



Williamtown - Site 218  
Screened Sand for  
Utility Assets  
2 0 2 3



*Specification Assessment with:*  
*R11, AS3725, WSA PS-350, WSA PS-360,*  
*STS101*





# Material Test Report

**Report Number:** P20023-6E  
**Issue Number:** 1  
**Date Issued:** 05/04/2023  
**Client:** Macka's Sand Pty Ltd  
2684 Nelson Bay Road, Salt Ash NSW 2318  
**Contact:** Andrew Pickard  
**Project Number:** P20023  
**Project Name:** Materials Testing - Screened Sand  
**Project Location:** Williamtown Quarry - Site 218  
**Work Request:** 9916  
**Sample Number:** 23-9916A  
**Date Sampled:** 13/01/2023  
**Dates Tested:** 13/01/2023 - 27/02/2023  
**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



Hunter Civilab  
62 Sandringham Avenue Thornton NSW 2322  
Phone: (02) 4966 1844  
Email: office@huntercivilab.com.au



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: James Wyatt  
Laboratory Manager  
NATA Accredited Laboratory Number: 14975

Particle Size Distribution (AS1141.11.1)			
Sample Washing	Sample was not washed		
Sieve	Passed %	Passing Limits	
1.18 mm	100		
0.6 mm	100		
0.425 mm	94		
0.3 mm	38		
0.15 mm	1		
0.075 mm	0		

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

Moisture Content (RMS T262)			
Moisture Content (%)	3.1	Min	Max

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)			
Sample History	Oven Dried	Min	Max
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)			
Moisture Condition Determined By	AS 1289.3.1.2	Min	Max
Linear Shrinkage (%)			
Cracking Crumbling Curling			

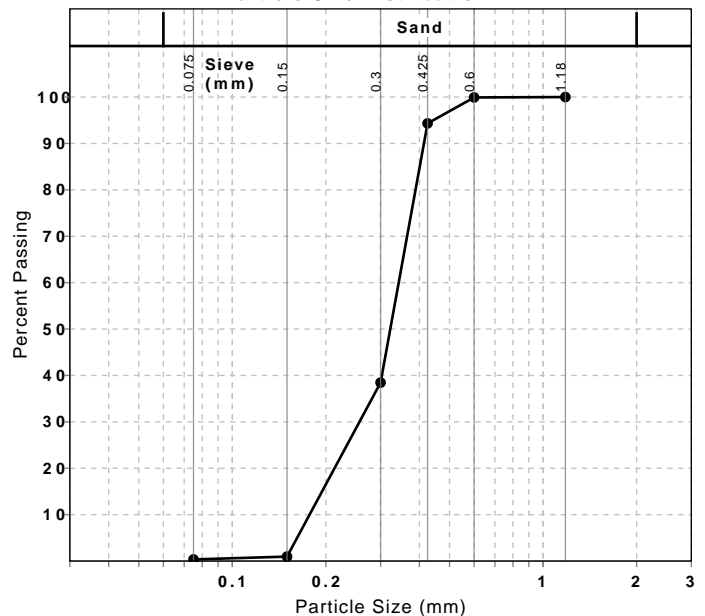
Linear shrinkage could not be determined as the liquid limit could not be obtained and the material is non-plastic.

Density and Water Absorption of Fine Aggregate (AS 1141.5)			
Apparent Particle Density (t/m <sup>3</sup> )	2.64	Min	Max
Particle Density Dry (t/m <sup>3</sup> )	2.62		
Particle Density SSD (t/m <sup>3</sup> )	2.63		
Water Absorption (%)	0.2		

Bulk Density of Aggregate (AS 1141.4)			
Uncompacted (t/m <sup>3</sup> )	1.23	Min	Max
Compacted (t/m <sup>3</sup> )	1.32		
Moisture Condition	Natural		
Nominal Size	Under 5mm		

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

Particle Size Distribution



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**Contact:** Andrew Pickard  
**Project Number:** P20023  
**Project Name:** Materials Testing - Screened Sand  
**Project Location:** Williamtown Quarry - Site 218  
**Work Request:** 9916  
**Sample Number:** 23-9916A  
**Date Sampled:** 13/01/2023  
**Dates Tested:** 13/01/2023 - 09/02/2023  
**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



