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DEPARTMENT OF MINES

SOUTH AUSTRALIA

First Report

GEOLOGICAL SURVEY FOR RAILWAY BALLAST IN S.E. SECTION 63, HD. TOWNSEND

by

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Map Reference	Title	Scale
55-289	Survey for Railway Ballast	100 ft. to 1 inch
Report No.		**Date**
G.S. 346 41/47		12th August, 1955

DEPARTMENT OF MINES

SOUTH AUSTRALIA

First Report

GEOLOGICAL SURVEY FOR RAILWAY BALLAST IN S.E. SECTION 63, HD. TOWNSEND

1. LOCATION

Section 63, Hd. Townsend is situated about 3 miles west of Lucindale and has a frontage on the main road between Lucindale and Kingston (see locality maps I and II). The area surveyed in detail is situated in the N.W. corner of Section 63, Hd. Townsend, immediately W. and N.W. of Ardune Homestead (see locality map II).

2. INTRODUCTION

A survey of a calcareous sandstone in the neighbourhood of Lucindale was requested by the Chief Engineer of the South Australian Railways (Mr. Bridgland). Specimens of the material had been submitted to him through the Resident Engineer in charge of gauge widening operations in the south-east (Mr. Joyce) by Mr. R.J. Turner, c/o Lucindale Post Office.

According to Mr. Bridgland it is probable that work in connection with the broadening of the Naracoorte - Kingston railway line will commence in the near future and the question of ballast was an important one. The requirements of ballast (information obtained from Mr. Joyce) would be about 50-60,000 cu. yds. for the Naracoorte - Lucindale section and 70-80,000 cu. yds. for the Lucindale - Kingston section. This would make a total of approximately 140,000 cu. yds. Daily requirements during gauge-widening operations would be about 200 cu. yds. At this rate, 2-3 years work would be available for a crushing plant.

Up to the present, a hard, reddish coloured fossiliferous (mainly rugose corals) dolomite has been used as ballast in the area, carted from Tantanoola. There is more than sufficient stone at Tantanoola to meet the ballast requirements of the broadening of the Kingston line but cartage costs are considerable (road distance from Tantanoola to Lucindale is 45 miles). It would therefore naturally be advantageous to obtain the services of a contractor to undertake quarrying and crushing of suitable material near Lucindale.

Mr. R.J. Turner has formed a company called the "Lucindale Crushing Co., Ltd.," with Messrs. G.A. Schloithe and J.W. Copping as partners. At present, the firm possesses only a tractor and large and small jaw crushers but it is intended to supplement the existing equipment to enable quarrying operations to be carried out in the near future. The most suitable size of material for use as railway ballast is about 2½ ins.

On 2/8/55, the writer visited Section 63, Hd. Townsend, in company with Messrs. Joyce, Turner and Schloithe. After a short discussion, a reconnaissance of the area was made. On 3/8/55 a detailed pace/compass survey was carried out. The sketch-plan produced accompanies this report. Five hand auger holes were put down to determine the thickness of superficial deposits overlying hard rock. In addition, a reconnaissance of the area to the north and south of the locality was made to determine the extent of possible future reserves.

3. GEOLOGY

The general geology of the Lucindale district has been described by R.C. Sprigg in Bulletin 29, G.S.S.A. ("The Geology of the South East Province, etc."), 1952.

The area is composed of Recent sands and soils, together with Pleistocene aeolianite (travertine) of the stranded beach dune system.

The main features in the district are these fossil

dunes which appear as prominent ridges above the surrounding plain. The main vegetation on these ridges are gum trees.

