

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

REPT.BK.NO. 81/118
DISTRICT COUNCIL OF STREAKY BAY
PLANNING POLICIES FOR MINERAL
AND GROUNDWATER RESOURCES

GEOLOGICAL SURVEY

by

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and

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DME.704/80

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SOUTH AUSTRALIA

Rept. Bk. No. 81/118
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DISTRICT COUNCIL OF STREAKY BAY
PLANNING POLICIES FOR MINERAL AND GROUNDWATER RESOURCES

ABSTRACT

No metallic mineral deposits of State or National significance are known within the Council area although there is potential for the discovery of significant metalliferous deposits in the basement rocks which lie concealed at relatively shallow depth beneath Quaternary cover.

Reserves of granular and seed gypsum south east of Streaky Bay township represent a mineral resource of considerable significance. A small deposit of high grade silica sand at the entrance to Baird Bay is used as filter sand at the Whyalla Steelworks and is a significant mineral resource. The red granite quarry near Calca is a major source of building stone.

Construction materials for local needs are the most important mineral resource in the Council area. Ripon Calcrete which occurs extensively throughout the southern half of the area provides a suitable source of material for road construction.

Groundwater is generally too saline for human consumption although stock water is available over a large portion of the Council area. A small basin of low salinity groundwater is located south of Streaky Bay.

Planning policies should protect known deposits and allow for future discoveries to be made and developed.

INTRODUCTION

The District Council of Streaky Bay has resolved to prepare a Supplementary Development Plan for the whole of the Council area. An appraisal has been made of the mineral and groundwater resources of the District Council, and comprises:-

- (a) A review of the geological environment to indicate where, as a result of future exploration, workable mineral resources may be found.
- (b) A review of known mineral deposits.
- (c) A statement of tenements held under the Mining Act at 30/11/81.
- (d) A brief discussion on groundwater resources in the area.
- (e) Suggested planning policies for the protection of groundwater, the development of mineral resources and guidelines for extraction and rehabilitation.

The area under review includes the hundreds of Wallala, Koolgera, Haslam, Pertubie, Walpuppie, Yantanabie, Findlayson, Tarlton, Cungena, Bockelberg, Scott, Murray, Chandada, Karcultaby, Ripon, Forrest, Campbell, Inkster, Wrenfordsley, Rounsevell, Witera and portion of Wright all within the county of Robinson. The area covers more than half of the STREAKY BAY and portion of the ELLISTON 1:250 000 map sheets. The District Council of Streaky Bay is located on western Eyre Peninsula (Figure 1, Plan no. S15678).

GEOLOGICAL SETTING

A brief summary of the stratigraphic sequence exposed in the Streaky Bay District Council area is given below.

The sediments are classified on a basis of age and lithology, and their distribution is shown on Figure 3, (Plan no. 81-571), which has been compiled from unpublished mapping of the Geological Survey of South Australia.

Basement lies at a relatively shallow depth throughout the Council area, and can be observed outcropping along the coastline

offshore at low tide, and inland as isolated inselbergs - prominent steep sided residual hills and mountains rising abruptly from the plains.

Exposed basement consists of granite and gneiss of Proterozoic Age. They are generally fresh and hard in surface outcrop.

Pleistocene and Recent deposits overlie the basement rocks and are widely distributed throughout the Council area. Oldest of these are the calcareous aeolianite of the Bridgewater Formation which form the cliffs and western plains in the coastal region. These are calcareous sand of windblown origin now partially consolidated.

Separating the Upper and Lower Bridgewater Formation is pink-brown Ripon Calcrete which also extends inland over a large portion of the Council area as flat-lying sheets up to 2 m thick. The calcrete is generally well cemented and hard.

A broad sheet of calcareous reddish silty sand referred to as the Woorinen Formation covers the northern portion of the Council area, and is the youngest of the Pleistocene deposits.

