



Williamtown - Site 218
Screened Sand for
Concrete & Asphalt
2 0 2 6



Specification Assessment with:
AS2758.1, AS4058,
TS 01733.1, TS 03264.1, TS 03270.1,
TS 03271.1, TS 03318.1





19/2/2026

HC Ref: P20023– Screened Sand – Williamtown

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. Please contact me if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to be "J. Wyatt", with a large loop at the start and a trailing flourish.

James Wyatt

Lab Manager

Hunter Geotechnical Services



Introduction

Hunter Geotechnical Services (HGS) have been commissioned to conduct sampling & testing of Screened Sand located at the Williamstown Deposit – Site / Pit 218. The purpose of the testing was to evaluate the material for use as fine aggregate for concrete and asphalt production.

Specifications referenced:

- AS 2758.1-2014 - Aggregates and Rock for Engineering Purposes, Part 1: Concrete Aggregates
- AS/NZ 4058:2007 – Pre-Cast Concrete Pipes (Pressure and Non-pressure)
- TS 01733.1 | Version: 2.00– Concrete Work for Bridges
- TS 03270.1 | Version: 0.00 – Lean-mix Concrete Subbase
- TS 03271.1 | Version: 0.00– Concrete Pavement Base
- TS 03264.1 | Version: 0.00– Concrete (for General Use), Mortar and Grout
- TS 03318.1 | Version: 0.00– Aggregates for Asphalt

Results

The sand has tested well and is expected to conform to the above specifications based on the tests that have been undertaken. The accompanying reports are attached to this letter. Where we cannot provide the test, we seek external supplier laboratories that have a NATA accreditation for the test where possible. A summary table has been provided for convenience to the reader, for their specification assessments.



Reactivity Summary

The sand is classified as Slowly Reactive when tested with 100% Boral GP/SL Cement using the Accelerated Mortar Bar Test (AMBT) method AS1141.60.1. A Concrete Prism Test (CPT) AS1141.60.2 was commenced January 2025 from last year's annual testing sample with the cement alkali level in the test requested to be increased to 1.38% Na₂O equivalent by mass of cement as per TfNSW B80 specification. The result from this test is Non-Reactive. A sub-sample from this year was also sent away for a CPT with identical parameters for inclusion in next year's annual testing report.

Testing & Limitations

Testing has been conducted in accordance with ISO/IEC 17025 "General Requirements for Testing & Calibration Laboratories" in a NATA endorsed facility where referenced. Test results should be assessed with regard to the precision in terms of repeatability, reproducibility, measurement uncertainty and effects of sampling. Hunter Geotechnical Services (HGS) extends no liability for any loss leading from conformity assessments to specifications from results reported by HGS, nor any opinions expressed, in published documents or accompanying commentary by HGS.



Macka's Sand - Screened Sand Williamtown Site 218 - Annual Testing Result Summary for 2026 - Concrete Aggregate Specification Compliance

Property	Units	Test Method	Result	Specification			
				AS2758.1	TS 01733.1	TS 03271.1	TS 03270.1
				Concrete Aggregates	Concrete Work for Bridges	Concrete Pavement Base	Lean-Mix Concrete Subbase
Uncompacted Bulk Density	t/m3	AS1141.4	1.50			min 1.2	min 1.2
Compacted Bulk Density	t/m3	AS1141.4	1.59			min 1.2	min 1.2
Particle Density (SSD)	t/m3	AS1141.5	2.64				min 2.1
Particle Density (Dry)	t/m3	AS1141.5	2.63	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	min 2.1
Water Absorption	%	AS1141.5	0.3	max 2	max 2.5	max 5.0	max 5.0
Particle Size Distribution:							
% Finer Than 2.36 mm	%	AS1141.11.1 / T201	100	+/- 5% from nominated	Refer to TS 00146 - Supply of Special Class Concrete - Table 9.14	Based on combined aggregate Table R83.1	+/- 5% from nominated
% Finer Than 1.18 mm	%	AS1141.11.1 / T201	100	+/- 10% from nominated		Based on combined aggregate Table R83.1	+/- 10% from nominated
% Finer Than 0.600 mm	%	AS1141.11.1 / T201	99	+/- 15% from nominated		Based on combined aggregate Table R83.1	+/- 15% from nominated
% Finer Than 0.425 mm	%	AS1141.11.1 / T201	87			Based on combined aggregate Table R83.1	
% Finer Than 0.300mm	%	AS1141.11.1 / T201	40	+/- 10% from nominated		Based on combined aggregate Table R83.1	+/- 10% from nominated
% Finer Than 0.150mm	%	AS1141.11.1 / T201	1	+/- 5% from nominated		Based on combined aggregate Table R83.1	+/- 5% from nominated
% Finer Than 0.075mm	%	AS1141.11.1 / T201	0	0 to 5		Based on combined aggregate Table R83.1	0 to 5
% Finer Than 0.075mm	%	AS1141.12 / T201	0	0 to 5		4 on Total Fines (TF)	Figure R82.1 on TF
% Finer Than 0.002mm	%	AS1141.13	N/A	max 1	max 1	1.0 on TF	Figure R82.1 on TF
Sodium Sulphate Soundness	%	AS1141.24	0.2	max 6	max 6	max 6.0	max 6.0
Light Particles	%	AS1141.31	0	max 1	max 1		max 1
Organic Impurities		AS1141.34	Lighter	Pass (lighter in Colour to Reference)	PASS (lighter in Colour to Reference)	PASS or FAIL on TF	PASS or FAIL on TF
Organic Matter Content	%	AS1289.4.1.1	<0.1			max 0.5 on TF	max 0.5 on TF
Sugar		AS1141.35	Absent	Negative (No Sugar)	Negative (No Sugar)	< 1 part in 10000 on TF	< 1 part in 10000 on TF
Methylene Blue Adsorption Value (MBV)	g/mg	T659	1			Figure R83.1	Figure R82.1
MBV75 Value	-	Calculated	0	max 150 (Manufactured fine aggregate)	max 100	Figure R83.1	Figure R82.1
Acid Insoluble Residue	%	Tex-612-J	95			min 60 on TF	
Micro-Deval Loss	%	ASTM D7428	3.6			max 15 on TF	
Flow Cone Time	s	T279	18.9			max 27 on TF	max 27 on TF
Chlorides	%	AS1012.20	0.002	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	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
Sulfates	%	AS1012.20	<0.001	Report if > 0.01, max 5% of portland cement	Report if > 0.01, max 5% of portland cement	Report if > 0.01, max 5% of portland cement	Report if > 0.01, max 5% of portland cement
Mortar Bar test		AS1141.60.1	Slowly - Reactive	Report for assessment of reactivity	Refer to - TS 00151 Code of Practice for the Management of Alkali Aggregate Reactivity	Refer to Clause 2.5.1	refer to Clause 2.4
Concrete Prism Test		AS1141.60.2	Non-Reactive				
Petrographic Analysis		ASTM C295	Report	Report for assesment of reactivity and classification of material		Report for assesment of reactivity and classification of material	Report for assesment of reactivity and classification of material
Secondary Mineral Count		AS1141.26	Report				
Moisture	%	AS1289.2.1.1	0.9				
Linear Shrinkage	%	AS1289.3.4.1	N/A				
Plasticity Index	%	AS1289.3.3.1	Non-Plastic				
Conductivity / Salinity	mS/cm	APHA 2510B	0.017				
pH Value	pH	AS1289.4.3.1	7.2				

