Darlington Point Quarry

Resource Assessment

Prepared for: Mawsons Concrete & Quarries

Date: December 2024

File Reference: 2833_220_001

DOCUMENT CONTROL

PROJECT / DETAILS REPORT

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Principal Author:	Nathanael Nahuysen
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Issue	Description	Date	Author	Reviewer
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Mawsons	1 x electronic

GROUNDWORK, PART OF SLR
Phone: 1800 GW PLUS (1800 497 587)
Email: info@groundwork.com.au
Website: groundwork.com.au
ABN 13 609 422 791

QLD/NSW
6 Mayneview Street, Milton Qld 4064
PO 1779, Milton BC Qld 4064
Phone: +61 7 3871 0411

SA/WA/NT
2/3 16 Second St, Nuriootpa SA 5355
PO Box 854, Nuriootpa SA 5355
Phone: +61 8 8562 4158

Geotechnical Laboratory
Unit 78/109 Leitchs Road, Brendale Qld 4500
Phone: 0417 615 217

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1 Introduction

Groundwork Plus (GWP) was commissioned by Mawsons to undertake a desktop review of information relating to the nature and quality of the sand resource occurring at the Darlington Point Quarry, NSW. The assessment is to estimate the volume of sand resource within the proposed quarry footprint. The Darlington Point Quarry produces sand products for the NSW regional market.

2 Key Site Details

Location:	The Darlington Point Quarry is located at Lot 175 DP750908, situated 7km South of Darlington Point, NSW, via Kidman Way and the Sturt Highway. Refer to Drawings.
Land Use:	Extractive industry
Landform:	Flat lying farmlands, within a large, open, sparse floodplain.
Site Geology:	Flat, low undulating, red-brown sand plain, with localised clay and silty clay.
Vegetation:	Groups of medium sized trees surrounded by native grasses and almond farms.

Plate 1: Project site looking into the main pit area. (source: Groundworks Plus, June 2024)

3 Regional Geology

The region is made up of several young alluvial and aeolian sedimentary facies. The site is located in the Quaternary-aged aeolian sand plain (Q_ds) being the most prominent. This unit presents as a flat to low undulating or hummocky fossil sand plain, with red-brown to brown humic, clayey, and silty to fine-grained sand, with silty clay at depth. The sand plain contains abundant regolithic and pedogenic carbonate, indicating significant modification through pedogenesis over time. Two older units exist in the area surrounding the quarry, the oldest being claypan and lacustrine deposits (Q_l), consisting of friable to plastic, finely laminated grey clay, silty clay, and humic clay. These deposits also include localized medium to fine-grained sand, due to periodic shifts in depositional energy within a lacustrine environment. Adjacent to this unit is the source-bordering dunes (Q_dds), composed of red-brown to light-brown, poorly sorted to bimodal, very fine to medium-grained feldspathic quartz sand.

The two younger units within the sequence include the alluvial channel deposits (Q_acm), which are composed of unconsolidated grey humic, clayey, very fine-grained sand, typically overlain by light brown clayey silt. Additionally, the alluvial floodplain deposits (CZ_af), the only Cenozoic-aged unit, are widespread across the region and consist of silt, very fine to medium-grained lithic to quartz-rich sand, and clay. These young sedimentary units represent a varied depositional history influenced by both aeolian and fluvial processes. See Plate 2 for a geological map.

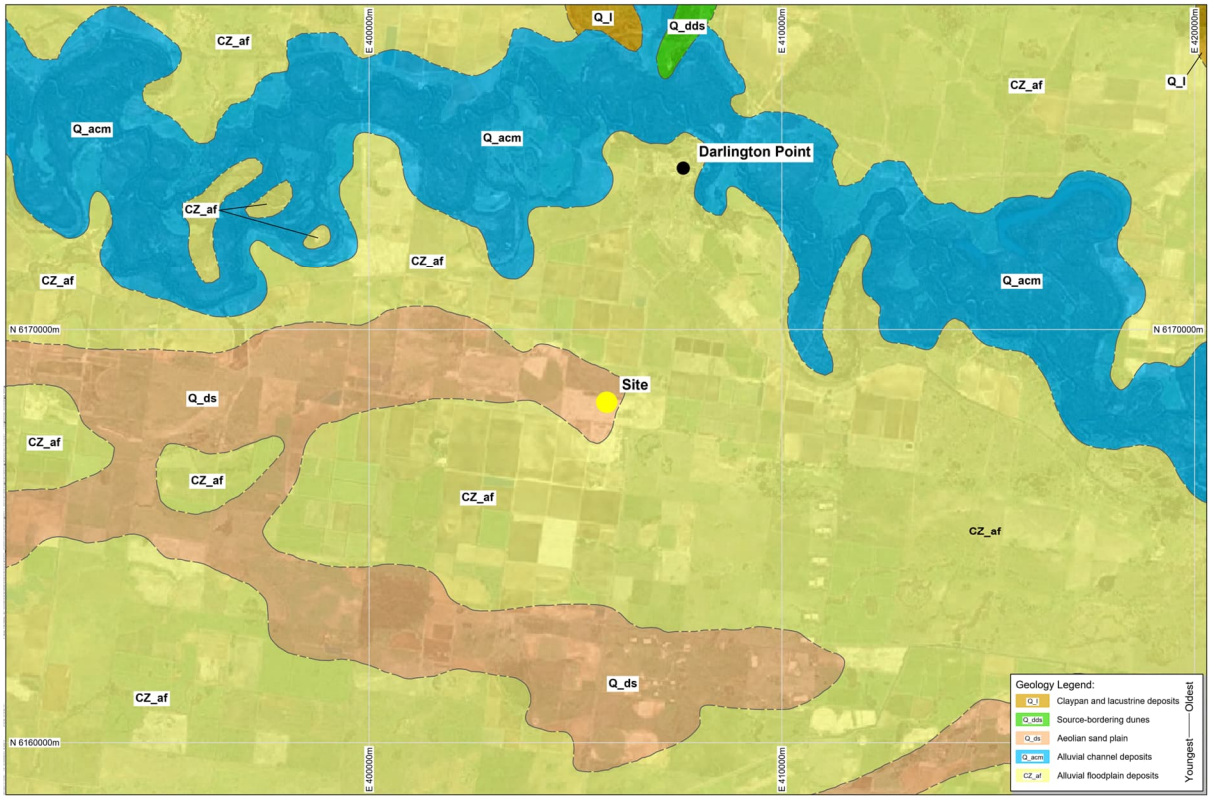


Plate 2: Regional Geology surrounding the Darlington Point Quarry site

4 Geological Investigations

The resource estimate is based on photographs and observations. No drillhole data or laboratory testing results were provided.

4.1 Local Geology

The local geological profile is defined as sand deposit beneath 1 m of topsoil. The depth of sand and particle size grading is unknown.