Sediments of Recent age comprise:-

Shallow lake sediments and associated dunes south of Streaky Bay (Yamba Formation) consisting of pale grey sand and flour gypsum.

Reworked Bridgewater Formation occurs as Semaphore Sand, the white and pale brown calcareous sand of the modern coastal dunes.

Molineaux Sand of the inland dune spread occurs in the far northeastern portion of the District Council area. It consists of an off-white sand over pale yellow-brown sand.

MINERAL RESOURCES

Current tenements under the Mining Act are listed in the Appendix and shown on the mineral resources map (Figure 2, Plan no. 81-570).

Red granite, gneiss and porphyry crop out in the southern half, in particular at Calca Bluff, Mount Hall and Mount Cooper. The Calca quarry (EML 4469) on section 46 hundred Rounsevell is one of four quarries in Australia producing red granite for monumental and building purposes. Mining methods are described by Falconer & Watkins (1977). As colour and texture varies, only a few outcrops are suitable for aggregate, such as porphyry at Mount Cooper, or have potential for building stone.

Although no other major mineral deposits have been located within the underlying Precambrian basement, the Council area is at present almost entirely covered by exploration licences. There is a possibility that intensive exploration will result in significant discoveries in the future, considering that the principal metalliferous mines in Australia are located in Precambrian rocks (Hiern, 1980).

Proven reserves of granular and seed gypsum occur 16 km southeast of Streaky Bay, representing a mineral resource of considerable significance. They are associated with Recent lake deposits, the highest concentration of gypsum occurring in section 9B hundred Ripon (Forbes, 1960). The principal deposit is estimated to contain in excess of 30 million tonnes of grey gypsum sand of 90 percent or higher purity covering 13 square kilometres to an average depth of 1.8 m. The chief impurity is calcite, averaging 6 percent by weight. A smaller quantity of gypsum sand in dunes in the same area is estimated to aggregate 520 000 tonnes.

Apart from its traditional uses in building materials, gypsum has been considered as an alternative source of sulphur but the current low demand for sulphur suggests that it may be many years before gypsum will be required for this purpose.

Potential also exists for the production of salt by solar evaporation of brine on lake beds, similar to the operation currently being carried out at Lake MacDonnell, 65 km west of Ceduna (South Australian State Planning Authority, 1974).

The lack of good harbour facilities is a problem for future development of the potential salt and gypsum deposits along the western coast of Eyre Peninsula. Similarly, the shortage of low salinity water in the Streaky Bay region would restrict the production rate of washed gypsum. Large reserves of gypsum still exist at Lake MacDonnell, and it is therefore unlikely that commercial development of the Streaky Bay deposit will take place for some time. However, it is important that these resources are not sterilized by alternative land uses.

Occurrences of coarse grained, well sorted and rounded quartz sand have been located along the coastline. A deposit of restricted size at the entrance to Baird Bay is at present mined on a small scale by the B.H.P. Company (EML's 4034 to 4036 sections 12, 186, 242 hundred Wrenfordsley) for use as filter sand at the Whyalla Steelworks (Hoyle, 1976 and Johnson, 1980).

Beach sand surveys of the coastal region conducted by the Department of Mines and Energy indicate that there are no heavy mineral deposits of economic importance in dune or beach sand within the Council district (Morris, 1977, 1978). One small rutile-zircon-ilmenite sand deposit has been recorded at Slade Point but has little economic potential.

The reserves of limesands at Coffin Bay (Semaphore Sand) are very large (Johns, 1968) and it is unlikely that the extensive dunes of limesand in the coastal region of the Council area will be worked in the future.

Suitable sources of coarse aggregate for road and railway construction and for concrete may be found in outcropping basement rocks and the widespread Ripon Calcrete. The former are of limited extent and it is important that there is no development in these areas which will prejudice future extraction.

A network of borrow pits will be required throughout the district for Council works. Ripon Calcrete is probably the most suitable source rock and this occurs extensively throughout the southern half of the Council area.