 Property	Macka's Sand - Screened Sand Williamtown site 218 - Annual Testing Result Summary for 2026 - Asphalt Aggregate Specification Compliance				
		Test Method	Result	Specification	
					TS 03318.1
					Aggregates for Asphalt
Uncompacted Bulk Density	t/m3	AS1141.4	1.50		
Compacted Bulk Density	t/m3	AS1141.4	1.59		
Particle Density (SSD)	t/m3	AS1141.5	2.64		Report
Particle Density (Dry)	t/m3	AS1141.5	2.63		Report
Water Absorption	%	AS1141.5	0.3		max 1.5% (quartz sands)
Particle Size Distribution:					
% Finer Than 2.36 mm	%	AS1141.11.1 / T201	100		+/-6% from nominated
% Finer Than 1.18 mm	%	AS1141.11.1 / T201	100		+/-6% from nominated
% Finer Than 0.600 mm	%	AS1141.11.1 / T201	99		+/-5% from nominated
% Finer Than 0.425 mm	%	AS1141.11.1 / T201	87		+/-5% from nominated
% Finer Than 0.300mm	%	AS1141.11.1 / T201	40		+/-5% from nominated
% Finer Than 0.150mm	%	AS1141.11.1 / T201	1		+/-3% from nominated
% Finer Than 0.075mm	%	AS1141.11.1 / T201	0		+/-2% from nominated
% Finer Than 0.075mm	%	AS1141.12 / T201	0		Report
% Finer Than 0.002mm	%	AS1141.13	N/A		-
Sodium Sulphate Soundness	%	AS1141.24	0.2		max 12
Light Particles	%	AS1141.31	0		
Organic Impurities		AS1141.34	Lighter		
Organic Matter Content	%	AS1289.4.1.1	<0.1		
Sugar		AS1141.35	Absent		
Methylene Blue Adsorption Value (MBV)	g/mg	T659	1.0		
MBV75 Value	-	Calculated	0		
Acid Insoluble Residue	%	Tex-612-J	95		
Micro-Deval Loss	%	ASTM D7428	3.6		
Flow Cone Time	s	T279	18.9		
Chlorides	%	AS1012.20	0.002		
Sulfates	%	AS1012.20	<0.001		
Mortar Bar test		AS1141.60.1	Slowly - Reactive		
Concrete Prism Test		AS1141.60.2	Non-Reactive		
Petrographic Analysis		ASTM C295	Report		
Secondary Mineral Count		AS1141.26	Report		
Moisture	%	T120	0.9		
Linear Shrinkage	%	AS1289.3.4.1	N/A		
Plasticity Index	%	T109	Non-Plastic		
Conductivity / Salinity	mS/cm	APHA 2510B	0.017		
pH Value	pH	AS1289.4.3.1	7.2		

Material Test Report

Report Number: P20023-10B
Issue Number: 1
Date Issued: 19/02/2026
Client: Macka's Sand Pty Ltd
2684 Nelson Bay Road, Salt Ash NSW 2318
Contact: Brett
Project Number: P20023
Project Name: Materials Testing - Screened Sand
Project Location: Williamtown Quarry - Site 218
Work Request: 21413
Sample Number: 25-21413A
Date Sampled: 01/12/2025
Dates Tested: 01/12/2025 - 27/01/2026
Sampling Method: AS 1141.3.1 9.4 - Sampling aided by power equipment - other than backblading method
Preparation Method: In accordance with the test method
Sample Location: Stockpile
Material: Screened Sand
Material Source: Macka's Sand - Williamtown Site 218



Hunter Geotechnical Services
62 Sandringham Avenue Thornton NSW 2322
Phone: (02) 4966 1844
Email: results@huntergeo.au



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: James Wyatt
Laboratory Manager
Laboratory Number: 14975

Particle Size Distribution (AS1141.11.1)

Sample Washing	Sample was Washed		
Sieve	Passed %	Passing Limits	
1.18 mm	100		
0.6 mm	99		
0.425 mm	87		
0.3 mm	40		
0.15 mm	1		
0.075 mm	0		

