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AB019287

Moruya Granite Quarry : environmental impact statement 1986

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NSW DEPT PRIMARY INDUSTRIES  
AB019287

# MORUYA GRANITE QUARRY

INDUSTRIAL PARK, SHELLEY ROAD, MORUYA

OFFICE: Ph. (044) 742800  
A.H.: Ph. (044) 742293

P.O. BOX-183,  
MORUYA, N.S.W. 2537

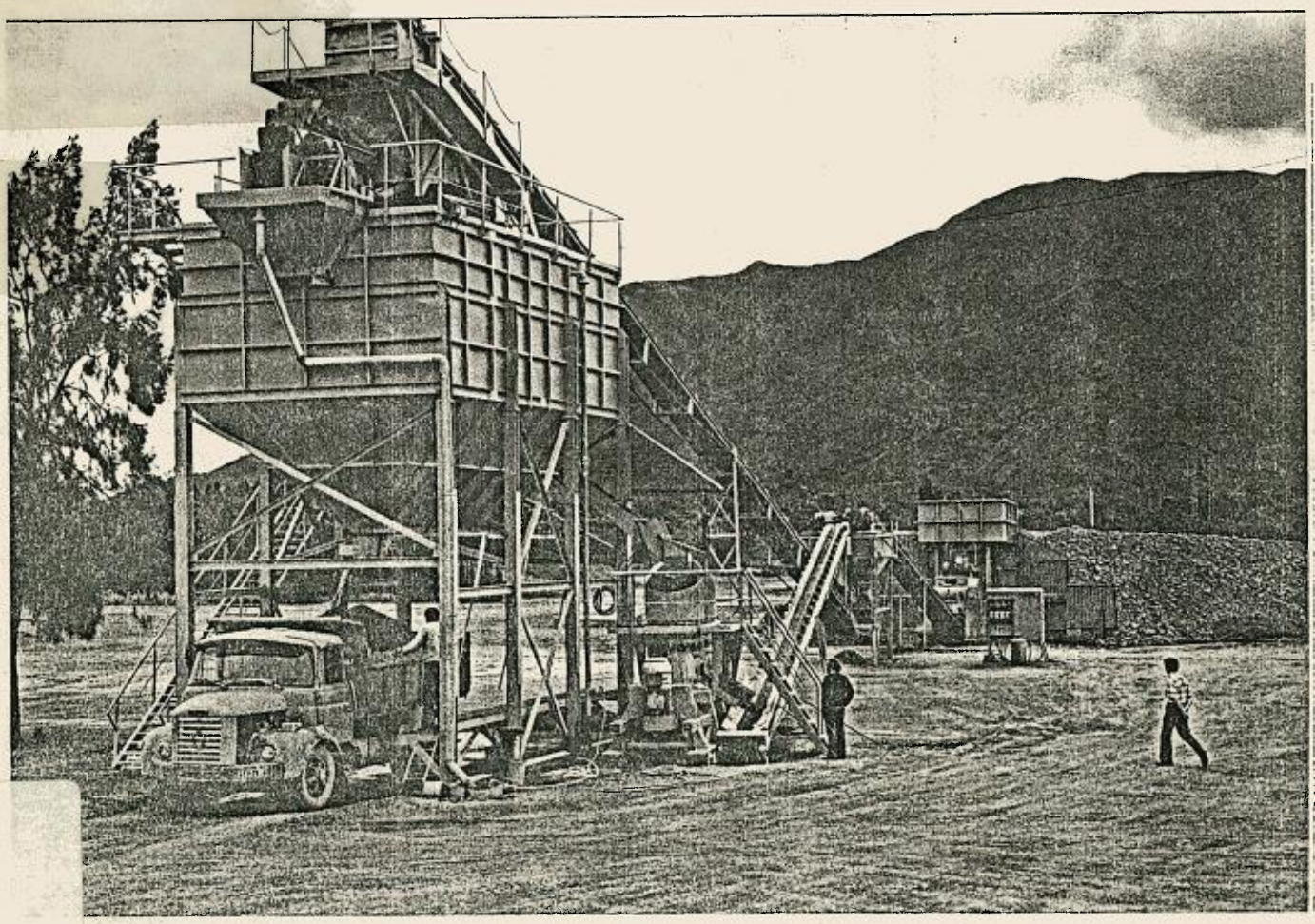
ENVIRONMENTAL GEOLOGY SECTION  
GEOLOGICAL SURVEY OF N.S.W.

