DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY
ENVIRONMENT AND RESOURCE DIVISION

CONSTRUCTION SAND RESOURCES
PORT LINCOLN AREA

by

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Rept. Bk.No. 74/151
G.S. No. 5469
D.M. No. 1044/73

26th July, 1974.

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CONSTRUCTION SAND RESOURCES PORT LINCOLN AREA

ABSTRACT

Stranded beach deposits of the St. Kilda Formation (Recent) provide construction sand for Port Lincoln. Operations at Louth Bay, Poonindie and North Shields lie entirely within a coastal strip 800 metres wide reserved from the operation of the Mining Act. 1971-1972.

An estimated 0.5 million tonnes of medium grained sand for concrete, 120,000 tonnes of fine grained sand utilised in fertilizer manufacture and 45,000 tonnes of mortar and plastering sand still exist on current mining tenements.

Coarse sand requirement of 3,500 tonnes per year cannot be met from current extractive minerals leases.

Geological reconnaissance has located five potential sources of sand near Port Lincoln: sandy alluvium in Warunda Creek and near Wanilla, scree sand on the western slopes of the Lincoln Uplands near Strawberry Hill, lacustrine sand at Lake Wangarry and aeolian Molineaux Sand at Edillilie. Detailed site investigations are required to define workable deposits and outline reserves.

Lifting of restrictions applying to the coastal reserve between Louth Bay and North Shields is unnecessary at the present time because there are adequate reserves of fine and medium grained sand in existing leases and coarse sand requirements can be obtained from alternative sources.

INTRODUCTION

The present sources of construction sand for Port Lincoln are located between Louth Bay and North Shields entirely within the coastal strip extending from low water mark to 800 metres inland from high water mark which is reserved from the operation of parts 4 to 8 of the Mining Act 1971-1972.

Following enquiries from mining tenement holders and sand users concerning the extension of quarrying outside the existing extractive minerals leases, an investigation of sand in the coastal reserve as well as alternative sand sources was undertaken.

This report presents construction sand resource data for lower Eyre Peninsula.

Field work was carried out by the author between 13th March 1974 and 22nd March 1974.

The results of size grading of sand samples by the Australian Mineral Development Laboratories, which are contained in AMDEL reports AN3387/73 and ME3669/74, are presented in this report.

SAND REQUIREMENTS IN PORT LINCOLN

Five types of sand are used in Port Lincoln for the purpose detailed below.

1) Fine grained sand:
   - plastering and mortar sand for the building industry.
   - fine,free running sand with well rounded grains as a filler in fertilizer by Adelaide and Wallaroo Fertilizer Ltd. - fine, free running sand with angular grains for sandblasting purposes.

2) Medium grained sand:
   - fine aggregate in concrete. Size grading must comply with Australian Standard No. A77 (Standards Association of Australia, 1957). Pre-mixed concrete is produced in Port Lincoln by Pioneer Concrete (S.A.) Pty. Ltd.

3) Coarse grained sand:

- coarse aggregate in vibrated modular masonry blocks by Betta Bloc. Coarse sand, blended in equal proportions with artificial sand, composes the aggregate portion of the mix.
- coarse grained sand with well rounded grains as coarse aggregate in pneumatically applied concrete by the E. & W.S. Department.

Coarse sand is not available from current extractive minerals leases between Louth Bay and North Shields.

Estimated annual requirement of coarse, medium and fine grained silica rich sand for 1974 is summarised in Table 1.

TABLE 1 - Estimated 1974 Requirement of Sand (Tonnes)

Requirement / Use	Fine grained sand	Medium Grained sand	Coarse grained sand	Total
mortar and plastering sand	4,000			4,000
filler in fertilizer	10,000			10,000
sandblasting	15			15
fine aggregate		10,000		10,000
modular masonry			2,000	2,000
pneumatically applied concrete			1,500	1,500
Total	14,015	10,000	3,500	27,515

Recorded production of silica sand for Port Lincoln for 1972 totalled 20,998 tonnes. Production statistics from 1952 to 1972 are detailed in the appendix. Figures for 1973 production are incomplete.

4) Lime Sand

- general filling for the E.&W.S. Department. Excavated at Billy Light's Point, 5 kilometres southeast of Port Lincoln is section 545, hundred of Lincoln and has been quarried at other sites in Port Lincoln. The pits are almost worked out but large resources of lime sand exist to the south and west of Port Lincoln.
  Lime sand for filling does not present a resource problem and is not dealt with further in this report.

Artificial Sand is produced as a by-product from crushing stone from McDonalds aggregate quarry which is located 3 kilometres west of Port Lincoln (see plan No. 74-490), in sections 401-405 and 305, hundred of Lincoln.
Size grading of a representative sample of crusher fines is shown on plan No. 74-488. About 2,000 tonnes per annum is utilised by Betta Bloc and an unknown but small amount is used by Pioneer Concrete (S.A.) Pty. Ltd.

GEOLOGICAL SETTING

The regional geology of Lower Eyre Peninsula is shown on LINCOLN (Johns et al., 1958) and is described by Johns (1961). The accompanying orientation and geological plan (74-489) is modified from a plan compiled by Hiern (1972).

The four main physiographic elements on Lower Eyre Peninsula are as follows:

1) Eastern Coastal Plain - extending northwards from North Shields.
2) Lincoln Uplands - northeasterly trending uplifted block of Precambrian basement rocks.

3) Western Highlands - uplifted basement block adjoining the western coast.

4) Central Basin - between the Lincoln Uplands and Western Highlands. Precambrian metasediments of the Gawler Block are referred to as Cleve Metamorphics (Thomson, 1969) and consist of quartzite, dolomite, iron formations and a variety of schists and gneisses. The Cleve Metamorphics are assigned a Lower Proterozoic age.

The basement rocks have been subjected to intense chemical leaching with the development of a kaolinitic zone which is capped by Yallunda Ferricrete or Boston Bay Silcrete of late Cainozoic age.

Younger Pleistocene to Recent deposits on Lower Eyre Peninsula include Hindmarsh Clay, calcareous aeolianite of the Bridgewater Formation, calcrete of the Bakara Soil, stranded beaches of the St. Kilda Formation, inland siliceous dunes of the Molineaux Sand and coastal calcareous and siliceous dunes of the Semaphore Sand.

ST. KILDA FORMATION BETWEEN LOUTH BAY AND NORTH SHIELDS

All sand for Port Lincoln for the last 18 years has been obtained from the St. Kilda Formation. This unit is confined to a narrow strip up to 500 metres wide adjoining the present day coast between Louth Bay and North Shields on the Eastern Coastal Plain.