Particle Distribution (AS 1141.12)		Min	Max
Material Finer than 75µm (%)	0		

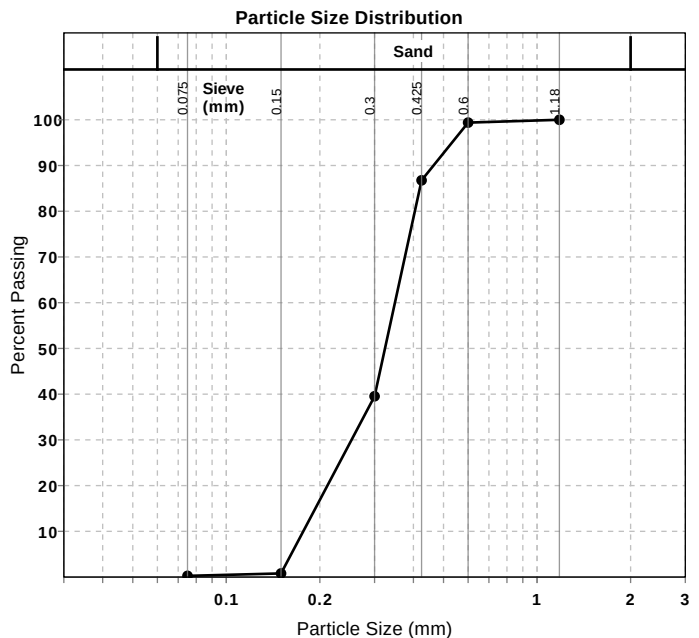
Bulk Density of Aggregate (AS 1141.4)		Min	Max
Uncompacted (t/m ³)	1.50		
Compacted (t/m ³)	1.59		
Moisture Condition	Dry		
Nominal Size	Fine Sand		

Density and Water Absorption of Fine Aggregate (AS 1141.5)		Min	Max
Apparent Particle Density (t/m ³)	2.65		
Particle Density Dry (t/m ³)	2.63		
Particle Density SSD (t/m ³)	2.64		
Water Absorption (%)	0.3		

Sodium Sulphate Soundness (AS 1141.24)		Min	Max
Sieve Aperture	% Loss		
0.600 - 0.300mm	0.2		
Total Weighted Loss (%)	0.2		

Light Particles (AS 1141.31)		Min	Max
Nominal Size of Aggregate (mm)	Less than 7		
Light Particles (%)	0		

Organic Impurities other than Sugar (AS 1141.34)	
Organic Impurities	Lighter than standard
Method of Colour Assessment	Visual using a reference solution



Material Test Report

Report Number: P20023-10B
Issue Number: 1
Date Issued: 19/02/2026
Client: Macka's Sand Pty Ltd
2684 Nelson Bay Road, Salt Ash NSW 2318
Contact: Brett
Project Number: P20023
Project Name: Materials Testing - Screened Sand
Project Location: Williamtown Quarry - Site 218
Work Request: 21413
Sample Number: 25-21413A
Date Sampled: 01/12/2025
Dates Tested: 01/12/2025 - 15/01/2026
Sampling Method: AS 1141.3.1 9.4 - Sampling aided by power equipment - other than backblading method
Preparation Method: In accordance with the test method
Sample Location: Stockpile
Material: Screened Sand
Material Source: Macka's Sand - Williamtown Site 218



Hunter Geotechnical Services
62 Sandringham Avenue Thornton NSW 2322
Phone: (02) 4966 1844
Email: results@huntergeo.au



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: James Wyatt
Laboratory Manager
Laboratory Number: 14975

Sugar (AS 1141.35)			
Sugar	Absent		
Methylene Blue (TS 02806.36)		Min	Max
	Test 1	Test2	
Methylene Blue Adsorption Value (mg/g)	1	2	
Mean Methylene Blue Value (mg/g)	1		
Moisture Content (AS 1289 2.1.1)		Min	Max
Moisture Content (%)	0.9		
Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	Not Obtainable		
Plastic Limit (%)	Not Obtainable		
Plasticity Index (%)	Non Plastic		
Linear shrinkage could not be determined as the liquid limit could not be obtained and the material is non-plastic.			
Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)			
Cracking Crumbling Curling			
Linear shrinkage could not be determined as the liquid limit could not be obtained and the material is non-plastic.			

SYDNEY ANALYTICAL LABORATORIES

Page 1 of 3

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:

HUNTER GEOTECHNICAL SERVICES

UNIT 3/62 SANDRINGHAM AVE
THORNTON 2322

ATTN: JAMES WYATT

JOB NO: SAL29375D

CLIENT ORDER: P20023

DATE RECEIVED: 03/12/25

DATE COMPLETED: 16/12/25

TYPE OF SAMPLES: SOIL

NO OF SAMPLES: 1



.....
Issued on 16/12/25
Lance Smith
(Chief Chemist)

ANALYTICAL REPORT

**JOB NO: SAL29375D
CLIENT ORDER: P20023**

SAMPLES	pH 1:5	Cl %	% as SO3	SO4	COND. uS/cm	O.M. %
1 25-21413A	7.2	0.002	<0.001		17	<0.1
MDL	0.1	0.001		0.001	0.1	0.1
Method Code	C1	C32		C33	WA2	C4
Preparation	P4	P5		P5	P4	P4

RESULTS ON DRY BASIS

MATERIAL: SCREENED SAND, WILLIAMTOWN QUARRY - SITE 218

DATE OF COLLECTION: 01/12/25

WRN: 21413

ANALYTICAL REPORT

JOB NO: SAL29375D

CLIENT ORDER: P20023

METHODS OF PREPARATION AND ANALYSIS

The tests contained in this report have been carried out on the samples as received by the laboratory. In the case where an analyte or group of analytes are received outside of recommended holding times, the analysis will proceed and the report annotated. Analysis is carried out within analyte holding times where possible.