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# Environmental Impact Statement

J. Nader

November 1986



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ENVIRONMENT IMPACT STATEMENT

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MORUYA GRANITE QUARRY

ENVIRONMENTAL IMPACT STATEMENT

INTRODUCTION

This Environmental Impact Statement (E.I.S.) has 5 parts:-

- . Background
- . Description of the Proposal
- . Description of the Environment
- . Environmental Interactions and Safeguards
- . Environmental Impact

Where an \* prefixes part of the statement, this part refers directly to the Director of Environment and Planning's specifications issued under clause 35 of the Environmental Planning and Assessment (E.P.A.) Regulation. The Director's specifications head the list of government authority consultations in appendix 1.

Where a 0 prefixes part of the statement, this part addresses the relevant matter in clause 34 of the E.P.A. Regulation.

BACKGROUND

0 Proposal Objectives

To blast, win and supply hard rock for extensions to Batemans Bay boat harbour.

To establish a crushing/screening plant supplying quality sub-base and base roadmaking material to; Department of Main Roads  
Local Government and  
Private Contractors

To minimise land use conflicts during construction and operation.

To minimise environmental degradation during construction and operation.

To rehabilitate the site when operations cease.

0 Feasible Alternatives

\* Characteristics and Economic Significance of the Resource.

In 1978 R. W. Galloway, in Land Use on the South Coast of N.S.W., predicted an increasing dependence on crushing quarried road making materials within Eurobodalla. He cited (Galloway, 1978) increased demand, environmental and landuse constraints restricting river and tertiary alluvial road making resources.

Higher demand and diminishing supply now justifies the application of capital and technology to crushing hard rock like granite and basalt. Despite higher development and operation costs quarrying/crushing represents a significant improvement for resource security and environmental management on the South Coast.

Quarrying/crushing provides large quantities of high quality roadmaking material without the complex environmental interactions associated with river and ridge scalping operations. Quarries are generally more compact and easily managed for erosion, sedimentation, pollution and landuse conflicts. Finally quarrying offers versatility, producing hard rock, monumental stone and sand as complementary products to road base.

Resource Constraints

- . Minimum deposit size greater than or equal to 200,000 cubic meters.
- . Extraction allowed by environmental planning instrument. (i.e. permitted in zone)
- . Resource isolation reducing landuse conflicts generated by noise, dust, visual, air and water pollution.
- . Resource proximity to major transport rout minimising transport costs and traffic conflicts.
- . Resource must meet Department of Main Roads and Shire road building requirements and standards.
- . Resource must be available within economic and environmental tolerances.
- . Resource to meet Public Works Department breakwater requirements.

Table 1. Alternatives Comparison (ref. Map 1.)

Map Reference	1	2	3	4	5
Name	Moruya River	Mogo Basalt	Crokers	Jeremadra Basalt	Moruya Granite

Resource	: granite	: basalt	: granite	: basalt	: granite
Zone I.D.O. # 3	: 1(a)	: b(d)	: 1(a)	: 1(a)	: 1(a)
Draft L.E.P 100/101	: 1(a)	: 1(a)	: 1(a)	: 1(a)	: 1(c)
Resource Size (m 3)	: <200 000	: >200 000	: <200 000	: >200 000	: >200 000
Resource quality	: high	: high	: variable	: low	: high
End use distance	: 32 km	: 8 km	: 30 km	: 9 km	: 28 km
Nearest dwelling	: 180 m	: 2 km	: 150 m	: 600 m	: 400 m
Nearest settlement	: 180 m	: 2 km	: 6 km	: 4 km	: 5 km
Princes Highway distance	: 2 km	: 2 km	: 3 km	: 2 km	: 1 km
Wetland basin	: No	: No	: Yes	: Yes	: Yes
Stream interruption	: Nil	: Nil	: Nil	: Nil	: Nil
Vegetation removal	: <5ha	: <5ha	: <5ha	: <5ha	: <5ha
Slope	: >20%av	: >20%	: >20%	: >20%	: >20%
Visibility	: high	: low	: moderate	: low	: moderate
:	:	:	:	:	:

#### Alternatives Evaluation: Summary

- . Moruya River Granite : Limited resource, high visibility, extreme proximity to dwellings, extreme traffic conflict. Heritage site.
- . Mogo Basalt : high quality resource, isolated, traffic conflict on forest road, resource limited by commitment to other projects, traffic conflict at highway.
- . Crokers Granite : variable quality, high land-use and traffic conflicts.
- . Jeremadra Basalt : Limited resource.
- . Moruya Granite : High quality resource, low land use conflict, low traffic conflict, dwelling proximity - moderate.

#### Selected Site (ref. Map 2)

- . Moruya Granite Quarry
- . Adjacent landuses (existing) : Industrial, agricultural, forestry, rural residential.

- . Adjacent landuses (proposed) : Industrial, rural residential.
- . Land tenure : freehold
- . Landuse conflicts : recreation restriction, noise, particle vibration, safety.
- . Environmental conflicts : habitat displacement, safeguard failure.

0 Consequences of not carrying out Development  
(Do nothing Alternative)

. Increased pressure to develop Crokers, Moruya River Granite and Mogo Basalt for road base. Mogo Basalt and Moruya River are constrained by size. Mogo Basalt is most suitable for road base but this resource used exclusively for roads will last about 7 years. This increases pressure to use Crokers for hard rock which has the highest landuse conflict of all alternatives.

Jeremadra basalt could yield hard rock alone in combination with Mogo Basalt for road base. This does not relieve the supply constraint for road base and again pressures a use for Crokers.

Failing a use for Crokers then there is an increased pressure for river gravel extraction. Only 1 years supply of tertiary gravel remains in the area. This leaves 2 alternatives; importation or the use of a lower quality material like metasediments from Larry's Mountain. This again has specific landuse conflicts especially associated with transportation.

0 DESCRIPTION OF THE PROPOSAL

Location of Works (ref. Map 2)

Lot : 1  
D.P. : 732595  
Road : Shelley Road  
Locality : North Moruya  
Grid Reference : 377270  
(1:25000 topo Mogo Sheet)

Location of End Uses (ref. Map 1)

Distance to Batemans Bay : 25 km  
Boatharbour  
Traversed urban area : 3 km  
Market Range : 50 km road distance

Construction Schedule

Land Clearing (ref: Map 3)

Area : 30,000 m<sup>2</sup>  
Disposal method : Stockpile for habitat and seed  
capture  
Removal method : Dozer, Chainsaw

\* Earthworks (ref Map 4)

\* Topsoil Removal and Stockpile

Soil depth/area : Depth 300 mm/area 10,000m<sup>2</sup>  
Soil volume : 3,000m<sup>3</sup> (approximately)  
Removal method : Dozer, loader,  
Revegetation potential : High  
Erodibility : Moderate/low  
Stockpile volume : 3,000m<sup>3</sup> (approximately)  
Erosion protection : Diversion banks  
Reclaiming method : Loader, dozer

\* Drainage Construction (ref Map 5)

General Design Criteria (Drainage)

Nominated storm return period : 1 in 5 years  
Storm intensity : 3 hours  
Catchment size : 2.3 ha  
Time of flow concentration : 5 minutes  
Coefficient of runoff : 0.6

Contour banks (ref detail A)

Channel gradient : 0.5%  
Maximum flow velocity : 2.0 m/seconds  
Batter gradients : 2:1  
Cross sectional shape : trapezoidal  
Cross sectional area : 0.4m<sup>2</sup>  
Design flow depth : 300 mm  
Freeboard : 100 mm  
Type



UngROUTED rip rap lined with a minimum layer of 150 mm stone on 100 mm gravel filter blanket.