GROUNDWATER RESOURCES

Groundwater in the Council area is generally saline except for a small basin of limited extent south of Streaky Bay where low salinity water occurs as a relatively thin layer above saline groundwater in the Bridgewater Formation (Figure 4, Plan no. 81-572).

Stock quality water is available over a large portion of the Council area. Recharge is small, being derived from local rainfall.

Groundwater resources have already been developed to their fullest extent and overpumping can result in salinity increases which may render the water unusable.

PLANNING POLICIES AND MANAGEMENT PRINCIPLES

Mineral bearing land is usually suitable for many other uses, ranging from conservation of natural and heritage features to occupation for residential, commercial or primary production

purposes.

Extraction of the underlying minerals is generally seen as a land use to be avoided because of the potential for adverse impact or loss of the land for other uses.

However mineral deposits are non renewable and as existing sources are depleted new deposits must be available to maintain the supply of these essential products.

The location of deposits is fixed by geological events of the past and it is not always possible to site workings in a desired place or to find an alternative source where the impact of extractive operations is lower.

This applies particularly to construction materials and other minerals with a purely local demand which, because of the high cost of transport, often funded from public sources, have to be won close to the place of use.

A complete knowledge of the resources in an area can never be obtained because many deposits, particularly base metals and hydrocarbons, lie undiscovered below the present land surface. However it is possible in some cases to identify areas with high potential for future discovery.

The existence of deposits of construction materials and some industrial minerals is often known but they cannot be classified as significant because there is no apparent demand for them. However the situation can change dramatically by a major public works or other development project which creates a new demand.

Mineral resource management needs to take these factors into account in protecting deposits required for the future and ensuring that workings are conducted to acceptable environmental standards.

Suggested policies and principles for inclusion in the Supplementary Development Plan are set out below.

Protection of resources

Significant deposits, including those not worked at present, and areas with potential for discovery, need protection from prior land uses which will prevent or prejudice mineral extraction when a need arises in the future.

Identification of significant resource areas in a Supplementary Development Plan not only provides the necessary protection of the resource but serves as an indication to potential purchasers of the surrounding land that mineral workings could be developed on the site at a later date.

The following general principle is recommended:

Mineral resources should be protected from development which is incompatible with extractive industry or which will add to the cost of extracting the resource.

The working face and the impacts associated with it, move progressively through the deposit. Thus many adjacent areas which are at present several hundred metres from the extractive operation will in due course become much closer to it.

The following general principle is recommended:

Development proposals in the vicinity of known mineral deposits should not be approved until the full extent of mineral workings has been considered.

Knowledge of mineral resources is continually being improved. The resource data presented in this report will consequently be modified in the future and the Department of Mines and Energy should be consulted for up to date information

when major development proposals in rural areas are being considered by the Council.

The following general principle is recommended:

When major development or large subdivisions are being considered in rural areas the Department of Mines and Energy should be consulted for up to date information on mineral resources.

Area Policies

The following deposits in the Council area are considered to be significant and should be identified in the area specific sections of the Supplementary Development Plan.

1. The silica sand deposits at Baird Bay (sections 12, 186 and 242 hundred Wrenfordsley, Extractive Mineral Leases 4034, 4035 and 4036) should be zoned extractive industry to ensure the availability of these unique deposits to the Whyalla steel industry.
2. Extractive industry should be a consent use in the remainder of the coastal zone but in addition to the normal environmental safeguards, the applicant should be required to demonstrate that no viable alternative sources exist. The coastal zone is defined as the area between low water mark and 800 m inland, and this zone is currently reserved from the operations of the Mining Act.
3. As EML 4469 over the Calca Granite quarry is only 2.25 ha, all of section 46, hundred Rounsevell, should be zoned extractive industry.
4. Extractive industry should be a consent use in rural areas outside of the settlements and new workings permitted where no significant permanent impacts are identified. Any major

development or subdivision proposed in rural areas should not be permitted to proceed until a detailed investigation of the site to determine its mineral potential has been completed.

