Statement of environmental effects on Lot 2 DP 842422

Broulee, for Coastal Quarry Development Pty Limited
STATEMENT OF ENVIRONMENTAL EFFECTS
ON LOT 2 DP 842422 BROULEE
FOR COASTAL QUARRY DEVELOPMENT
PTY LIMITED
A.C.N. 001 371 660

G.M.C. BROWN (3rd Year) B.Nat. Res. (UNE)
SYNOPSIS

The area being assessed in this Statement is a parcel of land on the South Coast of N.S.W. approximately 5 kms north of the Moruya River. (Map 1)

The Illawong sand pit has been operating as such since pre-1963. Under the new SEPP37 guidelines Coastal Quarry Development Pty Limited wishes to continue the operation of this sand pit in a legal and environmentally-responsible manner.

Coastal Quarry Development Pty Limited has examined the site and formulated a systematic management plan for the orderly extraction of the permitted quantities of sand. This plan involves the division of the present area into smaller working Zones. When one Zone has ceased working it will be rehabilitated at the same time as the next Zone is being excavated.

The northern Section of the site has a significant area of Wetlands traversing it. This Section has been identified and no development has taken or will ever take place on the Wetlands or on the Buffer area surrounding it.

This operation is, by its nature, non-threatening to the environment. By its isolation, it causes no inconvenience to others and the absence of chemicals and other pollutants in its operation makes it one of the preferred options for the land use of this site.

Investigations to date have revealed no rare or significant species of either flora or fauna that would be endangered by this development. As 97% of the site will always be a non-working area, the impact of the development on the flora and fauna would be minimal.

This Statement of Environmental Effects seeks to identify the environmental concerns surrounding this development and to justify the continued operation of this valuable extractive industry.
This negative is a photograph made as a permanent record of a document in the custody of the Registrar General this day 4 November 1994.

Map 1
INTRODUCTION

Operator: Coastal Quarry Development Pty Limited
P.O. Box 274
Batemans Bay 2536

Development: Sand Excavation

Location: Lot 2 DP 842422
Broulee
Parish of Tomaga
County of St. Vincent

Total Area: 83.17 hectares

Divisions: Section A: The Wetlands
Section B: Present developed area
Section C: Area for possible future development

Zone Size: 12,000 square metres

Project: Annual production of 40,000 tonnes is sought
# TABLE OF CONTENTS

Synopsis
Introduction

Chapter 1  Objectives of the Development
  1.1 Type of Product
  1.2 Markets

Chapter 2  Physical Characteristics
  2.1 On-site
  2.2 Off-site
  2.3 Transportation of Products
  2.4 Previous Operations
  2.5 Policy Schedule 1

Chapter 3  Planning Controls
  3.1 Present Controls
  3.2 Previous Controls

Chapter 4  Environmental Features
  4.1 Landform
  4.2 Hydrology
  4.3 Flora
  4.4 Fauna
  4.5 Soils
  4.6 Archaeology

Chapter 5  Interactions between Development and Environment
  5.1 Land-clearing
  5.2 Excavation
  5.3 Operation of Machinery

Chapter 6  Environmental Analysis
  6.1 Current Impact of the Development
  6.2 Future Impact of the Development
  6.3 DOP Guidelines
Chapter 7 Environmental Protection Measures
  7.1 Working Areas
  7.2 Site Rehabilitation
  7.3 Integration

Chapter 8 Justification of Proposed Development
  8.1 Environmental Considerations
  8.2 Economic Considerations
  8.3 Social Considerations

Chapter 9 Feasible Alternatives
  9.1 Alternatives to the Development
  9.2 Reasons for Choosing the Development

Chapter 10 Consequences of Non-Development

Chapter 11 Specific Matters
  11.1 Place of the Development in the Completed Scheme
  11.2 Integration of Proposed with Earlier Development
  11.3 Sequence of Extraction
  11.4 Management of Water Resources
  11.5 Rehabilitation and Restoration of Land
  11.6 Special Effects for Past or Future Generations

Chapter 12 Supporting Documentation
  12.1 Additional Plans
  12.2 Test Results

Chapter 13 Documentation
  13.1 Consultations Undertaken
  13.2 Necessary Approvals
Chapter 1: Objectives of the Development

1.1 Type of Product
The Illawong sand pit produces a variety of sand products for the supply of quality materials for the ever-expanding building industry of the Eurobodalla Shire. Sand is an essential resource in the building trade and the ready availability of these quality sands, as well as their economic viability, assure their ready acceptance in the market place.

The various sands produced at this pit include:

- Brickies' Sand
- Fill Sand
- Coarse Sand
- White tilers' Sand
- Concrete Sand
- Coarse Fill

1.2 Markets
The markets for the above products lie mainly with the building industry: bricklayers, concretors, builders and landscapers use the sand appropriate for their application. Other users include: concrete plants, brick plants, concrete products and roads and drainage works. The distribution of the products falls mainly within the Eurobodalla Shire, in particular in the Batemans Bay and Moruya areas.

Photo 1: Stockpiled Sand
Chapter 2: PHYSICAL CHARACTERISTICS

2.1 On-site
Sand excavation on this land has been carried out over a number of years. The presently proposed development is being, and will continue to be, carried out in a far more structured manner, giving due consideration to all the relevant environmental, economic and social considerations. The proposed development adheres to the following guidelines:

- Following a detailed inspection of the site, it has been determined which land is to be left in its native state (Section A - the Wetlands); which land is to be presently developed (Section B - excavated previously in the '70's) and which land could be developed in the future (Section C - heavily logged during the '50's, '60's and '70's).

- Section B is divided into four Zones, each one measuring approximately 80m x 150m - 12,000m² - ensuring that wildlife corridors and buffer zones are left.

Map 3
One Zone at a time is cleared so that sand can be excavated and screened. A front-end loader or excavator is used to excavate the sand and to load it on to the screener. The screening process separates the sand into different particle sizes and extraneous products.

The screened sand is then stock-piled, according to its classification - brickies' sand, fill sand, concrete sand, etc. As required, the sand is loaded on to tipping trucks and transported directly to the point of sale.

Recycling of tree heads and timber produces mulch which is used in the restoration and beautification of the site.

2.2 Off-site
Haul and access roads constitute the only consideration in off-site development. When leaving the sand pit, trucks travel a distance of 350 metres along the existing track to its junction with George Bass Drive, which is the initial road travelled towards either Batemans Bay or Moruya. There is no other secondary off-site development connected with this operation, as once the sand is removed from the site, it is delivered directly to the point of sale.

2.3 Transportation of Products
All materials are removed from the development site by combusted pneumatic-tyred vehicles.

2.4 Previous Operations
Previous methods of sand extraction involved the digging of holes, without the clearing of large trees. This frequently resulted in the undermining of the root systems of these trees. Partial rehabilitation of Section B took place after the area was mined during the mid '70's. This rehabilitation involved levelling of the area and filling in the old holes. Section C was heavily logged during the fifties and sixties.
2.5 Policy Schedule 1 - Registration Information

1. Particulars of the Operator
   Coastal Quarry Development Pty Ltd
   P.O. Box 274
   Batemans Bay 2536

2. Description of the Land
   - The land adjoins George Bass Drive, Broulee.
   - The area of Lot 2 is 83.17ha.
   - Lot 2, D.P. 842422 Parish of Tomaga, County of St. Vincent.