4.2 Petrographic Analysis

A sand sample from Darlington Point (M23-1019A) was submitted by E B Mawsons and Sons Pty Ltd for petrographic analysis, conducted by Geochempet Services. The analysis was performed to assess the sample's suitability for use in concrete and asphalt. The sample was a medium to coarse quartzofeldspathic and lithic sand and was found to consist primarily of quartz and feldspar grains alongside various lithic clasts. The grains were subangular to sub-rounded, and a crude dry sieving test revealed that the majority of the sample comprised medium-sized particles (67.1%), with a smaller proportion of coarse (25.5%) and fine (6.5%) material. Minor amounts of silt and clay were detected. Microscopically, quartz was the dominant mineral, accounting for 69% of the sample, with various degrees of strain observed in the grains. The Petrographic Inspection Report can be found in Attachment 1.

A summary of the report, with an associated microphotograph, is provided below (Error! Reference source not found.).

Plate 3: A damp subsample of sand (Geochempet)

In thin section analysis, the quartz content included unstrained to highly strained grains, while lithic clasts were composed of quartzite, chert, granitic rock, and volcanic materials. Feldspar was present at 6%, with muscovite and minor free minerals such as zircon and epidote also identified. The presence of sericitized and ferruginous clasts (5%) suggests some alteration within the sample.

Overall, the sample was deemed strong and durable, though the potential for slow alkali-silica reactivity was noted. This risk can be mitigated through proper concrete mix design and engineering precautions. The sand is also predicted to be suitable for use in asphalt, subject to further testing for bitumen stripping and polishing.

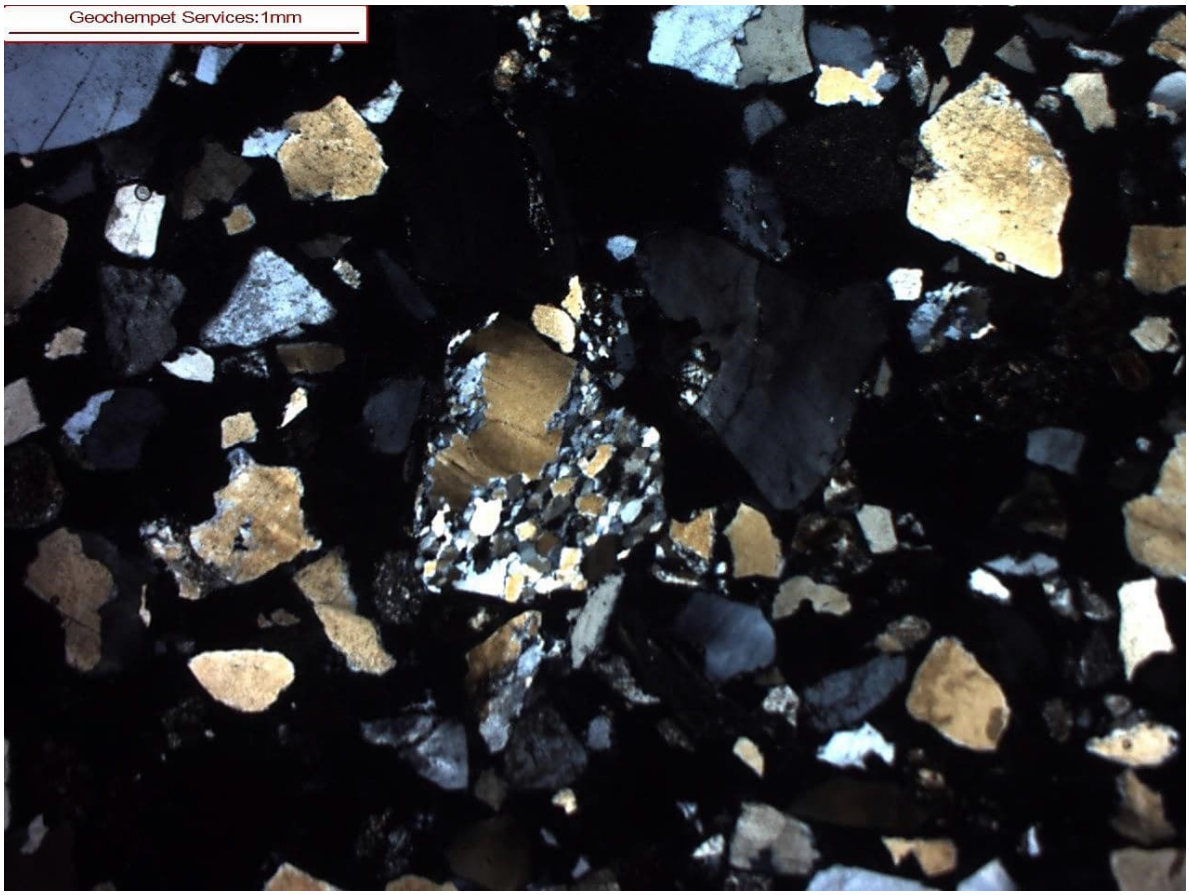


Plate 4: Micrograph taken at low magnification in transmitted cross polarised light of a granite fragment

4.3 Sand Sizing

A crude, dry sieving test of the petrographic sample provides an indication of sand particle size distribution. This is by no way a true and representative sample of the resource. A summary of the grading is presented in the Table 1. And shown in Error! Reference source not found..

Table 1 – Material Test Results

Sand Sample	Wt % of sample
Coarse (>1.18 mm)	25.5 %
Medium (>0.3 to <1.18 mm)	67.1 %
Fine (>0.075 to <0.3 mm)	6.5 %
Silt (<0.075 mm)	0.9 %