P4	Sample dried, sieved at 9.5mm, split and crushed to -425um
P5	Sample dried, split and crushed to -150um
C1	pH - AS1289.4.3.1
C32	Acid Soluble Chloride - AS1012.20.1
C33	Acid Soluble Sulphate - AS1012.20.1
WA2	Conductivity-In House Method A8.25 (1:5 soil/water extract) Determined by APHA 2510B
C4	Organic Matter - AS1289.4.1.1

**Materials Technical Services**

Boral Resources (NSW) Pty Ltd
ACN: 000 756 507
3-5 Gibbon Road, BAULKHAM HILLS, NSW 2153
PO Box 400
Winston Hills, NSW, 2153
Phone Number: (02) 9624 9900

Corporate Site #:xbh

Report No: MAT:WMT-25/17591-Q01**Issue No: 1***This report replaces all previous issues of report no 'MAT:WMT-25/17591-Q01'.*

Client: HUNTER CIVILAB
P.O. BOX 3127
THORNTON NSW 2322
Project: Testing of Screened Sand

TRN: 121905

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NATA Accredited Laboratory
Number: 547
Approved Signatory: Mahdi Baie (Laboratory Technician)
Date of Issue: 15/12/2025
THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

Sample ID: WMT-25/17591-Q01
Lab Sample No: 331822
Client Sample ID: 25-21413A
TRN: 121905 **Lot No:**
Date Tested: 12/12/2025
Material: Screened Sand
Stockpile: Stockpile
Date Sampled: 01/12/2025
Sampling Method: Sampled by client.
Specification:
Source: Williamtown Quarry
Progressive Tonnes: **Total Tonnes:**

Other Test Results

Description	Method	Result	Limits
Micro-Deval Abrasion [ASTM D7428]			
Micro-Deval Abrasion Test % Loss		3.6	
The % loss of the control agg		N/A	
Comments		Note 2	

Particle Size Distribution**Chart****Comments**

Testing of Screened Sand from Williamtown Quarry - Site 218
Project No: P20023
Work Request No: 21413



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Boral Construction Materials
Materials Technical Services

Unit 4, 3-5 Gibbon Road,
Baulkham Hills NSW 2153 Australia
PO Box 400,
Winston Hills NSW 2153

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boral.com.au

TEST REPORT

CLIENT: Hunter Civilab
P.O. Box 3127 Thornton NSW 2322

FILE No.: 629 / 25

PROJECT: Testing of Screened Sand from Williamtown Quarry - Site 218

REQUEST No.: 121905

TEST PROCEDURE:

AS 1141.12 – Material Finer than 75 micron *

AS 1141.13 – Material Finer than 2 micron

Laboratory Sample No.:	331822
Date Sampled:	1.12.25
Date Received:	3.12.25
Date Tested:	16.12.25
Project No.:	P20023
Work Request No.:	21413
Sample Description:	Screened Sand Client Sample No. 25-21413A
Field No.:	1

TEST RESULTS:

Material Finer than 75 micron (μm) (%) *	1
Material Finer than 2 micron (μm) (%)	Not Applicable

Sample was provided by the Client.

*The authorised signatory for AS 1141.12 is H.Kim.

Approved signatory

Kimley

H.Kim *Alhai* S.Krishnamoorthy

Date

17.12.25

Serial no.

CHEM121905.SK.1



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Test results in this Test Report relate only to the samples tested.

NATA Accredited Laboratory
Number: 547



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TEST REPORT

CLIENT: Hunter Civilab
P.O. Box 3127 Thornton NSW 2322

FILE No.: 629 / 25

PROJECT: Testing of Screened Sand from Williamtown Quarry – Site 218.
Project No: P20023. Work Request No: 21413.

REQUEST No.: 121905

TEST PROCEDURE:

Tex-612 - J – Acid Insoluble Residue for Fine Aggregate

Laboratory Sample Number:	331822
Date Sampled:	01.12.25
Date Received:	03.12.25
Date Tested:	17.12.25
Project No.:	P20023
Work Request No.:	21413
Sample Description:	Screened Sand - Stockpile Client Sample No. 25-21413A

Field No.: 1

TEST RESULTS:

Acid Insoluble Residue (%)	95
----------------------------	----

Sample was provided by the Client.

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Test results in this Test Report relate only to the samples tested.

Otilia Costache
14.01.2026



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Test Report

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Materials Technical Services

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Winston Hills NSW 2153

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boral.com.au

Client: HUNTER CIVILAB
Address: P.O. BOX 3127, THORNTON, NSW 2322
Date Received: 03/12/2025
Project: Testing of Screened Sand from Williamtown Quarry – Site 218; Project No: P20023; Work Request: 21413
Test Method: Potential Alkali-silica Reactivity – Accelerated Mortar Bar Method (AS 1141.60.1)

File No: 629/25
Req. No: 121905
Date Sampled: 01/12/2025

Lab Sample No	Sample Description	Location
331822	Screened Sand S/P - Sample No. 25-21413A	Williamtown Quarry
N/A	Boral GP/SL Cement	Berrima

Results:

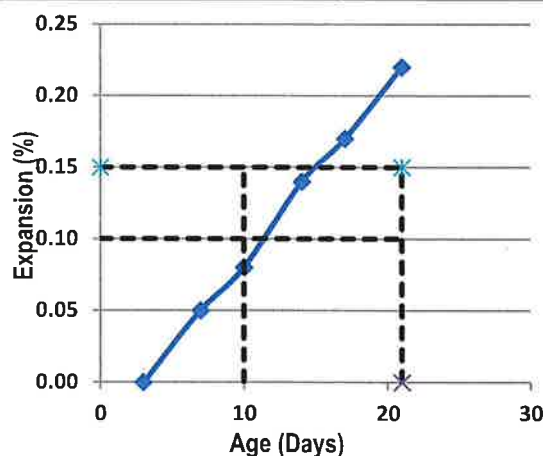
Flow (%): 80

W/C Ratio: 0.47

Date Mixed: 21/01/2026

Age (Days)	Expansion (%)			
	Specimen 1	Specimen 2	Specimen 3	Average
3	0.000	0.005	0.005	0.00
7	0.045	0.045	0.045	0.05
10	0.080	0.080	0.080	0.08
14	0.135	0.135	0.135	0.14
17	0.165	0.170	0.170	0.17
21	0.215	0.215	0.220	0.22

Mortar Bar Expansion (E) %		AS1141.60.1 Aggregate Reactivity Classification
Duration of Specimens In 1mol/L NaOH at 80°C		
10 Days	21 Days	
—	< 0.1*	Non-Reactive
< 0.1*	$0.1* \leq E < 0.3$	Slowly Reactive
$\geq 0.1*$	—	Reactive
—	$0.3 \leq E$	Reactive
*The value for natural fine aggregates is 0.15%		



Note:

- Sample supplied by the client.