5. The planning policies should recognise the Streaky Bay gypsum deposits as a significant and important resource and any major development or subdivision proposal should not be permitted in the area of this resource. The classification of the resource as an Extractive Industry Area is considered desirable and should safeguard the resource against uses which may preclude its utilization.
6. Provision should be made for the expansion of the Streaky Bay harbour site to provide for any future development of nearby gypsum deposits. Provision should be made for possible processing or stockpiling of mineral products which may be required as a result of future discoveries in the area.

Management of operations

The following text has been agreed between the Department of Environment and Planning and the Department of Mines and Energy to be appropriate development specific principles for extractive industry:-

Some definitions of extractive industry include the dressing and treatment of minerals as well as the mining of these materials.

However because dressing and treatment processes are more akin to industrial activities, these principles are confined to the winning of construction materials and other minerals from mines, quarries and shallow pits.

Mining operations usually alter the natural land form of the site and have potential to cause either temporary or permanent changes to other physical features or the amenity of the surrounding area.

Mining proposals should therefore be assessed prior to operations commencing to be assured that the community will not be unnecessarily disadvantaged in the opening of a new deposit and that the site will be reclaimed to an appropriate land form and after use when extraction is complete.

Proposals for new operations, including borrow pits for Councils and other public works should therefore be assessed in relation to the following.

1. Community gain

The overall benefit to the community from the minerals produced together with the planned after use of the site should outweigh any loss of amenity or other resources resulting from the extractive operation.

2. Suitability

It should be established that the site contains minerals of the necessary quality and that for reasons of location, quality or other factors no practical alternative source is available.

3. Resource utilisation

The proposed operation should maximise the utilisation of the resource but minimise the adverse impacts of extraction.

4. Buffers

An effective buffer of land, tree screening or mounding should be established around the site to protect the existing adjoining land users from the effects of the operation.

5. Operations

Operations should be conducted in accordance with a development and reclamation programme approved by the appropriate authority and which

- 1) ensures that danger and unreasonable damage or nuisance does not arise from the workings or any operations associated with them.
- 2) provides for progressive reclamation of disturbed areas.
- 3) provides for the removal of buildings, plant, equipment, rubbish and litter when operations are complete.
- 4) renders the site safe for future occupiers or users.

6. After use

An after use appropriate to the site and the locality should be established on the completion of extractive operations.

7. Townships

New extractive operations should generally not be opened within township boundaries unless for short term public works programmes or other special purposes.

Protection of groundwater resources

Development should not deplete or pollute groundwater resources, particularly the potable water supply south-east of Streaky Bay.

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Development Plan. Govt. Printer, Adelaide.

APPENDIX

DISTRICT COUNCIL OF STREAKY BAY - MINING TENEMENTS CURRENT 30/11/81

NUMBER	LESSEE	HUNDRED	SECTION(S)	AREA (Ha)	EXPIRY DATE	COMMODITY	OPERATOR
EML 4034	B.H.P. CO, LTD	Wrenfordsley	Pt.12, 186 242	8	From 7.12.79 for 21 years	Sand	B.H.P. Co. Ltd.
EML 4035	"	"	"	"	"	"	"
EML 4036	"	"	"	"	"	"	"
EML 4469	Concrete Industries (Monier) Ltd.	Rounsevell	Pt. 46	2.25	27/4/82	Granite (Dimension Stone)	Calca Granite

