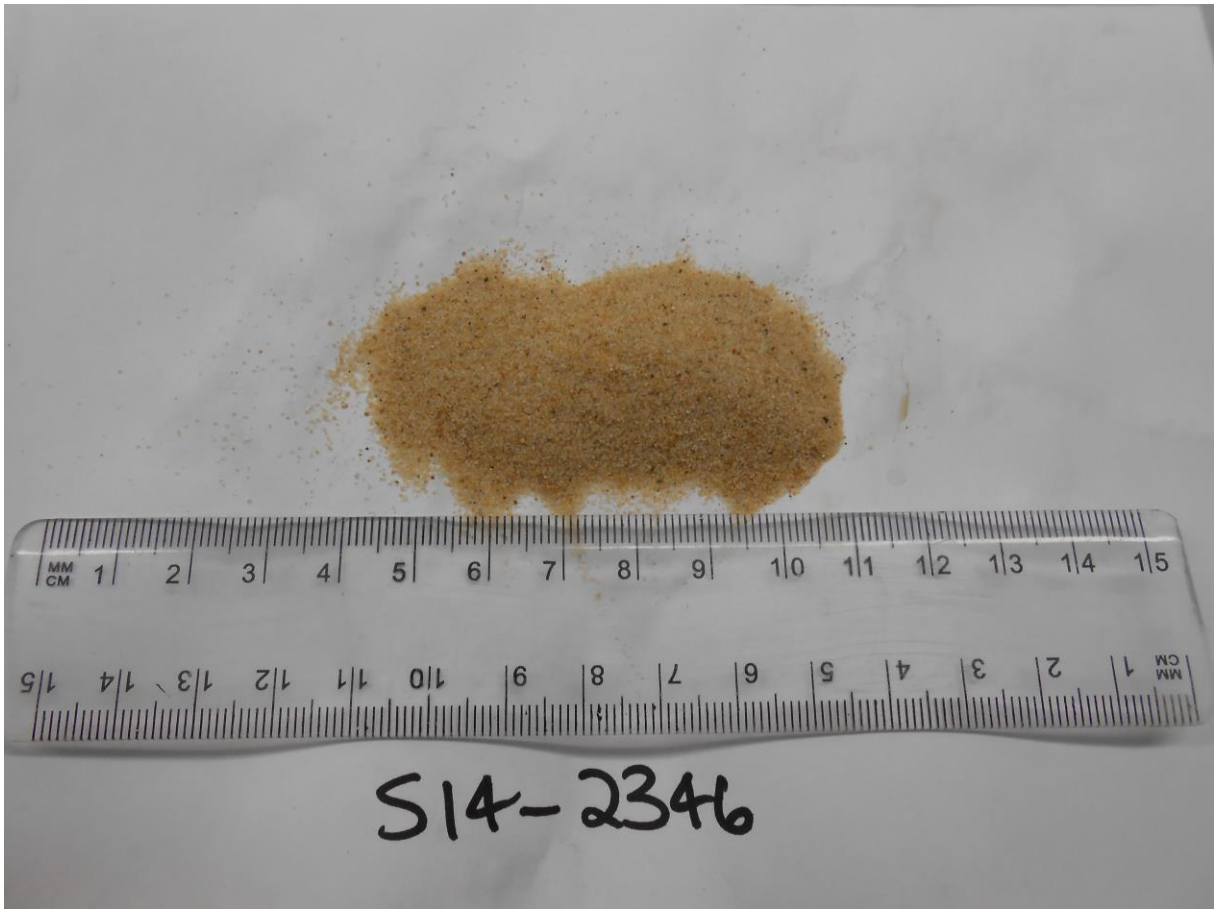

Figure 1: Image of screened sand sample.

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

84%	quartz as single, free, unstrained to mildly strained grains (76%) or as simple composite crystalline aggregates of quartz grains (8%)
10%	quartz as moderately strained simple or crystalline composite grains
<1%	chert
2%	quartzite (composed of moderately strained quartz grains and occasional muscovite flakes and iron straining)
3%	feldspars as free grains (orthoclase and plagioclase)
<1%	heavy minerals (rutile, zircon and tourmaline)
<1%	lithic clasts of acid tuffaceous rock
1%	lithic clasts of intermediate volcanic rock
<1%	lithic clasts of granitic rock
<1%	meta-siltstone/sandstone
<1%	lithic clasts of greenstone
<1%	volcaniclastic arenite
trace	plant matter and charcoal

In thin section the sand is seen to consist predominantly of quartz, comprising 76% quartz as single, free, unstrained to mildly strained grains and 8% quartz as similarly unstrained

crystalline composite grains. Moderately strained simple and polycrystalline grains of quartz amount to 10%. Finely microcrystalline, siliceous lithic clasts of chert are present (<1%) along with 2% moderately strained quartzite.

There is 3% feldspars composed orthoclase and slightly weathered plagioclase. Less than 1% of heavy mineral such as rutile, hornblende and tourmaline are noted.

Rounded lithic clasts of acid tuffaceous rock amount to <1%. Other lithic clasts include <1% each of volcaniclastic arenite, (1%) intermediate volcanics, meta-siltstone/sandstone, granitic rock and greenstone.