The formation comprises fine to coarse grained, well sorted, yellow and yellow-brown shelly sand with heavy mineral lamination, pebble and shell bands, clayey sand zones and carbonate segregations.

The shell bands constitute a transported fossil assemblage and include the following forms identified by Dr. N.H. Ludbrook, Palaeontological Consultant to the Department of Mines.

Katelysia peroni (Lamarck)

Electromactra flindersi Cotton and Godfrey

Bittium (Eubittium) lawleyanum Crosse

Batillaria (Zeacumantus) diemenensis (Quoy and Gaimard).

These species inhabit sandy mudflats and estuaries.

The St. Kilda Formation is of Recent age. Radiocarbon ages of shell fragments range from 1,100 years B.P. at the top of the unit to about 4,000 years B.P. at the base (Firman, 1969).

These deposits, which formed in the shallow marine and estuarine environment of the Osborne high sea-level of Sprigg in Aitchison et. al. (1954), comprise fossil beach deposits now stranded.

Reworking of St. Kilda Formation by wave action within the modern littoral zone produces the present day silica rich sand beaches.

Dunes of siliceous Semaphore Sand have formed by aeolian reworking of the uppermost 0.3 metres.

Measured thicknesses of the St. Kilda Formation of up to 2.5 metres lie above the local water table. The maximum depth to which the unit extends below the water table is unknown.

The relationship of the St. Kilda Formation to other rock units at Louth Bay is shown diagrammatically on cross section W-E (Plan No. S 10924).

CURRENT SAND SOURCES

1. Louth Bay

Location 23 kilometres north of Port Lincoln and 1.5 kilometres southwest of Louth Bay township in section 277, hundred of Louth. (see Plan No. 74-490).

Mining Tenements Three adjoining extractive minerals leases are held by K. Seeman, 58 Lincoln Highway, Port Lincoln, S.A. over a total area of 38 hectares. EML's 3081 and 3082 expire on 31st December 1981 and EML 3363 on 30th September 1978.

Workings The main open cut is 400 metres long in a north-south direction by 60 metres wide. Overburden, up to 0.3 metres in depth, comprises sand within the soil profile. A single pit face is limited to a height of 2 metres by the local water table although usable sand extends below the quarry floor to an unknown depth.

Sand is currently excavated from the southern portion of the main pit by front-end loader. The material is trucked to Port Lincoln for screening to remove the larger shells. Three smaller pits also lie within the leased area.

The workings are not visible from adjacent public roads. The northern, worked out part of the main pit is used as a rubbish dump for Louth Bay township.

Natural vegetation comprises low scrub and grass and the area is not used for agricultural purposes.

Geology Yellow-brown, shelly, medium to coarse grained sand of the St. Kilda Formation is veneered by Semaphore Sand. Within the St. Kilda Formation alternating coarse and fine layers, shell and pebble bands and heavy mineral laminations strike parallel to the coast and have a primary dip of about 5^{o} eastwards. The relationship between St. Kilda Formation and other rock units in the Louth Bay area is shown on cross section W-E (Plan No. S 10924).

Size grading of a vertical channel sample (A 26/73) of sand from the pit face shown on plan No. 74-488, complies with specifications for fine aggregate.

Production and Reserves.

Current annual production of approximately 10,000 tonnes is utilised by Pioneer Concrete (S.A.) Pty. Ltd. for pre-mixed concrete.

Recorded production figures of sand from Louth Bay are detailed in appendix.

Sand is expected to exist under an area of 8 hectares to an average depth of 2 metres giving 240,000 tonnes of sand. Further quantities of sand may be present within the area of the leases.

2. Poonindie

Location

18 kilometres north of Port Lincoln and 2 kilometres north-east of Poonindie in section 124, hundred of Louth (see plan No. 74-490).

Mining Tenements Two adjoining extractive minerals leases are held by R.A., V.A. and J.H. Dodd, 37 Dublin Street, Port Lincoln over a total area of 32.5. hectares. EML's 3203 and 3245 were granted to 30th September 1983 and 31st December 1984 respectively.

Workings

A north-south elongate open cut is 400 metres long by 100 metres wide. Overburden up to 0.3 metres in depth comprises sand within the soil profile. A single pit face is limited to a height of up to 2 metres by the local water table although usable sand continues below the quarry floor to an unknown depth.

Sand is currently excavated from the southern portion of the pit by front-end loader. The material is passed over a ¼ inch screen on site. Oversize material is rejected and undersize material is trucked to Port Lincoln.

The workings are not visible from nearby public roads.

The natural vegetation comprises low scrub and the area is not used for agricultural purposes.

Geology

Yellow-brown, shelly, medium to fine grained sand of the St. Kilda Formation is covered with Semaphore Sand.

Size grading of a 2 metre vertical channel sample (A156/74) of sand from the pit face is presented on plan No. 74-488.

Production and Reserves

Current annual production of about 10,000 tonnes is utilised by Adelaide and Wallaroo Fertilizers Ltd.

Recorded production figures of sand from Poonindie are detailed in the appendix.

Sand is expected to exist under an area of 4 hectares to an average depth of 2 metres giving 120,000 tonnes of sand. Further quantities of sand may be present within the area of the lease.

3. North Shields

a) EML 3204

Location 15 kilometres north of Port Lincoln and 5 kilometres northeast of North Shields in section III, hundred of Louth (see plan No. 74-490).

Mining Tenement Extractive minerals lease 3204 is held by W.D. Hage, Private Bag 104, Port Lincoln, S.A. over an area of 8 hectares and expires on 30th September 1983.

Workings Abandoned pits up to 2 metres deep were excavated for gravel. A disused crushing plant remains on site.

There are no lease corner pegs.

The workings are not visible from surrounding public roads.

Geology Slightly sandy, well rounded, coarse gravels are developed in buried creek channels on the floodplain of the Tod River.

Production and Reserves Production has ceased and no workable construction sand remains.

b) EML 3205

Location 15 kilometres north of Port Lincoln and 5 kilometres northeast of North Shields in section III, hundred of Louth (see plan No. 74-490).

Mining Tenement Extractive minerals lease 3205 is held by W.D. Hage, Private Bag 104, Port Lincoln, S.A. over an area of 16 hectares and was granted to 30th September 1983.