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Laboratory Manager  
NATA Accredited Laboratory Number: 14975

Sugar (AS 1141.35)		
Sugar	Absent	

Methylene Blue (RMS T659)		Min	Max
	Test 1	Test2	
Methylene Blue Adsorption Value (mg/g)	1	2	
Mean Methylene Blue Value (mg/g)	1		

Sodium Sulphate Soundness (AS 1141.24)		Min	Max
Sieve Aperture	% Loss		
4.75 - 2.36mm			
2.36 - 1.18mm			
1.18 - 0.600mm			
0.600 - 0.300mm	0.3		
<b>Total Weighted Loss (%)</b>	<b>0.3</b>		

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

Flow Time and Voids Content (RMS T279)		Min	Max
Proportion of Oversize (%)	0		
Measurement	1	2	3
Flow Time (s)	18.8	18.8	18.8
<b>Average Flow Time (s)</b>	<b>18.8</b>		
Dry Density (kg/m <sup>3</sup> )	2620		
Air Voids (%)	43.5	43.5	43.5
<b>Average Air Voids (%)</b>	<b>43.5</b>		

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A handwritten signature in black ink, appearing to read "James Wyatt".

Approved Signatory: James Wyatt  
Laboratory Manager  
NATA Accredited Laboratory Number: 14975

## Moisture Content RMS T262

Sample Number	Sample Location	Moisture Content (%)	Min	Max	Material
23-9916A	Stockpile	3.1 %	**	**	Screened Sand

## TEST REPORT

CLIENT: HUNTER CIVILAB

FILE NO: 629/23

PROJECT: Testing of Screened Sand ex Williamtown Quarry – Site 218.

REQUEST NO: 103825

TEST PROCEDURE: ASTM 7428, Standard Test Method for Resistance of Fine Aggregate to Degradation by  
Abrasion in the Micro-Deval Apparatus

DATE TESTED: 14.2.23

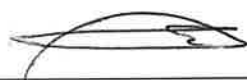
Sample Description:	Screened Sand –Stockpile	
Project No:	P20023	
Work Request No:	9916	
Client Sample No:	23-9916A	
Date Sampled:	13.1.23	
Date Received:	25.1.23	
Laboratory Sample No:	278564	
<b>Test Method:</b>	<b>Test:</b>	<b>Results</b>
ASTM D7428*1	Micro-Deval Abrasion Test % Loss The % loss of the control Agg. tested closest to the time at which the sample was tested = 19.5	2.9

Sample provided by client

NOTE: \*1Sample tested without preparing standard grading as per ASTM D7428 Clause 8 Note 2

J. Wyatt, Q C File, File

Approved Signatory



Kamal Ali

Date

17.2.23

Serial No.

AGG103825.KA.1

**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](http://boral.com.au)**TEST REPORT**CLIENT: Hunter Civilab  
P.O. Box 3127 Thornton NSW 2322

FILE No.: 629 / 23

PROJECT: Testing of Screened Sand - Stockpile from Williamtown Quarry - Site 218 REQUEST No.: 103825

**TEST PROCEDURE:**

AS 1141.12 – Material Finer than 75 micron \*

AS 1141.13 – Material Finer than 2 micron

Laboratory Sample No.:	278564
Date Sampled:	13.1.23
Date Received:	25.1.23
Date Tested:	13.2.23
Project No.:	P20023
Work Request No.:	9916
Sample Description:	Screened Sand - Stockpile Client Sample No. 23-9916A
Field No.:	1

**TEST RESULTS:**

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

Sample was provided by the Client.

\* The authorised signatory for AS 1141.12 is K.Ali.

James Wyatt, Mat.File, File.

Approved Signatory



K.Ali

S.Krishnamoorthy

Date

15.2.23

Serial No.