3. Planning Controls
   - June 16th, 1993.
   - SEPP37

4. Nature of Operation Prior to Planning Controls
   - Sand was first extracted from this area around 1959.
   - Prior to 1980, there only exist incomplete records of quantities of material produced. Since 1980 the figures are as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980/81</td>
<td>7000 tonnes</td>
</tr>
<tr>
<td>1981/82</td>
<td>1200</td>
</tr>
<tr>
<td>1982/83</td>
<td>9375</td>
</tr>
<tr>
<td>1983/84</td>
<td>23481</td>
</tr>
<tr>
<td>1984/85</td>
<td>14046</td>
</tr>
<tr>
<td>1985/86</td>
<td>13250</td>
</tr>
<tr>
<td>1986/87</td>
<td>14461</td>
</tr>
<tr>
<td>1987/88</td>
<td>16225</td>
</tr>
<tr>
<td>1988/89</td>
<td>17317</td>
</tr>
<tr>
<td>1989/90</td>
<td>49594</td>
</tr>
<tr>
<td>1990/91</td>
<td>51400</td>
</tr>
</tbody>
</table>

   - A small area was cleared of undergrowth and small trees with a front-end loader. The topsoil was removed and sand excavated using a front-end loader. The sand was then put over a screener in order to
remove roots and sticks. The screened sand was stockpiled, according to its classification until its removal by tip truck to the point of sale.

- The main haulage route was via the old Moruya-Broulee Tip Road and the Broulee Road and Princes Highway either north to Batemans Bay or south to Moruya.

5. Details of Operation after Planning Control
- See Map 3.
- Material produced has been sand for the building industry.
- The only treatment the material undergoes is the screening process. The sand is loaded with a front-end loader.
- Hydraulic rubber-tyred loaders and excavators are used for extraction, screening and loading, while combusted pneumatic-tyred tipping trucks are used to transport the sand to its destination.
- The hours of operation of the quarry are: 6a.m. to 7p.m. Monday to Friday.
Chapter 3: PLANNING CONTROLS

3.1 Present Controls
There is only one Control presently in force over this operation, that being State Environmental Planning Policy No. 37, which enables the operation to continue, with some restrictions, until 18 September 1995, unless the Registration is cancelled. During the moratorium period the amount of material that may be extracted is 51,400 tonnes and the area of the pit size is 13,500 square metres.

3.2 Previous Controls
All past planning instruments permitted extractive industries to operate with consent. On 9th August 1963, the first Planning Control, IDO No. 1, came into force. This was the first Planning Control over the land.
Chapter 4: ENVIRONMENTAL FEATURES

The site of the proposed development is located on the South Coast of N.S.W. approximately five kilometres north of the Moruya River.

4.1 Topography
- The land is generally flat with some drainage depressions running at 20° N/S. The Wetlands lie in a low depression, rising very gradually to the almost flat middle section. The southern section consists of very gently undulating natural bushland, with a .5 to 1 metre fall.

- The annual rainfall of the area is about 850 mm and is fairly evenly distributed throughout the year, while the temperatures are generally mild. The average daily maximum temperatures range from 16.6°C in July to 26.7°C in February, while the average minimum temperatures range from 0.7°C in July to 14.6°C in February.

- The site is well protected from strong winds with its cover of trees and rather dense understorey.

4.2 Hydrology
The dominant hydrological feature is the Wetland, zoned 7(a) and protected under SEPP 14, which traverses the northern section of Lot 2, running almost parallel to the line of subdivision with Lot 1. A water table lies under the sand at varying depths. Along almost the entire length of the southern-most border natural drainage runs in a south-north direction every 50 metres.

4.3 Flora
Preliminary field work was carried out on 10-11 June 1995. On 3-4 August 1995 Nicholas Graham-Higgs and Associates assessed six vegetation quadrats within the study site, determining the structure, floristic composition and percentage of cover of each species.

Two broad vegetation communities were identified in Lot 2. Section A is dominated by the Wetland community, while Sections B and C are covered by Open Dry Scherophyll Forest in which Eucalyptus pilularis (Blackbutt) is the dominant species.
Map 4: Vegetation Communities and Spotlight Transects
(Courtesy Nicholas Graham-Higgs & Associates)
Section A - the Wetlands: This area is a more open tract of land and was inundated at the time of the survey. In the upper stratum, to 20 metres, approximately 5% of the Wetland is covered by *Casuarina glauca* (Swamp oak), 50% being dead and 50% moribund. The remaining 95% of the inundated area is covered by *Cladium procerum* which grows to a height of 1.2 metres. The transitional vegetation between the Wetland and forest is dominated by sedge, grass and herb species with 90% cover, to a height of 0.5 metres. There was no evidence of the salvinia water weed which is causing problems in other Wetlands in the area.

Photo 2: View towards the Wetlands

Sections B & C- The Developed & Future Areas: Section B was excavated for sand in the '70's and is now only sparsely timbered with heavy trees which are remnants of this earlier spot-digging of sand, while Section C was heavily logged in the '50's, '60's and '70's. The foliage cover of the dominant species, *Eucalyptus pilularis* (Blackbutt) and the scattered *Eucalyptus botryoides* (Bangalay) is only in the region of 15-25%. The tallest eucalypts reach a height of 30 metres. In the middle storey, to 8 metres, scattered *Banksia serrata* (Saw banksia) and *Acacia maidenii* (Maiden's wattle) are found.
The understorey is dominated by *Pteridium esculentum* (bracken) and *Macrozamia communis* (burrawang), together with *Imperata cylindrica* (Blady grass). The shrub cover is of medium to low density, varying between 50% and 60%. There is some infestation of *Chrysanthemoides monolifera* (bitou bush) and other weeds in patches where the ground has clearly been disturbed previously. The bitou bush was recently treated with Roundup, following consultation with Graham Harding, E.S.C.'s Weeds Officer.

Photo 3: Vegetation of Section C
Photo 4: Canopy of Section B

Photo 5: Vegetation of Section B
This flora list incorporates species identified during a site visit to the development site undertaken on the 3 and 4 of August 1995;