Workings The main pit is 50 metres long by 40 metres wide. Overburden, 0.3 metres in depth comprises sandy soil. A single pit face is limited to a height of 3 metres by the local water table.

Sand is excavated by front-end loader and trucked to Port Lincoln.

A small abandoned pit is located at the western end of the lease.

The workings are not visible from surrounding public roads.

Geology

Yellow-brown and red-brown medium and coarse grained sand of the St. Kilda Formation is veneered by Semaphore Sand. Within the St. Kilda Formation, alternating coarse and fine layers and bands of broken shell fragments are flat lying.

The size grading of a vertical channel sample (A157/74) of sand from the pit face, presented on plan No. 74-488, shows that the material is suitable for concrete fine aggregate.

Production and Reserves

Production from this pit is recorded with the main pit on EML 3206 in the appendix but it is reported that only a small quantity of concrete sand is excavated to supply the building trade.

Sand is expected to exist under an area of 10 hectares to an average depth of 2 metres giving 250,000 tonnes of sand. Further quantities of sand may be present within the area of the lease.

c) EML 3206

Location 15 kilometres noth of Port Lincoln and 5 kilometres northeast of North Shields in section 110, hundred of Louth (see plan No. 74-490).

Mining Tenement Extractive minerals lease 3206 is held by W.D. Hage Private Bag 104, Port Lincoln, S.A. over an area of 8 hectares and expires on 30th September, 1983.

Workings An irregular shaped pit extends 120 metres north-south by 40 metres wide. Overburden up to 0.2 metres in depth comprises sand within the soil profile. The height of the single pit face ranges from 1 to 2 metres and is limited by the level of the local water table and clay rich zones.

Sand is currently excavated from the centre of the lease area by front-end loader and transported to Port Lincoln by truck. Screening or washing is not necessary.

The workings are not visible from surrounding public roads

The natural vegetation comprises low scrub and grass and the area is not used for agricultural purposes.

Geology Yellow-brown fine grained sand and clayey sand of the St. Kilda Formation is covered with Semaphore Sand. Within the St. Kilda Formation clay blebs up to 1 centimetre in diameter are present. Layering and shell bands are absent. Clayey sand and sandy clay zones in the quarry face and below the quarry floor are avoided during excavation.

Size grading of a vertical channel sample (A158/74) of sand from the pit face, presented on plan No, 74-488 shows the material suitable for mortar and plastering sand.

Production and Reserves Current annual production from this lease and EML 3205 totals about 7,000 tonnes. The greater part supplies the building trade with mortar and plastering sand.

Pioneer Concrete (S.A.) Pty Ltd. utilise a small proportion to blend with sand from Louth Bay.

Recorded production figures of sand from North Shields pits are presented in the appendix.

Approximately 45,000 tonnes of sand are expected to exist based on an area of 3 hectares, a depth of one metre and assuming 50 per cent is clay free sand. Further quantities of sand may be present within the area of the lease. As this lease is the sole source of fine grained construction sand a drilling programme is recommended to outline reserves. If large reserves of clayey sand are proved, installation of a washing plant should be considered.

LAPSED EXTRACTIVE MINERALS LEASE 3303 AT NORTH SHIELDS

Location 15 kilometres north of Port Lincoln and 5 kilometres northeast of North Shields in section 110, hundred of Louth and adjoining EML 3206 (see plan No. 74-490).

Mining Tenement Extractive minerals lease No. 3303 was held by W.D. Hage Private Bag 104, Port Lincoln, S.A. over an area of 8 hectares and expired on 30th June, 1972. The lease lapsed due to an oversight.

Workings Eight irregular shaped pits range in sizes from 200 metres by 80 metres to 15 metres. Overburden 0.2 metres deep consists of sandy soil. Pit faces about one metre high are limited by an underlying layer of sandy clay.

The workings do not obtrude on the general landscape.

Geology Yellow-brown, very coarse grained sand and pale brown, fine grained, sandy clay of the St. Kilda Formation are overlain by Semaphore Sand.

Size grading of a vertical channel sample (A159/74) of sand from the pit face is shown on plan No. 74-488 and lies inside specification for concrete fine aggregate.

Production and Reserves Production has ceased. Production figures from this lease are not recorded separately but are included with those from the main pit on EML 3206 in the appendix.

Coarse sand is expected to exist under an area of at least one hectare to an average depth of one metre giving 15,000 tonnes of sand. Further quantities may be present in the area.

Significance These pits were the sole source of coarse sand for Betta Bloc and the E. & W.S. Dept.

Betta Bloc now purchase Louth Bay sand from Pioneer Concrete (S.A.) Pty. Ltd. An inferior block is produced because Louth Bay sand is finer grained than desired.

The E. & W.S. Dept. now transport coarse creek sand, satisfactory for pneumatically applied concrete, from Lipson at higher freight charge.

ALTERNATIVE SOURCES

A. Warunda Creek

Hundred of Mortlock, Sections 76 (recreation reserve) 6 and 41. In the Central Basin, 42 kilometres northwest of Port Lincoln.

Coarse creek sand from Warunda Creek provided construction sand for Port Lincoln prior to the establishment of pits at Louth Bay, Poonindie and North Shields.

The creek sand, variable in grain size and clay content, occurs in lenticular bodies between modern creek channels.

Size grading of a representative sample (A160/74) of sand is shown on plan No. 74-488.

Both modern and buried creek channels contain deposits of sand. Detailed exploration is required to locate workable deposits.

B Wanilla

Hundred of Wanilla, Sections 120 and 127. In the Central Basin, 32 kilometres northwest of Port Lincoln.

Sand spread overlies nodular ferricrete in the vicinity of Wanilla R.S. Although this sand is generally less than 10 centimetres in depth, thicker sections have developed in buried and modern creek channels.

Size grading of a representative sample (A161/74) of sand from a modern creek bank in section 120, hundred of Wanilla is shown on plan No. 74-488.

Sand exceeding 5 metres in thickness is reported to have been intersected during well sinking in section 127, hundred of Wanilla.

C Strawberry Hill

Hundred of Wanilla, Section 138. On the western slopes of the Lincoln Uplands, 40 kilometres nothwest of Port Lincoln.

Quartz gravels and coarse to fine grained sands form slope deposits at the base of three adjacent Precambrian quartzite hills, 2.5 kilometres notheast of Strawberry Hill.

There are two abandoned gravel pits at the base of the quartzite hills.

Size grading of coarse sand (sample A162/74) from an auger hole (0 - 2.85m) conforms to A77 specification (see plan No. 74-488).

