DEPARTMENT OF MINES

SOUTH AUSTRALIA

Report on

# GREENHILL QUARRIES

## SECS. 1052, 1056, 1057, HD. ADELAIDE, CO ADELAIDE

(J. H. Leverington)

by

L. G. NIXON

Geologist

MINERAL RESOURCES SECTION

GEOLOGICAL SURVEY

Contents



| Map No. | Title | Scale |
|---|---|---|
| 59-392 | Greenhill Quarries Geological Plan | 100' = 1" |
| 59-393 | Greenhill Quarries Geological Sections | 100' = 1" |



H.O. No. 49/145
G.S. No. 1534
D.M. 692/59

10th November, 1959.

DEPARTMENT OF MINES

SOUTH AUSTRALIA

Report on

# GREENHILL QUARRIES

Secs. 1052, 1056, 1057. Hd. Adelaide, Co. Adelaide

(J. H. Leverington)

## 1. ABSTRACT

Rock types mapped in the above area include arkosic ortho quartzites, arkosic sandstones and chloritic quartzite schists of the Stonyfell Quartzite formation in the Torrensian Series.

Total available reserves of rock are estimated at over thirty million cubic yards; of this total an estimated 6.3% would be quartzite; 0.32% sandstone; 93.3% chloritic quartzite schist.

Folding and faulting has had little effect on the quality of the stone, but combined with topography, has, in places, increased the overburden ratio considerably.

## 2. INTRODUCTION

Following a request from J. H. Leverington of Greenhill Quarries for a broad geological survey to assist in further development work in the above sections, field work was initiated on 19/8/59, including an instrument survy of geologic and topographic features with M.B. Langsford (Surveyor).

This present survey may be considered an extension of a previous survey (L. G. B. Nixon, Mining Review 106, pp. 67-69. 1959).

## 3. REFERENCES

Mining Review No. 106, 1959 pp. 67-69 (L.G. Nixon).

Adelaide Sheet. 1 mile Geological Series. 1951.

## 4. LOCATION & TOPOGRAPHY

The area mapped is bounded to the south and west by Slapes Gully and to the north by an old fence which runs part way up the hill from the gully. The eastern boundary is just west of the E.T.S.A. pylons on the brow of the hill to the north of Slapes Gully.

The topography is youthful and rugged; slopes are usually steep gradients in places being one in one. In the north eastern portion the more arenaceous beds outcrop boldly forming small cliffs. Vegetation consists predominantly of epacris bushes and eucalyptus trees, both varieties are thickest in the gullies although the epacris is dense over most of the area.

Outcrop is fairly good near the tops of the spurs but poor elsewhere.

## GENERAL GEOLOGY

Rock types in the area include ortho quartzites interbedded with chloritic quartzite schists and arkosic sandstones of the Stonyfell Quartzite Formation in the Torrensian Series of the Adelaide System.

A major fault to the north and west of the area known as the Stonyfell fault has locally affected the attitude of the rocks. Faults in the mapped area are also believed to be related to the Stonyfell Fault.

## DETAILED GEOLOGY

For the purpose of this report the Stonyfell Quartzite formation in the mapped area has been subdivided into the following four units: (1) upper Sandstones, (2) Upper quartzite, (3) chloritic quartzite schist and (4) lower quartzite.

1. Upper Sandstones - These beds do not outcrop well except near stn 44 (see accompanying map No. 59-392). The sediments are medium grained, cross bedded and white in colour with occasional chloritic beds. Differential weathering has etched out the bedding planes. In some places pockets of weathered and eroded rocks have formed small caves. This unit is probably a very arenaceous varient of the chloritic quartzite schists. As their name implies they are not tough like the quartzites but because of their appearance they be acceptable to some contractors.

2. Chloritic quartzite schists are the most extensively developed rocks in the area mapped and are well exposed in the road cuttings contructed during development. The rock types consist of flaggy and laminated interbedded quartzite, chlorite quartz schist and chlorite schist beds with minor variations. Its colour varies from light to dark grey to green. Generally the rock is not very tough and is of inferior quality and poor colour.

Pockets of weathering have completely altered the rock locally to soft buff coloured freestone. These areas of weathering vary in size but may be relatively large, the freestone quarry marked on the accompanying map is in one such area.