<table>
<thead>
<tr>
<th>Species</th>
<th>Producer Species</th>
<th>Additional Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acacia longifolia</td>
<td>Imperata cylindrica</td>
<td>Stackhousia spathulata</td>
</tr>
<tr>
<td>Acacia maidennii</td>
<td>Isoplepis nodosa</td>
<td>Tamunculus amphitrichus (?)</td>
</tr>
<tr>
<td>Acacia mearnsii</td>
<td>Juncus sp.</td>
<td>Themeda australis</td>
</tr>
<tr>
<td>Acianthus fornicatus</td>
<td>Lagenifera stipitata</td>
<td>Trema aspera</td>
</tr>
<tr>
<td>Allocasuarina littoralis</td>
<td>Lomandra longifolia</td>
<td>Triglochin procerum (?)</td>
</tr>
<tr>
<td>Aristida vagans</td>
<td>Macrozamia communis</td>
<td>Typha orientalis</td>
</tr>
<tr>
<td>Banksia serrata</td>
<td>Microlaena stipoides</td>
<td>Viola cleyanat</td>
</tr>
<tr>
<td>Baumea articulata</td>
<td>Monotoca elliptica</td>
<td>Viola hederacea</td>
</tr>
<tr>
<td>Baumea juncea</td>
<td>Notelea longifolia</td>
<td>Zanthorrhoea concava (?)</td>
</tr>
<tr>
<td>Billardiera scandens</td>
<td>Opercularia varia</td>
<td>*Anagallis arvensis</td>
</tr>
<tr>
<td>Botrychium australc</td>
<td>Oplismenus aemulus</td>
<td>*Cirsium vulgare</td>
</tr>
<tr>
<td>Calochaena dubia</td>
<td>Oxalis sp.</td>
<td>*Hydrocotyle bonariensis</td>
</tr>
<tr>
<td>Carex appressa</td>
<td>Panicum simile</td>
<td>*Hypochaeris radicata</td>
</tr>
<tr>
<td>Casuarina glauca</td>
<td>Pelargonium australc (?)</td>
<td></td>
</tr>
<tr>
<td>Centella asiatica</td>
<td>Pellaea falcata</td>
<td></td>
</tr>
<tr>
<td>Cladium procerum</td>
<td>Persicaria decipiens</td>
<td></td>
</tr>
<tr>
<td>Cymbidium suave</td>
<td>Persoonia linearis</td>
<td></td>
</tr>
<tr>
<td>Cyperus sanguinoletus</td>
<td>Phragmites communis</td>
<td></td>
</tr>
<tr>
<td>Desmodium varians</td>
<td>Platysace lanceolata</td>
<td></td>
</tr>
<tr>
<td>Deyeuxia quadrirseta</td>
<td>Poa labillardieri</td>
<td></td>
</tr>
<tr>
<td>Dichondra repens</td>
<td>Poranthera microphylla</td>
<td></td>
</tr>
<tr>
<td>Digitaria sp.</td>
<td>Potametnum tricarinatus</td>
<td></td>
</tr>
<tr>
<td>E. pilularis</td>
<td>Pratia purpuracens</td>
<td></td>
</tr>
<tr>
<td>Echinopogon ovatus</td>
<td>Pratia purpurascens</td>
<td></td>
</tr>
<tr>
<td>Entolasia stricta</td>
<td>Pieridium esculentum</td>
<td></td>
</tr>
<tr>
<td>Eragrostis leptostachya</td>
<td>Pierostylis nutans</td>
<td></td>
</tr>
<tr>
<td>Eucalyptus botryoides</td>
<td>Pyrrosia rupestris</td>
<td></td>
</tr>
<tr>
<td>Eucalyptus pilularis</td>
<td>Ranunculus amphitrichus (?)</td>
<td></td>
</tr>
<tr>
<td>Eucalyptus macrochata</td>
<td>Ranunculus plebeius (?)</td>
<td></td>
</tr>
<tr>
<td>Gaehnia clarkei (?)</td>
<td>Rubus parvifolius</td>
<td></td>
</tr>
<tr>
<td>Geranium sp.</td>
<td>Schelhammera undulaia</td>
<td></td>
</tr>
<tr>
<td>Glyicine clandestina</td>
<td>Schoenoplectus balidus</td>
<td></td>
</tr>
<tr>
<td>Gonocarpus teucroides (?)</td>
<td>Senecio sp.</td>
<td></td>
</tr>
<tr>
<td>Hardenbergia violacea</td>
<td>Sagesbeckia orientalis</td>
<td></td>
</tr>
<tr>
<td>Hibbertia obtusifolia</td>
<td>Solanum pungetum</td>
<td></td>
</tr>
<tr>
<td>Hibbertia scandens</td>
<td>Sporobolus sp.</td>
<td></td>
</tr>
<tr>
<td>Hydrocotyle peduncularis</td>
<td>Stackhousia aphytulata</td>
<td></td>
</tr>
</tbody>
</table>

Table 1
Leigh, Boden & Briggs identify nineteen endangered species which were or are threatened by mining and quarrying activities throughout Australia.

### Table 2

<table>
<thead>
<tr>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acacia anomalata</td>
</tr>
<tr>
<td>Apatophyllum constabiei</td>
</tr>
<tr>
<td>Boronia revoluta</td>
</tr>
<tr>
<td>Calothamnus longissimus</td>
</tr>
<tr>
<td>Calothamnus rupestris</td>
</tr>
<tr>
<td>Calytrix superba</td>
</tr>
<tr>
<td>Cryptocarya foetida</td>
</tr>
<tr>
<td>Darwinia masonii</td>
</tr>
<tr>
<td>Daviesia purpurascens</td>
</tr>
<tr>
<td>Eucalyptus steedmani</td>
</tr>
<tr>
<td>Eucalyptus stoatei</td>
</tr>
<tr>
<td>Euphorbia carissoides</td>
</tr>
<tr>
<td>Helipterum gracile</td>
</tr>
<tr>
<td>Leucopogon obtectus</td>
</tr>
<tr>
<td>Persoonia rudis</td>
</tr>
<tr>
<td>Pultenaea skinneri</td>
</tr>
<tr>
<td>Stachystemon axillaris</td>
</tr>
<tr>
<td>Stawellia dimorphantha</td>
</tr>
<tr>
<td>Tetratheca remota</td>
</tr>
</tbody>
</table>

There was no evidence of any of these species on any of the land in question.

### 4.4 Fauna

Nicholas Graham-Higgs and Associates undertook field work pertaining to fauna on the nights of 3 and 4 August, 1995, completing a total of seven transects. Following is a list of the fauna observed during June and during the Field Survey in August.

### Table 3

<table>
<thead>
<tr>
<th>Mammals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macropus giganteus</td>
</tr>
<tr>
<td>Macropus rufogriseus</td>
</tr>
<tr>
<td>Wallabia bicolor</td>
</tr>
<tr>
<td>Petauroides volans</td>
</tr>
<tr>
<td>Petaurus australis</td>
</tr>
<tr>
<td>Petaurus breviceps</td>
</tr>
<tr>
<td>Trichosurus vulpeca</td>
</tr>
<tr>
<td>Pseudocheirus peregrinus</td>
</tr>
<tr>
<td>*Canis familiaris</td>
</tr>
<tr>
<td>*Sus scrofa</td>
</tr>
<tr>
<td>*Felix catus</td>
</tr>
<tr>
<td>*Vulpes vulpes</td>
</tr>
<tr>
<td>Eastern Grey Kangaroo</td>
</tr>
<tr>
<td>Red-necked Wallaby</td>
</tr>
<tr>
<td>Swamp Wallaby</td>
</tr>
<tr>
<td>Greater Glider</td>
</tr>
<tr>
<td>Yellow-bellied Glider</td>
</tr>
<tr>
<td>Sugar Glider</td>
</tr>
<tr>
<td>Common Brush-tailed Possum</td>
</tr>
<tr>
<td>Common Ringtail Possum</td>
</tr>
<tr>
<td>Dog</td>
</tr>
<tr>
<td>Feral Pig</td>
</tr>
<tr>
<td>Cat</td>
</tr>
<tr>
<td>Fox</td>
</tr>
</tbody>
</table>
### Birds