Hand augering to a maximum depth of 2.85 metres failed to reach the base of the sand.

Similar sand is expected to extend over 20 hectares and 0.5 million tonnes of sand is inferred.

The site is not visible from surrounding public roads.

D Lake Wangarry

Hundred of Lake Wangarry, Section 127. In the western Central Basin, 46 kilometres west-northwest of Port Lincoln.

Coarse grained, well washed lacustrine sand forms multiple sand bars at the mouth of the major creek entering the northeastern side of Lake Wangarry.

The sand which is 2.5 metres thick, overlies grey sandy clay. The top 0.3 metres of sand is rich in organic matter.

Size grading of a sample (A163/74) from an auger hole (0.3 - 2.5 metres) fulfills specifications shown on plan No. 74-488.

Sand appears to underlie an area of about 10 hectares and 250,000 tonnes of sand is inferred.

E Edillilie

Hundred of Mortlock, Section 14. In the Central Basin, 48 kilometres north-northwest of Port Lincoln.

Fine grained aeolian Molineaux Sand forms north -northeast trending dunes near Edillilie.

Size grading of a sample (A164/74) from an auger hole (0 - 3.95 metres), presented on plan No. 74-488, shows the material to be too fine for construction sand. However, blending with a coarse sand such as at Strawberry Hill or Lake Wangarry would produce a series of useable sands.

Augering to a maximum depth of 3.95 metres failed to penetrate the full thickness of the deposit.

SUMMARY AND CONCLUSIONS

Stranded beach deposits of the St. Kilda Formation veneered by Semaphore Sand, both of Recent age, adjoin portion of the east coast of lower Eyre Peninsula and provide the principal present source of sand supplies for Port Lincoln.

Sand pits at Louth Bay, Poonindie and North Shields lie within a coastal zone reserved from parts 4-8 of the Mining Act 1971 - 1972.

About 45,000 tonnes of clay free fine sand for mortar and plastering are inferred on EML 3206 at North Shields. Installation of a washing plant would enable beneficiation of additional large quantities of clayey sand. A drilling programme is recommended to outline reserves.

Fine grained sand utilised in fertilizer manufacture is obtained at Poonindie where adequate reserves of at least 120,000 tonnes are inferred within current mining tenements.

Medium grained sand for fine aggregate is quarried at Louth Bay. Here, and on EML 3205 at North Shields, a total of 0.5 million tonnes of concrete grade sand is inferred.

Annual coarse sand requirement by Betta Bloc and the E. & W.S. Dept. totals 3,500 tonnes, originally supplied from lapsed extractive minerals lease 3303 at North Shields. Present supplies are considered unsatisfactory.

Five alternative sources of construction sand have been located. Sands and gravels forming slope deposits near Strawberry Hill and lacustrine sand at Lake Wangarry have the greatest potential.

At both deposits, subsurface exploration is required to define reserves.

Alluvial sand is present in Warunda Creek and near Wanilla but reconnaissance drilling is required to locate workable deposits. Fine grained dune sand at Edillilie, blended with coarse sand would produce a series of useful sands.

These five alternative sites are further by road from Port Lincoln that the existing pits.

Adequate quantities of medium and fine grained sand are available on current mining tenements at Louth Bay, Poonindie and North Shields but do not contain useable coarse sand.

Lifting of restrictions in the coastal reserve to allow extension of mining outside existing extractive minerals leases is not necessary at the present time because adequate supplies of fine and medium grained sand exist within current leases and alternative sources of coarse sand occur within reasonable distance of Port Lincoln.

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Industrial Minerals Section

DN:JG
29/7/74

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APPENDIX

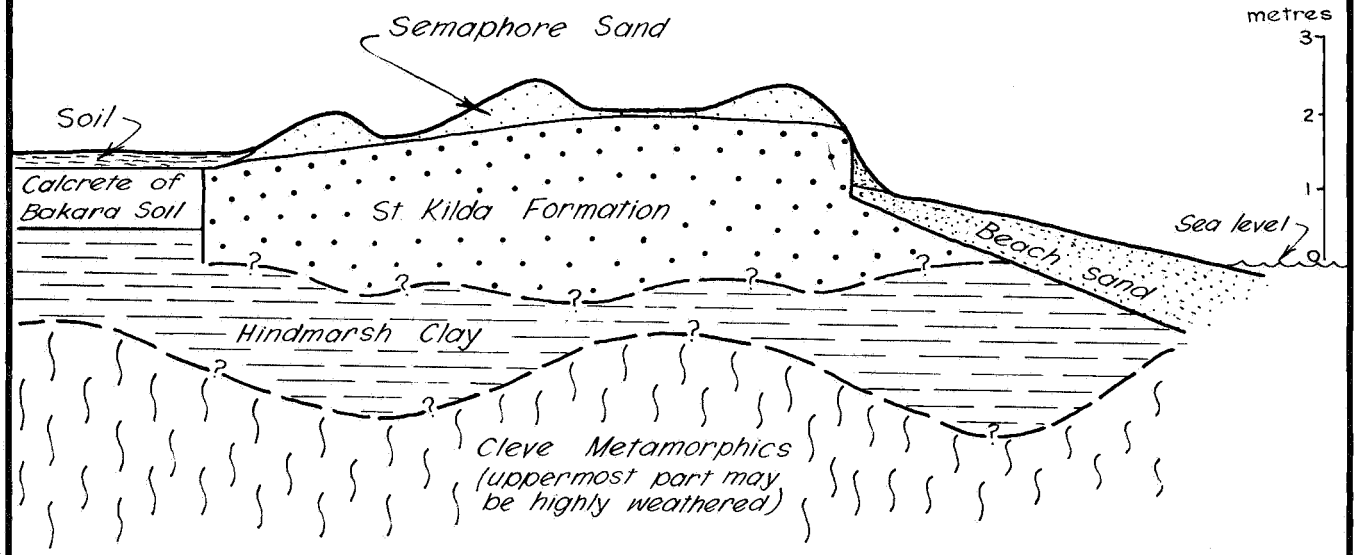
Production Statistics for Current Sand Sources

APPENDIX - Production Statistics for Current Sand Producers

Table 2: Production Statistics 1952 - 1972 (tonnes)