CHEM103825.SK.1





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**TEST REPORT**

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

FILE No.: 629 / 23

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

REQUEST No.: 103825

**TEST PROCEDURE:**

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

Laboratory Sample Number:	278564
Date Sampled:	13.1.23
Date Received:	25.1.23
Date Tested:	14.2.23
Project Number:	P20023
Work Request Number:	9916
Sample Description:	Screened Sand - Stockpile Client Sample No. 23-9916A
Field No.:	1

**TEST RESULTS:**

Acid Insoluble Residue (%)	100
----------------------------	-----

Sample was provided by the Client.

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

S. Krishnamoorthy  
15<sup>th</sup> February 2023

James Wyatt, Mat. File, File.



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### Test Report

[boral.com.au](http://boral.com.au)

**Client:** HUNTER CIVILAB  
**Address:** P.O. BOX 3127, THORNTON, NSW 2322  
**Date Received:** 25/01/2023  
**Project:** Testing of Screened Sand from Williamtown Quarry – Site 218 – Project # P20023 – WR # 9916  
**Test Method:** Potential Alkali-silica Reactivity – Accelerated Mortar Bar Method (AS 1141.60.1)

**File No:** 629/23  
**Req. No:** 103825  
**Date Sampled:** 13/01/2023

Lab Sample No	Sample Description	Location
278564	Screened Sand – Stockpile – Sample No. 23-9916A	Williamtown Quarry – Site 218
N/A	Boral GP/SL Cement	Berrima

**Results:**

Flow (%): 68

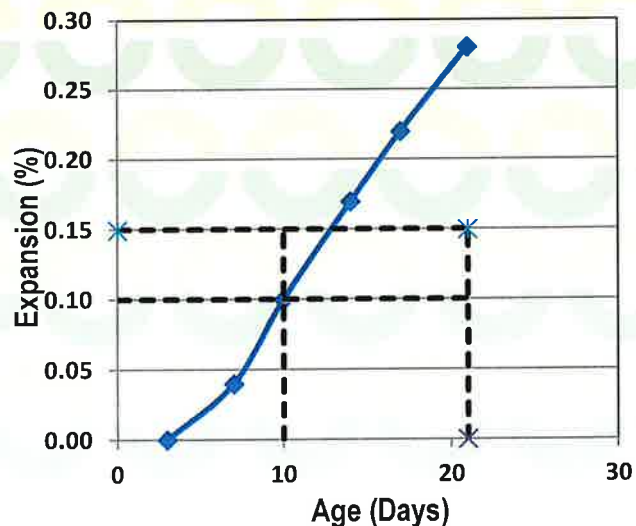
W/C Ratio: 0.47

Date Mixed: 15/02/2023

Age (Days)	Expansion (%)			
	Specimen 1	Specimen 2	Specimen 3	Average
3	0.005	0.000	0.000	0.00
7	0.045	0.040	0.045	0.04
10	0.100	0.095	0.100	0.10
14	0.165	0.165	0.170	0.17
17	0.215	0.220	0.225	0.22
21	0.270	0.275	0.280	0.28

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*≤ E < 0.3	Slowly Reactive
≥ 0.1*	—	Reactive
—	0.3 ≤ E	Reactive
*The value for natural fine aggregates is 0.15%		

\*The value for natural fine aggregates is 0.15%


**Note:**

- Sample submitted by the Client.

James Wyatt, Mat. File, File

Approved Signatory Julius C. Alvaro Julius AlvaroDate 11/03/2023 Serial No. CEM103825.JA.1

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NATA Accredited Laboratory  
 Number: 547



# GEOCHEMPET SERVICES

ABN 25 065 630 506

PETROGRAPHIC, GEOLOGICAL & GEOCHEMICAL CONSULTANTS

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## PETROGRAPHIC REPORT ON A SCREENED SAND SAMPLE (23-9916A) FROM WILLIAMTOWN QUARRY

