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COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

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Records 1965/111

MINOR INVESTIGATIONS BY NORTHERN TERRITORY RESIDENT GEOLOGICAL  
SECTION: CONSTRUCTION MATERIALS, 1963

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by

P. Rix and J. Barclay



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GEOLOGICAL SECTION:

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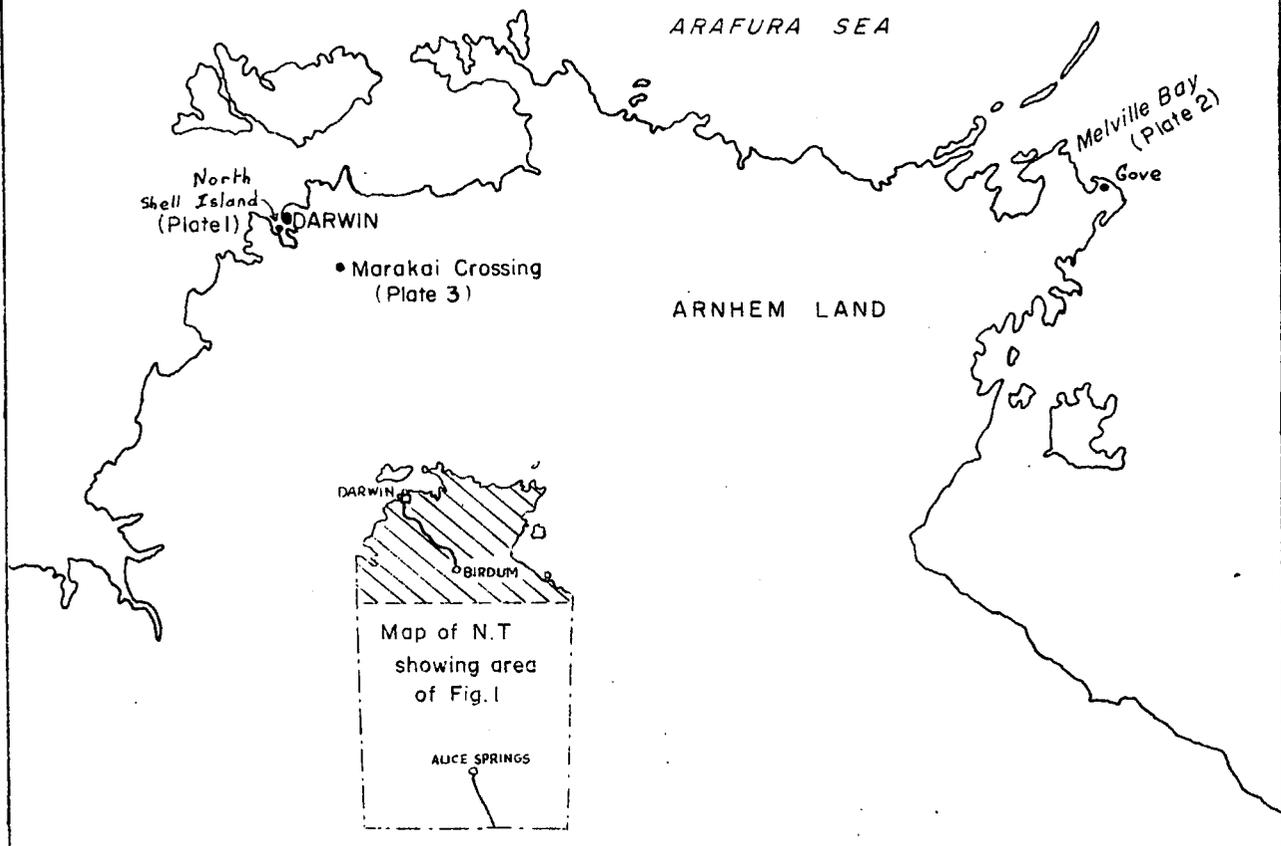
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## PREFACE.

This record contains three reports, by geologists of the Darwin Resident Geological Office, on brief investigations of possible sources of raw materials for construction purposes in the northern part of the Northern Territory. The investigations were carried out during 1963. A more extensive investigation has been made of lime and cement-making materials and of clay and shale resources for the manufacture of heavy earthenware. These are, or will be, reported upon in separate Records. Investigations into possible sources of pottery clay in the Darwin region are also reported upon in a separate Record.

Figure 1 shows the localities of the deposits described in the three reports.

# LOCATIONS OF DEPOSITS DESCRIBED IN REPORT



SCALE 1 : 6,000,000

100 50 0 100 200 300 Miles

SHELL BANK, NEAR NORTH SHELL ISLAND,

DARWIN HARBOUR.

