DEPARTMENT OF MINES
SOUTH AUSTRALIA

RECONNAISSANCE FOR ROAD METAL

Hundreds of Moorooroo and Muriootpa, County Light

- District Council of Tanunda -

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PLANS

Plan No.	Title	Scale
69-998	Geological Plan: Potential Sources of Road Metal. Portions of Hundreds of Moorooroo and Muriootpa. County Light (Tanunda District Council).	1" = 60 chains

Rept.Bk.No. 70/1
G.S. No. 4389
DM. 1007/69

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ABSTRACT

Two main areas have been outlined as likely sources of rock which the Council could exploit for use as road base material.

High quality marble occurs in the area to the north of the Penrice quarries near Angaston.

Quartzite could be obtained from many localities to the northwest of Tanunda. These are closer to Tanunda but are of lower quality than the marble.

Other deposits of various rock types have been located but are less desirable than these in the two main areas because of quality, size of deposits or access.

INTRODUCTION

During the past year the District Council of Tanunda has experienced increasing difficulty in obtaining suitable material for use as base-course under sealed roads. The Department of Mines was approached for assistance in a letter dated 18th August 1969. Mr. M.N. Hiern, Senior Geologist and the author, spent a day inspecting possible sources of material with the District Council Overseer on 22nd September, 1969. Following this, the author continued the survey from 6th to 10th October, 1969.

REQUIREMENTS

At present material is being obtained from I.C.I. Australia Ltd. at

Angaston, where surplus crusher run product from the marble quarry is available. However the District Council is not always able to obtain sufficient material from this source, with consequent disruption of road-making programmes.

Since most of the crushed rock is being used within Tanunda, the source is required as near as possible to the town to keep transport costs to a minimum. The material must meet standards set by the Highways and Local Government Department for 1½-inch crusher run. The main restrictions imposed by these standards are a fairly high resistance to abrasion, and a specified distribution of particle sizes in the crushed material.

The rock should be such that it can be quarried as easily as possible with a minimum of blasting.

Crushing plants are available in Tanunda, and the author has been informed that there will be no difficulty in getting the rock crushed once suitable supplies are located.

GEOLOGY

General

The basement rocks in the area of investigation consist of sandstones, siltstones, shales, greywackes and limestones which were laid down in an extensive trough during the Late Proterozoic and Early Palaeozoic Eras.
After deposition of these sediments, uplift, folding and faulting took place, accompanied by minor intrusions of acidic and basic igneous rocks. As a result of folding, the dominant structural features in the area are elongate north-south trending anticlinal and synclinal folds. Locally, however the fold patterns are very complex because several phases of folding took place during the Early Palaeozoic orogeny, and minor contortions have been superimposed on the major structures. These fold patterns determined the original shape of the Barossa Valley.

The folded rocks were subjected to subaerial erosion, and later, during the Tertiary period gravels and sands were deposited on the eroded surface.

Subsequent faulting has uplifted large blocks of basement rock, and shaped the valley as it is today. Much of the Tertiary sand and gravel has been eroded, but large deposits can still be seen near the western margin of the valley, and small ferruginised remnants occur in elevated positions in the hills on either side.

Within the valley itself there is an extensive cover of relatively young, unconsolidated fine-grained alluvium.

Stratigraphy

The following geological sequence has been adapted from the unpublished Adelaide 1:250,000 map sheet. The distribution of these units is shown on the accompanying plan.

QUATERNARY: Recent alluvial clays, silts and gravels. Pleistocene Peeraka Formation of red-brown sandy clay.

TERTIARY: Quartz sands, pebbly conglomerate and sandy clay.

PALAEOZOIC (Upper Cambrian to Lower Ordovician

(Albitised granitic intrusives, small dolerite dykes and white

(and pink meta-arkose grading to granite gneiss.

(Kanmantoo Group: grey and grey-green siltstones, greywackes

(and arkose.

(Hawker Group Equivalent

(Heathordale Shale equivalent

(Angaston Marble: white, blue and pink marble.

PROTEROZOIC (Wilpena Group: Ulupa Siltstone.

