Teralba Quarry
Product Technical Guide - 2022

PRODUCTS *Other Products May be Available Upon Request	***PERFORMANCE INFORMATION*** **The information provided below is to be used as a basic guide only. For current test data or information relating to specific construction specifications, please contact Teralba Quarry on (02) 49 506640*	
NGB20 (Roadbase) Tested as per Lake Maquarie City Council - 1141 Guidelines	• Densely Graded 20mm Minus • California Bearing Ratio ≥ 80 (98% Modified Compaction)	• Maximum Dry Compressive Strength ≥ 1.7 MPa • Plasticity Index ≤ 6
NGS20 (Subbase) Tested as per Lake Maquarie City Council - 1141 Guidelines	• Densely Graded 20mm Minus • California Bearing Ratio ≥ 30 (98% Modified Compaction)	• Maximum Dry Compressive Strength ≥ 1.0 MPa • Plasticity Index ≤ 12
Select Fill	• Densely Graded 40mm Minus • California Bearing Ratio ≥ 33 (100% Standard Compaction)	• Maximum Dry Compressive Strength ≥ 2.0 MPa • Plasticity Index ≤ 12
RRB20 (Recycled Roadbase) NGS20 + 20% Crushed Concrete	• Densely Graded 20mm Minus • California Bearing Ratio ≥ 30 (100% Standard Compaction)	• Plasticity Index ≤ 12
General Fill (Structural)	• Graded 100mm Minus • California Bearing Ratio ≥ 8 (100% Standard Compaction)	• Plasticity Index ≤ 25
Concrete Aggregates (mm) (20) (20 Graded) (20/14) (14) (10) (10/7) (7) (Manufactured Sand - 5mm Minus)	• As per AS2871.1 Guidelines • Suitable for Exposure Categories A1, A2, B1 and B2.	• Test Reports Can be Provided Upon Request
Drainage Aggregates (mm) (20) (20/14) (14) (10/14) (10) (7)	• Various Sizings Available • ≤ 5% Passing the 75µm Sieve	
Coarse Packing / Fill Sands	• Well Graded 5mm Minus • Plasticity Index = Non-Plastic • ≤ 5% Passing the 75µm Sieve	

Teralba Quarry is a Conglomerate based source. Petrographic information provided in the report below.

Petrographic Report 2021

ABN 25 065 630 506
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PETROGRAPHIC REPORT ON A 20/14 mm AGGREGATE SAMPLE (NEW21W-2980-S06) FROM TERALBA QUARRY

prepared for

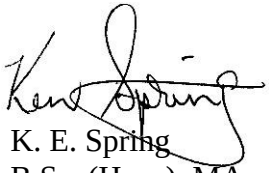
QUALTEST
WARABROOK NSW

Purchase Order: QTPO21-242

Invoice Number: G2207546

Client Ref: Dane Cullen

Issued by



K. E. Spring
B.Sc. (Hons), MAppSc
26 July 2021

GEOCHEMPET SERVICES BRISBANE

Sample Label:	NEW21W-2980-S06	**Date Sampled**:	02/07/2021
Label No:	G21070066	**Date Received**:	09/07/2021
Sample Type:	20/14mm Aggregate	**Sample Location**:	Teralba, NSW
Project No.:	13/00030	**Project Name**:	Material Testing
Lot Number:	Batch 6-B11-21/87	**Work Order No**:	NEW21W-2980

Work Requested Petrographic analysis in relation to suitability for use as concrete aggregate: 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 Standard Guide for the *Method for sampling and testing aggregates*, of the content of the 2015 joint publication of the Cement and Concrete Association of Australia and Standards Australia, (HB 79-2015) entitled *Alkali Aggregate Reaction - Guidelines on Minimising the Risk of Damage to Concrete Structures in Australia*

Identification Aggregate composed of water-worn and more abundant broken pebbles of volcaniclastic sandstone, related volcaniclastic siltstone and minor chert

Description

The sample consisted of variously water-worn or recently broken, hard, robust pebbles with intermediate diameters of about 14 to 20 mm. The pebbles are of mainly medium light grey to dark grey colour; a few fragments show light brown staining attributable to generally slight weathering. Minor fragments are whitish pebbles are cherty with minor other rock types and are probably derived from a volcanolithic conglomerate originally tightly cemented by secondary iron oxide, calcite, chlorite and rarely clay, but most have a partly or wholly broken form.