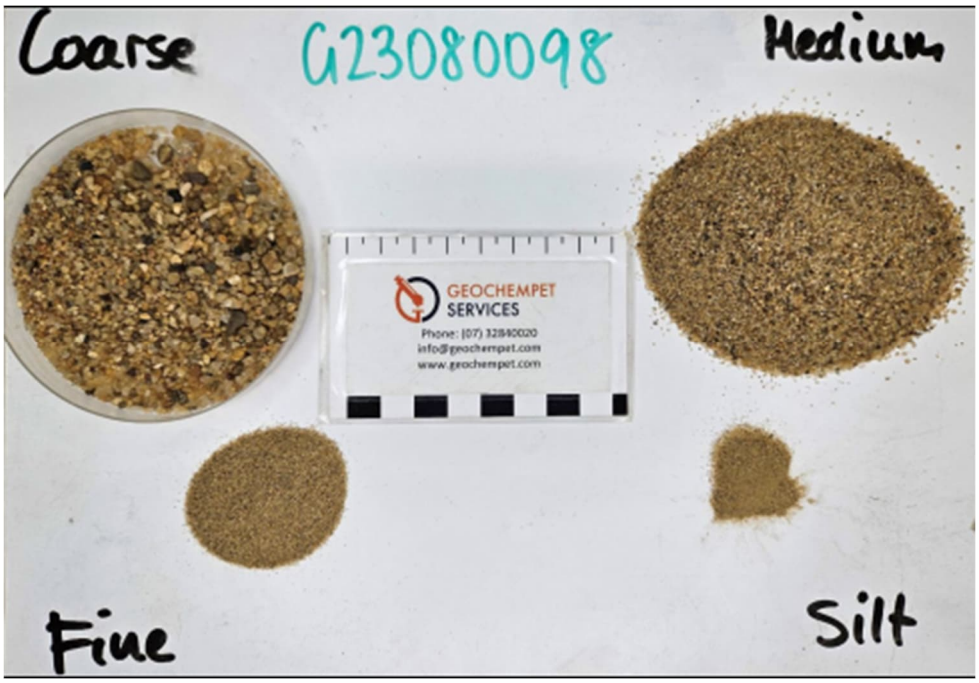


Plate 5: Seive fractions as recorded above (Geochempet)

4.4 Sand Quality

Sand quality may be defined by particle size distribution and slit/clay content. Particle size definitions are displayed in Table .

Table 2 – Particle Size Definitions

Components	Subdivision	Size (mm)
Boulders		>200
Cobbles		63 - 200
Gravel	Coarse	19 - 63
	Medium	6.7 - 19
	Fine	2.36 - 6.7
Sand	Coarse	0.6 – 2.36
	Medium	0.21 – 0.6
	Fine	0.075 – 0.21
Silt		0.002 – 0.075
Clay		<0.002

5 Quarry Design

5.1 Pit Design

A conceptual pit design was created using the following criteria:

- Single bench of 10m
- Batter slope of 1V in 3H

The current and proposed depth of extraction is approximately 10 meters below the surrounding topography. The surrounding topography is approximately 124m AHD and the proposed pit floor is approximately 114m AHD.

Plate 5: Pit Crests (plan view)

Plate 6: Proposed Quarry Design (plan view)

Plate 7: Proposed Quarry Design (rotated view)

5.2 Volume Estimates

The volumes of sand within the pit designs are shown in Table 2.

Table 2 – Insitu Resource Estimate

	Proposed Quarry Footprint	
Material	Volume (m^3)	Tonnes[1] (t)
Overburden	564,000	902,000
Sand	4,882,000	7,812,000
Total	5,446,000	8,714,000

1: Bulk density of 1.60 t/m^3 has been assigned.
2: Estimates rounded to nearest 1,000

6 Summary

The Darlington Point Quarry consists of a clean, rounded to sub-rounded quartz and feldspar particles medium to coarse in size distribution. Further testing to support the processed sand is suitable for concrete sand and use in asphalt.

The pit designs are limited to a single bench of 10 metres in depth aligned to the existing depth of excavation. The quarry pit terminal design has wall angles of 1V in 3H slopes.

The quarry resource has been classified as Inferred Resource.

Table 3 – Inferred Sand Resource

	Inferred Resource (Proposed Quarry Footprint)	
Pit	Volume (m^3)	Tonnes[1] (t)
Total	4,882,000	7,812,000

7 Important Information

Your attention is drawn to the document – 'Important Information about your Report'. The statements presented in this document are intended to advise you of what your realistic expectations of this report should be and to present you with recommendations on how to minimise the risks associated with the geotechnical criteria for this project. The document is not intended to reduce the level of responsibility accepted by Groundwork Plus, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing. We would be pleased to answer any questions about this important information from the reader of this report. Further information is presented in Attachment 2.

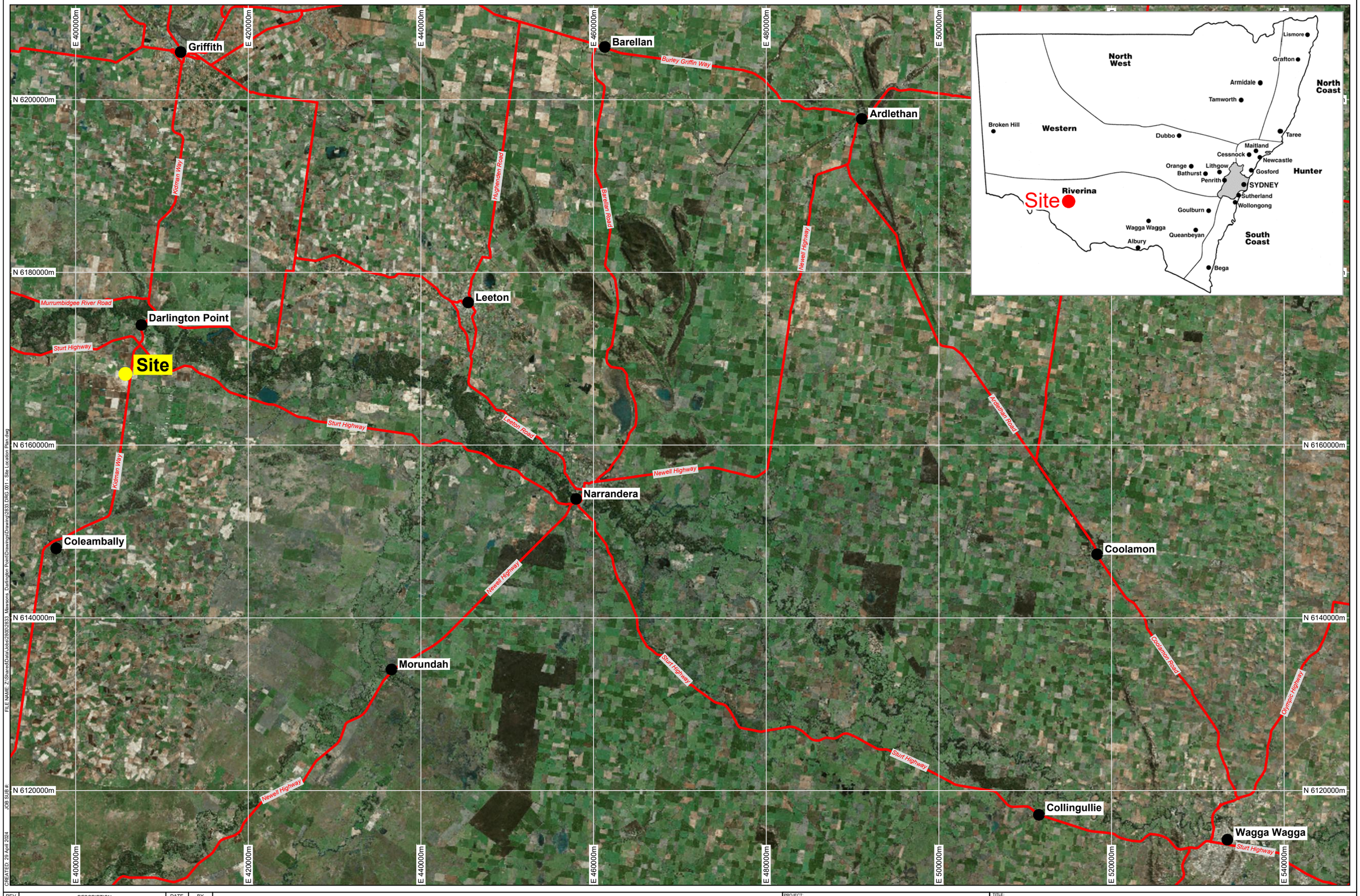
8 References

Murrumbidgee Council, 2021. Modification of Development Approval DA 07-2-18/19

Planningmatters Development Services, 2021, Statement of Environmental Effects (Amended), Proposed sandpit on Lot 175 DP750908, The Kidman Way, Darlington Point, NSW