Approved signatory

Julius Alvaro

Date 16/02/2026

Serial no. CEM121905.JA.1

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Test results in this Test Report relate only to the samples tested.



NATA Accredited Laboratory
Number: 547



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Boral Construction Materials
Materials Technical Services

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Test Report

Client: HUNTER CIVILAB

Address: P. O. Box 3127, THORNTON, NSW 2322

Project: Testing of Screened Dune Sand from Williamtown Quarry - Site 218 - for AAR - CPT
Project No: P20023 - Work Request No: 17728 - AS1141.60.2-B80 Specification

Sample ID: Screened Dune Sand - Sample No. 24-17728A

Location: Williamtown Quarry

Test Method: AS 1141.60.2 – Potential Alkali-Silica reactivity–Concrete Prism Method

Date of Cast: 09/01/2025

Results: Expansion (%) (Average of three specimens)

File No: 629/25

Req. No: 116528

Lab No: 315712

Date Sampled: 16/12/2024

Age	Expansion (%)
Week 1	0.000
Month 1	0.000
Month 2	0.002
Month 3	0.001
Month 4	0.001
Month 5	0.001
Month 6	0.002
Month 7	0.000
Month 8	-0.001
Month 9	-0.001
Month 10	-0.002
Month 11	-0.001
Month 12	0.001

Criteria to determine the potential deleteriousness of expansion

Expansion greater than 0.03% at 12 months shall be classified as a reactive aggregate and non-reactive when it is equal to or below 0.03%.

Notes: Cement type in trial Mix: **Boral GP/SL Cement - Berrima**

Non-reactive Coarse Aggregate used in trial mix: **Peats Ridge**

Environment room at 38.0 ± 2.0 °C. used to store the concrete prisms

Sample was provided by the client and tested as received

Alkali Content as per B80 Spec. 1.38%

Approved signatory _____

S. Somasundaram

Date 19/02/2026

Serial no. _____

CEM116528.SHA.1





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Boral Construction Materials
Materials Technical Services

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Winston Hills NSW 2153

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CONCRETE TRIAL MIX REPORT

CLIENT: HUNTER CIVILAB

File N°: 629/25

PROJECT: Testing of Screened Dune Sand from Williamtown Quarry – Site 218 for AAR -CPT
Project No: P20023 – WR: 17728 - AS1141.60.2 B80 Specification

REQ N°: 116528

TEST METHOD: AS1012 – Part 2

SAND DESCRIPTION: Screened Dune Sand
Sample No. 24-17728A

LAB SAMPLE N°: 315712

Location: Williamtown Quarry

DATE SAMPLED : 16/12/2024

DATE MIXED: 09/01/2025

TIME COMMENCED: 12:45 pm

		Type	Source	Moisture Content (%)		S.S.D. Batch Weights (kg)	S.S.D.Cubic Metre Batch Weights (kg/m³)
				As Batch	SSD		
Cement (bulk)		Boral GP/SL	Berrima			12.60	415
Sand		Screened Sand	Williamtown Quarry	3.1	0.2	20.58	680
Coarse Aggregate	-19.0mm +13.2mm	Blue Quarry	Peats Ridge	1.3	0.5	12.38	410
	-13.2mm +9.5mm	Blue Quarry	Peats Ridge	1.7	0.5	12.38	410
	-9.5mm +4.75mm	Blue Quarry	Peats Ridge	2.2	0.5	12.38	410
Water (incl. admix's)		Tap	Lab.			5.67	188
NaOH		Flakes	Ajax			0.143	4.73

Room Temperature °C	22.0	Slump (mm)	AS1012.3.1	100
Concrete Temperature °C	26.0	Air Content (%)	AS1012.4.2	1.2
Type of Mixer	PAN	Density (kg/m³)	AS1012.5	2510

Note: Alkali Content as per B80 Spec. 1.38%

S. Somasundaram
19/02/2026

A specialised delivery



PETROGRAPHIC ANALYSIS REPORT



ARC reference: ARC25_PAR_0713

Date: 19 December 2025

Petrographic Analysis for Sand Sample

Client: Hunter Geotechnical Services
Client contact: James Wyatt
Project name: P20023 – Materials Testing – Screened Sand
Location: Williamtown Quarry – Site 218, Stockpile
Sample number: 25-21413A
Sample description: Screened Sand
Date sampled: 01 December 2025
Date received: 15 December 2025
Report issued: 19 December 2025



Accredited for compliance with ISO/IEC 17025 – Testing

NATA Accredited Laboratory No. 21169

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Matthew van Herk



General Manager
NATA Level 5 Signatory
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Introduction

A screened sand sample was sampled by the client and sent to the ARC Laboratory Services Pty Ltd petrographic facility. The thin section was analyzed by ARC Laboratory Services Pty Ltd with instructions from the client to conduct petrographic analysis to ASTM C295, AS 2758.1 proposed use of aggregate and rock for concrete, AS 1141.26 secondary mineral content in basic igneous rock, TS 00151 code of practice for the management of alkali aggregate reactivity and recommend further testing if significant deleterious characteristics are identified.