(Umberatana Group: Predominantly laminated grey and green

(siltstones with some sandstone and arkose interbeds.

PROTEROZOIC contd.. (Burra Group: Laminated grey and green siltstones with some
(thin dolomite interbeds.

This subdivision is used as a basis for considering the availability of rock materials in the council area. Geological features of each unit relating to construction materials are discussed below.

Upper Cambrian to Lower Ordovician

The meta-arkose will provide suitable material for base course since it is a hard, recrystallised rock consisting predominantly of quartz and feldspar. Lesser amounts of biotite occur as orientated flakes which give the rock a prominent foliation (e.g. locality 11).

Kanmantoo Group

The rocks are predominantly metamorphosed siltstones and greywacke which now appear as laminated, micaceous quartzo-feldspathic schists. Throughout much of the sequence they are soft, friable and quite variable in lithology. There are some bands of relatively hard, micaceous quartzo-feldspathic rock which might be suitable (e.g. locality 10). A thin marble band and associated calc-silicate rock at locality 5 may provide suitable material.

Hawker Group Equivalent

The Angaston Marble Formation being mined by I.C.I. Australia Limited at Penrice is the council's present source of road-making material. This is a high grade, pink, blue and white marble, and suitable material may be derived from this formation at other localities (e.g. localities 1, 2 and 6).

Umberatana Group

In the area under investigation these rocks consist predominantly of

siltstones and shales. Feldspathic quartzite interbeds at the base of the Appila Tillite outcrop within two miles of Tanunda, and these may prove to be of suitable quality. (Localities 3, 4, 7, 8 and 9).

Burra Group

Siltstones and dolomitic siltstones are the predominant rock types of the Burra Group in the vicinity of the Barossa Valley. The only likely source of material would be thin marble interbeds such as at locality 12.

POTENTIAL SOURCES OF SUPPLY

Deposits of potentially suitable rock are discussed below and the location of these sites is shown on the accompanying plan. The deposits are listed in order of preference in terms of physical properties, reserves and access. It is recommended that representative samples of rock from these localities be submitted to the Highways and Local Government Department for testing.

Localities:

Locality 1 - Hawkins' Quarry, Sections 362, 364 Hd. Moorooroo

A considerable quantity of high grade white marble has been extracted from a steeply dipping marble bed which is the northern extension of the the deposit at present being mined by I.C.I. Australia Limited at Penrice. Hawkins' quarry was closed two years ago and has not been worked since. The quarry is at the north end of a long north-south ridge along which marble outcrops extensively. Extension of the quarry southwards along the ridge should provide ample supplies of excellent material for many years. Although there is some jointing of the marble, primary and secondary blasting would be necessary.

Locality 2 - Sections 361, 362, Hd. Moorooroo

A ridge underlain by marble coincides with the boundary of Sections 361

and 362, Hd. Moorooroo, and forms the southern extension of the beds at locality 1. Several small charges have been exploded in the side of the ridge, and the marble exposed by them is of very good quality. A pit opened in Section 361 on the eastern side of the ridge would provide suitable material.

Locality 3 - Harnisch's Quarry Section 241, Hd. Muriootpa

A quarry approximately 20 feet deep has been developed in a feldspathic quartzite horizon within the Appila Tillite Formation in the Umberatana Group. The quarry is situated near the nose of a tight syncline where the rock is very strongly fractured and jointed. Because of this, the rock could be easily extracted by ripping with only a minimum of blasting.

The feldspar grains in the quartzite have been altered to white clay, and white clayey material also occurs in thin westerly-dipping interbeds which are common in the eastern wall of the quarry. It would be necessary to avoid these clayey bands when quarrying the rock for use as base course, but for use on unsealed roads the presence of clay would be an advantage.

Locality 4 - Quarry, Section 512, Hd, Muriootpa

A quarry has been dug into the northern end of a low southeasterly trending ridge of saccharoidal, feldspathic quartzite which occurs as an interbed in the Appila Tillite. The quartzite in this quarry has fewer interbeds of clayey material than in Harnisch's quarry at locality 3. It is also slightly less fractured and jointed, but much of the material could still be removed by ripping with only a minimum of blasting. Large quantities of material could be obtained by re-opening the quarry and extending it southeasterly along the strike of the quartzite ridge.