Geochempet Services, 2023, Petrographic Report on a Sand Sample (M23-1019A)

DRAWINGS



FILE NAME: Z:\Shared\Data\Jobs\2800\2833 Mawsons Darlington Point\Drawings\Drawing\2833.DRG.001 - Site Location Plan.dwg
JOB SUB #
CREATED: 29 April 2024

REV	DESCRIPTION	DATE	BY

Data Sources:
Photography: Digital Globe
Topography:
Cadastre:
Ecosystem:
Other:

Legend:
- Project Site
- Population Centre
- State Controlled Roads

PROJECT: Darlington Point Quarry

CLIENT: Mawsons

TITLE: Site Location Plan

GROUNDWORK PART OF SLR
PH: +61 7 3871 0411
WWW.GROUNDWORK.COM.AU

SCALE: 1:400,000 When Printed On A3 — 0 — 8km
DRAWING NUMBER: 2833.DRG.001
REVISION:
DATE: 29 April 2024 DRAWN: MR
PRINTED: 29 April 2024 CHECKED: JL
DATUM: HORIZONTAL / VERTICAL / ZONE
GDA94 / MGA / AHD / 55

FILE NAME: Z:\Shared\Data\Jobs\2800\2833 Mawsons Darlington Point\Drawings\Drawing\2833.DRG.003 - Existing Site Layout Plan.dwg
JOB SUB #
CREATED: 3 June 2024

REV	DESCRIPTION	DATE	BY

Data Sources:
Photography: Digital Globe
Topography: 2010 SRTM Level2 1s DEM_Smoothed_Geoscience Australia
Cadastre:
Ecosystem:
Other:

Legend:
- Site Boundary (Area =117.88 ha)
- Cadastral Boundary
- Easement Boundary
- Disturbance (Area = 15.20 ha)

PROJECT: Darlington Point Quarry

CLIENT: Mawsons

TITLE: Existing Site Layout Plan

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SCALE: 1:6,000 When Printed On A3 — 0 — 120m
DRAWING NUMBER: 2833.DRG.003
REVISION:
DATE: 10 June 2024 DRAWN: MR
PRINTED: 10 June 2024 CHECKED: JL
DATUM: HORIZONTAL / VERTICAL / ZONE: GDA94 / MGA / AHD / 55

FILE NAME: Z:\Shared\Data\Jobs\29\02833 Mawsons Darlington Point\Drawings\Drawing\2833.DRG.004 - Approved Site Layout Plan.dwg
JOB SUB #:
CREATED: 10 June 2024

REV	DESCRIPTION	DATE	BY

Data Sources:
Photography: Digital Globe
Topography: 2010 SRTM Level2 1s DEM_Smoothed_Geoscience Australia
Cadastre:
Ecosystem:
Other:

Legend:
- Site Boundary (Area = 117.88 ha)
- Cadastral Boundary
- Easement Boundary
- Approved Extraction (Area = 2.0 ha)
- Buffer (Area = 43.91 ha)

PROJECT: Darlington Point Quarry

CLIENT: Mawsons

TITLE: Approved Site Layout Plan

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SCALE: 1:6,000 When Printed On A3 — 0 — 120m
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REVISION:
DATE: 10 June 2024 | DRAWN: MR
PRINTED: 10 June 2024 | CHECKED: JL
DATUM: HORIZONTAL / VERTICAL / ZONE
GDA94 / MGA / AHD / 55

FILE NAME: Z:\Shared\Data\Jobs\2807\2833 Mawsons Darlington Point\Drawings\Drawing\2833.DRG.006 - Conceptual Site Layout Plan.dwg
JOB SUB #
CREATED: 13 September 2024

REV	DESCRIPTION	DATE	BY

Data Sources:
Photography: Digital Globe
Topography: 2010 SRTM Level2 1s DEM_Smoothed_Geoscience Australia
Cadastre:
Ecosystem:
Other:

Legend:
- Site Boundary (Area = 117.88 ha)
- Cadastral Boundary
- Access Road
- Proposed Quarry Footprint (Area = 70.95 ha)
- Buffer (Area = 46.94 ha)

Note:
- Proposed Extraction Depth of 114m AHD
- Maximum area of disturbance at any one time is 40ha