Methodology

Petrographic analysis was completed on a Leica DM2700P polarizing microscope utilizing transmitted light with a range of objective lenses. Photographs of the hand specimen and thin section photomicrographs showing grain sizes and any aspects of the minerals are included as part of the report (Fig 1 to 4). The composition of mineral in the sample was calculated using a Pelcon Automatic Point Counter on 1800 points (Table 2 – Composition of mineral in the sample). The test was performed in accordance with the following standard:

- ASTM C 295 – 2019 Standard Guide for Petrographic Examination of Aggregates for Concrete.
- AS 2758.1 – 2014 Aggregates and Rock for Engineering Purposes Part 1: Concrete Aggregates.
- AS 1141.26 – 2019 Standard Guide for the Method for Sampling and Testing Aggregates – Secondary Minerals Content in Igneous Rocks.
- TS 00151:1.0 – Code of Practice for the Management of Alkali Aggregate Reactivity.

The following standard also referenced:

- SA HB 79-2015 Alkali-Aggregate Reaction - Guidelines on Minimizing the Risk of Damage to Concrete Structure in Australia - Cement and Concrete Association of Australia and Standards Australia.
- AS 2758.2 – 2014 Aggregates and Rock for Engineering Purposes Part 2: Aggregate for sprayed bituminous surfacing.
- AS 2758.5 – 2014 Aggregates and Rock for Engineering Purposes Part 5: Asphalt Aggregates.
- AS 1726-2017 Geotechnical Site Investigations.
- AS 1141.65-2008 Methods of sampling and testing aggregates Alkali aggregate reactivity – Qualitative petrological screening for potential alkali-silica reaction.

Macro-Examination Results

The hand specimen indicates the supplied sample as **quartz sand** and is composed of mostly fine to medium grains. The very fine grains (<0.075mm) and the coarse grains (>1.18mm) are trace in abundance. When treated with water minor suspended silt sized particles probably the clay/silt coated in the grains generated mild turbidity. The sand is moderately to well sorted, and the grains are

observed to be subrounded in shape, and of varying sphericity. The majority of the particles in the sample are hard, dense and physically sound. The sand is light brown in color overall. The light grey particles are observed to be quartzose in composition which includes quartz crystals, dark colored grains are supposed to be of lithic clasts and bioclasts. Minor feldspar grains are also observed. Traces of plant/coal fragments were observed. Table 1 shows the grain size distribution from dry sieve test. Fig 1 shows the portion of the sample as received. Fig 2 & 3 shows the sample under stereoscopic examination and dry sieved sample respectively.

Table 1 – Grain size distribution from dry sieve test

Grain Size (mm)	Abundance (%)
>1.18	Trace
1.18-0.3	76.2
0.3-0.075	23.8
<0.075	Trace



Fig 1: Photograph of the sample as received.



Fig 2: Photograph of the sample showing abundant quartz of various sized with bioclasts, opaque minerals, feldspar, minor lithic fragments.

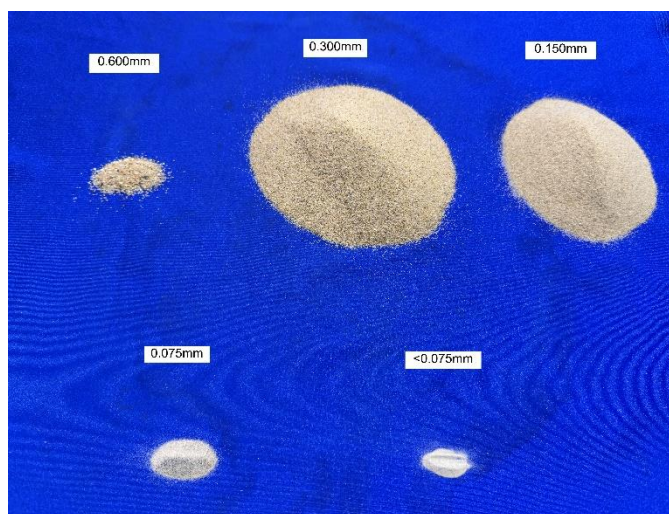


Fig 3: Photograph showing portions of the dry sieved sample.

Micro-Examination Results

AS 1141.26 is intended for use with basic igneous rock. Therefore, the method is not directly applicable to the supplied sand sample. The term 'non-durable mineral' is used instead 'secondary mineral' but basically is to determine the soft or weak phases.

From thin section analysis the sample is observed quartzose in nature. The composition of mineral in the sample based on a point count of 1800 widely spaced points shows the durable minerals make up **97.9%** and non-durable of **2.1%**.

Durable minerals include quartz (92.7%), feldspar (0.8%), bioclasts (1.7%), lithic clasts (1.3%), opaque minerals (1.4%) and hornblende.

The most abundant mineral in this phase is quartz. Quartz grains are occurring as monocrystalline and polycrystalline with variable degrees of strain either with undulatory or non-undulatory and straight extinction. Some are mildly fractured and lightly filled with secondary deposits. 76.1% quartz as free, unstrained to mildly strained grains, 13.7% quartz as moderately strained simple or crystalline composite grains, 2.2% as moderately to highly strained quartzite, 0.5% as vein quartz and 0.2% as finely microcrystalline chert. Some grains are coated with iron oxide/clay cement particles. Most quartz grains are inclusion free and with embayed texture. 0.8% of feldspar grains are seen in this sample are alkali feldspar with subordinate plagioclase. Orthoclase seen with typical cloudy appearance. Microcline with cross hatched twinning. Most of the grains are slightly weathered with cracks filled with iron oxides and/or clay cement. Perthitic intergrowth are observed in some grains. Plagioclase recognized by its parallel twinning. Most of them are seen as subrounded in shape. Mild sericitisation is observed in feldspar grains. 1.7% of bioclastic deposits are composed of broken and fragmental remains of organisms derived from foraminifera, molluscs, echinoids and coral. 1.3% of lithic fragments seen as fine grained metasedimentary having a quartzarenitic composition and metamorphic rocks with some degree of deformations. Mild alteration of minerals can be seen within the lithic fragments. 1.4% of opaque minerals occurs as fine subrounded crystals usually seen as opaque in the thin sections. Traces of hornblende seen as prismatic grains with light brown to dark green in color probably derived from parent rock.