The Ardune dune (see photograph No. 1) so named by R.C. Sprigg, (op. cit.), of which the locality selected for detailed study is a part, trends approximately NNW - SSE with its highest points about 50 feet above the present level of the plain. The dune is approximately 28 miles long, with maximum width 1 mile. The dune itself is composed in the main of consolidated calcareous aeolianite - a hard, well-compacted calcareous sandstone. It is thought that the material has been formed through the migration by capillary action of calcium-rich solutions through unconsolidated ocean sand dunes. The material is composed of a high percentage of angular to sub-rounded quartz grains cemented by a calcareous cement. The material is generally fairly uniform in appearance and is relatively fine grained. Locally fine-grained variants are noted; the outermost ½ in. of the material is generally very fine-grained and may be flint-like.

Two percussion bores were put down for water by O. Thiele, Lands Department, immediately S.W. of Ardune Homestead (see sketch-plan and photograph No. 2). The Department of Mines logs are as follows:

No. 1 Borehole (163/53)

0	- ½'	Sandy soil
½	- 15'	Cream, very sandy limestone
15	- 50'	Cream aeolianite
50	- 78'	Light, creamy grey, very sandy limestone (abandoned)

No. 2 Borehole (164/53)

0	- ½'	Sandy soil
½	- 14'	Cream aeolianite
14	- 29'	? Sandstone
29	- 70'	Cream aeolianite
70	- 80'	? Hard sandstone

These bores indicate a thickness of up to 80 ft. of dominantly hard material.

The main areas (1 and 2 on the accompanying sketch-plan - area 2 is shown in photograph No. 3) containing frequent exposures of the proposed material are delimited by a pecked line, edged in blue. Besides the main areas, there are three small knolls at the northern end of the area surveyed. The land between areas 1 and 2 contains scattered fragments of calcareous sandstone on brown sand (the thickness of sand, determined by the use of a hand auger, varies from 9 in. to 4 ft.). No. 4 auger hole was put down on the chain road about 33 yards west of the limit of the dune and disclosed the following section:-

0	- 3"	Dark brown loam
3	- 7"	Olive brown loamy sand
7	- 15"	Stiff brown clay with limy streaks and travertine fragments
		Decomposed calcareous sandstone

No. 5 auger hole, put down to the S.E. of area 1, disclosed the following section:-

0	- 6'	Fine brown sand
6	- 7'	Yellow clay
		Decomposed calcareous sandstone

Within area 1, calcareous sandstone has been quarried at one locality situated about 300 yds. N.N.W. of Ardune Homestead (see sketch plan and photographs 4 (a) and (b)). The material has been taken out in two small benches, the floors of which show a difference in height of about 3 ft. A thickness of at least 6 ft. is expected.

4. QUALITY OF THE MATERIAL

In general, the proposed material is hard and sound. It is considered to be suitable for use as railway ballast. Both the Chief Engineer, South Australian Railways and the Resident Engineer, Naracoorte (Mr. Joyce) have expressed their opinion of the suitability of the rock. It should be crushed to a size of about 2½ inches.

5. RESERVES

The two percussion bores put down immediately S.W. of Ardune Homestead disclosed a thickness (up to 80 ft.) of aeolianite and sandy limestone. Outcrops of calcareous sandstone (aeolianite) in the vicinity of the positions of the two boreholes are of similar material to exposures in area 1 to the N.W. It is probable therefore that area 1 is underlain by a succession similar to that disclosed in the percussion boreholes.

The total acreage of exposed rock in areas 1 and 2 (and north of area 1) is approximately 12 acres (this is allowing for safety strips round Ardune Homestead and outbuildings.) A thickness of 6 ft. of material is exposed in the quarry situated in the N.E. portion of area 1, without any indication of a lower limit being reached. On the basis of 6 ft. exposure over 12 acres approximately 120,000 cu. yds. of reserves would be available. Should an appreciably greater thickness be proved, all requirements could be obtained from area 1 without having recourse to area 2.

Mr. Turner intends to bring in a compressor and jackhammer at an early future date. The latter is capable of drilling to about 25 ft. To obtain information regarding the thickness and quality of material present in the area, six pits taken to about 10 ft. are recommended in positions A, B, C, D, E and F on the accompanying sketch-plan.