- by -

P. Rix.

SUMMARY

A shell bank near North Shell Island was mapped and sampled and the shell sand was analysed; lower grade material flanking the shell bank was also sampled and preliminary beneficiation tests were done. The investigations indicate that the quantity of high grade shell sand is too small and the grade of the flanking material is too low for the area to be an economic source of raw material.

INTRODUCTION

In September, 1963, a sample of shell sand from a sandbank near North Shell Island (see Figure 1) was collected by the Senior Resident Geologist and submitted to Australian Mineral Development Laboratories, Parkside, South Australia, for analysis. The results indicated that the sand is a potential raw material for cement manufacture. The locality was visited again in November and a more extensive examination of the sandbank was carried out.

FIELD INVESTIGATIONS

The approximate size and shape of the sandbank was ascertained by pacing, and the form lines by visual estimation. Shell sand with a maximum vertical thickness of 7 feet overlies material composed of mixed mud and sand with coral and rock fragments. (Plate 1).

A sample of the clean shell sand was obtained by pitting and an attempt was made to sample the flanking lower grade material by means of a sand pump. This method was not very successful due to the inability of the sand pump to penetrate material containing coarse shell fragments. Consequently, a sample of the lower grade flanking material was obtained by pitting, but the incoherent nature of the material restricted the sampling depth to about one foot.

Details of the pit and the auger holes, shown in Plate 1, are as follows :-

H1	0' - 2'	shell sand
	2' - 5'	mixed sand, mud, and shell fragments.
H2	0' - 2'	shell sand
	2'	obstructed by layer containing coarse coral or rock fragments
Pit	0' - 4'	shell sand

RESERVESGrade

The analysis of the sample of shell sand collected from the sandbank in September, 1963, gave the following result:-

	<u>%</u>
Silica	8.60
Calcium carbonate	78.25
Magnesium carbonate	2.40
Ferric oxide	4.05

(Analysis by Australian Mineral Development Laboratories, Parkside, South Australia)

This is thought to be representative of the material forming the sandbank.

Preliminary tests on the lower grade material were done in the Resident Geological Office, Darwin. These tests comprised solution tests with hydrochloric acid to obtain an approximate figure for the total carbonates, and sieving tests to determine the feasibility of beneficiation by sizing.

The results were :-

<u>Sieve</u> (B.S.S.)	<u>Aperture</u>	<u>% Distribution</u>	<u>% Carbonate</u>	<u>% Distribution of Carbonate</u>
+ ¼	0.250"	2.10	41.4	1.14
+ 18 mesh	0.0336"	32.15	81.8	34.56
+ 30 mesh	0.0197"	11.40	79.7	38.30
+ 60 mesh	0.0099"	25.18		
- 60 mesh	----	29.17	68.0	26.00

The sieving tests were done on a sample of about 500 grammes, the fractions of which, after weighing, were reduced by quartering for the acid tests. Calculations show the grade of the original sample to be 76.1% carbonates.

A few initial tests indicated the probability that the rock and coral fragments are irregularly distributed in the low-grade material and therefore as large a test sample as possible is required before the results can be considered representative. The sample used in the tests was probably not fully representative, and the figures must therefore be treated with some circumspection.

It appears that some upgrading can be achieved, but up to one third of the material may have to be rejected.

Quantity

The shell bank is estimated to contain 50,000 cubic yards of good quality shell sand, the thickness of which ranges up to 7 feet.

The reserves of the low-grade material are unknown, but large tonnages may be available. This material covers a large area between the shell bank and the mainland, but it may be only a few feet thick.