prepared for

**HUNTER CIVILAB  
THORNTON NSW**

Purchase Order: 9916

Invoice Number: G2302513

Client Ref: James

Issued by



K. H. Lynn  
BSc. (Hons)  
15 February 2023

Reviewed by



A.G. Christy  
MA PhD FMinSoc  
15 February 2023

February, 2023

Hc230201

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<b><u>Sample Label:</u></b>	23-9916A	<b><u>Date Sampled:</u></b>	13/01/2023
<b><u>Laboratory ID:</u></b>	G23010054	<b><u>Date Received:</u></b>	16/01/2023
<b><u>Material:</u></b>	Screened Sand	<b><u>Project:</u></b>	P20023
<b><u>Location:</u></b>	Williamtown Quarry – Site 218	<b><u>Location:</u></b>	Stockpile
<b><u>Work Request:</u></b>	9916		
<b><u>Work Requested:</u></b>	Petrographic analysis in relation to use as concrete sand; petrographic assessment of potential for alkali-silica reactivity		

**Methods** Account taken of ASTM C 295 Standard Guide for *Petrographic Assessment of Aggregates for Concrete*, the AS2758.1 – 2014 *Aggregates and rock for engineering purposes part 1; Concrete aggregates (Appendix B)*, the AS1141.65 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, entitled (HB 79-2015) *Alkali Aggregate Reaction - Guidelines on Minimising the Risk of Damage to Concrete Structures in Australia*

**Identification** Medium to fine quartz sand

## **Description**

The sample consisted of about 5 kg of greyish orange, quartz-rich, free-flowing clean sand. Clasts appear to be dominated by quartz with minor lithic clasts and are mainly sub-rounded.



**Figure 1:** A sub sample of the supplied sand from Williamtown Quarry .

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In a crude, dry sieving test of a small subsample these results were tabulated:

Sieve Size	Wt % of sample
Coarse (> 1.18mm)	<0.1%
Medium (> 0.3mm)	64.9%
Fine (> 0.075mm)	35.0%
Silt (< 0.075mm)	0.1%

Clasts range up to 1 mm. No coarse fraction was recorded from the sieve. The sand consists largely of rounded quartz grains with minor lithic clasts. There are no apparent deleterious grain coatings.

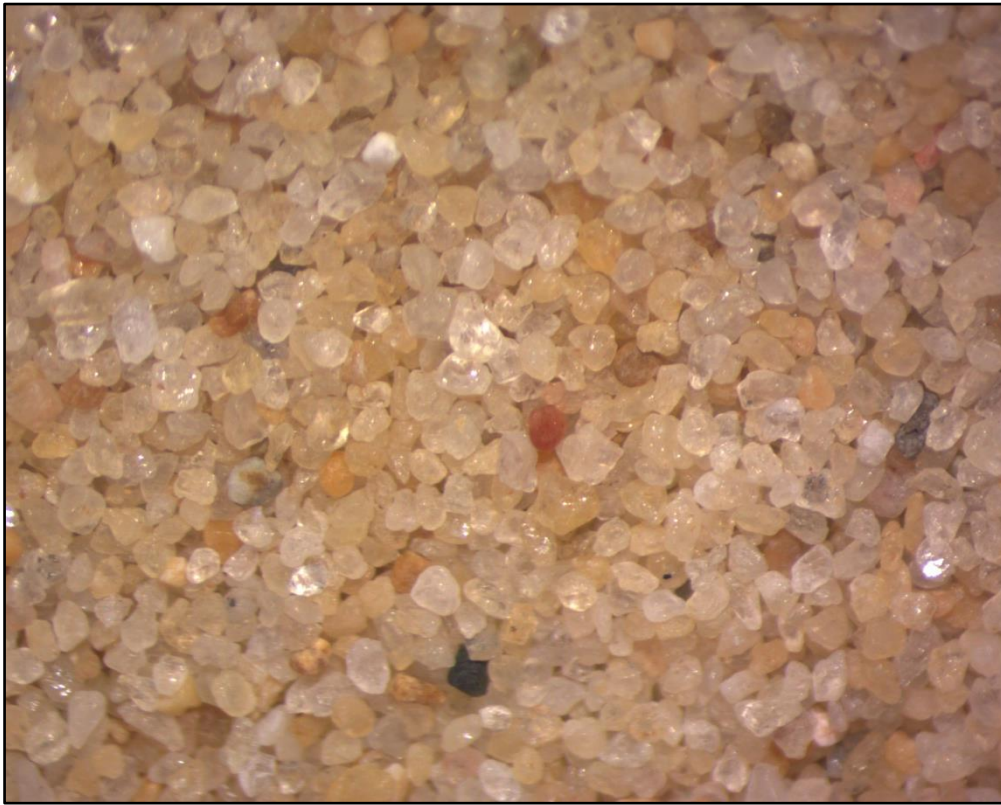
A sub-sample was swirled in water, generating a very light persistent greyish orange turbidity with traces of argillized scum at the surface, indicating the presence of some very minor clay and silt.