Considerable further reserves are available if required in the area to the north of that delineated in the accompanying sketch-plan and also to the S.E. of Ardune Homestead as far as the Kingston - Lucindale main road.

6. CONCLUSIONS AND RECOMMENDATIONS

An area selected for detailed examination in Section 63, Hd. Townsend, contains potential reserves of a hard, calcareous sandstone suitable for use as railway ballast.

For a preliminary assessment of reserves and quality of the material, six pits are recommended in positions

A, B, C, D, E and F (shown on the accompanying sketch-plan). The depth of pits should be about 10 ft. If good, hard material is encountered throughout the sections of these pits, the required reserves of 140,000 cu. yds. should be obtained.

Considerable further reserves of material are available from other sections of the same dune in the vicinity of Ardune Homestead.

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DSB:AGK
24/8/55.

APPENDIX - PHOTOGRAPHS

Photograph No. 1

Ardune Dune, near its southerly termination (taken from the S.W.)

Photograph No. 2

Ardune Homestead and outbuildings. (taken from area 1)

Photograph No. 3

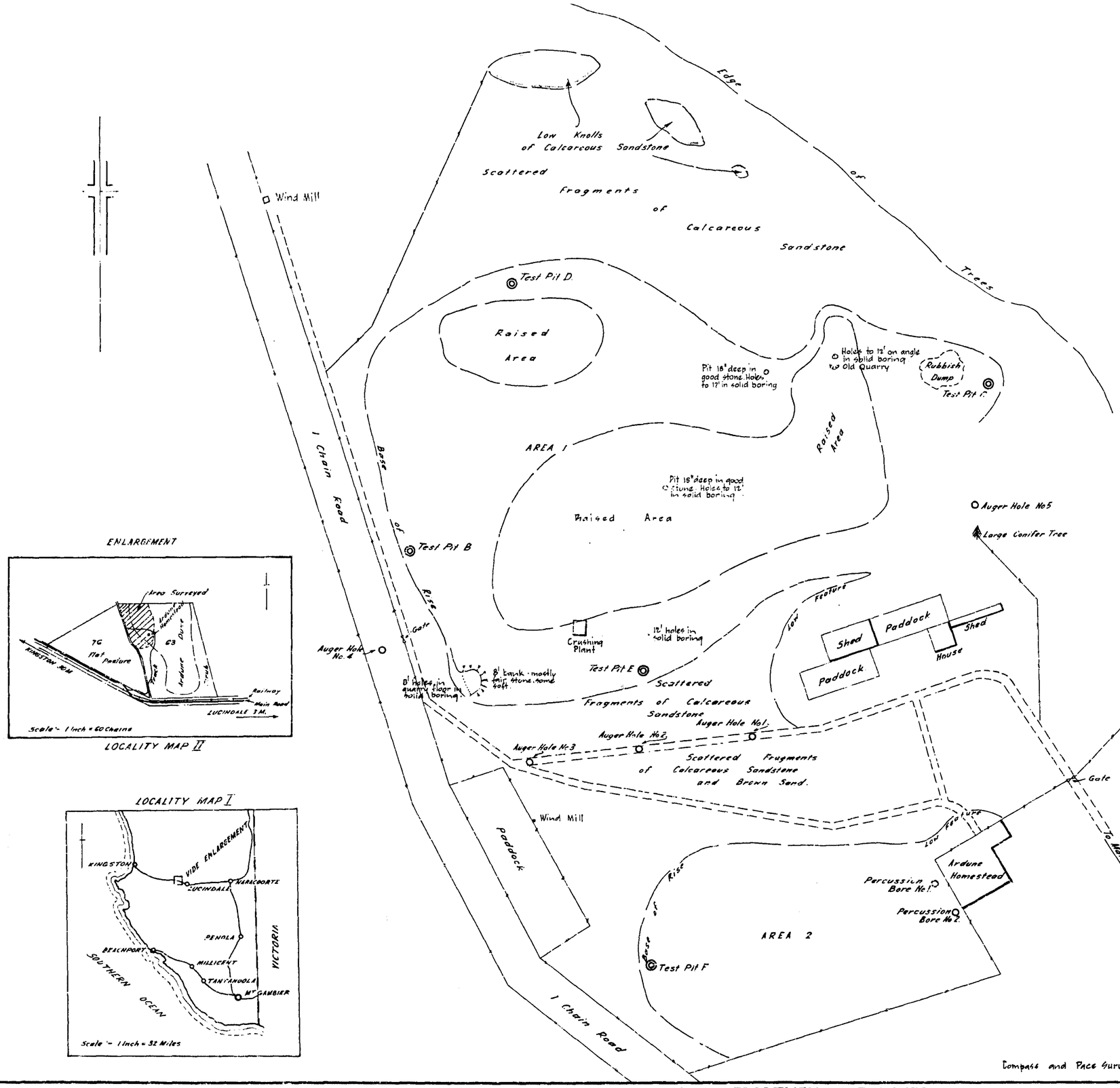
Area 2 (taken from area 1)