PROJECT: Darlington Point Quarry

CLIENT: Mawsons

TITLE: Conceptual Site Layout Plan

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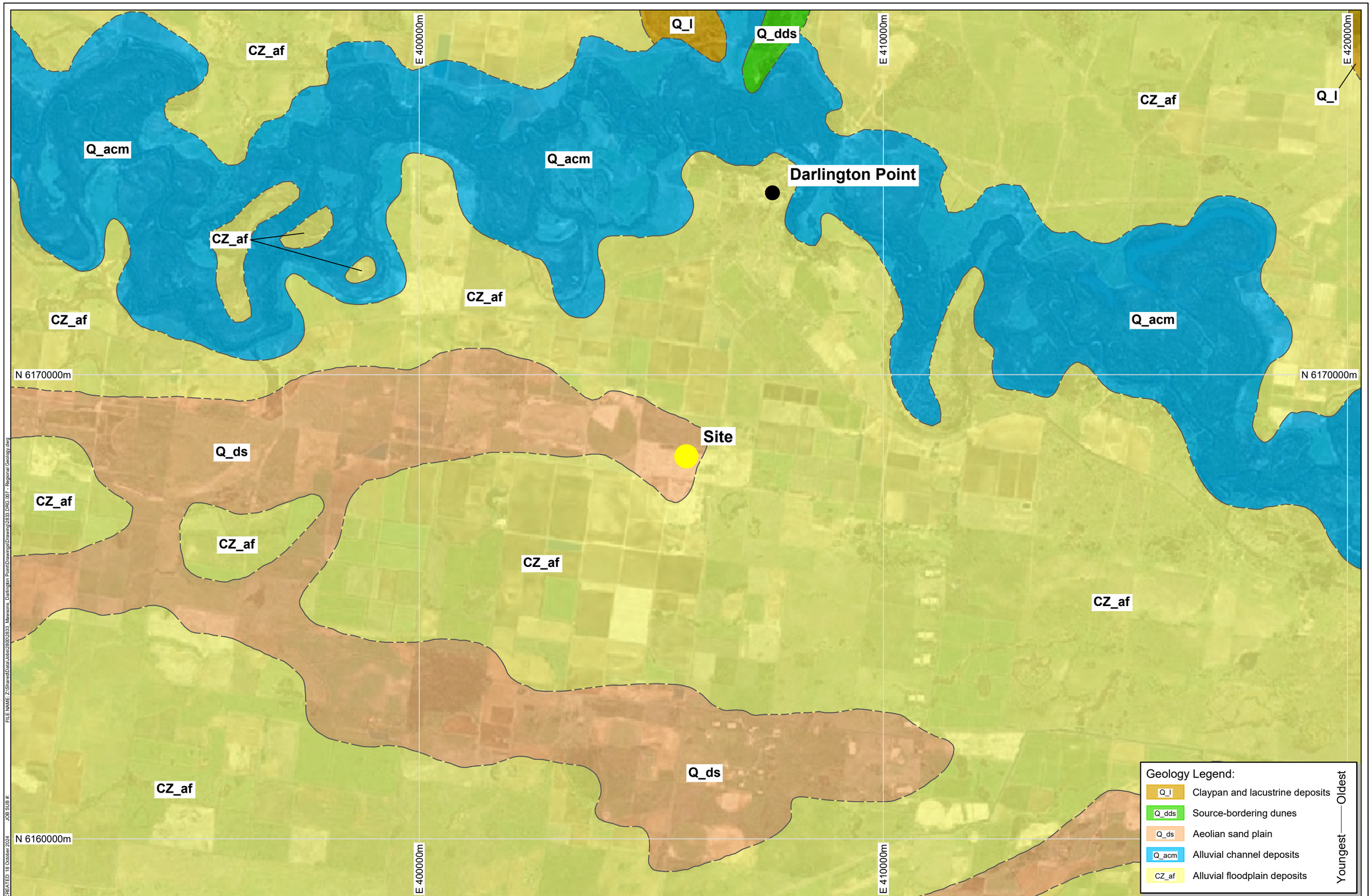
SCALE: 1:6,000 When Printed On A3 — 0 — 120m
DRAWING NUMBER: 2833.DRG.005
REVISION:
DATE: 13 September 2024
DRAWN: MR
PRINTED: 13 September 2024
CHECKED: JL
DATUM: HORIZONTAL / VERTICAL / ZONE
GDA94 / MGA / AHD / 55



FILE NAME: Z:\Shared\Data\Jobs\2800\2833_Mawsons_Darlington Point\Drawings\Drawing\2833.DRG.007 - Regional Geology.dwg
JOB SUB #
CREATED: 18 October 2024

REV	DESCRIPTION	DATE	BY

Data Sources:
Photography: Digital Globe
Topography:
Cadastre:
Ecosystem:
Other:

Legend:
- Project Site
- Population Centre

PROJECT: Darlington Point Quarry

CLIENT: Mawsons

TITLE: Regional Geology

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SCALE: 1:75,000 When Printed On A3 — 0 — 1500m
DRAWING NUMBER: 2833.DRG.007
REVISION:
DATE: 18 October 2024 DRAWN: NN
PRINTED: 18 October 2024 CHECKED: JL
DATUM: HORIZONTAL / VERTICAL / ZONE
GDA94 / MGA / AHD / 55

Resource Volumes

	Pit Design Inferred Resource	
Resource	Volume	Tonnes
Overburden	563,900	902,240
Sand	4,882,400	7,811,840
Grand Total	5,446,300	8,714,080

E 404500m
E 405000m
E 405500m
E 406000m
E 406500m
N 6168500m
N 6168000m
N 6167500m
Floor RL 114m
174 DP750908
175 DP750908
176 DP750908
2 DP1088274
33 DP750908
2 DP1009959
1 DP1009959
157 DP750908
Jim Cattanach Road
Kidman Way

FILE NAME: \\Egrynd0rive\Data\Jobs\28000\28333 Mawsons Darlington Point\Drawings\Drawing\2833.DRG.008 - Conceptual Pit Design.dwg
JOB SUB #
CREATED: 28 November 2024

REV	DESCRIPTION	DATE	BY

Data Sources:
Photography: Digital Globe
Topography: 2010 SRTM Level2 1s DEM_Smoothed_Geoscience Australia
Cadastre:
Ecosystem:
Other:

Legend:
- Site Boundary
- Cadastral Boundary
- Proposed Pit Extent

PROJECT: Darlington Point Quarry
CLIENT: Mawsons
TITLE: Pit Design

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SCALE: 1:6,000 When Printed On A3 (0 – 120m)
DRAWING NUMBER: 2833.DRG.008
REVISION:
DATE: 29 November 2024 DRAWN: GL
PRINTED: 29 November 2024 CHECKED: TH
DATUM: HORIZONTAL / VERTICAL / ZONE GDA94 / MGA / AHD / 55

ATTACHMENTS

Attachment 1

Petrographic Report

ABN 25 065 630 506
PETROGRAPHIC, GEOLOGICAL & GEOCHEMICAL CONSULTANTS

28 Cameron Street
Clontarf, QLD 4019

Telephone: (07) 3284 0020
Email: info@geochempet.com
www.geochempet.com

PETROGRAPHIC REPORT ON A SAND SAMPLE (M23-1019A) FROM DARLINGTON POINT FOR MILBRAE

Prepared for

E B MAWSONS AND SONS PTY LTD

Order Number: 175462

Invoice Number: G202310544

Client Ref: Ian Hamilton

Issued by

C. C. Angus
BSc, BA (Hons)
18 October 2023

Reviewed by

A.G. Christy
MA PhD FMinSoc
18 October 2023

Sample Number:	M23-1019A	**Date Sampled**:	16/08/2023
Geochempet ID:	G23080098	**Date Received**:	25/08/2023
Project Number:	124	**Work Request Number:**	1019
Material Source:	Darlington Point	**Lot Number:**	CS-118
Sample Type:	Coarse Sand - CSAND		

Work Requested: Petrographic analysis in relation to suitability for use as concrete sand and in asphalt; 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 – 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 Medium to coarse quartzofeldspathic and lithic sand

Description The sample consisted of moderate yellowish-brown sand composed primarily of quartz and feldspar grains and lithic clasts. Grains are dominantly sub-angular to sub-rounded.

Figure 1: A damp subsample of the supplied sample.