Plate 1: Photograph of washed sub-sample of 20/14 mm pebble aggregate.

A total of 14 random fragments were incorporated into two thin sections and were found to comprise:

50%	volcaniclastic sandstone (12% quartz, of which 4% is finely microcrystalline)
43%	volcaniclastic siltstone (8% quartz, of which 6% is finely microcrystalline)
7%	chert (7% quartz, of which 6% is finely microcrystalline)

The sectioned fragments of moderately indurated to indurated volcaniclastic sandstone or greywacke are hard, robust and mostly slightly weathered. Sectioned examples display moderately sorted, angular and sub-angular mineral grains and sub-rounded to rounded volcanic lithic clasts (a few fragments contain a few carbonaceous wisps) now densely packed and tightly cemented by secondary iron oxide, chlorite and/or calcite. The sand-sized mineral grains comprise plagioclase feldspar, unstrained and faintly strained quartz, and opaque oxide. The sand-sized lithic clasts (or rock fragments) comprise acid tuffaceous rock and less common intermediate and acid volcanic. The lithic clasts are now most commonly microcrystalline and slightly sericitized, chloritized and/or carbonated. The grainsize and degree of sorting within the arenite varies from one pebble fragment to another, apparently covering the whole range sand size range between siltstone and pebbly conglomerate.

The sandstone is commonly thinly veined by calcite, feldspar and quartz. It is visually estimated that silica in the arenite clasts amounts to about 25%, most of it as sand-sized grains of quartz and about a third of it in finely microcrystalline form.

The sectioned fragments classified as volcaniclastic siltstone are quite hard and robust (very indurated) and they show the least weathering. Sectioned examples are mainly of broadly "cherty" appearance and cut by abundant thin veins of quartz and less common feldspar, calcite, chlorite and sericite. Closer inspection reveals their silty character, modified by some very fine recrystallization and induration along with some hornfelsing to fine sericite and biotite. They consist of silty and now most commonly finely microcrystalline feldspars and quartz, accompanied by sericite, chlorite and very fine carbonaceous matter. It is not feasible to perform a worthwhile point count, but it is estimated that the siltstone carries about 10-20% of quartz, 80% of it being finely microcrystalline (perceived to be a slowly alkali reactive form of silica).

The sectioned fragment of chert is slightly weathered, very hard and very robust. Sectioned examples display some variations in composition and internal grainsize. It consists almost entirely of finely microcrystalline quartz (finer than 0.01 mm and regarded as a slowly alkali reactive form of silica) cut by some veins of coarser, unstrained quartz. They are transitional to mudstone, being composed partly of quite finely microcrystalline quartz (some of it within tiny spheroids after probable *Radiolaria* fossils) and partly of sericite. In essence, the chert fragments represent very robust and durable material, but generally with potential for deleterious alkali-silica reactivity because they are dominated by finely microcrystalline quartz.

Comments and Interpretations

This supplied nominal 20/14 mm aggregate sample (labelled NEW21W-2980-S06) from Teralba, NSW is considered to have been generated by crushing and screening water-worn pebbles of mainly slightly weathered rock, dominated by indurated volcaniclastic arenite and related indurated volcaniclastic siltstone and chert.

For engineering purposes, the supplied aggregate sample maybe summarised as consisting of:

- varied shape (water-worn or more commonly recently broken)
- **93% indurated sedimentary rock fragments** (composed of mineralogically broadly similar volcaniclastic sandstone, volcaniclastic siltstone, which are in a mostly slightly weathered, hard and robust condition,
- **7% chert/jasper** in slightly weathered condition being very hard and very robust)
- **<1% minor other rock types** not observed in petrographic examination

Overall, the aggregate is predicted to be **durable**.

The supplied sample of aggregate has an estimated average content (appropriately weighted) of about 27% free silica, including an estimated 16% of finely microcrystalline (a slowly alkali reactive form of silica occurring within fragments of volcaniclastic sandstone, siltstone and chert). Thus, the aggregate is predicted to have **potential for substantial deleterious alkali-silica reactivity in concrete**.

In short, aggregate equivalent to the supplied sample is predicted to be **physically suitable for use as concrete aggregate**, but it is recommended that appropriate precautions be taken in mix and engineering design to take account of a perceived potential for deleterious alkali-silica reactivity.