This unit may be projected into the area where the upper benches of Stonyfell Quarries are located and where the sediments are weathered to a fairly soft buff coloured rock.

For this reason it is expected that the quality of the rock with respect to colour may improve as the quarries advance towards the north, on the other hand it is expected they will get relatively softer due to weathering.

3. The Upper quartzite horizon is a medium grained, tough dense, hard, cross bedded, white-pinkish coloured arkosic ortho quartzite. It outcrops well near the top of the hill above the freestone quarry and around the flanks of the spur. The unit as a whole has a general dip of $10^{\circ}$ to the S.W. but local variations of strike and dip occur. Since the base of this horizon is obscured its true thickness is unknown but is estimated at about 20 feet.

This rock type is of good quality and suitable for use in civil engineering projects.

4. The lower quartzite horizon is exposed in the exploratory quarry and the gully immediately to the east of it. The rock is massive pinkish to white in colour, medium grained, tough dense and hard. To the east of the gully scree and soil together with dense undergrowth mask the underlying rock, but it is thought that the quartzites persist eastwards under a relatively thin cover of overburden to the eastern boundary of the mapped area. No where in the mapped area is the base of this unit exposed so its thickness is unknown but is estimated at about 20 feet. This rock type is suitable for use as aggregate in civil engineering projects.

## STRUCTURE

1. Faulting. Two main faults located in the mapped area appear to be normal, the relative movement being east side down, the throw on the Western fault being about 65 feet and that on the East fault being 25 feet. Other smaller normal faults have been located and plotted on the

accompanying map.

Small thrust faults oblique to the normal faults have also been mapped, the relative movement on these faults being east side up.

It is possible that thrust faults are the result of stress which produced the Stonyfell structure and the normal faults produced by the relaxation of these stresses.

The faults have had no detrimental effects on the quality of the stone examined, their only effect has been to increase the overburden ratio in some places.

2. Folding. Apart from a steepening of the beds from north east to south west, as the beds approach the Stonyfell fault area; only minor variations in strike and dip occur. The structure is simple as can be seen from the cross sections accompanying this report.

Because of the variations of dip and strike combined with faulting and topography the outline of some of the beds gives the appearance of a complex structure which in actual fact is relatively simple.

## RESERVES

Total reserves of stone in the area outlined are estimated at over thirty million cubic yards allowing for 65' faces angled at 75° with 20 foot berms. Of these reserves an estimated 2.05 million cubic yards (6.3%) would be good quality quartzite (assuming 20' thickness for upper quartzite horizon and 20' thickness for lower quartzite horizon); one hundred thousand cubic yards (0.32%) of passable sandstone, over twenty eight million cubic yards (93.36%) of inferior quality chloritic quartzite schist.

## DEVELOPMENT

At the time of the survey, development work completed

included a short road to an exploratory quarry immediately to the north of Slapes Gully and a fairly long access track rising to an elevation approximately half way up to the top of the north flank of Slapes Gully.

This exploratory quarry has exposed the lower quartzite horizon which dips 34° southerly but shallows to the north which takes it under the hill beneath chlorite quartzite schists.

Further exploratory work is recommended to prove the extent of the quartzite exposed in the exploratory quarry either by a series of casteans to bedrock 200 feet apart from gully level up the north flank for 80 feet to the east boundary of the mapped area or a continuation of the road past the exploratory quarry to the eastern boundary. It is expected that the overburden overlying the quartzite will be relatively shallow in this area.