Year	Operation Louth Bay	Poonindie	North Shields	Total
1952	-	4064	-	4064
1953	-	1727	-	1727
1954	-	2032	-	2032
1955	-	2540	-	2540
1956	-	3048	-	3048
1957	-	3048	9754	12802
1958	-	4572	9144	13716
1959	203	5588	1681	7472
1960	1144	5080	1983	8207
1961	1151	9246	11490	21887
1962	3280	5419	9087	17786
1963	2323	3999	6160	12482
1964	5082	4442	10013	19537
1965	3652	4117	9288	17057
1966	2638	6584	6046	15268
1967	5571	7169	6670	19410
1968	8508	5247	4734	18489
1969	10611	6884	5995	23490
1970	4369	7824	6173	18366
1971	1788	7627	5108	14523
1972	8585	8270	4143	20998
Total	58905	108527	107469	274901

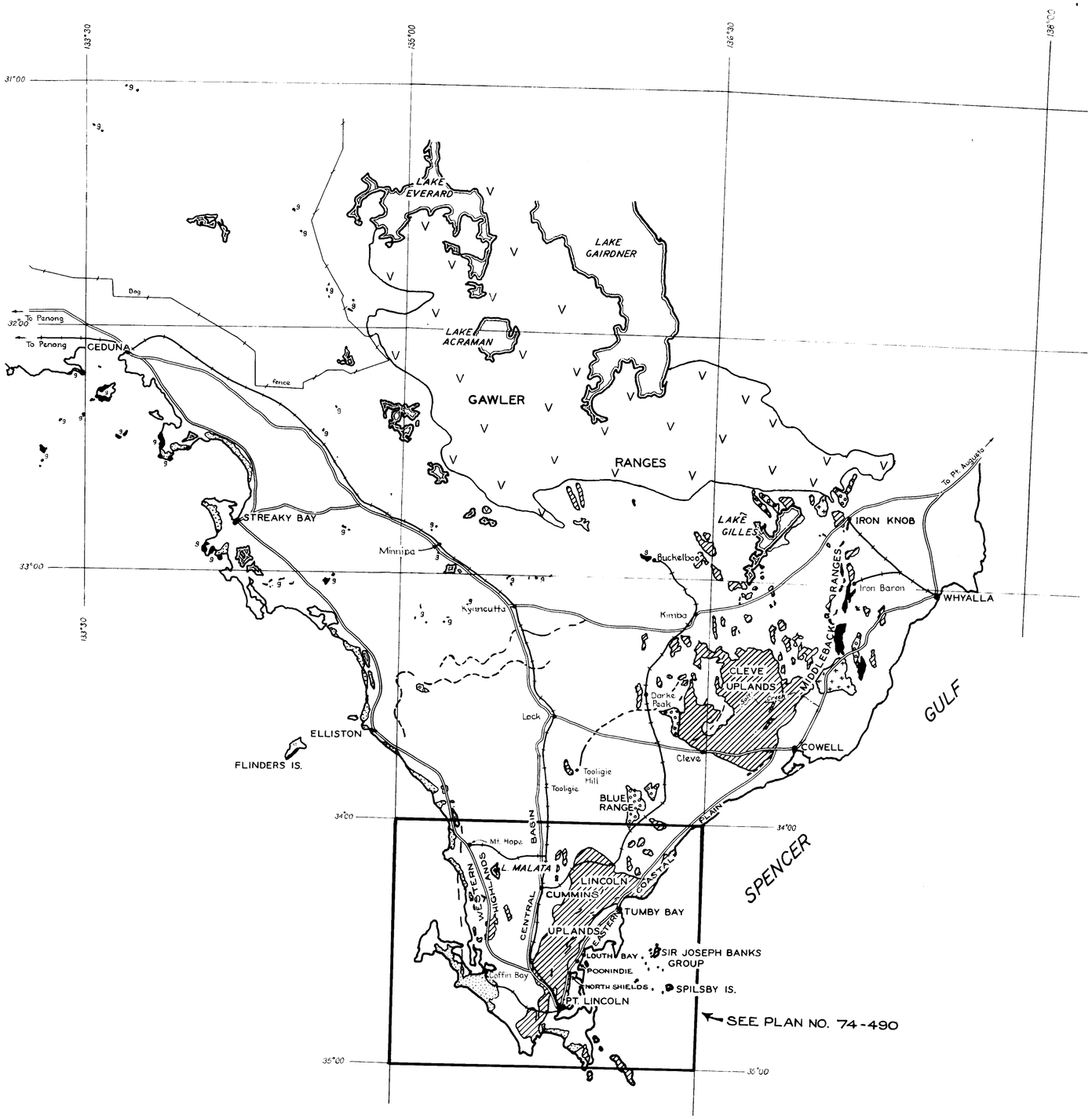
Figures for 1973 production are incomplete. Production figures are shown graphically on plan No. 74-530. Construction of major public works such as silos and reservoirs correspond with periods of relatively high production.



DEPARTMENT OF MINES — SOUTH AUSTRALIA

INDUSTRIAL MINERALS SECTION	**Drn.** D.N.	CONSTRUCTION SAND RESOURCES PORT LINCOLN AREA	**SCALE:** DIAGRAMMATIC
	Tcd. A.F.		S10924
	Ckd. A.F.	W-E CROSS SECTION AT LOUTH BAY SHOWING ROCK RELATIONSHIPS (DIAGRAMMATIC)	DLn
	Exd.		**DATE:** JULY 1974

500—2.69 665



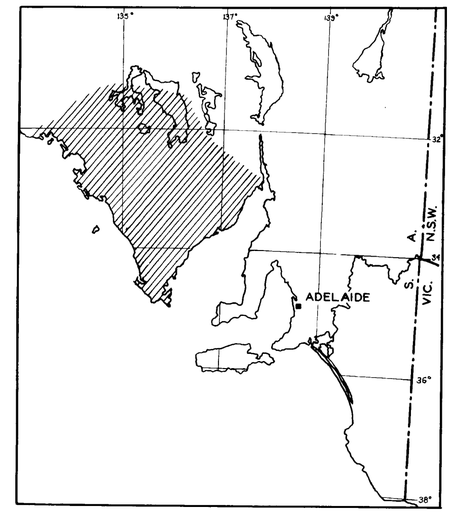
SCALE IN KILOMETRES

50 0 50 100

20 0 20 40 60 80

SCALE IN MILES

REGIONAL LOCALITY PLAN



LEGEND.