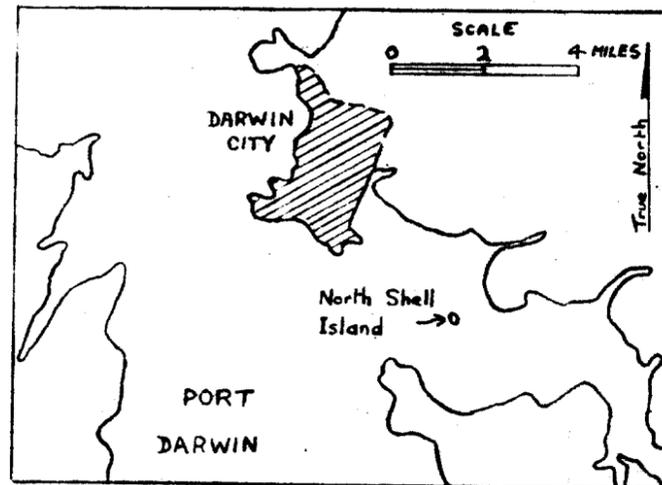
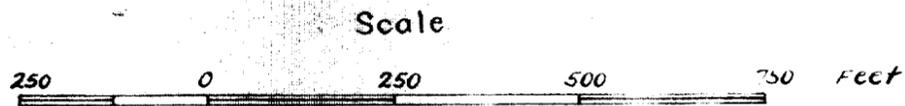
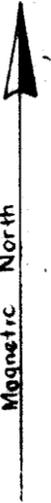
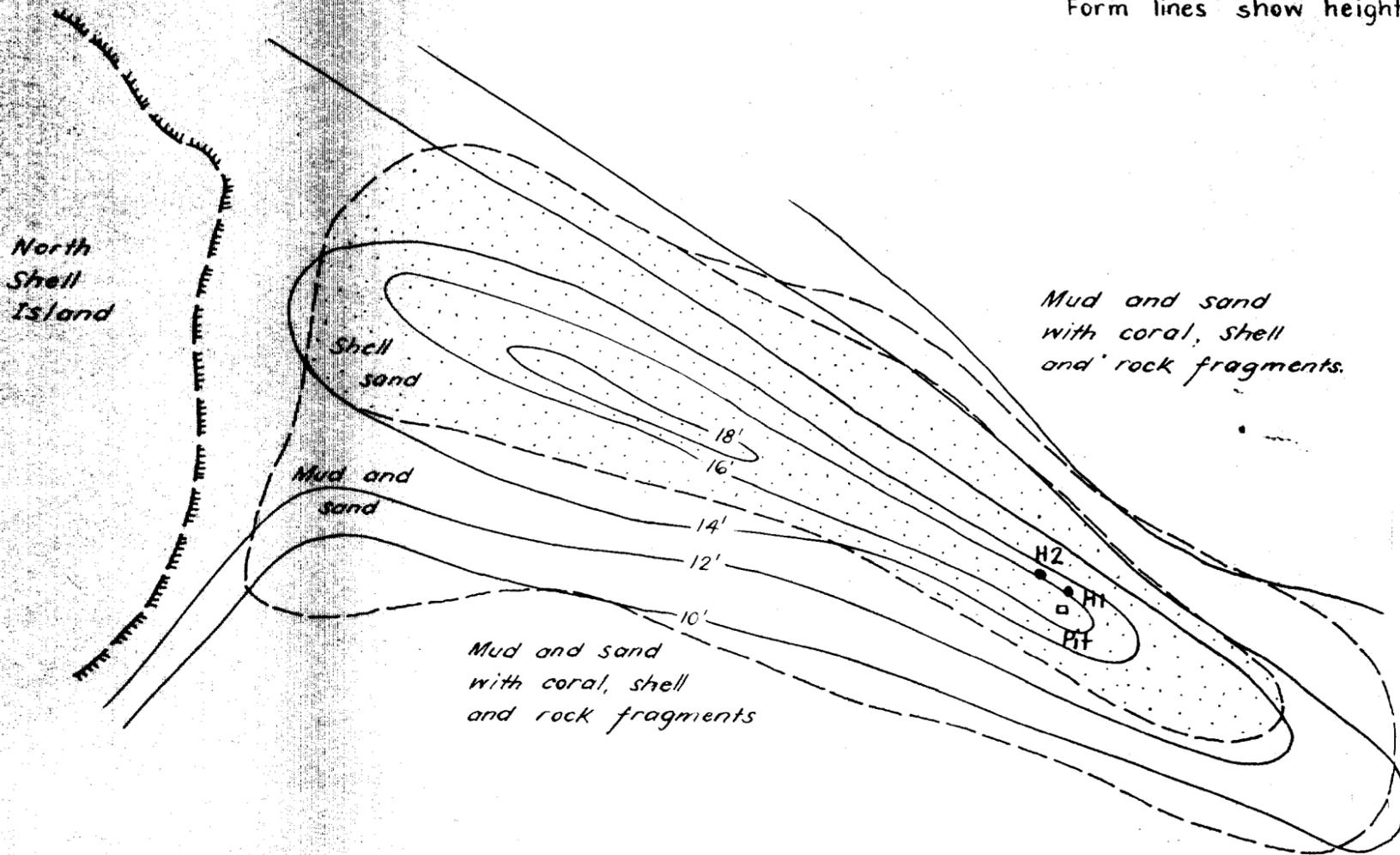
The area is normally covered by shallow water, but is exposed at the lowest tides. Effective sampling of such material is difficult and would probably require more sophisticated techniques than those used so far.