Dam (ref detail B)

Dam Yield Calculations (U.S.D.A. method)

Average annual rainfall(mm)(R): 950  
Total annual evaporation (mm) : 900  
Reliability (years out of 10) : 8  
Runoff as a % of av. annual :  
rainfall (Y) : 12%  
Catchment area (A) : 38ha  
Catchment runoff =  $100 \times A \times R \times Y$  litres  
=  $100 \times 38 \times 950 \times 12$  litres  
= 43,320,000 litres

Dam Specifications

Purpose : water storage/sediment control  
Batter gradients : 2:1  
Free board : 0.5m  
Crest width : 3m  
Soil properties : dispersible wall to be rock stabilised  
Spillway : see detail C :  
Storage capacity : 4500 m<sup>2</sup> = 4,500,000 litres  
Sediment removal : backhoe/dragline  
Stabilisation : clay lining with mulched and seeded batters.

Retention ponds  
(ref detail C)

Purpose : sediment control  
Batter gradients : 3:1  
Freeboard : 500 mm  
Crest width : 1 m  
Soil properties : dispersible, walls to be rock filled  
Spillway channel : See diagram  
Storage capacity : 500,000 litres 500 m<sup>3</sup>  
Sediment removal : backhoe  
Stabilisation : mulched and seeded batters

Volume capacity assessed by allowing 150 m<sup>3</sup> per ha exposed (D.M.R. 1985)

Total capacity at 500 m(2)for 3.3 ha exposed.

Well (ref detail D)

Plant and Building Constructions (ref Map 6, drawings 1,2,3,)

	Area	Height	Length	Width
Crusher	300m	4m	100m	3m
Office and Workshop	432m <sup>2</sup> at Lot 10-11 Shelley Road			

Office 11.5m<sup>2</sup> at Quarry sight  
 Weighbridge 38m<sup>2</sup> on ground 10m 3m

Services : electricity line to follow access Road.  
 : on site septic disposal

\* Labour Requirement (construction)

Land clearing : 2 employees x 2 weeks  
 Earthworks : 6 employees x 6 weeks  
 Building construction : 4 employees x 12 weeks  
 Transport : 2 employees x 20 weeks

0 Energy Requirement (Construction)

Land clearing : Diesel powered plant,  
 chainsaws (petrol)  
 Earthworks : Diesel powered plant  
 Building construction : Electric power tools  
 Transport : Diesel/petrol powered vehicles

\* Transport Requirement (Construction) (ref Map 7)

Plant delivery : 5 vehicle trips (truck)  
 Plant pickup : 2 vehicle trips (truck)  
 Materials delivery : 5 vehicle trips (truck)  
 (construction)  
 Services construction : 2 vehicle trips (truck)  
 Backup : 50 vehicle trips (passenger car)  
 Total truck movements : 28 vehicle movements (approximately)  
 Total passenger car movements : 100 vehicle movements (approximately)

Plant Operation (Construction)

Plant Operating time and Hours

Dozer	Monday-Friday	7.00am-6.00pm	Saturday	7.00am-1.00pm
Loader	Monday-Friday	7.00am-6.00pm	Saturday	7.00am-1.00pm
Chainsaw	Monday-Friday	7.00am-6.00pm	Saturday	7.00am-1.00pm
Power tools	Monday-Saturday	7.00am-6.00pm	Saturday	7.00am-1.00pm

(S.P.C.C. ref appendix 4)

\* Operating Schedule

Blasting : To S.P.C.C. and Mines Inspection  
 Blast pattern : Division Department of Labour and  
 Industry Requirements (see Noise  
 assessment) (S.P.C.C. ref app.4)  
 Maximum instantaneous charge : 80 kg  
 Estimated airblast  
 nearest dwelling : < 105 dB linear pk  
 Estimated vibration  
 nearest dwelling : < 5 mm/sec  
 Blast hours : Monday-Friday 9.00am - 3.00pm  
 Saturday 9.00am - 1.00pm