CAINOZOIC QUATERNARY

- Mainly silica sand and aeolianite overlying tertiary sediments
- **SEMAPHORE SAND**: mobile carbonate sand
- **YAMBA FORMATION**: Gypsum dunes

PRECAMBRIAN

CARPENTARIAN

- **GAWLER RANGE VOLCANICS**: pink quartz feldspar porphyry
- **BLUE RANGE SANDSTONE**: conglomerate, sandstone, siltstone, dolomite
- Granite, massive coarse grained
- **BURKITT GRANITE AND CHARLESTON GRANITE**: massive, coarse grained granite
- **MOONABIE PORPHYRY**: porphyritic rhyolite

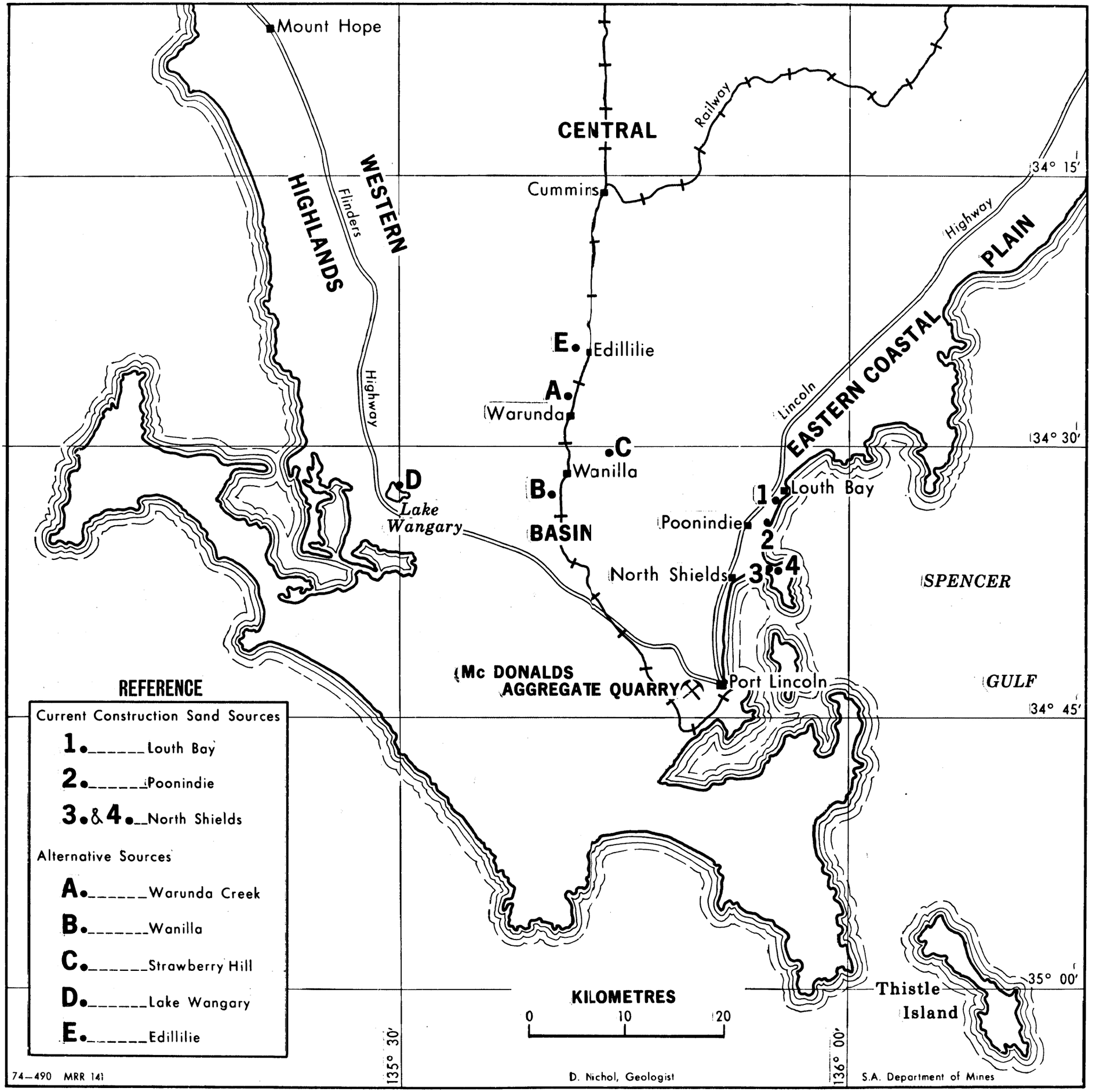
LOWER PROTEROZOIC CLEVE METAMORPHICS

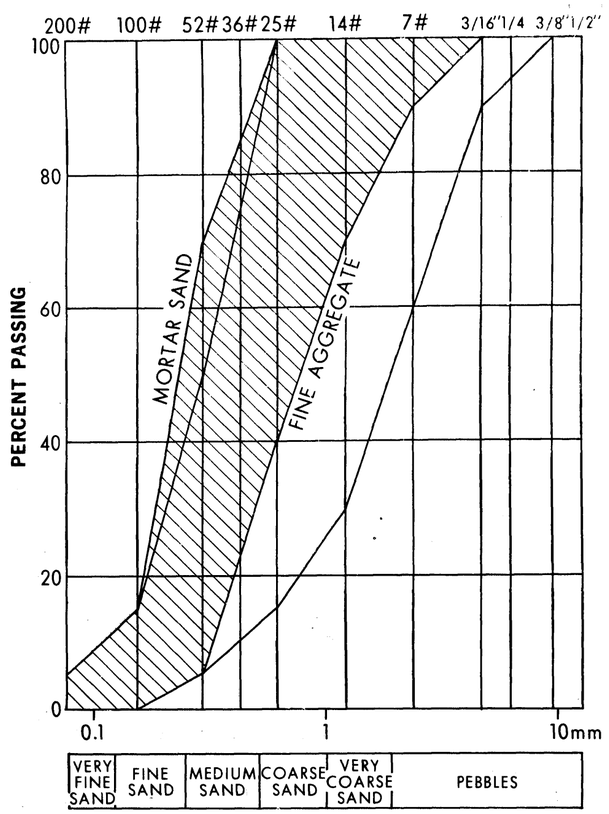
- Schist, gneiss, quartzite (outcrop)
- Dolomite
- Iron formation; outcropping or established by drilling
- Inferred from aeromagnetic survey