CONCLUSIONS

The shell bank of high grade shell sand is too small to be economic without supplementary reserves. The low-grade material flanking the sandbank and above low water mark could provide large tonnages, but it is probably not economic owing to the low grade, range in composition and the consequent necessity for beneficiation.

# Sand Bank near North Shell Island, Darwin Harbour, N.T.

Sketch Map only not based on survey  
Form lines show height above arbitrary datum.



LOCALITY MAP

BUILDING SAND DEPOSITS

MELVILLE BAY, ARHEM LAND

- by -

F. Rix

INTRODUCTION

A visit was made to Gove (see Figure 1 and Plate 2) on 6th - 8th November, 1963, to examine and sample potential deposits of building sand in the Melville Bay area. The visit was made at the request of Mr. S. B. Dickinson, of Gove Mining and Industrial Corporation.

REQUIREMENTS.

The Department of Works, Darwin, required 20,000 cubic yards of fine aggregate for use in the construction of a mining township close to Melville Bay on Gove Peninsula. Their stated requirement for fine aggregate is that it should comprise "clean, hard, strong, durable, uncoated grains of natural sand, screened gravel or crushed rock, more than 90% of which passes a 3/16" sieve. It should be free of organic matter, shale and other impurities."

SAID OCCURRENCES.

Occurrences of three types of sand were examined: coastal sand, granite sand and reworked granite sand.

1. Coastal Sand.

Coastal beaches and sand dunes are common in the Melville Bay area. They comprise a mixture of quartz grains and shell fragments in a wide range of relative proportions. The presence of significant quantities of lime-rich shells in the coastal sand makes it unsuitable for use as fine aggregate. No samples of the coastal sand were taken.

2. Granite Sand.

The granite bedrock in the Melville Bay area crops out in a few places but is mostly covered with a layer of sand derived by weathering of the granite. This sand consists of angular quartz and feldspar grains, almost all of which pass a 3/16 inch sieve. This material is considered to be suitable for use as fine aggregate.

The best locality is considered to be the area north of the Melville Bay road about 7 miles from Melville Bay, where a large area of sand between the road and Mount Saunders is capable of yielding very large tonnages. Excavations along the road would yield sufficient quantities for the present project. A small quantity of this granite sand was excavated near Buffalo Creek and used as fine aggregate in the construction of the concrete floors at the present mining camp. It was apparently quite satisfactory for this purpose. Two samples of sand were taken, one from the existing sand pit (Sample 3; 70 lbs.), and the other from a locality half a mile north-east of the road (Sample 1; 70 lbs.). The sand deposit probably would not be workable during the wet season; its thickness has not been determined.

### 3. Reworked Granite Sand.

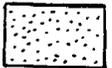
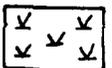
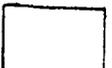
A deposit of reworked granite sand occurs to the landward of a mangrove swamp embayment near Melville Bay. The deposit occurs close to and south of the road between Melville Bay and the Drimmie Head turnoff. The sand is greyish-white and consists of angular quartz fragments, with only minor amounts of other constituents. Virtually all the material passes a 3/16 inch sieve and it is considered to be the best quality building sand in the area. It is probably not more than 3 feet thick, but as it covers an area of about 30,000 square yards, it is expected that 20,000 cubic yards will be available from this source. A sample of this sand (Sample 2; 80 lbs.) was taken. This sand deposit probably would not be workable during the wet season.