Non-durable, soft or weak minerals include:

1.9% earthy secondary iron oxides and clay cement within indentations on the grains and along weathering cracks.

0.2% sericite forming as alteration/weathering within feldspar and lithic clasts.

Traces of free mica.

Traces of plant fragments.

Table 2: Composition of mineral in the sample

Durable minerals	Overall, %
Macro quartz	76.1
Strained quartz ^{(R)*}	13.7
Moderately to highly strained quartzite ^{(R)*}	2.2
Vein quartz	0.5
Microcrystalline quartz ^{(R)*}	0.2
Feldspar	0.8
Bioclasts	1.7
Lithic clasts	1.3
Opaque minerals	1.4
Hornblende	Trace
Nondurable, soft or weak minerals	Overall, %
Secondary iron oxides / clay cement	1.9
Sericite	0.2
Free mica	Trace
Plant/coal fragments	Trace
Total	100

*(R) Reactive mineral

Summary

From the petrographic analysis the submitted sand sample is identified as fine to medium grained **quartz sand**. From the point counting, the sample consists of durable minerals include quartz (92.7%), feldspar (0.8%), bioclasts (1.7%), lithic clasts (1.3%), opaque minerals (1.4%) and hornblende.

The average non-durable mineral count over the three slides is 2.1%.

Secondary iron oxides/clay cement (1.9%), sericite (0.2%) and traces of free mica are mostly found as non-durable/weak mineral.

Free Silica Content

The total free quartz is estimated at around **92.7%**.

The Engineering properties are influenced by the primary mineralogy, the grain size and structure, secondary and adverse mineralogy, and the degree of weathering. Some of them are classified below:

The submitted sample is:

- A fine to medium grained **quartz sand**.
- Moderately to well sorted, subrounded, and of varying sphericity.
- Containing **97.9% durable** and **2.1% non-durable/weak phases**.
- Containing **92.7% free silica** with **76.1% unstrained or mildly strained**, **13.7% moderately strained quartz**, **2.2% moderately to highly strained quartzite**, **0.5% vein quartz** and **0.2% finely microcrystalline chert**.
- Regarded collectively as **hard, strong** and **durable**.

Alkali Silica Reactivity

From the point counting, the sample was found to contain **13.7% moderately strained quartz**, **2.2% moderately to highly strained quartzite** and **0.2% finely microcrystalline chert**. In Accordance with Standards Australia HB 79-2015, the sample tested may have **potential for mild and/or slow deleterious AAR (Alkali Aggregate Reaction) in concrete**.

Alkali Carbonate Reactivity

Due to the observation of **lack of alkali-carbonate reactive minerals** (calcitic dolomite or dolomitic limestone) in this sample is deemed to be **low/no risk** to cause an ACR in concrete.

Based on the petrographic assessment conducted on the sand sample provided it is concluded that aggregates produced from this source predicted to be suitable for construction and engineering purposes including:

Aggregates – Concrete.

This recommendation is made on the basis that additional testing will be required to verify the aggregates produced from the sand source assessed meet suitability of application in specific engineering projects.

The test required and recommended to verify this sand source include but are not limited to:

AS 1141.60.1 - Methods for sampling and testing aggregates potential alkali-silica reactivity - Accelerated mortar bar method.

AS 1141.5 – Particle density and water absorption of fine aggregate.

AS 1141.31 - Methods for sampling and testing aggregates light particles.

AS 1141.34 - Methods for sampling and testing aggregates – Organic impurities other than sugar.

NB Refer: Durability assessment as per Aggregates and Rock for Engineering Purposes - AS 2758.1.*

Limitations: *The Analysis reported include composition is based on a small sample provided by the client, it may not be representative of the entire source. Further analysis may be required if the source is of variable geology and or visually different to the sample provided. Comments are made specifically to the sample examined.*