DEPARTMENT OF MINES — SOUTH AUSTRALIA

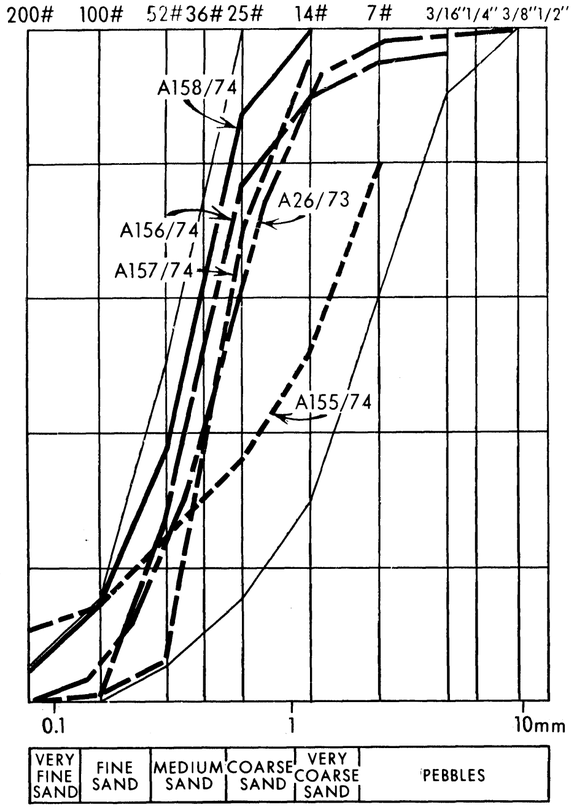
CONSTRUCTION SAND RESOURCES PORT LINCOLN AREA ORIENTATION AND REGIONAL GEOLOGY

INDUSTRIAL MINERALS SECTION	D. NICHOL GEOLOGIST	Drn. D.N.	SCALE: 1:1,500,000
		Tcd. J.W.	74-489 Dlm.
		Ckd. A.F.	
Director of Mines		Exd.	DATE: 2nd July 1974

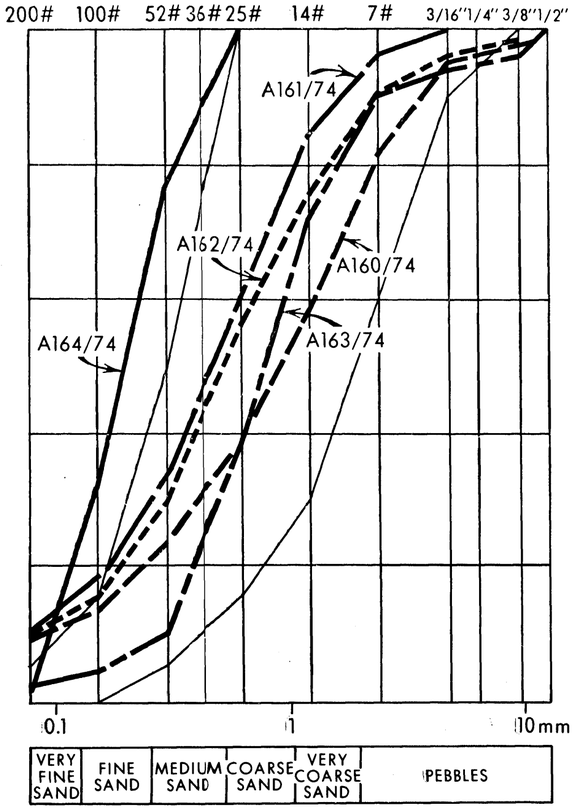

Mount Hope
WESTERN HIGHLANDS
Flinders Highway
CENTRAL
Railway
Cummins
34° 15'
Highway
EASTERN COASTAL PLAIN
Lincoln
E. Edillilie
A. Warunda
C. Wanilla
B.
BASIN
D. Lake Wangary
34° 30'
1. Louth Bay
Poonindie
2
North Shields
3. 4
SPENCER GULF
Mc DONALDS AGGREGATE QUARRY
Port Lincoln
34° 45'
Thistle Island
35° 00'
KILOMETRES
0 10 20
135° 30'
136° 00'
REFERENCE
Current Construction Sand Sources
1. Louth Bay
2. Poonindie
3. & 4. North Shields
Alternative Sources
A. Warunda Creek
B. Wanilla
C. Strawberry Hill
D. Lake Wangary
E. Edillilie
74—490 MRR 141
D. Nichol, Geologist
S.A. Department of Mines



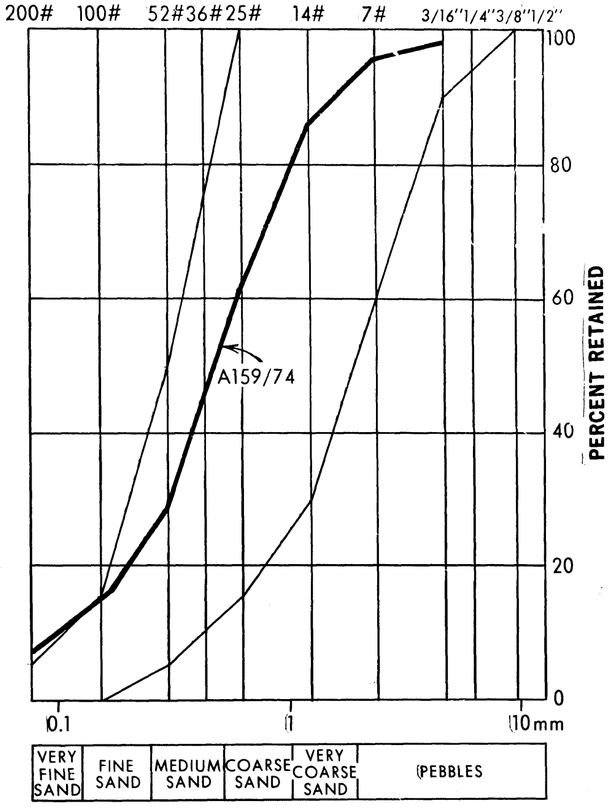
LIMITS OF A.S.A. A77
1957 FINE AGGREGATE
BS1200 (1955) MORTAR SAND