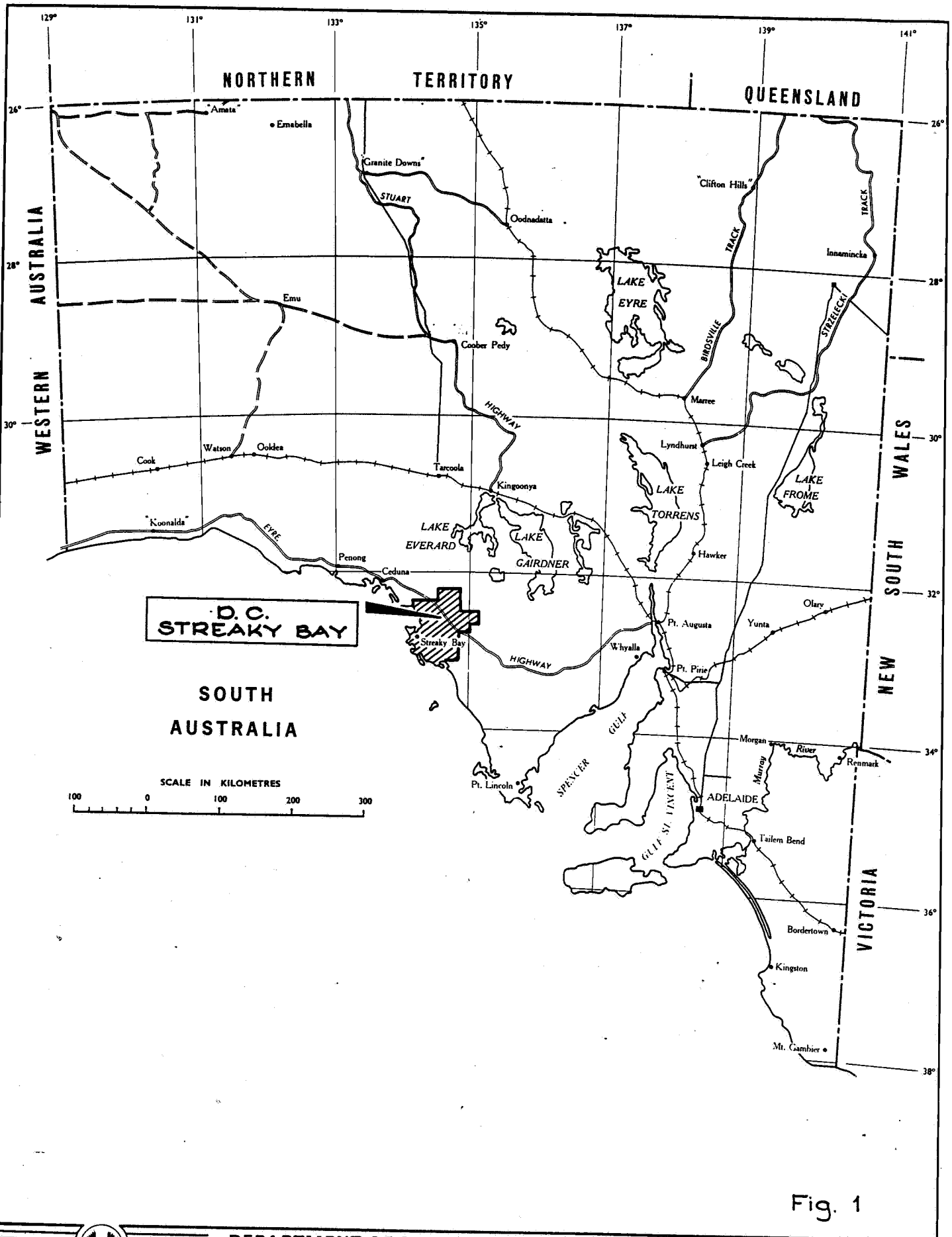


Fig. 1



DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

DISTRICT COUNCIL OF STREAKY BAY

LOCALITY PLAN

COMPILED
B.G.T.

DRAWN
M.R.