**Figure 2:** Photograph of sieve fractions recorded above.



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**Figure 3:** Photograph of the medium fraction composed mostly of quartz grains and a few darker lithic grains.

A thin section was prepared for microscopic examination in transmitted, polarized light. A count of 600 widely spaced points falling within sectioned sand clasts gave the following composition:

- 70% quartz as unstrained to mildly strained simple (66%) or composite free grains (4%)
- 18% quartz as moderately strained simple or composite grains
- 5% quartzite
- <1% chert
- <1% vein quartz
  
- 2% feldspar (2% K-feldspar, <1% plagioclase)
- <1% other mineral grains (including opaque oxides, zircon, rutile, biotite and tourmaline)
  
- <1% lithic clasts of felsic volcanics (<1% finely microcrystalline quartz)
- <1% lithic clasts of intermediate volcanics
- <1% lithic clasts of granite
- 2% lithic clasts of volcanoclastic siltstone (<1% finely microcrystalline quartz)
- 1% lithic clasts of sandstone (<1% quartz)
- 1% lithic clasts of pelitic siltstone/slate
- <1% argillized clasts
  
- 1% shell fragments

## **Thin Section Description**

A simultaneous count of total free silica content yielded 93%, comprising 88% as free quartz grains, 5% quartz

# GEOCHEMPET SERVICES, BRISBANE

locked within lithic clasts (quartzite, granite, sandstone, and chert), and <1% within felsic volcanic clasts and siltstone.

In thin section the sand is seen to consist largely of quartz in the form of unstrained to mildly strained simple (66%) and less abundant composite free grains (4%). Simple or polycrystalline grains of moderately strained quartz amount to about 18%. Other siliceous clasts include 45% quartzite and <1% chert.

Potassium feldspar grains represent about 2% of the rock, while plagioclase is <1%. About <1% of the sand consists of other mineral grains (including heavy minerals of tourmaline, rutile and zircon and epidote). Other lithic fragments amount to about 5% of the sample and include felsic volcanic fragments, intermediate volcanic fragments, granite, basalt, siltstone, and sandstone. Argillized fragments together amounted to <1% of the sample.

Shell fragments amount to 1%.

A full secondary mineral count as per AS1141.26 over three slides counting 1800 points (report Hc230202smc) indicated the following soft, weak mineral content:

- 0.9% sericite forming as alteration/weathering within quartzite and lithic fragments
- 0.8% earthy secondary iron oxides within indentations on the grains and along weathering cracks
- 0.4% limonite

The estimated total is 2.1% of the rock.

## **Comments and Interpretations**

The submitted dune sand sample (labelled 23-9916A) from Williamstown Quarry may be regarded as clean, free flowing, medium to fine quartz sand, and is narrowly graded.

The total **free silica content** (or **total quartz content**) is **93%**, comprising 88% as free quartz grains, 5% quartz locked within lithic clasts (quartzite, granite, sandstone, and chert), and <1% within felsic volcanic clasts and siltstone.

Being composed almost entirely of hard, strong, durable, rounded siliceous mineral grains and lithic clasts, sand is interpreted to be **physically suitable for use in concrete**.