GRAPH 1



GRAPH 2



GRAPH 3

SOURCE STATUS	ROCK UNIT	SAMPLE NO.	LOCATION REF.	HUNDRED	SECTION	OTHER INFORMATION	GRAPH	SAMPLE LOCATION	F.M.*	OTHER COMMENTS
CURRENT	Cleve Metamorphics	A155/74		Lincoln	401–405,305	McDonalds aggregate quarry	1	Screenings stockpile	2.9	Artificial sand
	St. Kilda Formation	A26/73	1	Louth	277	Louth Bay sand pit	1	2m vert. channel sample from pit face		Fine aggregate
	"	A156/74	2	"	124	Poonindie sand pit	1	2m " "	2.11	Filler in fertilizer manufacture
	"	A157/74	3b	"	111	North Shields EML 3205	1	3m " "	3.28	Fine aggregate
	"	A158/74	3c	"	110	" EML 3206	1	2m " "	1.6	Mortar and plastering sand
ALTERNATIVE	Alluvium	A160/74	A	Mortlock	76,61,4	Warunda Creek	2	1m vert. channel sample from creek bank	2.88	
	"	A161/74	B	Wanilla	120	Wanilla	2	0.75m " "	2.06	
	Scree sand	A162/74	C	"	138	Strawberry Hill	2	Auger sample 0–2.85m	2.40	
	Lacustrine sand	A163/74	D	Lake Wangary	127	Lake Wangary	2	" 0.3–2.5m	2.96	
	Molineaux Sand	A164/74	E	Mortlock	14	Edillilie	2	" 0.3–3.95m	0.92	Fine grained:requires blending
OTHER	St. Kilda Formation	A159/74		Louth	110	North Shields Lapsed EML 3303	3	1m vert. channel sample from pit face	2.12	Coarse sand

* *The fineness modulus (F.M.) is calculated from the sum of the cumulative percentages retained in the sieve analysis divided by 100 when the 100,52,25,14,7, 3/16 (and coarser if reqired) BSS sieves are used, each succeeding sieve having an opening double that of the preceeding one. The coarser the material the larger the fineness modulus. The limits of the A77 specification have fineness moduli of 1.35 and 4.*

74—488 MRR 141

D. Nichol Geologist

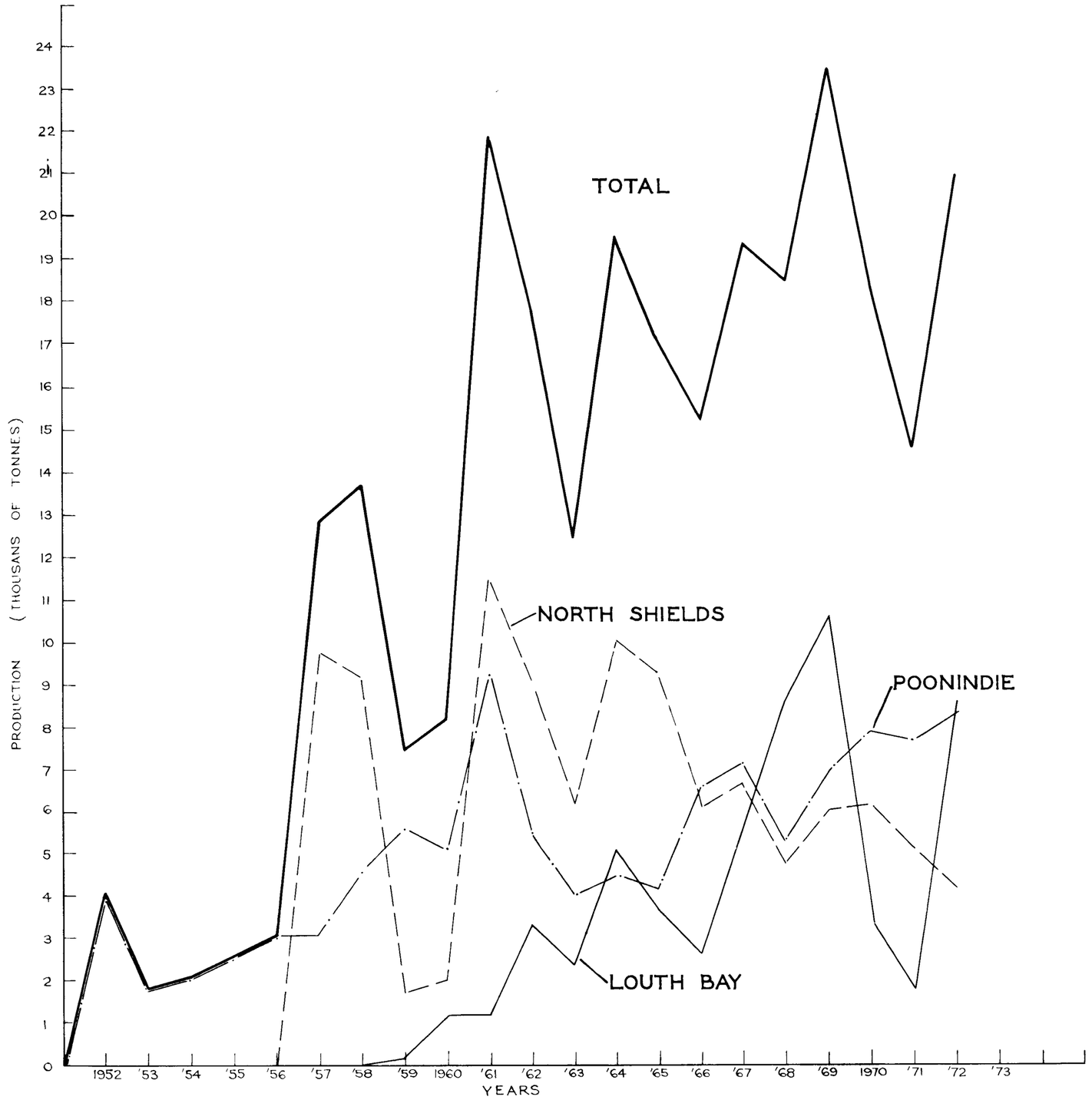
S. A. Department of Mines

REDUCE TO ~~9½~~ inches
8¾

74/151

CONSTRUCTION SAND RESOURCES
PORT LINCOLN AREA
SAND SIZE GRADINGS

Fig. 4
MRR 141



DEPARTMENT OF MINES — SOUTH AUSTRALIA

CONSTRUCTION SAND RESOURCES - PORT LINCOLN AREA

PRODUCTION GRAPHS FOR CURRENT SAND PRODUCERS

INDUSTRIAL MINERALS SECTION	D. Nichol GEOLOGIST	*Drn.* D.N.	**SCALE:** GRAPHICAL
		Tcd. A.F.	74 – 530 DLn
Director of Mines		*Ckd.* A.F.	
		Exd.	**DATE:** JULY 1974