Locality 5 - Sections 675, 84, Hd. of Moorooroo

Within the Strangway Hill Formation at Vine Vale, there is a bed of marble which lenses out to the southeast. It strikes in a northwesterly direction and dips steeply to the north-east. The marble forms part of a low ridge along the road between sections 675 and 84, Hd Moorooroo.

The marble is course grained and ranges in colour from white to light blue and brown. It is bounded on the north-eastern margin by a relatively thin band of hard, massive, light green calc-silicate rock. Both rock types should be of sufficiently high quality for use as base course. The contact between the two is close to the northern boundary of the road and runs parallel to it.

The marble weathers to form a powdery white to light brown calcrete-like material, which has been extracted from several small pits on the north side of the road.

In order to establish the quality of stone and depth of overburden, a test pit should be opened on the south side of the ridge, approximately 20-30 feet inside the fence.

Locality 6 - Section 381, Hd. Meereeree

Approximately 50 yards to the north of the road crossing section 381, Hd. Meereeree a low hill occurs on which pink, white and brown marble outcrops extensively. The site is some distance from Tamanda. Testing should take the form of a costean sunk into the southwestern side of the hill. A steeply-dipping band of marble extends northwards from this site, and should provide reserves of suitable material.

Locality 7 - Section 512, Hd. Nuricotpa

In the northwestern corner of Section 512, Hd. Nuricotpa there is an exposure of feldspathic quartzite, which occurs as an interbed in the Appila Tillite. A test pit sunk into this rock should yield material similar to that at localities 3 and 4.

Locality 8 - Quarry, Section 113, Hd. Nuricotpa

A small, narrow quarry has been dug into a low ridge on the north side of the road a quarter of a mile east of Marananga and exposes feldspathic quartzite representing an interbed in the Appila Tillite. Suitable material could be obtained from here and from the small pits in the same material 200 yards south of the road.

Locality 9 - Road cutting, Section 163, Hd. Nuriootpa

If the quartzite is traced northwards along strike from locality 10, it is observed in a road cutting approximately 1 mile north of Marananga. Here the quartzite is saccharoidal and feldspathic as in other localities northwest of Tanunda, but appears to be slightly less jointed. Test pits sunk in the low ridge on the eastern side of the road should expose suitable material.

Locality 10 - Quarry, Section 81, Hd. Moorooroo

Much of the area to be the southeast of Vine Vale is underlain by laminated, micaceous quartzo-feldspathic schists. Many of these are too soft and friable for crushing, but there are some harder horizons, one of which is exposed in this quarry.

The bedding strikes approximately north-south and dips 30 degrees to the east. Extraction would be facilitated by two prominent joint sets which dip steeply westwards and strike at approximately 055 and 015 degrees respectively.

The quarry is the nearest source of this type of material, and samples should be submitted to the Highways and Local Government Department for testing.

Locality 11 - Bethany Quarry, Sections 80, 82, 905, Hd. Moorooroo

This quarry was opened in granite gneiss with the intention of working northwards into the hill to extract dolerite for use as road-making material. However, the quarry was declared unsafe and closed before the dolerite was reached. Since granite gneiss is a common rock type in the area, it would be worthwhile having samples from this locality tested. If it is found suitable, ample supplies could be obtained by opening a pit in the side of the hill to the south of the creek in Section 905, Hd. Moorooroo.

Locality 12 - Sections 643, 758, Hd. Moorooroo

A 60 to 80ft. wide band of white and brownish-white marble outcrops on the north side of a ridge running parallel to the boundary fence between Sections 643 and 758, Hd. Moorooroo. The marble is a steeply-dipping interbed within the Woolshed Flat Shale. It strikes approximately north-south, and is bounded to the

east by impure quartzites and calc-silicates, and to the west by fissile, micaceous schists. Although the marble appears to be of high grade, it is only a small deposit, and the access road up the crest of the ridge would need upgrading.

CONCLUSIONS

No materials are available in the immediate vicinity of Tanunda because the basement rocks here are covered by the younger sediments of the Barossa Valley. Hard rocks flank the valley on all sides, but most of these would not provide crushed rock to the specification required.