Size Fractions

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

Size	Wt % of sample
Coarse (>1.18 mm)	25.5%
Medium (>0.3 mm)	**67.1%**
Fine (>0.075 mm)	6.5%
Silt (<0.075 mm)	0.9%

The coarse fraction consists of mainly rounded to sub-rounded quartz and feldspar fragments, with some lithic clasts, averaging 1–2 mm.

When a subsample was swirled in a beaker of water, it generated a heavy, persistent, pale yellowish orange (Munsell Colour Chart 2009 10YR 8/6) turbidity, with some argillized scum at the surface. This suggests the presence of some minor silt and clays within the sample.

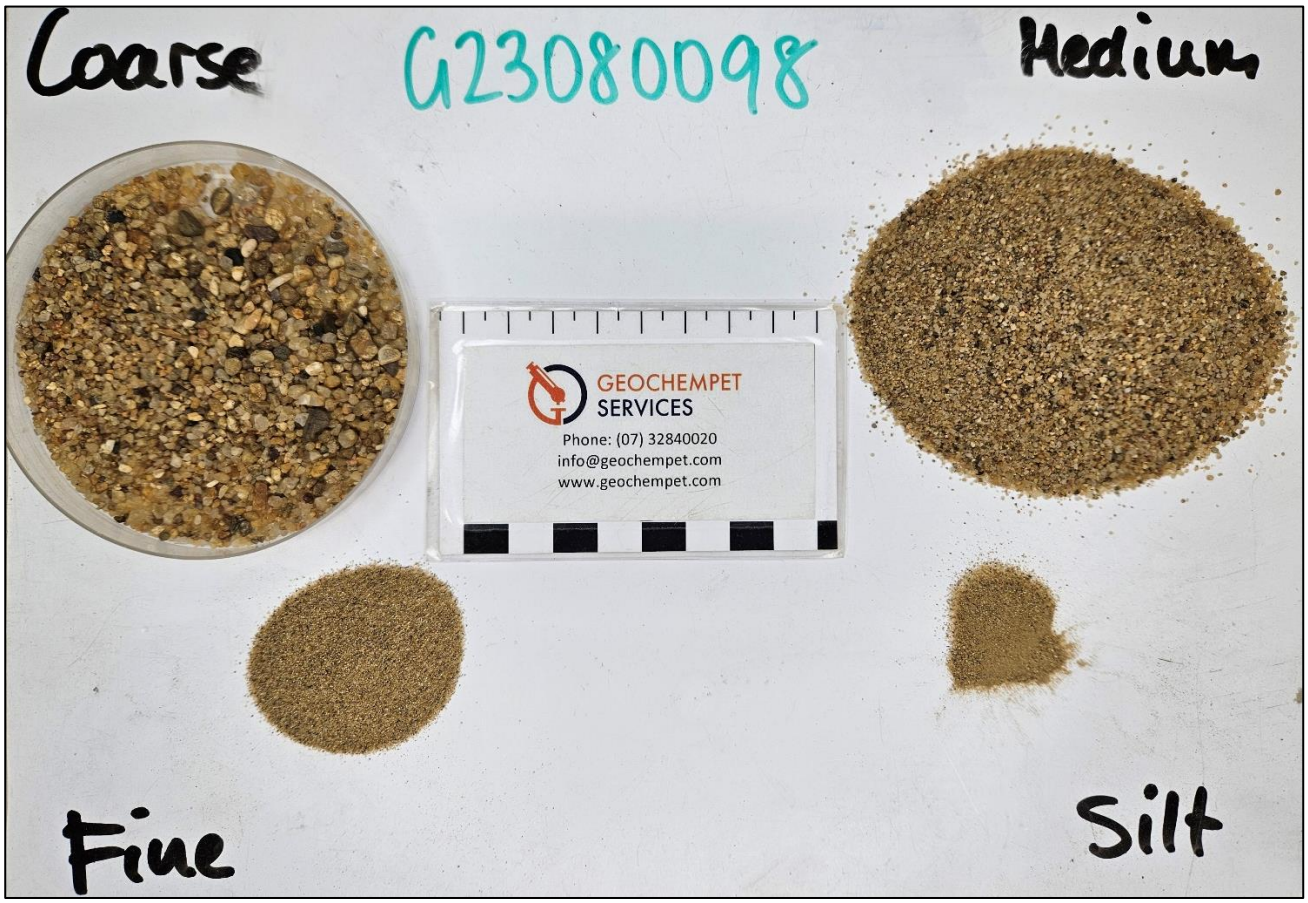

Figure 2: Sieved fractions as recorded above.

Figure 3: Coarse fraction as recorded above, composed mainly of quartz and lithic clasts.

Mineralogy

A thin section was prepared from a randomly selected subsample of the supplied sand to permit detailed, microscopic examination in transmitted, polarised light. An approximate composition, expressed in volume percent of clast types and based on a systematic count of 100 points falling within sectioned fragments, is:

23%	quartz as unstrained and mildly-strained free simple (21%) and composite grains (2%)
8%	quartz as moderately-strained free simple (7%) and composite grains (1%)
1%	quartz as highly strained grains
5%	vein quartz fragments (heavily strained)
19%	lithic clasts of quartzite (7% unstrained grains, 12% moderately strained grains)
5%	lithic clasts of chert (finely microcrystalline quartz)
6%	feldspar (5% alkali feldspar, 1% plagioclase)
1%	muscovite mica
<1%	other free mineral grains (opaque oxide, zircon, epidote)
10%	lithic clasts of granitic rock (5% quartz of which 2% is highly strained)
9%	lithic clasts of felsic volcanic rock (3% microcrystalline quartz)
3%	lithic clasts of pelite
3%	lithic clasts of intermediate volcanic rock
1%	lithic clasts of greywacke
1%	lithic clast of epidosite
4%	ferruginous clasts
1%	sericitized clasts

Thin Section Description

A simultaneous count of free silica content yielded **69%**, with 32% as free simple or composite grains, 24% locked within lithic clasts of quartzite, and granite, 5% present as fragments of vein quartz, and 8% finely microcrystalline quartz locked within lithic clasts of chert and felsic volcanics.

Microscopically, the most common grains are free quartz (32%), occurring in a variety of forms and degrees of strain, from unstrained to mildly strained simple or composite grains (23%) to moderately strained (8%), and highly strained (1%). Moderately strained quartz also occurs in quartzite (12%) and highly strained grains are present in granite lithic clasts (2%). Heavily strained quartz occurs in fragments of vein quartz (5%), with lithic clasts of finely microcrystalline chert (5%) and microcrystalline quartz in felsic volcanic rocks (3%) also observed.

Free grains of variably weathered feldspars comprise 6% of the sample (5% alkali feldspar, 1% plagioclase). Feldspars are variably sericitized and argillized. Muscovite was observed as a free mineral (1%) in the sample. Other very minor robust free minerals observed include opaque oxide, zircon, and epidote.