## CONCLUSIONS

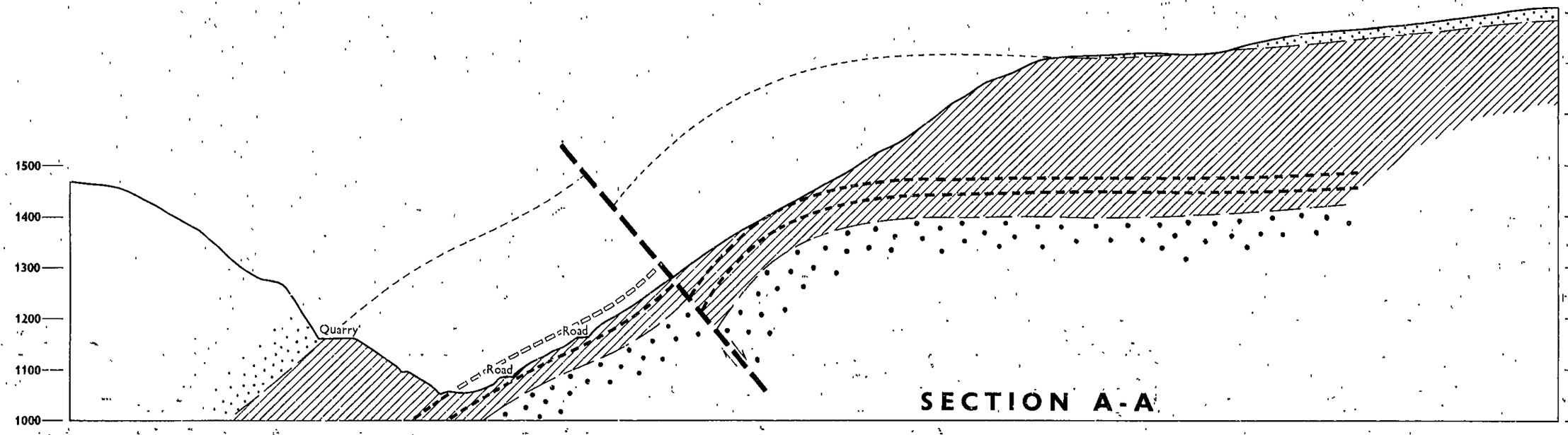
Sandstones, quartzites and chloritic quartzite schists of the Stonyfell Quartzite formation have been mapped in the above area.

Available reserves of stone are estimated at over thirty million cubic yards, of these an estimated 6.3% would be good quality quartzite, 0.32% moderately hard sandstone, 93.36% chloritic quartzite of inferior quality.

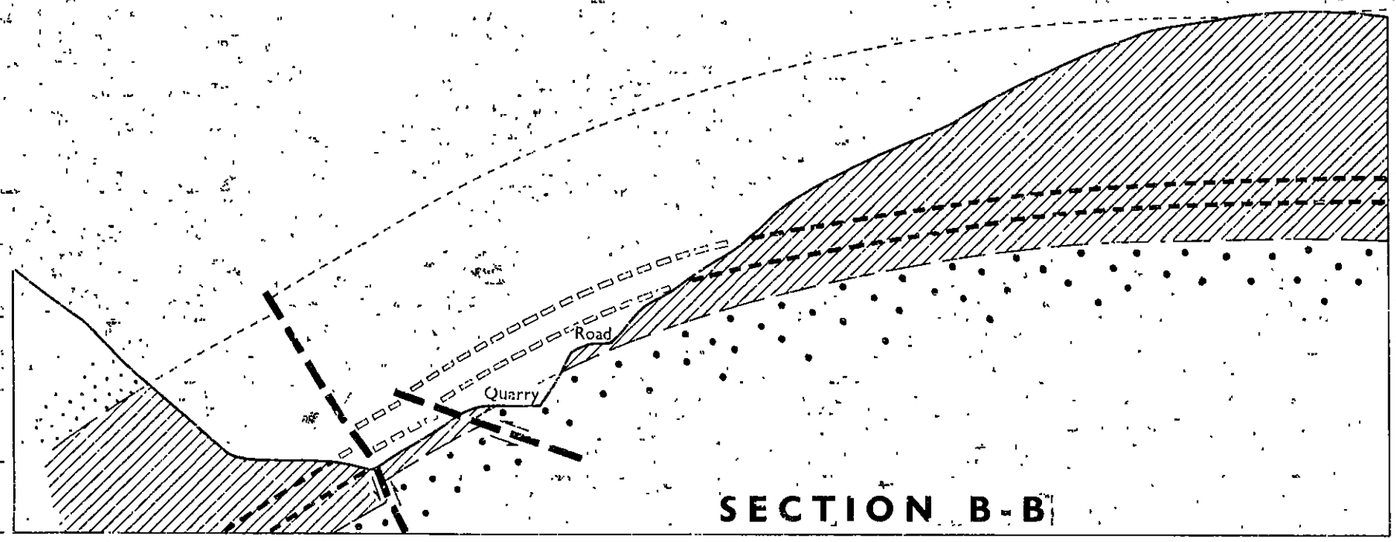
The lower quartzite horizon is expected to provide the bulk of the good quality stone quarried in this area and it is recommended that further exploratory be carried out as outlined in this report.