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Acanthiza pusilla</em></td>
<td>Brown Thornbill</td>
</tr>
<tr>
<td><em>Acanthorhynchus tenuirostris</em></td>
<td>Eastern Spinebill</td>
</tr>
<tr>
<td><em>Anas superciliosa</em></td>
<td>Black Duck</td>
</tr>
<tr>
<td><em>Anthochaera carunculata</em></td>
<td>Red Wattlebird</td>
</tr>
<tr>
<td><em>Anthochaera chrysopetera</em></td>
<td>Little Wattlebird</td>
</tr>
<tr>
<td><em>Ardea novaehollandiae</em></td>
<td>White-faced Heron</td>
</tr>
<tr>
<td><em>Allisterus scapularis</em></td>
<td>King Parrot</td>
</tr>
<tr>
<td><em>Cacatua galerita</em></td>
<td>Sulphur-crested Cockatoo</td>
</tr>
<tr>
<td><em>Cacatua roseicapilla</em></td>
<td>Galah</td>
</tr>
<tr>
<td><em>Callocephalon fimbriatum</em></td>
<td>Gang-gang Cockatoo</td>
</tr>
<tr>
<td><em>Colluricinclia harmonica</em></td>
<td>Grey Thrush</td>
</tr>
<tr>
<td><em>Clamacteris leucocephaea</em></td>
<td>White-throated Treecreeper</td>
</tr>
<tr>
<td><em>Corvus coronoides</em></td>
<td>Australian Raven</td>
</tr>
<tr>
<td><em>Colluricinclia harmonica</em></td>
<td>Grey Thrush</td>
</tr>
<tr>
<td><em>Dacelo gigas</em></td>
<td>Kookaburra</td>
</tr>
<tr>
<td><em>Dicaeum hirundinaceum</em></td>
<td>Mistletoe Bird</td>
</tr>
<tr>
<td><em>Eopsaltria australis</em></td>
<td>Southern Yellow Robin</td>
</tr>
<tr>
<td><em>Gymnorhina tibicen</em></td>
<td>Australian Magpie</td>
</tr>
<tr>
<td><em>Lichenostomus chrysops</em></td>
<td>Yellow-faced Honeyeater</td>
</tr>
<tr>
<td><em>Malurus cyaneus</em></td>
<td>Superb Blue Wren</td>
</tr>
<tr>
<td><em>Meliphaea lewini</em></td>
<td>Lewins Honeyeater</td>
</tr>
<tr>
<td><em>Melithreps lunatus</em></td>
<td>White-napped Honeyeater</td>
</tr>
<tr>
<td><em>Microeca flicophae</em></td>
<td>Jacky Winter</td>
</tr>
<tr>
<td><em>Pachycephala pectoralis</em></td>
<td>Golden Whistler</td>
</tr>
<tr>
<td><em>Pardalotus striatus</em></td>
<td>Striated Pardalote</td>
</tr>
<tr>
<td><em>Phylidonyris novaehollandiae</em></td>
<td>New Holland Honeyeater</td>
</tr>
<tr>
<td><em>Platycercus elegans</em></td>
<td>Crimson Rosella</td>
</tr>
<tr>
<td><em>Platycercus eximius</em></td>
<td>Eastern Rosella</td>
</tr>
<tr>
<td><em>Psophodes olivaceus</em></td>
<td>Eastern Whip Bird</td>
</tr>
</tbody>
</table>

### Amphibians

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Crinia signifera</em></td>
<td>Common Eastern Froglet</td>
</tr>
<tr>
<td><em>Litoria verreauxii</em></td>
<td>Verreaux's Tree Frog</td>
</tr>
</tbody>
</table>

* Introduced Species
However, the following points should be considered when assessing the impact of the development on the wildlife of the area:

- The Wetland, protected under SEPP14, provides potential habitat to five species of endangered fauna. To minimise any impact from the development in Section B, it is essential to maintain a vegetated buffer between the sand extraction activities and the Wetland. Active control of feral animals, especially the predatory foxes, cats and dogs should be undertaken. If these measures are taken, it is considered that the impact of the development on flora, fauna and water quality will be negligible.

- Additional assessment of Section C should be undertaken prior to the commencement of any sand extraction. Assessment of the rehabilitation success of the mined areas of Section B will provide a basis for permitting activities to commence in this Section.

- The Seven Point Test of Significance was carried out to determine whether the removal of habitat within the development area will significantly impact on endangered fauna as described under Section 77(3)(d) of the EPA Act. On completion of this test it is considered unlikely that the mining of Zones A, B, C and D within Section B will significantly impact on local populations of endangered fauna.

- In Section B, the maximum area that will be cleared and worked at any one time will be 24,000m$^2$ - one Zone of 12,000m$^2$ being excavated and one of 12,000m$^2$ being restored. That leaves 97% of the site for any native fauna to utilise as habitats. There has been continued use of this site as a sand excavation site for a number of years and there still exists a wide variety of native - both endangered and common - animals in the immediate area.
4.5 Soils
Uniform sandy soils occur in Sections B and C, while the soil in Section A, the Wetlands is more humic in nature. The soil is moderately to strongly acidic and is well-drained and aerated.

<table>
<thead>
<tr>
<th>SOIL PROFILE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
</tr>
<tr>
<td>Black sandy soil</td>
</tr>
<tr>
<td>0.3</td>
</tr>
<tr>
<td>Greyish Sand</td>
</tr>
<tr>
<td>1.5</td>
</tr>
<tr>
<td>Yellow Sand</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>White Sand</td>
</tr>
</tbody>
</table>

Table 7
The nutrients and mineral content of the sandy soil are mainly derived from leaf litter. As about 95% of the leaf litter is derived from the dominant Blackbutt species, the following table formulates the mineral content therein:

Table 8
Annual Mineral Return in leaf Litter

<table>
<thead>
<tr>
<th>Forest Type</th>
<th>Leaf Litter (kg/ha)</th>
<th>Minerals in Leaf Litter (kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subtropical rainforest</td>
<td>5943</td>
<td>N 97 P 4.7 K 30 Ca 90</td>
</tr>
<tr>
<td>Blackbutt</td>
<td>6506</td>
<td>N 41 P 1.3 K 8 Ca 25</td>
</tr>
<tr>
<td>Antarctic beech</td>
<td>2720</td>
<td>N 29 P 1.5 K 8.5 Ca 10</td>
</tr>
</tbody>
</table>
4.6 Archaeology
An Archaeological Assessment of Lot 2 was carried out by South East Archaeology in July 1995.

AIMS
- to identify and record any Aboriginal sites within the study area;
- to assess the significance of any Aboriginal sites located during the survey;
- to assess the potential impacts of the proposed development on any such sites;
- to consult with the local Aboriginal community;
- to make recommendations for the conservation and management of any Aboriginal sites identified.

RESULTS
During the survey one isolated artefact, Waldrons Swamp 1, was discovered in Section C, the area that is not being developed at present. The artefact is a quartz flake measuring 29mm x 28mm x 7mm.

Two other artefacts were identified on adjoining land owned by E.S.C.