Photograph No. 4(a)

Small quarry in calcareous sandstone 300 yds. N.W. of Ardune Homestead.

Photograph No. 4(b)

Close-up of upper portion of quarry

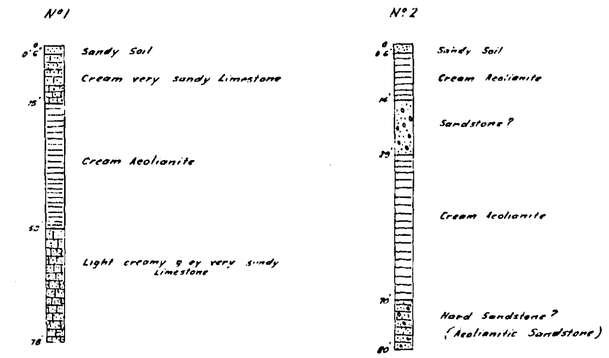


ENLARGEMENT

LOCALITY MAP II

LOCALITY MAP I

PERCUSSION BORES.



HAND AUGER HOLES

No. 1. Depth 4'0"

0'-3"	Dark Loamy Sand
3"-3'1"	Red-Brown Sand
3'1"-4'0"	Weathered Calcareous Sandstone

No 2 Depth 1'3"

0'-3"	Dark Loamy Sand
3"-1'0"	Red-Brown Sand
1'0"-1'3"	Weathered calcareous sandstone

No. 3. Depth 0'9"

0'-4"	Dark Loamy Sand
4"-5"	Red-Brown Sand
5"-9"	Weathered calcareous sandstone

No. 4. Depth 1'3"

0'-3"	Dark Loamy Sand
3"-8"	Olive-Brown Loamy Sand
8"-8"	Stiff Brown Clay - Loamy Streaks and Traverting Fragments
8"-1'3"	Weathered calcareous sandstone

No. 5. Depth 7'0"

0'-6'0"	Fine Brown Sand
6'0"-7'0"	Yellow Clay
7'0"-	Horal Rock (Decomposed Calcareous Sandstone)

Test Pits proposed by D.S. Buist. ◎

Compass and Pace Survey

To accompany report by D.S. Buist. Additions by G.F.W. 17.11.55

S.A. DEPARTMENT OF MINES

SURVEY FOR RAILWAY BALLAST
LUCINDALE AREA
SEC. 63 HD. TOWNSEND

Associated Drawing / No.	No. / Amendment / Exd. / Date	Req. No. D.M. 1308/55 Compiled from	Approved / Passed — Director of Mines
			Drn. — Tcd. R G C — Ckd. — Exd. R R
			Scale: 100 Feet to 1 Inch — 55-289 Ke 3 — Date 26-8-55