L. G. Nixon
GEOLOGIST

LGN:PAL
10/11/59

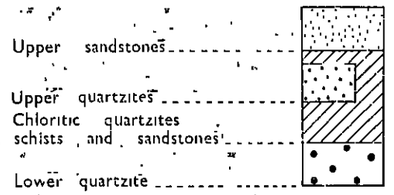



SECTION A-A




SECTION B-B

## LEGEND




Geological boundary : Inferred

Geological boundary . Projected

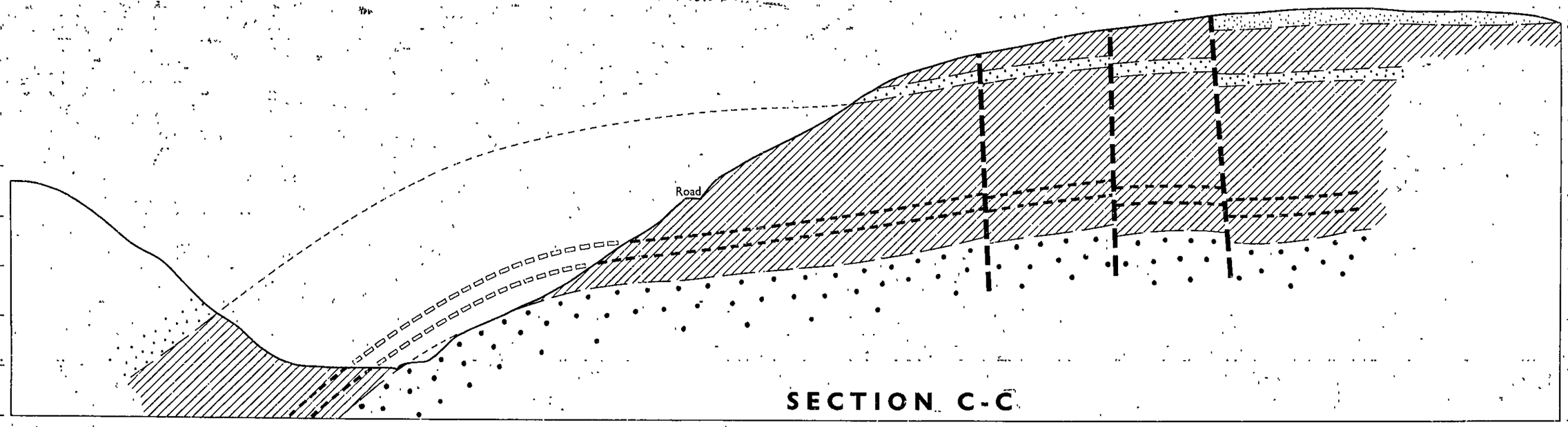
Structure lines : Inferred

Structure lines : Projected

Fault (showing relative movement)

100 0 100 200 300 400 500 600 700 800 900 1000

SCALE IN FEET




SECTION C-C

S.A. Dept. of Mines

L.G. Nixon Geologist

59-393

# LEGEND

Alluvium

Upper sandstones

Upper quartzites

Chloritic quartzites schists and sandstones

Lower quartzite

Geological boundary Observed

Geological boundary Inferred

Structure lines

Strike and dip of bedding

Strike and dip of jointing

Fault showing dip

Contours - 20 foot interval, arbitrary datum

N

Face, June 1956

Track

PT. 1052

1057

1056

WEST FAULT

EAST FAULT

Approximate position of boundary

Quartz vein

Exploratory quarry

Track

Freestone quarry

Station 44

Area for which volume has been calculated

Approximate position of boundary

A

B

C

SCALE IN FEET

100 0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500

SCALE IN FEET

100 0 100 200 300 400 500

SCALE IN METRES

50 0 50 100 150

LOCALITY MAP

ADELAIDE

River Torrens

Greenhill Road

QUARRY

34 55

138° 40'

138° 35'

0 1 2

MILES

S.A. Dept. of Mines

Geology by L. G. Nixon

8

59-392