Two main areas are likely to provide suitable material:

1. High grade marble can be found in quite large quantities at localities 1 and 2 to the north of the Penrice quarries. Although these deposits are 7 miles from Tanunda, there are no closer marble deposits of comparable quality or size. The deposit at Vine Vale, 5 miles to the east of Tanunda is small but should be considered.
2. Most of the ridges in the hills to the northwest of Tanunda are underlain by brecciated feldspathic quartzite (e.g. at localities 3, 4, 7 ,8 and 9). Large amounts of this material could be obtained from within 2 miles of Tanunda, the most promising of these deposits being at locality 8, where clayey interbeds are rare. Crushing of the quartzites may yield too much fine material, but due to the low cartage costs involved it may be feasible to screen some of the fines from the crushed rock.

Many of the other localities discussed in this report are likely to prove less satisfactory because of the size or quality of the deposits, access, or depth of overburden.

RECOMMENDATIONS

Representative samples of rock from the localities described in this report should be sent to the Highways and Local Government Testing Laboratories for advice on their suitability.

In localities where the rock is of sufficiently high quality, and quarries or pits are already established, they could be re-opened. At other deposits in which the material is shown to be suitable, test pits should be opened to prove reserves and the depth of overburden before quarrying commences. It will probably be simpler and less expensive to re-open existing quarries if suitable material exists.

Since consistency from load to load is required, care should be taken with quarrying techniques. If, for example, material from different parts of a quarry has different characteristics, it may be necessary to stockpile material in advance so that mixing may be carried out on site.

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AMP:JMH:JB
2.1.1970

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REFERENCES

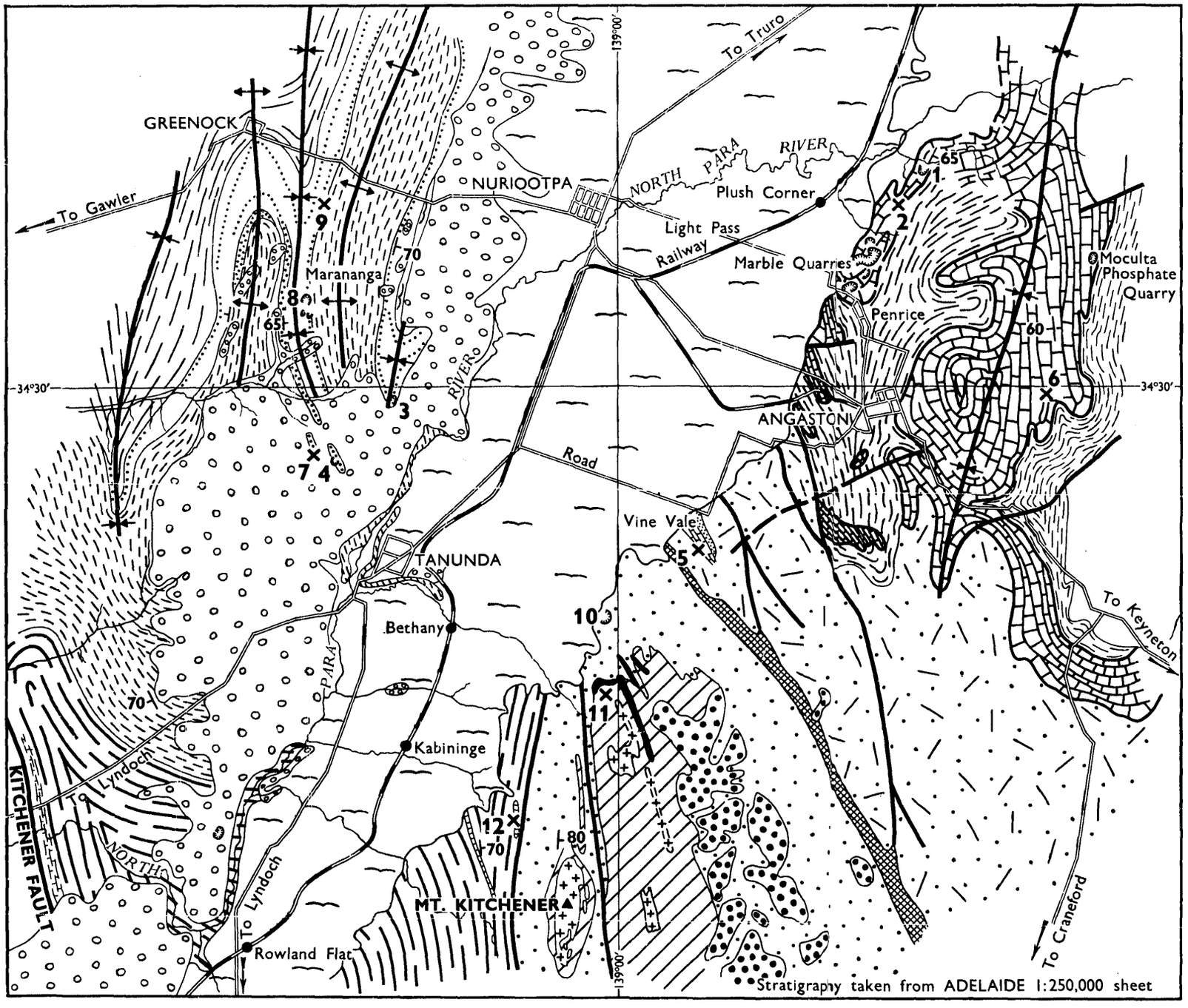
ANTMANIS, T., 1968. Geological Atlas of South Australia. Sheet: Cambrai 1:63,360 series (Unpublished mapping).