Lithic clasts of granitic rock amount to 10% of the sample, consisting of quartz (5%), alkali feldspar, plagioclase, micas and trace opaque oxides. Some granitic clasts display partial to complete sericitic and argillic alteration of component feldspars. Other lithic clasts include felsic volcanic rock (9%), and pelite (3%), intermediate volcanic rock (3%), greywacke (1%), epidosite (1%).

Iron oxide-stained ferruginous lithic clasts were observed throughout the sample and account for 4%. Rounded, fully sericitized clasts (1%) are observed and are likely highly altered remnant feldspars and lithic clasts.

Comments and Interpretations

The supplied sample (labelled M23-1019A) of coarse sand may be described broadly for engineering purposes as **medium to coarse quartzofeldspathic and lithic sand**. The sand consists of worn, essentially hard, strong, and durable, mineral and rock fragments, but contains about 5% sericitized/ferruginous clay fragments and 1% free mica flakes.

The **free silica content** (or **total quartz content**) of the sand is **69%**, with 32% as free simple or composite grains, 24% locked within lithic clasts of quartzite, and granite, 5% present as fragments of vein quartz, and 8% finely microcrystalline quartz locked within lithic clasts of chert and acid volcanics.

The sand possesses 20% moderately stained quartz, 8% heavily strained quartz and vein quartz fragments, and 8% finely microcrystalline quartz; therefore, the sample is predicted to **have potential for mild or slow alkali-silica reactivity in concrete.**

In short, rock of the type represented by the supplied sample is predicted to **suitable for use as a source of concrete sand**, provided that appropriate precautions are taken in concrete mix and engineering design to take account of its perceived **potential for deleterious alkali-silica reactivity**.

It is also predicted to be **suitable for use as asphalt** (subject to bitumen stripping and polishing tests).

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 of this sample is approximately 69%.

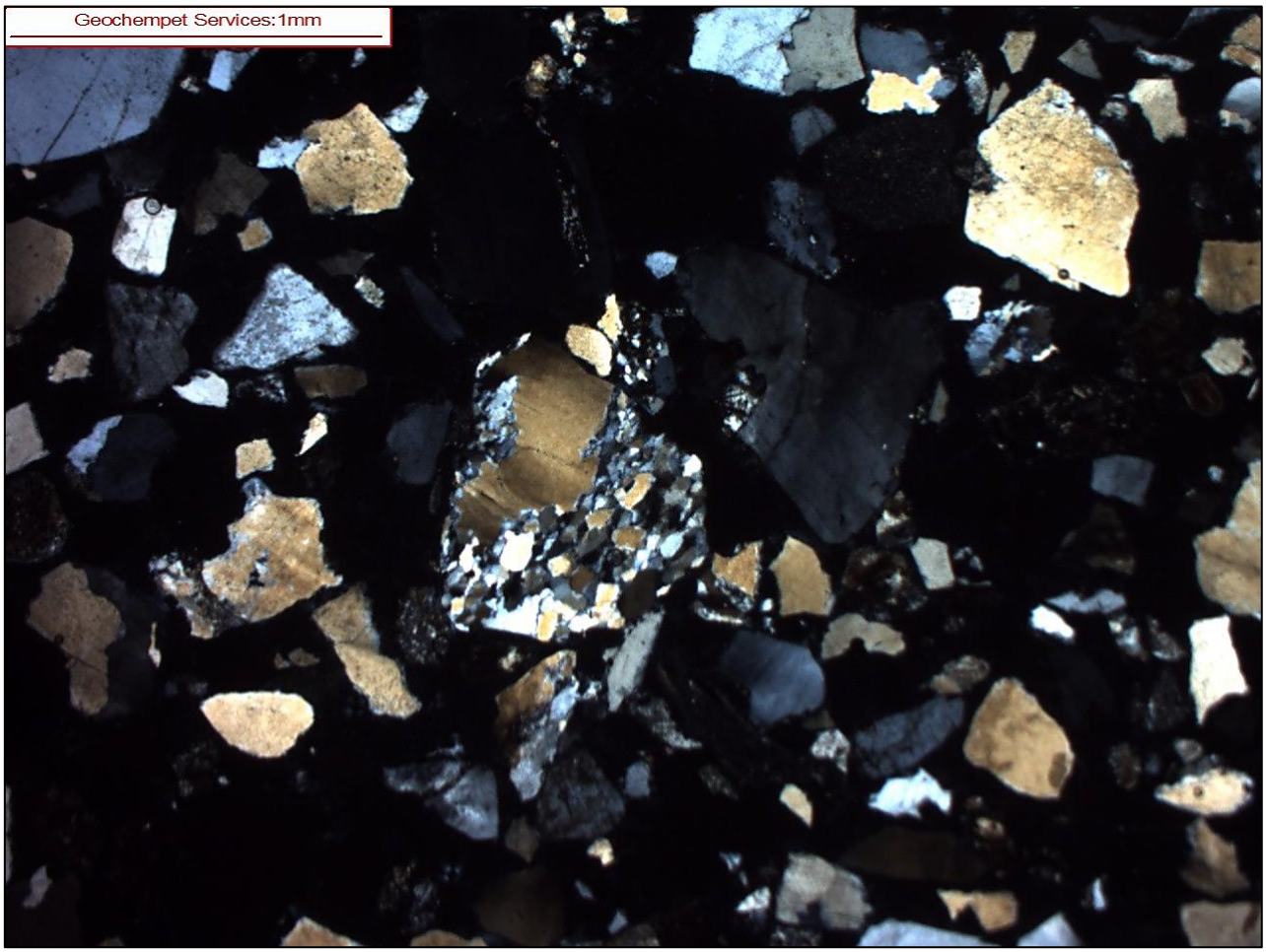

Figure 4: Micrograph of sample taken at low magnification (2× objective) in transmitted, cross-polarized light. The image shows the representative mineralogy, dominated by grains subrounded to angular quartz with various strain, and feldspar, and lithic clasts.

Attachment 2

Important Information About Your Report

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL REPORT

These notes have been collated by Groundwork Plus. They are designed to help you in the interpretation of your Report.

Geological studies are commissioned to gain information about environmental conditions on and beneath the surface of a site. The more comprehensive the study, the more reliable the assessment is likely to be, but remember, any such assessment is to a greater or lesser extent based on professional opinions about conditions that cannot be seen or tested. Accordingly, no matter how much data is accumulated, risks created by unanticipated conditions will always remain. Work with your geological consultant to manage known and unknown risks. Part of that process should already have been accomplished, through the risk allocation provisions you and your geological professional discussed and included in your contract's general terms and conditions. This document is intended to explain some of the concepts that may be included in your agreement and to pass along information and suggestions to help you manage your risk.