Safeguards : Selected drill pattern  
 : Selected blast delay  
 : Recommended loading and stemming  
 greater than or equal to burden  
 : Free face blast producing minimal  
 toe  
 Plant : Tracked drilling machine (silenced)  
 Output :

Plant Output (Proposed average)

:Occurrence	:	Size	:	Quantity	:
:Project Specific	:	Large	:	70,000 m3 p.a.	:
:	:	Medium	:	35,000 m3 p.a.	:
:Day to day	:	Production	:	7,000 m3 p.a.	:

Loading

Plant type : Rubber tyred loader  
 Operating hours : 7.00 am - 6.00 pm Monday - Friday  
 : 7.00 am - 1.00 pm Saturday

Crushing/screening (ref drawing 1)

Plant type : Wet spray primary, secondary and  
 tertiary crusher  
 Operating times : Minimum 6 weeks p.a. approx.  
 : 5 day/week  
 Operating hours : 7.00 am - 6.00 pm Monday - Friday  
 : 7.00 am - 1.00 pm Saturday  
 Noise level : See Noise Assessment  
 Output : 200 m3 /day maximum  
 Stockpile volume : 2500 m3 approximately

Quarry

Face height : 2 x 15 metres  
 Berm width : 9 metres

\* TRANSPORT OPERATION (ref Map 7)

THE PROPOSED TRUCK MOVEMENTS AND DURATION OF TRUCK MOVEMENTS  
 TABLE

	TYPE	RETURN TRIPS/DAY MAXIMUM	RETURN TRIPS/DAY AVERAGE	MINIMUM NUMBER OF DAYS PER YEAR
PROJECT	Large	40	20	150

SPECIFIC	Medium	30	15	75
DAY TO DAY	Normal	35	15	150

TABLE

TYPES OF OCCURRENCES	SIZE	ROUTES
Projects	Large	Princes Hwy North 100%
Specific	Medium	Princes Hwy North 50%
		Princes Hwy South 50%
Day to Day	Production	Princes Hwy North 75%
		Princes Hwy South 25%

FREQUENCY OF VEHICLE MOVEMENTS

PREFERRED HOURS OF OPERATION

TABLE

	Monday to Saturday	Sunday and Public Holidays
Normal Frequency	7 am - 6 pm	Minimal Movement
At Substantially Reduced Frequency	6 am - 7 am	8 am - 6 pm
Minimal or Isolated	10 pm - 6 am	6 pm - 8 am

The majority of the movements would be in normal frequency and substantially reduced, minimal or isolated occurrences are not envisaged.

Source (S.P.C.C.) (See appendix 4)

\* LABOUR REQUIREMENT (Operation)

TABLE

Types of	Proposed No
----------	-------------

Occurences	Size	Persons Employed
Project Specific	Large	8-10
	Medium	5-8
Bay to Day	Production	3-8

0 ENERGY REQUIREMENT (Operation)

Loader : Diesel powered  
 Transport : Diesel, petrol powered  
 Crusher : Electrically powered, I.C.C. mains supply

COMMENTS

All operations to comply with:- Soil Conservation Service  
 Department of Main Roads  
 State Pollution Control Commission  
 Department Industrial Relations,  
 Mines Inspection Division and  
 Eurobodalla Shire guidelines

\* REHABILITATION (ref Map 8)

Intended Landuse : Industrial

Uses compatible with draft L.E.P. : Yes

Earthworks:

Reshaping - nil	- 9m berms and 15m faces to remain
Drainage modification	- nil emplacements to remain
Slope stabilisation	- mulching and revegetation with seed
Surface preparation	- contour ripping - 300 mm deep
Topsoil respreading	- loader and leveller
Depth	- 200 mm
Stabilisation	- mulching and mesh for slopes > or equal to 10%
Topsoil suitability	- high
Additives	- nil
Vegetation establishment	- plantings (seedlings and seeding)
Species selection	- Spotted gum
	- Ironbarks
	- Melaleuca (tea tree)
	- Silver Top Ash
	- Black wattle
Sowing technique	- broadcast seed 500 gm/ha and hand plantings
Timing	- March/April
Maintenance	- seasonal monitoring, hand weeding
Erosion protection	- as for quarry
Irrigation	- as required should monitoring indicate needs

## DESCRIPTION OF THE ENVIRONMENT

### Topography. (ref. Map 9)

The proposed site occupies a small area on the southern foothills of Pollwombra Mountain. The excavation will commence at about the 20 metre contour with the associated screening and crushing plant lower down the slope.

The quarry work area slopes to the south-west with fairly steep gradients into the small creek valley. The ridge maintains a more gentle slope forming a saddle at about the 100 metre contour. The whole area occupies the lowland hill area which slopes to the narrow coastal plain in the east and rises to the escarpment of the Dividing Range in the west.

### Geology and Soils (ref. Map 10)

The general geology consists of outcrops of granite from The Moruya Granite group, biotite of Silurian origin. Vertical bands of decomposed granite define the strata.

The slopes are covered with a shallow layer of soil containing varying amounts of gravel, clay and organic material.

The flatter areas of the saddle and valley floors consist of a 300 mm deep grey, brown soil underlayed with a deep layer of gravelly sands.

### Climate (ref table)

The area has mild summers and cool winters, controlled by maritime air masses with extremes of heat and cold caused by continental influences.

The average daily temperatures would be similar to those of Moruya Heads with the inland location expected to increase daily maximums and minimums by one degree. The southerly aspect would tend to alter the micro-climate by moderating summer extremes and decreasing winter minimums. The surrounding vegetation and sheltered position of the site would further moderate temperatures.

Rainfall would be about 1000mm per annum, most falling in summer and autumn. Spring droughts are not uncommon. Distribution would approximate that of Moruya Heads.

Frosts can occur between March and September. The creation of cleared patches in gully bottoms with a general southerly aspect could create frost hollows.

The winds are light to moderate north-east to south-east. Strong winds associated with frontal changes can occur, especially in summer.

During summer, very strong westerly winds can occur and when associated with high temperatures and low humidity, give rise to extreme bushfire conditions.

### Meteorological Data Moruya Heads

The Bureau of Meteorology provides the following microclimatic details for Moruya Heads:-

NOTE: These conditions would be indicative of those expected at the extraction site, although some modification could be expected because of the 7.5 km distance from the weather station and because of the local terrain.

Item	Month											
	J	F	M	A	M	J	J	A	S	O	N	D
<u>Temp (rounded to nearest 0 C)</u>												
Mean Max.	23	24	23	22	19	17	16	16	18	20	21	22
Mean Min.	16	16	15	12	9	7	6	6	8	11	12	14
<u>Rainfall mm.</u>												
Mean	97	90	102	81	85	85	55	54	60	74	74	74
Rain Days	10	9	10	8	8	8	7	7	8	10	10	10

Wind Analysis 0900 hrs L.S.T

Dominant Direction	N.E.	W.	W.	N.E.
Usual velocity (knots)	3-15	1-10	1-10	1-10
Max. (knots)	27+	20	27+	27+
Direction of max. wind	S.	S.W.	S.E.	W.
Frequency +15 knots	8/100	4/100	8/100	11/110

Wind Analysis 1500hrs L.S.T.

Dominant Direction	N.E.	N.E.	N.E.	N.E.
Usual velocity (knots)	7-15	3-15	3-15	7-15
Max. (knots)	27+	27+	26	27+
Direction of Max. Wind	N.E.	N.E.	N.W.	N.E.
Frequency + 15 KNOTS	35/100	26/100	13/100	32/100

\* Hydrology (ref. Map 11)

The site forms part of the catchment of the Moruya River, being drained to the south by a small watercourse which drains into the permanent Malabar Creek. This creek then flows south westerly till it collects a watercourse from the north west and then flows generally south until it twists near the Princes Highway and then flows generally easterly and south easterly until it reaches Malabar Lagoon, some 5 km downstream of the quarry site.