Guidance on appropriate precautions is available in 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

Estimated to be about 27% of the rock, comprising 11% as common quartz and 16% as finely microcrystalline or cherty silica.

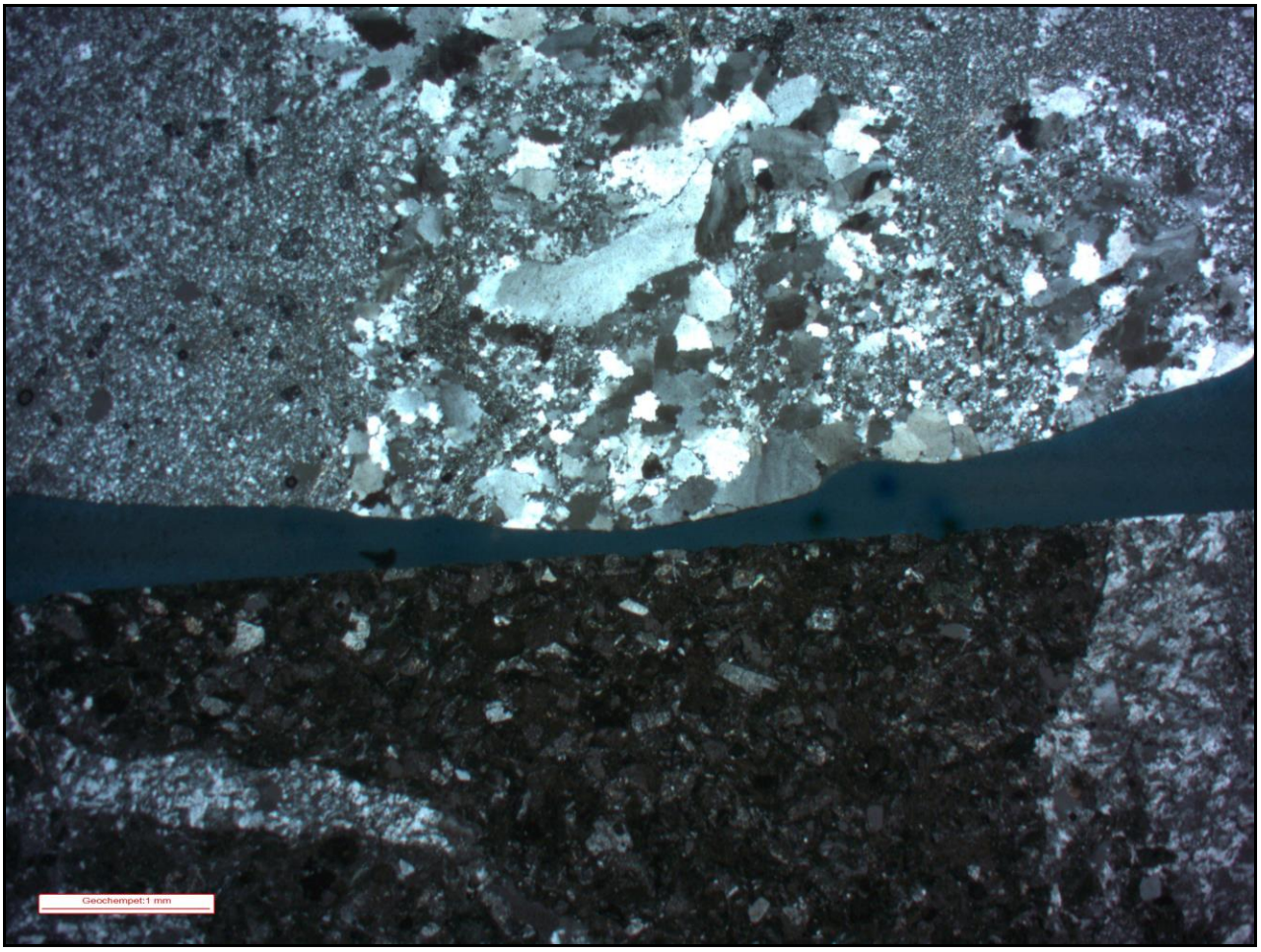


Plate 2: Micrograph taken at low magnification in transmitted cross polarised light of a chert fragment (upper part of image) and volcaniclastic sandstone fragment (lower part of image). Note both fragments are veined by quartz.