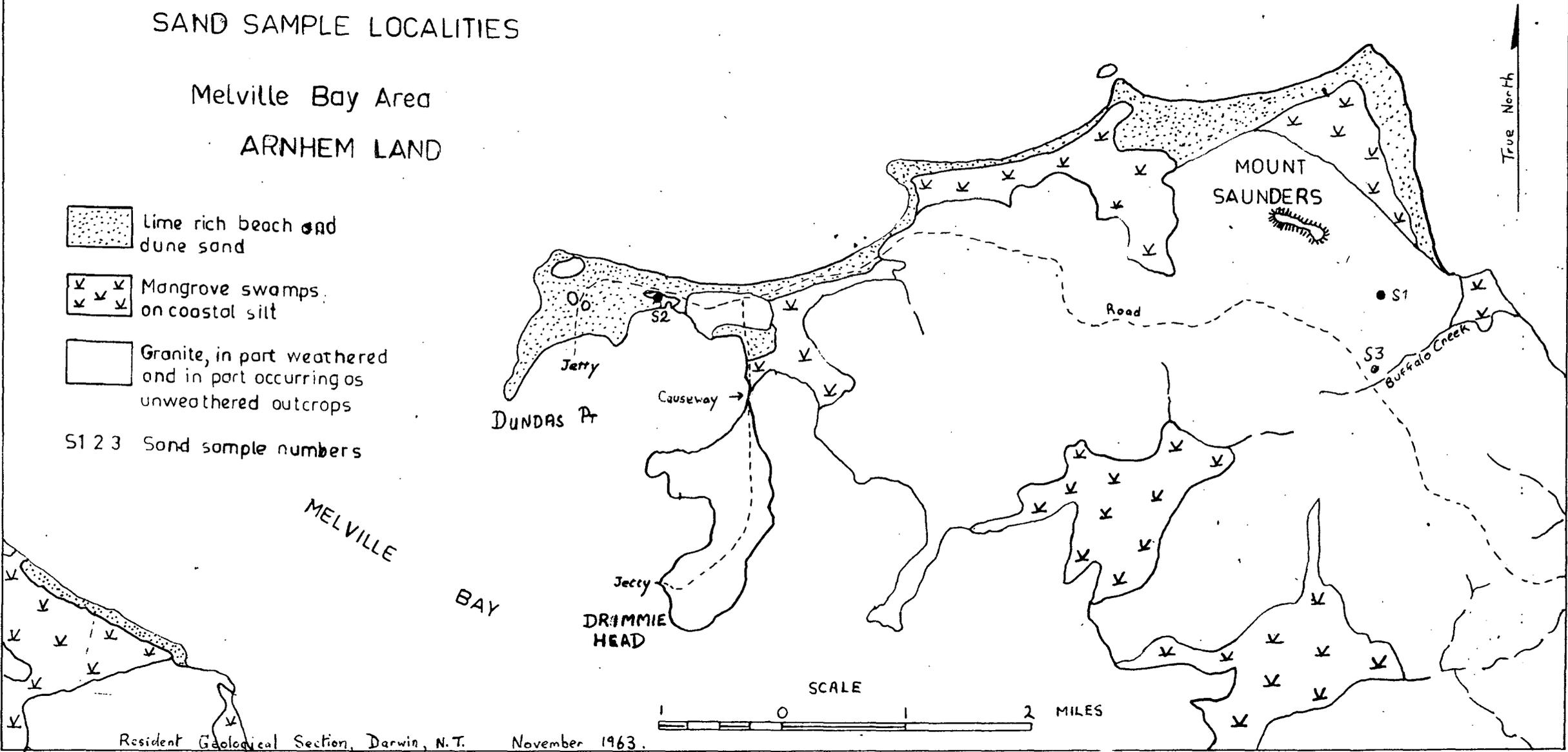
### CONCLUSIONS.

Subject to confirmation by tests to be undertaken by the Department of Works, the reworked granite sand is probably the best material for fine aggregate, but the granite sand is also expected to be satisfactory. The coastal lime-rich sands are unsuitable as fine aggregate.

# SAND SAMPLE LOCALITIES

## Melville Bay Area ARNHEM LAND

-  Lime rich beach and dune sand
  -  Mangrove swamps on coastal silt
  -  Granite, in part weathered and in part occurring as unweathered outcrops
- S1 2 3 Sand sample numbers



Resident Geological Section, Darwin, N.T. November 1963.

To Accompany Record 1965/111 D53/A4/3 D53/3-4/DG.1

RIVER SAND DEPOSITS

NEAR MARRAKAI CROSSING, ADELAIDE RIVER, N.T.

- by -

J. Barclay.

At the request of Mr. Hyams of Darwin, several deposits of quartz sand of alluvial origin, along the north-east bank of the Adelaide River, near the Marrakai Crossing (Figure 1 and Plate 3) were briefly examined on 25th July, 1963.

Samples of the sand were taken for examination by the Works Department Laboratory, Darwin, to determine if the sand is suitable for use in the building industry.

GEOLOGY.

The sands are Recent alluvial deposits laid down on a terrace of the Adelaide River, on its north-east side about one mile downstream from the Marrakai Crossing.

There are several deposits, aligned parallel to the bank of the river. They range up to 1000 feet in length, are lenticular in cross section, about 200 feet wide and 6 feet deep.

The sand is free-flowing and fairly clean. Individual quartz grains are either lightly iron-stained or pink in colour; they are sub-angular to rounded.

CONCLUSIONS.

If the tests being carried out by the Works Department Laboratory indicate that the deposits can be used as building sand, it would be necessary to determine the overall suitability and tonnage or yardage available in the deposits.

A simple programme of augering and sampling on a grid pattern would be adequate for this purpose.

# RIVER SAND DEPOSITS MARRAKAI CROSSING, N.T.