RECOMMENDATIONS
- There are no archaeological constraints to the development of Section B.
- A Consent-to-Destroy Permit should be obtained from NPWS if future sand extraction is to affect the artefact, Waldrons Swamp 1, which is of low heritage significance.
- ESC should be notified of the existence of the two sites on their land.
- A further assessment of Section C should be carried out by a qualified archaeologist, in consultation with the Mogo Land Council, after the initial removal of vegetation, when development is about to proceed.
- NPWS should be notified of any unrecorded sites or relics found to date.
Chapter 5: INTERACTIONS BETWEEN DEVELOPMENT & ENVIRONMENT

5.1 Land-clearing
The land that is presently cleared and being worked covers an area of 12,000m$^2$ and on completion of excavation will be rehabilitated. This minor landclearing (1.4% of the total land area) and the installation of the mobile screener have already been assessed by Council staff to be of no major impact to the environment. No clearing whatsoever will take place on the area immediately to the north of the present cleared site, as that area constitutes the Wetlands and the Buffer zone.

Careful planning of the extraction sites should enable as many habitat trees as practicable to be retained. The flora and fauna studies undertaken conclude that the clearing of such small areas is not likely to adversely affect vegetation communities or the habitat of endangered fauna, provided certain guidelines are adhered to.

5.2 Excavation
Excavation is carried out by means of Hydraulic Excavators and rubber-tyred loaders. All machinery has spark and sound resistant mufflers. Sand excavation initially will have an impact on the landscape, but with adequate control measures, this can ultimately have a positive outcome.

The annual rate of sand extraction is not to exceed 40,000 tonnes. The rate at which each Zone is exhausted will depend, to a large extent, on market demand. However, it is anticipated that Zone a will be excavated for 2-3 years, after which quarrying activities will be relocated in Zone b. Rehabilitation of Zone a will commence concurrently with the development of Zone b.
5.3 Operation of Machinery
- The operator is aware of the contamination that could be caused by oil and fuel leakages, so there will be no storage of such on site.

- All mechanical repairs will be carried out off-site, thus reducing the danger of fuel and oil leakages.

- As the closest resident to the development, who lives approximately one kilometre away, has personally given assurances that the machines can not be heard at his place, noise is not an issue with local residents.

Photo 6: Machinery
Chapter 6: ENVIRONMENTAL ANALYSIS

6.1 Current Impact of the Development

(i) Noise
- The hours of operation fall within normal daytime working hours.

- The noise created by the operating machinery is minimal and the operation has generated no excessive noise complaints.

- Because the site is situated in a depression, the impact of the noise is further lessened. Contact with the closest neighbours indicates that they have no complaints about the noise levels from Coastal's machinery and operation, as the noise does not intrude on their residences.

- As sand excavation has been taking place in the area for a number of years, the continuing noise has not caused the native wildlife to vacate the area.

(ii) Vibration
- The method used in this extraction process does not create a vibrating effect.

- The operation does not include any drilling or blasting procedures.

(iii) Dust
- Dust is not a common problem to this type of development. The granular characteristic of sand tends to absorb moisture and thus reduce dust.

- Dust created by the movement of trucks and loaders will be minimal because of the slowness of their movements.

(iv) Erosion, Water and Drainage
- The erosive effect of this development is limited, as the method used contains the water within the working area.

- Any natural drainage towards the Wetlands will be trapped.

- The area, being of flat terrain, does not create a run-off problem.
- There will be little or no imbalance of the water table due to the fact that any tree removal imbalance is counteracted by the evaporative effect from the open ponds.

- A study on the North Coast, in the Coffs Harbour Shire, has indicated that extraction of sand below water level does not affect the water table. The consequence is that the water table that was controlled by the vegetation is now controlled by evaporation.

- Wind erosion is limited because of the location of the development within a treed area.

(v) Traffic
- Access to the site will be off George Bass Drive. The entry to George Bass Drive affords clear vision for over 300 metres.

- The estimated truck movements from the site will be 10-15 movements per day at spread intervals and the present road usage along George Bass Drive is between 2200 and 2400 vehicles per day.

- After consultation with the relevant authorities, the construction of a suitable intersection at the junction of the access road and George Bass Drive will be undertaken.

Fig. 1
- The bitumen sealing of 100 metres of the haulage road will eliminate any dust problem from the braking and acceleration of moving vehicles.

- Vehicle movement will be at random (daytime) hours.

- Vehicle warning/turning signs will be erected.
(vi) Land Rehabilitation

- Land rehabilitation will be an on-going concern.

- Measures will be taken to maintain landscape amenity.

- Stockpiling and re-spreading the black topsoil will be one of the major steps in the restoration process.

- The banks around the ponds will be battered and covered with black sand and mulch. Backfilling will stabilise the areas around the lakes.

- Ponds will be re-shaped and their banks landscaped, covered with mulch, and native seeds encouraged to germinate. Old logs will be strategically placed for native animals.

- There has been little regrowth of the dominant blackbutt, particularly in Section C due, in all probability, to the fact that blackbutt will not set down seedlings unless there is bare soil on the forest floor and ample sunlight. When the restoration process begins, blackbutt seedlings will have ideal conditions in which to flourish, as the area being rehabilitated will have been cleared and proper management of correct growing conditions will be possible.

- Should natural regeneration of *Eucalyptus pilularis* and *E. botryoides* not take place, active planting of these species as well as shrub and grass species should take place, using seed or cuttings from local plants.

- There should be no prescribed burning for a period of 10-15 years to enable the regrowth forest to become established.
6.2 Future Impact of the Development
There will not be any anticipated change to the character, nature or scale of the operation in the future. When the Zone currently being worked, Zone a, has expired the operation will move to Zone b and rehabilitation of the Zone a site will commence. This will constitute the total area, 24,000m², that will be cleared at any one time. This represents only 3% of the total area of the site.

Vegetation: As 97% of the vegetation will remain in its natural state at any one time, there will always be a model to follow when planning replanting and restoration. There will always be a source of native seeds and seedlings which can be used in the restoration process. The vegetation of the Wetlands will never be disturbed.

Scenic character: The scenic character of the site will always be maintained. Buffer zones and wildlife corridors will reduce noise, shield the development from sight and provide habitats for wildlife.
Special Features: A special feature of this site is the Wetlands area which traverses the northern section of Lot 2. A buffer will be left permanently around this area, so as not to disturb the fauna or flora of this site and to minimise the ingress of feral animals and the spreading of weeds. No development will ever take place in the Wetlands, which has a high value in terms of its habitat for flora and fauna; its nutrient recycling capabilities; its hydrological stability and landscape amenity.

6.3 DOP Guidelines
This operation will continue under the threshold limits outlined in clause 20(1)(a). The DOP guidelines outline the matters for consideration in determining whether this development is designated or non-designated. The main consideration is whether the continued development will significantly affect the environment. The matters to be taken into account for the above consideration fall into two groups:

1. Current Impact on Surrounding Locality:
   - management of noise, vibration, dust, erosion, water and traffic.
   - land rehabilitation carried out by the operator.

2. Future Impact of the Development
   - proposed changes to the character, nature or scale of the continued operation.
   - existing vegetation, scenic character or special features of the land on which the development is to be carried out and its locality.

Thus, a Statement of Environmental Effects has been prepared in accordance with the DOP guidelines, in order to determine the status of this development.
Chapter 7: ENVIRONMENTAL PROTECTION MEASURES

7.1 Working Areas
   (i) Noise
   - Machines are modern and fitted with mufflers to reduce noise.
   - The isolation of the development from residential areas precludes any complaint about the noise of the operation. The working area is 4kms from the township of Broulee and 1km away from the closest resident, who cannot hear the machinery from his residence.
   - Buffer areas of vegetation are left around each working area to further reduce noise levels.