Comments and Interpretations

The supplied sample of Mackas Sand (labelled S14-2346) from Williamtown is considered to be clean, fine to medium quartz sand. It is considered to be fairly narrowly graded with about 73% with a grainsize between 0.3 to 1.18 mm.

The sand has a **free silica content** of **about 96%,** comprising 94% as free sand grains and quartz locked in crystalline composite grains as well as an additional 2% locked within a lithic clasts of quartzite and <1% finely microcrystalline quartz in lithic clasts of acid tuffaceous tuff and chert.

Because the sand consists of mainly common quartz rounded to sub-rounded, essentially fine, mainly siliceous, quite hard, strong, and durable fragments, it is predicted to be **physically quite suitable for use as fine concrete sand**.

In relation to potential for alkali-silica reactivity in concrete it is noted that the sand carries about 12% of moderately strained quartz (as free grains and crystalline composite grains and in quartzite) and <1% of finely microcrystalline quartz (within clasts of chert and acid volcanic/tuffaceous rock). Thus, the sand as a whole is predicted to have **potential for mild and/or slow deleterious alkali-silica reactivity in concrete**. Accordingly, it is recommended that appropriate precautions be taken in mix and engineering design.

Guidance on appropriate precautions can be obtained from the 1996 joint publication of the Cement and Concrete Association of Australia and Standards Australia, entitled *Alkali Aggregate Reaction - Guidelines on Minimising the Risk of Damage to Concrete Structures in Australia*.

Free Silica Content

The free silica content is about 96%.

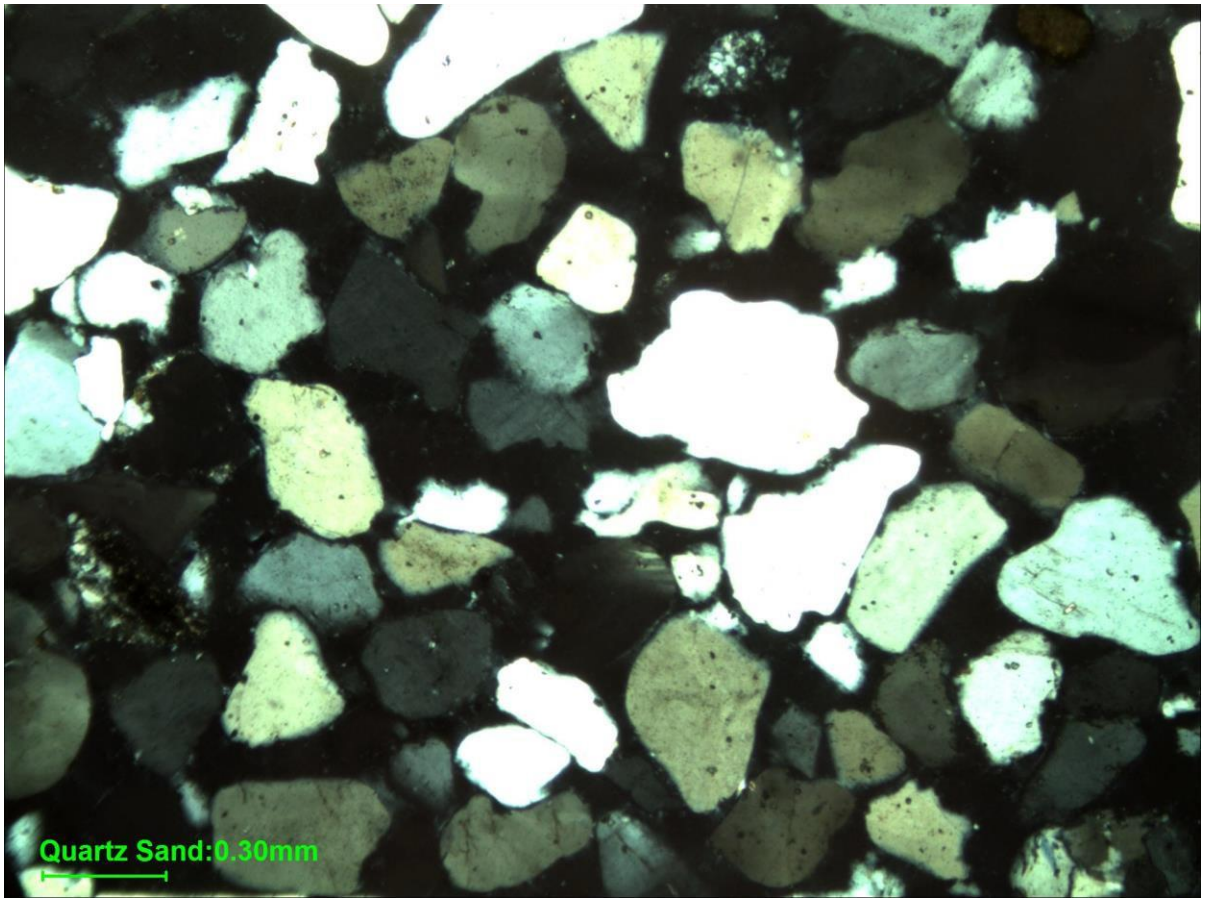

Figure 2: Image at 4x magnification in cross polarised light of the quartz grains in the sample.