DATE
Aug. 1981

CHECKED

(C.D.O.) DATE

SCALE As shown






PLAN NUMBER

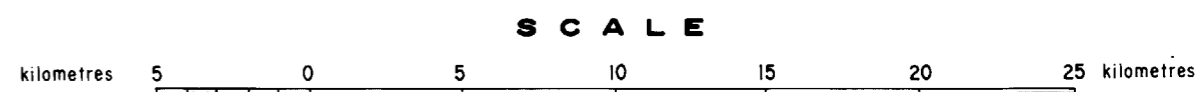
S 15678

25-40



REFERENCE

- | | | | |
|---|--------------------------|---|---|
|  | CALCRETE - road rubble |  | GRANITE - Aggregate and building stone. |
|  | LIMESANDS |  | SILICA SAND |
|  | GYPSUM (lakes and dunes) | ● EML 4465 | Extractive Mineral Lease |
| | | □ ML 4036 | Mineral Lease |




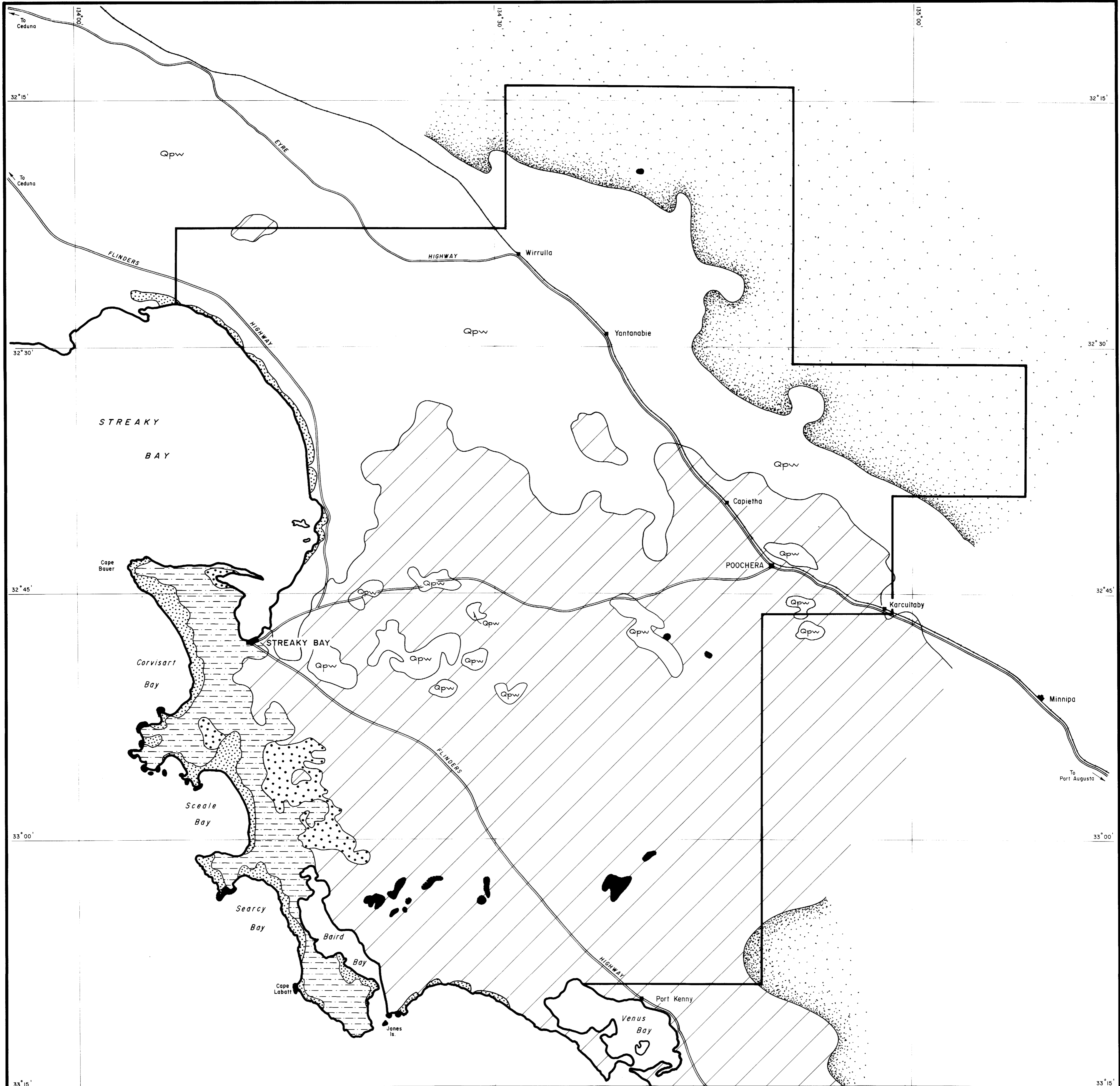
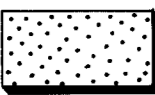
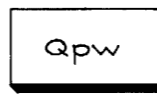