   (ii) Vibration
   - This is of a very low priority.

   (iii) Dust
   - Dust is not a concern as the material is screened wet.
   - Trucks travelling along the 350 metre access gravel track do so at slow speed. The short distance being travelled, coupled with the slow speed of the trucks, results in very little dust being created from this source.
   - All access roads will be watered to assist in dust control.
   - The first 100 metres of the access road will be bitumen sealed.

   (iv) Erosion, Water and Drainage
   - The black topsoil, a valuable source of dormant seed, nutrients and organisms, will be retained in stockpiles to be spread after excavating in a Zone has ceased. This will significantly assist in the re-establishment of soil cover.
   - Backfilling around the perimeters of the holes will stabilise the banks to prevent soil loss.
The cleared foliage will be mulched and spread along the battered banks of the ponds to stabilise them.

Both the undeveloped and rehabilitated areas will have a good cover of vegetation or mulch.

At any one time, the retention of 97% of the site in its natural state will result in only a very small area having to be managed closely. It will not prove difficult to manage the rehabilitation of an area the size of 12,000m² at any one time.

The material is simply screened, not washed, so there is no run-off from the operation.

Trucks and machinery are not washed on site, so there is no run-off from that source.

No oils or fuels are stored on site, and constant vigilance will ensure that any accidental seepage from machinery will be contained.

Any run-off from heavy rains will be diverted away from bare areas by appropriate drainage.

Erosion along roadways will be contained by proper maintenance and drainage of the roads.

The water holes which will be formed as a result of the sand excavation will effectively reduce flow velocity, as a high run-off velocity is a major erosive force.

(v) Traffic

At present two tipping trucks operate from the sand pit, carting material towards either Moruya or Batemans Bay. The time actually spent at the pit is so short that the trucks could have no significant effect on the environment.

The main road used by the trucks is George Bass Drive which allows very good vision in both directions when the trucks are turning from George Bass Drive to the access road and from the access road back to George Bass Drive.
7.2 Site Rehabilitation

- After consultation with the Shire's weed control officer, Graham Harding, a program will commence shortly to eradicate the pervading bitou bush, which has taken hold in previously disturbed areas in Section B.

- By removing the weeds, the native seeds and spores on the ground will have a chance to thrive in the natural environment and much of the bush will regenerate naturally.

- Rehabilitation of the developed Zones will be undertaken in a controlled and orderly manner. Only small areas will be worked at any one time, so that small manageable areas will be continually being restored.

- The black topsoil that is initially removed when development commences, will be stockpiled and re-spread when work is completed in that area.

- To ensure maximum survival of the vegetative material in the topsoil, the stockpiles will be kept relatively low and flat.

- To further protect the stockpiles, they will be kept away from drainage lines and clear of traffic.

- The holes caused by the sand excavation will naturally fill with water. Afterwards, these areas will be re-shaped, leaving ponds which will prove valuable habitats for wildlife.

- Re-shaping of steeper slopes to produce gently sloping surfaces around these areas will be undertaken, so that vegetation will be able to re-establish more easily.

- Foliage will be mulched for spreading over and stabilising the banks of the ponds. Mulching will also assist in the prevention of weed regrowth.

- Seed for regeneration will be provided by local vegetation.
7.3 Integration
The holes from which the sand is being extracted, now and in the future, will fill with water. When the present development is finished, these ponds will be re-shaped and restored with natural vegetation. In the very long-term, should a recreational activity - such as a golf course - be considered for this site, much of the preliminary groundwork will already have been commenced.

The conservation of the foliage from the clearing stage for its ultimate use as mulch for the banks of the ponds also shows clearly the integration of the various stages of the present and future development with the overall development of the site.
### Chapter 7: ENVIRONMENTAL PROTECTION MEASURES

<table>
<thead>
<tr>
<th>Activity</th>
<th>Interaction</th>
<th>Protective Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land clearing</td>
<td>Noise</td>
<td>Isolated from residential area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Buffer area around boundaries</td>
</tr>
<tr>
<td>Habitat removal</td>
<td></td>
<td>No vegetation removal in Wetlands</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Development in previously disturbed areas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clearing in orderly stages - allowing for regeneration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stockpiling &amp; re-spreading of topsoil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Site planning to retain habitat trees</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Active planting of native species, if necessary</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Seed or cuttings taken from local plants</td>
</tr>
<tr>
<td></td>
<td>Dust</td>
<td>Buffer area around boundaries</td>
</tr>
<tr>
<td></td>
<td>Hydrology</td>
<td>Buffer area around Wetlands</td>
</tr>
<tr>
<td></td>
<td>Archaeological</td>
<td>No development in undisturbed area - the Wetlands</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Development in previously disturbed areas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Site checks during operations</td>
</tr>
<tr>
<td></td>
<td>Erosion</td>
<td>Mulching of cleared foliage for later spreading</td>
</tr>
<tr>
<td>Extraction</td>
<td>Noise</td>
<td>Isolated from residential area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Buffer area around boundaries</td>
</tr>
<tr>
<td></td>
<td>Dust</td>
<td>Minimal effect as material screened is wet</td>
</tr>
</tbody>
</table>
# Chapter 7: ENVIRONMENTAL PROTECTION MEASURES

<table>
<thead>
<tr>
<th>Activity</th>
<th>Interaction</th>
<th>Protective Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access roads</td>
<td>watered</td>
<td>Access roads watered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100 metres of access road to be bitumen sealed</td>
</tr>
<tr>
<td>Hydrology</td>
<td></td>
<td>Buffer area around Wetlands</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Re-shaping and landscaping of ponds</td>
</tr>
<tr>
<td>Archaeological</td>
<td></td>
<td>No development in undisturbed area - the Wetlands</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Development in previously disturbed areas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Site checks during operations</td>
</tr>
<tr>
<td>Erosion</td>
<td></td>
<td>Seed &amp; mulch disturbed land</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Run-off to be diverted from bare areas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Run-off velocities to be kept low</td>
</tr>
<tr>
<td>Machinery</td>
<td>Fuel/Oil seepage</td>
<td>Maintenance of machinery to be carried out off-site</td>
</tr>
<tr>
<td></td>
<td>Noise</td>
<td>Isolated from residential area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Buffer area around boundaries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Decibel rates within legal limitations</td>
</tr>
</tbody>
</table>
Chapter 8: JUSTIFICATION OF PROPOSED DEVELOPMENT

Introduction
This site has been divided into three distinct Sections:

Section A: The Wetlands - no development to ever take place.
Section B: Site presently being developed.
Section C: Site for future development.

As less than 3% of the total area of the whole site is being developed at any one time, the impact of the development on the environment is minimal. Habitats for wildlife will always exist in the Wetlands and undeveloped bushland, as well as the corridors and buffer zones left around the developed sectors. Rehabilitation and regeneration of the bushland, once a Zone has been completed, will take place.

Photo 10: Buffer Zone
8.1 Environmental Considerations
The site will be divided into three zones:

- Section A: The Wetlands
- Section B: Presently operating
- Section C: Future development

- There will not be, at any time, any development of Section A, the Wetlands, which also includes a 30 metre buffer zone.