CAMPANA, B., and WHITTLE, A.W.G., 1953. Geological Atlas of South Australia. Sheet: Gawler 1:63,360 series.

COATS, R.P., and THOMSON, B.P., 1959. Geological Atlas of South Australia. Sheet: Truro 1:63,360 series.

DICKINSON, S.B. and COATS, R.P., 1957. Geological Atlas of South Australia. Sheet: Kapunda 1:63,360 series.

THOMSON, B.P., Geological Atlas of South Australia. Sheet: Adelaide 1:250,000 series. Unpublished. (Compiled by B.P. Thomson).



SCALE

MILES 1 0 1 2 3 MILES

1 0 1 2 3 4 5 KILOMETRES

REFERENCE

- Quarry or pit
- Fault
- Anticline
- Syncline
- Strike and dip of bedding (65)
- Locality described in text (×4)

LEGEND

CAINOZOIC

QUATERNARY–PLEISTOCENE

POORAKA FORMATION: pale, red-brown sandy clay

TERTIARY

Laterite; ferruginous residual of old weathering profile

Undifferentiated white quartz sand and pebbly conglomerate, sandy clays, in places with ferruginous matrix

PALAEOZOIC

UPPER CAMBRIAN TO LOWER ORDOVICIAN

Dolorite dykes

Albitised granitic intrusives

Recrystallized white and pink meta-arkose grading to granite-gneiss

LOWER TO MIDDLE CAMBRIAN

KANMANTOO GROUP

INMAN HILL FORMATION: Grey metamorphosed greywacke and arkose

STRANGWAY HILL FORMATION: Grey-green metamorphosed siltstone-greywacke with minor marble and calc-silicate interbeds

LOWER CAMBRIAN

HAWKER GROUP

HEATHERDALE SHALE EQUIVALENT

ANGASTON MARBLE: White, grey and pink marble

PROTEROZOIC

MARINOAN

WILPENA GROUP

ULUPA SILTSTONE: Green laminated silty shale

STURTIAN

UMBERATANA GROUP

TAPLEY HILL FORMATION: Laminated silty shales

APPILA TILLITE: Siltstone with sandstone and arkose interbeds and a few horizons of boulder tillite

TORRENSIAN

BURRA GROUP

SADDLEWORTH FORMATION: Well laminated silty shales

WOOLSHED FLAT SHALE: Grey laminated siltstones and shales

SKILLOGALEE DOLOMITE: Impure dolomite with quartzite and siltstone interbeds

Breccia Zone

69-998 MR 132

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