Beware Of Change; Keep Your Geological Professional Advised

The design of a geological study considers a variety of factors that are subject to change. Changes can undermine the applicability of a reports findings, conclusions, and recommendations. Advise your geological professional about any changes as you become aware of them. Geological professionals cannot accept responsibility or liability for problems that occur because a report fails to consider conditions that did not exist when the study was designed. Ask your geological professional about the types of changes you should be particularly alert to. Some of the most common include:

- modification of the proposed development or ownership group;
- sale or other property transfer;
- replacement of or additions to the financing entity;
- amendment of existing regulations or introduction of new ones; or
- changes in the use or condition of adjacent property.

Should you become aware of any change, do not rely on an existing geological report. Advise your geological professional immediately; follow the professional's advice.

Prepare To Deal with Unanticipated Conditions

The findings, recommendations, and conclusions of a report typically are based on a review of historical information, interviews, a site 'walkover' and other forms of non-invasive research. When site subsurface conditions are not sampled in any way, the risk of unanticipated conditions is higher than it would otherwise be.

While borings, installation of monitoring wells, and similar invasive test methods can help reduce the risk of unanticipated conditions, do not overvalue the effectiveness of testing. Testing provides information about actual conditions only at the precise locations where samples are taken and only when they are taken. Your geological professional has applied that specific information to develop a general opinion about environmental conditions. Actual conditions in areas not sampled may differ (sometimes sharply) from those predicted in a report. For example, a site may contain an unregistered underground storage tank that shows no surface trace of its existence. Even conditions in areas that were tested can change, sometimes suddenly, due to any number of events, not the least of which include occurrences at adjacent sites. Recognize too, that even some conditions in tested areas may go undiscovered, because the tests or analytical methods used were designed to detect only those conditions assumed to exist.

Manage your risks by retaining your geological professional to work with you as the project proceeds. Establish a contingency fund or other means to enable your geological professional to respond rapidly, in order to limit the impact of unforeseen conditions. To help prevent any misunderstanding, identify those empowered to authorize changes and the administrative procedures that should be followed.

Do Not Permit Any Other Party to Rely On The Report

Geological professionals design their studies and prepare their reports to meet the specific needs of the clients who retain them, in light of the risk management methods that the client and geological professionals agree to, and the statutory, regulatory, or other requirements that apply. The study designed for a developer may differ sharply from one designed for a lender, insurer, public agency or even another developer. Unless the report specifically states otherwise, it was developed for you and only you. Do not unilaterally permit any other party to rely on it. The report and the study underlying it may not be adequate for another party's needs and you could be held liable, for shortcomings your geological professional was powerless to prevent or anticipate. Inform your geological professional when you know or expect that someone else - a third-party will want to use or rely on the report. Do not permit third-party use or reliance until you first confer with the Geological professional who prepared the report. Additional testing, analysis, or study may be required and in any event, appropriate terms and conditions should be agreed to so both you and your geological professional are protected from third-party risks. Any party who relies on a geological report without the express written permission of the professional who prepared it and the client for whom it was prepared may be solely liable for any problems that arise.

Avoid Misinterpretation of the Report

Design professionals and other parties may want to rely on the report in developing plans and specifications. They need to be advised, in writing, that their needs may not have been considered when the study's scope was developed and even if their needs were considered, they might misinterpret geological findings, conclusions, and recommendations. Commission your geological professional to explain pertinent elements of the report to others who are permitted to rely on it and to review any plans, specifications or other instruments of professional service that incorporate any of the report's findings, conclusions, or recommendations. Your geological professional has the best understanding of the issues involved, including the fundamental assumptions that determined the study's scope.

Give Contractors Access to the Report

Reduce the risk of delays, claims, and disputes by giving contractors access to the full report, providing that it is accompanied by a letter of transmittal that can protect you by making it unquestionably clear that: I) the study was not conducted and the report was not prepared for purposes of bid development and 2) the findings, conclusions and recommendations included in the report are based on a variety of opinions, inferences, and assumptions and are subject to interpretation. Use the letter to also advise contractors to consult with your geological professional to obtain clarifications, interpretations, and guidance (a fee may be required for this service) and that-in any event, they should conduct additional studies to obtain the specific type and extent of information each prefers for preparing a bid or cost estimate. Providing access to the full report, with the appropriate caveats, helps prevent formation of adversarial attitudes and claims of concealed or differing conditions. If a contractor elects to ignore the warnings and advice in the letter of transmittal, it would do so at its own risk. Your geological professional should be able to help you prepare an effective letter.

Do Not Separate Documentation from the Report

Geological reports often include supplementary documentation, such as maps and copies of regulatory files, permits, registrations, citations, and correspondence with regulatory agencies. If subsurface explorations were performed, the report may contain final boring logs and copies of laboratory data. If remediation activities occurred on site, the report may include; copies of daily field reports, waste manifests and information about the disturbance of subsurface materials, the type and thickness of any fill placed on site and fill placement practices, among other types of documentation. Do not separate supplementary documentation from the report. Do not permit any other party to redraw or modify any of the supplementary documentation for incorporation into other professionals' instruments of service.

Realize That Recommendations May Not Be Final

The technical recommendations included in a geological report are based on assumptions about actual conditions and so are preliminary or tentative. Final recommendations can be prepared only by observing actual conditions as they are exposed. For that reason, you should retain your geological professional to observe construction and/or remediation activities on site, to permit rapid response to unanticipated conditions. The geological professional who prepared the report cannot assume responsibility or liability for the report's recommendations if that professional is not retained to observe relevant site operations.

Understand That Geotechnical Issues Have Not Been Addressed

Unless geotechnical engineering was specifically included in the scope of professional service, a report is not likely to relate any findings, conclusions, or recommendations about the suitability of subsurface materials for construction purposes, especially when site remediation has been accomplished through the removal, replacement, encapsulation, or chemical treatment of on- site soils. The equipment, techniques, and testing used by geotechnical engineers differ markedly from those used by Geological professionals; their education, training, and experience are also significantly different. If you plan to build on the subject site, but have not yet had a geotechnical engineering study conducted, your Geological professional should be able to provide guidance about the next steps you should take. The same firm may provide the services you need.

Read Responsibility Provisions Closely

Geological studies cannot be exact; they are based on professional judgement and opinion. Nonetheless, some clients, contractors, and others assume geological reports are, or certainly should be, unerringly precise. Such assumptions have created unrealistic expectations that have led to wholly unwarranted claims and disputes. To help prevent such problems, geological professionals have developed a number of report provisions and contract terms that explain who is responsible for what and how risks are to be allocated. Some people mistake these for 'exculpatory clauses', that is, provisions whose purpose is to transfer one party's rightful responsibilities and liabilities to someone else. Read the responsibility provisions included in a report and in the contract you and your Geological professional agreed to.