- The operation of the machinery takes place during daylight hours (6a.m. to 7p.m.) which fall outside the normal feeding hours of most fauna. Any noise generated by the operation is at random times and should have no deleterious effect on the wildlife.

- At any one time the maximum area of land that will be disturbed will be 24,000m² - one working Zone of 12,000m² and one Zone of like size being rehabilitated. This represents less than 3% of the total area of Lot 2, which is 83.17 hectares.

- The division of Sections into these small workable Zones will allow for the orderly use of the site.

- Buffer zones and wildlife corridors will reduce noise, shield the development from sight and provide habitats for wildlife.

- Due care will be exercised to ensure that valuable topsoil, containing native seeds, nutrients and organisms will be retained for restoration purposes.

- Recycling, by mulching, of leaves and branches will produce additional ground cover for restoration work.

- Because the development site is in a bush environment there is much natural screening of the operation from sight.

- Apart form the Wetlands - where no development is to take place - almost all of Sections B and C have been previously disturbed - for both excavation and logging purposes.

- Much of the "wildlife" passing through Sections B and C is nomadic or feral, with clear evidence of both feral pigs and cats.
- The orderly clearing of Zones and the formation of lakes will assist in bushfire control.

- After rehabilitation, there will be ponds and restored bush which will provide habitats for wildlife.

8.2 Economic Considerations

- The continued operation of this development will ensure employment for local residents.

- As sand is an essential component in the building industry, there is a continuing demand for sand products in the E.S.C.

- Should the demand for sand outweigh the supply, due to restrictions on operators in the E.S.C., the importation of sand from outside sources will have a negative effect on the economy of this area.

8.3 Social Considerations

- This operation is positioned so as not to have any effect on the rights or quality of life of others.

- It will not have any adverse effect on the township of Broulee.

- The industry is, by nature, a non-threatening one.
Chapter 9: FEASIBLE ALTERNATIVES

9.1 Alternatives to the Development

It is difficult to come by any alternatives to this development, as sand is an essential component in all stages of building: fill sand, concrete sand, bricklayer's sand, tiler's sand and landscaping sand. The development site contains an excellent deposit of quality sands.

9.2 Reasons for Choosing the Development

- This site, which has existing excavation rights, contains a substantial deposit of high quality sands.

- There are few such sites already in use, in areas that have little to no impact on the environment or the local community, that contain such deposits.

- The building industry is an expanding industry in the Euroballa Shire and there is strong demand for a variety of quality products such as those produced at this sand excavation.

- With a policy of causing minimal environmental disturbance and taking adequate control measures during operations, in conjunction with the rehabilitation of affected areas, this development would be one of the preferred options for the long-term usage of this land.
Chapter 10: CONSEQUENCES OF NON-DEVELOPMENT

There are two matters to consider if this proposed development were not to proceed. In the first instance, the long-term fate of this land and secondly, the repercussions that would be felt throughout the local building industry due to the non-development of this valuable source of raw materials.

- Agricultural, residential or other business ventures could have a far worse impact on the environment than the proposed development. This development involves no use of chemicals, fertilisers or pesticides which an agricultural land use would require. A residential development would involve a great amount of landclearing and create further problems with regard to sanitation and other polluting concerns. Other business activities could have a more severe effect in terms of air and water pollution.

- There are problems to be addressed if nothing at all is done with the land. There is a growing weed problem in Section B, in particular with the bitou bush which will suffocate many native plants unless it is removed.

- There has been very little regrowth of the dominant blackbutt, particularly in Section C due, in all probability, to the fact that blackbutt will not set down seedlings unless there is bare soil on the forest floor and ample sunlight. When the restoration process begins, blackbutt seedlings will have ideal conditions in which to flourish, as the area being rehabilitated will have been cleared and proper management of correct growing conditions will be possible.

- There would be a greater demand on the present sand resources in the Shire.

- The local economy would suffer, as materials would have to be imported from other areas.
Chapter 11: SPECIFIC MATTERS

11.1 Place of the Development in the Completed Scheme
On the completion of the rehabilitation of each Zone the ultimate use of
the site could well be for recreational activities and is ideally suited to
being converted into a golf course. The excavation sites will be re-shaped
and landscaped into attractive lakes, lagoons or ponds. These will provide
extra habitats for birdlife.

11.2 Integration of Proposed with Earlier Development
Previously, Sections B and C were used for both sand excavation and
logging. This development is an extension of these earlier developments.

11.3 Sequence of Extraction
- After clearing the top vegetation, the black top sand is stockpiled for
  future rehabilitation use.
- The second layer of sand is a sand that carries a small amount of clay
  fats. This is screened to remove roots, sticks, etc., and stockpiled as
  brickies' sand.
- The third layer of sand is screened and stockpiled as concrete sand.
- The main machinery used in the excavation process consists of an
  excavator and a rubber-tyred front end loader. The excavator digs the
  sand out to its various layers.
- Present development is taking place in Zone a (cf. Map 3) and will
  continue in this Zone until supplies have expired, in 2 to 3 years.
- Sand extraction will then begin in Zone b, while rehabilitation of the
  neighbouring Zone a will commence.
- This procedure will continue through Zones c and d.
- The rate of extraction and, consequently the opening up of subsequent
  Zones, will be controlled, to a large extent by market demand.
11.4 Management of Water Resources
Sand is excavated from an enclosed area.

(i) When the excavator reaches water level the water is contained within the excavated area.

(ii) Flooding does not propose any problems as the excavated area is well above flood level.

(iii) The excavation pit has ballast banks.

(iv) Sand is excavated to a depth of approximately 4m.

(v) Water is underground water from beneath the sand.

11.5 Rehabilitation and Restoration of Land
(i) Stockpiling and re-spreading the black topsoil will assist in soil conservation, as will the spreading of mulch to prevent soil loss from rain.

(ii) To achieve structural stability, the banks around the lakes will be battered and covered with black sand and mulch. Backfilling will stabilise the areas around the lakes.

(iii) Lakes will be re-shaped and their banks landscaped, covered with mulch, and native seeds encouraged to germinate. Old logs will be strategically placed for native animals.

(iv) If natural regeneration does not occur, active planting of native trees and shrubs should be undertaken. Seeds or cuttings from local plants should be used.

11.6 Special Effects for Past or Future Generations
- Section A: This area will be preserved in its natural state where the flora and fauna of the Wetlands may flourish.

- Sections B & C: An archaeological survey, in consultation with the Mogo Aboriginal Land Council, revealed no indication that the area was of any Aboriginal
The isolated artefact, Waldrons Swamp 1, (found in Section C) is considered to be of low heritage value and the Land Council has indicated it to be of no specific cultural significance to the local Aboriginal community.

By adhering to the impact mitigation strategies detailed elsewhere in this Statement the effects of the development on native flora and fauna should be minimal.

- The aesthetic value of the site is maintained by natural buffer zones. Sight will never be lost of the original native environment, as there will always be 97% of the site in the same state as it was before this present development commenced.