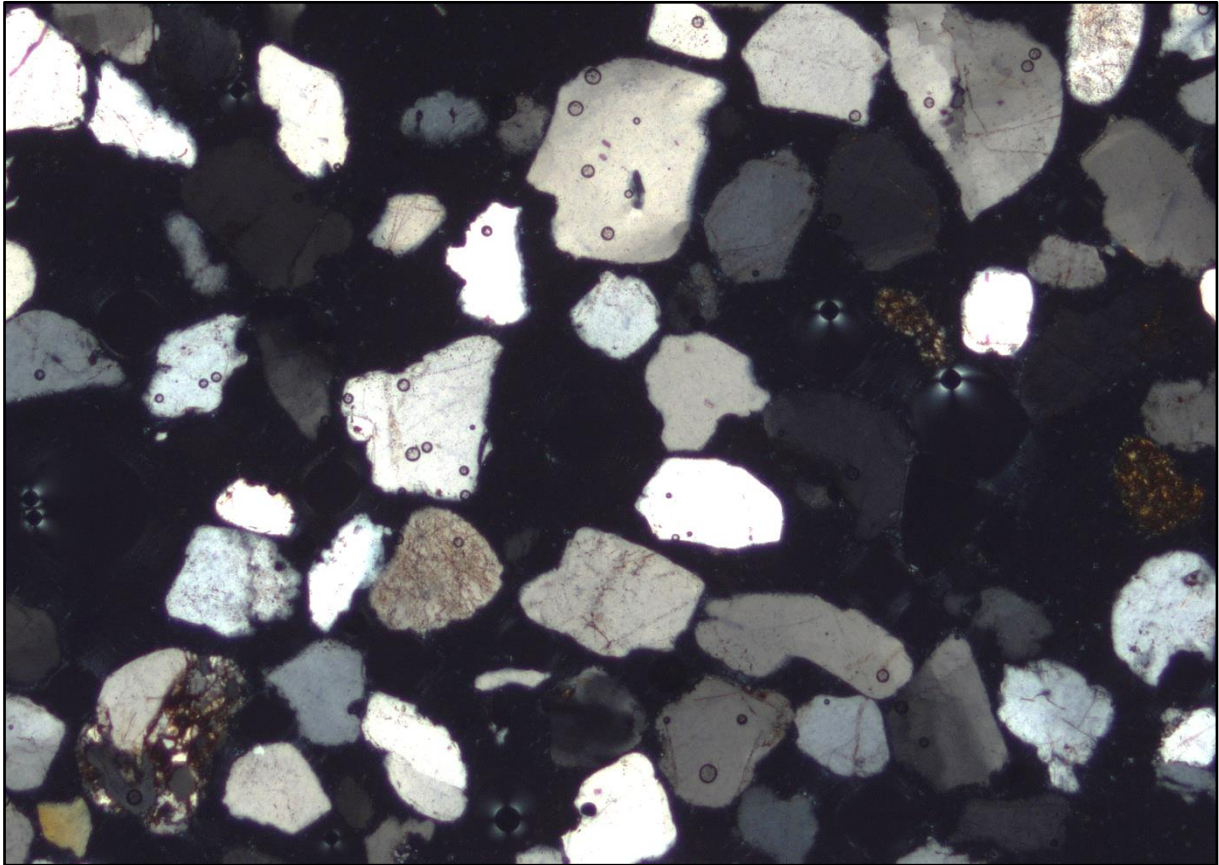
In relation to potential for alkali-silica reactivity in concrete, it is noted that the sand carries about 23% of moderately strained quartz (as free simple and composite grains, and in lithic clasts of quartzite and chert) and about <1% of finely microcrystalline quartz (within felsic volcanic/tuffaceous rock, chert, and siltstone). Thus, the sand is predicted to **have potential for mild and/or slow deleterious alkali-silica reactivity in concrete**.

The supplied sand sample is predicted to be **suitable for use as fine concrete sand**, provided that the appropriate precautions are taken in mix and engineering design to deal with its perceived potential for deleterious alkali-silica reactivity when used under conditions which might promote such reaction.

Guidance on appropriate precautions can be obtained from the 2015 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 93%.



**Figure 4:** Photo-micrograph taken at low magnification in transmitted, cross-polarised light. The image shows a representative view of the sample, which is dominated by mildly to moderately strained quartz grains along with minor lithic clasts including quartzite and volcanoclastic siltstone.