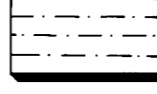

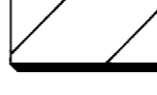

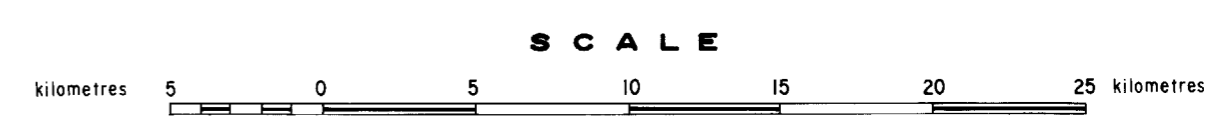
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	DISTRICT COUNCIL OF STREAKY BAY	
	HUNDREDS, MINING TENEMENTS AND MINERAL RESOURCES	
	DRAWN M.R. DATE Aug. 1981 CHECKED	SCALE 1:250,000 PLAN NUMBER 81 - 570

Fig. 2



REFERENCE

- | | | | |
|---|---|---|--|
|  | SEMAPHORE SAND:
Calcareous sand of the modern coastal dunes. |  | WOORINEN FORMATION:
Aeolian calcareous silt sand sheet with carbonate lumps and nodules. |
|  | MOLINEAUX SAND:
Pale yellow-brown sand of the inland dune spread. |  | BRIDGEWATER FORMATION:
Yellow-brown calcarenite with reworked calcareous shell sand. |
|  | YAMBA FORMATION
Silty shell sand, swamps and tidal deposits, lacustrine and dune gypsum deposits. |  | Calcrete in BAKARA SOIL with RIPON CALCRETE at the base. |
| | |  | Granite and granitic gneiss. |