- No other effects are evident.
Chapter 12: SUPPORTING DOCUMENTATION

12.1 Additional Plans
See Following

12.2 Test Results
See Following
15 June 1995

R&A Brown
PO Box 274
BATEMANS BAY NSW 2536
FAX: 727705

Dear Mr and Mrs Brown

GEORGE BASS DRIVE - SECTION BROULEE ROAD TO RACECOURSE
TELEPHONE REQUEST FOR TRAFFIC COUNTS

This is to confirm telephone conversation of today's date that the AADT (Average Annual Daily Traffic) for this section of George Bass Drive is currently estimated to be in the order of 2200 to 2400 vehicles per day.

Should you need to engage a Traffic Consultant then the matter could be discussed further at that time.

If you require further information please contact Mr Ted Williams on (044) 741-208.

Yours faithfully

A W RATCLIFFE
GENERAL MANAGER

Per:
PLAN OF MANAGEMENT 95-110

No vegetation whatsoever to be removed from any land outside the identified area.

No works to be undertaken in the Za zone land.
### Coarse Fraction (≤ 19 mm sieve)

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Mass Retained</th>
<th>% Retained</th>
<th>% Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>75 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>63 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37.5 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26.6 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total M1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pan</td>
<td>M2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total mass of oven-dry soil, \( M_s = \frac{M_1 + M_2}{M_s} \)

(if sample contains ≤ 19 mm particles)

### Intermediate Fraction Calculation

Container no: ........................................

- Mass of –19 mm subsample, \( M_3 = \) ...........
- Mass of oven-dried subsample, \( M_4 = \) ...........
- Mass of wash sieved and oven-dried subsample, \( M_5 = \) ...........

\[ \text{% retained} = \frac{\text{mass retained}}{M_3} \times 100 \]

Moderated retained X ................................ (see note)

### Fine Fraction Calculation

Container no: ........................................

- Mass of –2.36 mm subsample, \( M_7 = \) ...........

\[ \text{% retained} = \frac{\text{mass retained}}{M_2} \times \frac{M_6}{M_7} \times 100 \]

Moderated retained X ................................ (see note)

### Notes

1. If sample contains only ≤ 19 mm particles: \( M_s = M_4 \times \frac{M_2}{M_3} = 1 \)
2. If sample contains only ≤ 2.36 mm particles: \( \frac{M_2 \times M_6}{M_7} = 1 \)
Chapter 13: DOCUMENTATION

13.1 Consultations Undertaken

- Frequent consultation has taken place with David Price of the E.S.C. Planning and Environment Department, by phone, in person and through correspondence concerning the correct guidelines to follow.

- Consultation has taken place with the E.S.C.'s Mr Ted Williams to obtain traffic flow figures for George Bass Drive.

- The E.S.C.'s Mr Peter Best has been consulted regarding access on to George Bass Drive. Legal opinion has also been sought regarding this matter.

- Traffic flow figures have also been obtained from the RTA for the Princes Highway.

- Consultation has taken place with scientists from the Departments of Natural Resources and Resource Engineering at UNE, Armidale, concerning many of the environmental issues in this statement.

- Consultation with officers of the NPWS Southern Zone at Queanbeyan has resulted in the flora and fauna and the archaeological assessments being undertaken.

- South East Archaeology was contacted and undertook an archaeological survey of the site, in consultation with the Local Aboriginal Lands Council.

- Consultation with Graeme Andy, of the Mogo Aboriginal Land Council, resulted in his inspection and assessment of the site.

- Nicholas Graham-Higgs and Associates were commissioned to assess the impact of the development on the flora and fauna of the site.
• CALM was contacted to obtain information regarding water tables and the impact on the Wetlands.

13.2 Necessary Approvals
Development consent No. 110/95 for approved plan No. 95.110 was granted on May 17, 1995 for landclearing and installation of the mobile screening plant to be carried out as a continued operation under SEPP37.
Dear Mrs Brown,

Re: Statement of Environmental Effects -
Proposed sand quarry, Lot 2 DP 842422 Broulee

I refer to your request of 20 June 1995 for the National Parks and Wildlife Service to comment on the Statement of Environmental Effects (SOEE) for the above proposal.

Under the National Parks and Wildlife Act 1974 (NPW Act) the Service is responsible for the protection and care of Aboriginal sites and relics, and native flora and fauna throughout NSW. With regard to these responsibilities, the following remarks are offered.

Archaeology

No archaeological sites are listed on the Site Register within the development area. However, there are two recorded sites in the area:

(1) An artefact scatter (58-4-50), which was destroyed with consent during the construction of George Bass Drive.

(2) A well-known scarred tree, the Broulee Canoe Tree (58-4-2/58-4-51), adjacent to George Bass Drive.

Furthermore, the Service understands that Aboriginal sites have been recorded on the adjacent CSR Readymix sand quarry site.

The location of the proposal on the sand dune adjacent to the wetland, together with the presence of the above sites in the vicinity, indicates that it is likely that other sites will occur within the development area; particularly artefact scatters, scarred trees and middens.

3 July 1995
The SOEE should therefore have assessed more fully the potential impacts on the archaeological values of the area. This should be rectified by a qualified archaeologist conducting an archaeological survey of the area to be affected by the proposal. If required, a list of consultant archaeologists can be provided by the Service.

If this survey were to be conducted, consultation should continue to occur with the Local Aboriginal Land Council. Information from the NPWS Aboriginal Sites Register is also available by contacting the Sites Registrar, NPWS, PO Box 1967 Hurstville 2220. Three copies of any archaeological report should be submitted for review to:

The Zone Archaeologist  
NPWS Southern Zone  
PO Box 2115  
Queanbeyan 2620.

Should Aboriginal archaeological sites be present in the study area, you should consider the requirements of the NPW Act with regard to Aboriginal relics. Under Section 90 it is an offence to knowingly damage or destroy relics without the prior consent of the Director-General of NPWS.

Flora and Fauna

The Broulee quarry is located in a sensitive ecological area. Wetlands and wetland margins are important fauna habitat and the extensive wetland fringing the northern boundary of the site is listed in State Environmental Planning Policy 14 (No 184), which is designed to protect the remaining significant coastal wetlands in NSW.

The Service suggests that the assessment of impact on native flora would be improved if a map clearly delineating the plant communities on site was produced. This would enable a more comprehensive assessment of the habitat potential of the area.

Since a significant amount of native forest may be cleared in Section B and Section C, the Service considers that the potential impacts, both direct and indirect, on native fauna should be thoroughly considered. Further work from a qualified fauna consultant, targeting any likely endangered species (those listed on Schedule 12 of the NPW Act) could greatly improve the assessment.

You are also advised to consider the requirements of the NPW Act with regard to the ‘taking or killing’ of endangered fauna. It should be noted that the Act defines ‘take’ as including ‘significant modification of the habitat of fauna which is likely to adversely affect its essential behavioural patterns’.

If endangered fauna are recorded or if the area is considered likely endangered fauna habitat, then it is suggested that the potential impact be assessed according to the seven-point test in Section 4A of the Environmental Planning and Assessment Act 1979. This will enable Council to make an assessment of the impact of the proposal on endangered fauna.

Following this assessment, if a ‘take or kill’ of endangered species is likely to occur, it is recommended that you apply to NPWS for a Section 120 General Licence under the NPW Act. Under Section 92B of the Act a Fauna Impact Statement (prepared in accordance with Section 92D) is required to accompany a Licence application. Preferably, the development and activities could be modified to mitigate against possible impacts and so reduce the extent of