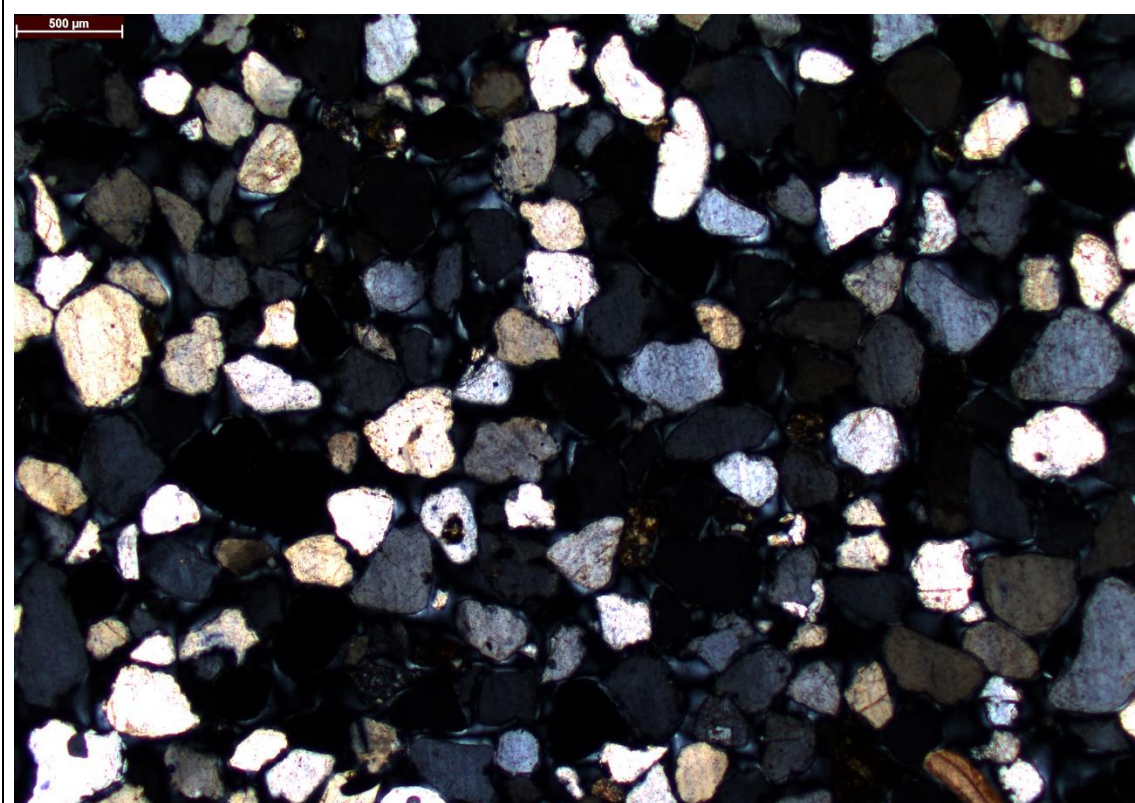
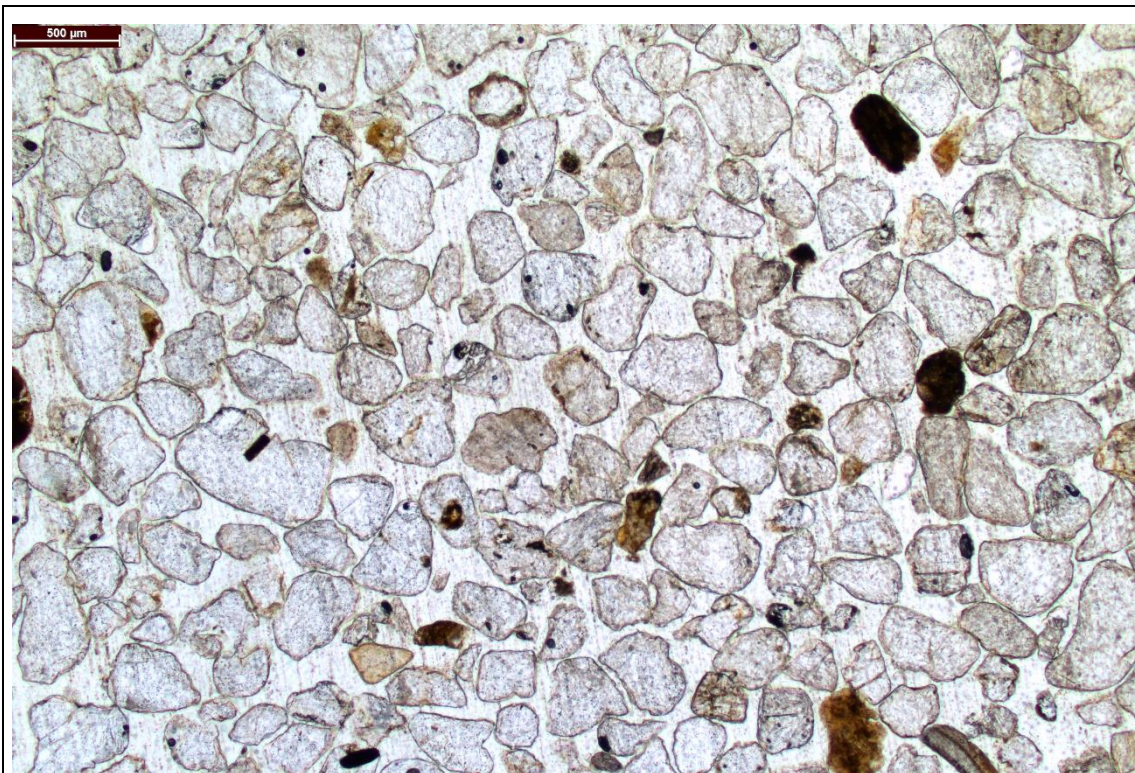


Fig 4: Photomicrograph showing sand dominated quartz grains with bioclasts, feldspar and minor lithic fragments with indentations of iron oxide or clay cement along the weathering cracks. The highly strained quartzite and opaque minerals seen within the range. Plane polarized & Cross polarized image. 25X Magnification.

Material Test Report

Report Number: P20023-10A
Issue Number: 1
Date Issued: 19/12/2025
Client: Macka's Sand Pty Ltd
2684 Nelson Bay Road, Salt Ash NSW 2318
Contact: Brett
Project Number: P20023
Project Name: Materials Testing - Screened Sand
Project Location: Williamtown Quarry - Site 218
Work Request: 21413
Sample Number: 25-21413A
Date Sampled: 01/12/2025
Dates Tested: 01/12/2025 - 19/12/2025
Sampling Method: AS 1141.3.1 9.4 - Sampling aided by power equipment - other than backblading method
Preparation Method: In accordance with the test method
Sample Location: Stockpile
Material: Screened Sand
Material Source: Macka's Sand - Williamtown Site 218



Hunter Geotechnical Services
62 Sandringham Avenue Thornton NSW 2322
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Email: gb@huntergeo.au



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Grant Burgess
Geologist
Laboratory Number: 14975

Flow Time and Voids Content (TS 02799.54)				Min	Max
Proportion of Oversize (%)	0				
Measurement	1	2	3		
Flow Time (s)	18.9	18.9	18.8		
Average Flow Time (s)	18.9				
Dry Density (kg/m ³)	2631				
Air Voids (%)	44.0	44.5	44.5		
Average Air Voids (%)	44.0				