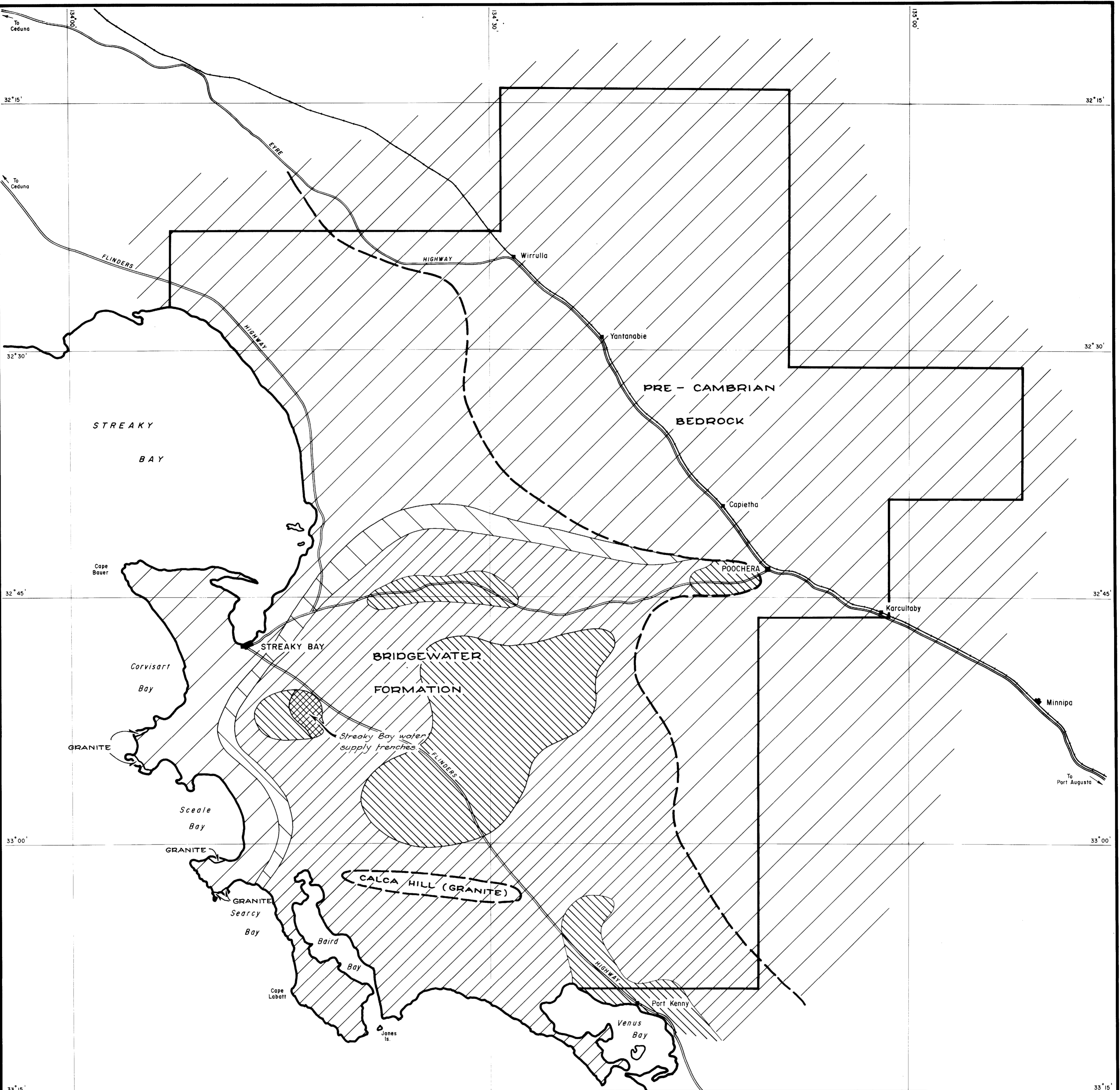

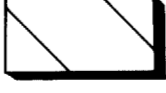

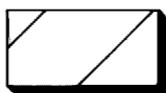
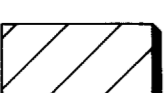

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		DRAWN M.R.	SCALE 1:250,000
DISTRICT COUNCIL OF STREAKY BAY GENERALISED GEOLOGY		DATE Aug 1981	PLAN NUMBER 81-571
		CHECKED	

Fig. 3

25-40



SALINITY

	0 - 1500 mg/L		7000 - 12000
	1500 - 3000 mg/L		Over 12000
	3000 - 7000 mg/L		Rock Unit Boundary.

NOTE: Low salinity groundwater of the Bridgewater Formation occurs as a relatively thin "skin" above saline groundwater. Over-pumping can result in salinity increases to the point where the water may be unusable. Recharge is derived from local rainfall.



NOTE: Data from Groundwater Resources of S. Aust. 1:1000,000 by R.G. Shepherd.

Fig. 4

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA		COMPILED	<i>MC</i>	28-3-82
		R.G.S.	C.P.G.	DATE
DISTRICT COUNCIL OF STREAKY BAY GROUNDWATER RESOURCES		DRAWN	SCALE 1:250,000	
		M.R.	DATE	PLAN NUMBER
		CHECKED	Aug 1981	81-572