# SYDNEY ANALYTICAL LABORATORIES

Page 1 of 3

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A.B.N. 81 829 182 852  
NATA No: 1884

ANALYTICAL REPORT for:

HUNTER CIVILAB

UNIT 3/62 SANDRINGHAM AVE  
THORNTON 2322

ATTN: JAMES WYATT

JOB NO: SAL28465C  
CLIENT ORDER: P20023  
DATE RECEIVED: 17/01/23  
DATE COMPLETED: 30/01/23  
TYPE OF SAMPLES: SOIL  
NO OF SAMPLES: 1



.....  
Issued on 30/01/23  
Lance Smith  
(Chief Chemist)



**ANALYTICAL REPORT**

**JOB NO: SAL28465C  
CLIENT ORDER: P20023**

SAMPLES	pH 1:5	Cl %	% as SO3	SO4 SO3	O.M. %
1 23-9916A	9.4	0.007		0.009	<0.1
MDL	0.1	0.001		0.001	0.1
Method Code	C1	C32		C33	C4
Preparation	P4	P5		P5	P4

RESULTS ON DRY BASIS  
MATERIAL: SCREENED SAND  
DATE OF COLLECTION: 13/01/23  
WRN: 9916

**ANALYTICAL REPORT**

**JOB NO: SAL28465C  
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
C4	Organic Matter - AS1289.4.1.1



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## SECONDARY MINERAL COUNT (AS 1141.26) ON A SAND SAMPLE (23-9916A) FOR WILLIAMTOWN SAND

prepared for

**HUNTER CIVILAB  
THORNTON NSW**

Purchase Order: 9916

Invoice Number: G2302513

Client Ref: James

Issued by



K. H. Lynn  
BSc. (Hons)  
15 February 2023

Reviewed by



A.G. Christy  
MA PhD FMinSoc  
15 February 2023

February, 2023

Hc230202smc

Page 1 of 2

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## SECONDARY MINERAL CONTENT USING A PETROLOGICAL MICROSCOPE\*

**Sample Label:** 23-9916A **Date Sampled:** 13/01/2023  
**Laboratory ID:** G23010054 **Date Received:** 16/01/2023  
**Material:** Screened Sand **Project:** P20023  
**Location:** Williamtown Quarry – Site 218 **Location:** Stockpile  
**Work Request:** 9916

### Discussion

It is noted that strictly AS 1141.26 is intended for use with mafic igneous rocks. Therefore, the requested method is not directly applicable to the sample supplied.

However, the general intent of the method is to determine the secondary minerals because they are usually soft, weak or non-durable. Accordingly, the methods of AS 1141.26 have been modified to focus on the soft/weak secondary phases (through a difficult count across thin sections of sand) to generate the results tabulated below.

Sect. No.	Durable Minerals (in places of primary minerals)		Soft, weak or non-durable minerals (in place of secondary minerals)			Voids		(M) Total Min. Count	(T) Total Point Count
	(P) Point	%	(S) Points	%	Av. %	(VC) Points	%	P+S	
<b>A</b>	588	98.0	12	2.0	<b>2.1%</b>	0	0	600	600
<b>B</b>	585	97.5	15	2.5		0	0	600	600
<b>C</b>	590	98.3	10	1.7		0	0	600	600

\*The determination has been made using a Test Method essentially similar to that described in AS 1141.26.

**Section A** contained numerous sand grains

**Section B** contained numerous sand grains

**Section C** contained numerous sand grains

The supplied sample is considered to be a quartz sand which may be described broadly for engineering purposes as medium to fine quartz sand from petrographic report Hc230201. The sand carries a very small amount of soft, weak, and deleterious minerals within weathered lithic clasts and in indents on grain surfaces, along with very minor free mica. The total soft/weak mineral count is **2.1%**.

### The average content of weak, soft or non-durable minerals

- 0.9% sericite forming as alteration/weathering within quartzite and lithic fragments
- 0.8% earthy secondary iron oxides within indentations on the grains and along weathering cracks
- 0.4% limonite