As this creek leaves the site it flows through a wide expanse of aquifer sands before reaching the flood plain of the Moruya River.

A number of small mid slope soaks were in evidence on the test site.

The general catchment of the creek is well vegetated and no erosion was apparent.

Vegetation (ref. Map 12)

The general vegetation of the site can be described as Spotted Gum - Ironbark Type 74 After Bauer.

The drier ridges carry tall overmature dry sclerophyll forest dominated by Spotted Gum and Ironbarks. The groundcover consists of Bladey Grass and Burrawangs suggesting a frequent history of fires.

The more sheltered slopes have a good cover of wattles, Silver Top Ash and Stringybarks.

The gullies are dominated by an understorey of tea tree, wattles, Forest Red Gum and Roughbarked Apple.

Main vegetation in the area.

Spotted Gum	<i>Eucalyptus maculata</i>
Mugga Ironbark	<i>Eucalyptus sideroxylon</i>
Grey Ironbark	<i>Eucalyptus paniculata</i>
White Stringybark	<i>Eucalyptus globoidea</i>
Red Bloodwood	<i>Eucalyptus gummifera</i>
Silvertop Ash	<i>Eucalyptus sieberi</i>
Forest Red gum	<i>Eucalyptus tereticornis</i>
Wollybutt	<i>Eucalyptus longifolia</i>
Roughbarked Apple	<i>Angophora floribunda</i>
Sydney Golden Wattle	<i>Acacia longifolia</i>
Mabel's Wattle	<i>Acacia mabellae</i>
Sally Wattle	<i>Acacia floribunda</i>



Black Wattle	Acacia mearnsii
Prickly Moses	Acacia ulicifolia
Tea tree	Leptospermum flavescens
Geebung	Persoonia levis
Banksia	Spinulosa
Blackboy	Xanthorrhoea australis
Boronia	Boronia ledifolia
Burrawang	Macrozamia communis.

A detailed list of flora can be found in the Bateman's Bay Management Plan, Forestry Commission NSW.

#### Fauna

A casual study of the fauna was made while completing the vegetation study and during site surveys.

In general the site and surrounding area is rich in fauna as a result of the variety of habitats ranging from gullies, open grassland and tall eucalypt forest.

The surrounding gully sites are the richest areas containing large numbers of a wide variety of birds and would be expected to provide shelter for most of the mammals using the area.

The locality also contains a large number of over mature trees with numerous hollows and hence ideal habitats for arboreal mammals and tree nesting birds. There are only a few of these in the quarry area.

The surrounding landscape of native forest and partially cleared farmland offers a wide variety of habitats.

Birds Observed ;	Eastern Rosella	Black Cockatoo
	King Parrot	Mountain Larry
	Jacky Winter	Grey Fantail
	Rufous Fantail	Australian Raven
	Magpie Lark	Spotted Pardalote
	Grey Thrush	Brown Tree-creeper
	Golden Whistler	Whip Bird

Mammals seen or assumed to be present on the basis of scats; Grey kangaroo, Swamp wallaby and Brush-tailed Possum.

#### Visual Resource (Ref. Map 13)

The visual resource of the site in a local context is moderate being part of the lowland hill country.

In the broad visual catchment the site is part of the forested landscape forming a backdrop to the farming areas.

The quarry site cannot be viewed from the north or the east, as it is located on the south western side of a ridge.

A buffer zone of two ridges to the east protects the rural dwellings along the Old Highway.

#### Landuse

Previous landuse was grazing and some timber extraction. Logging vehicles have made numerous tracks through the site.

- \* Consultation and N.P.W.S. officer study indicates no archeological evidence. N.P.W.S. advise no further survey is necessary. (See Letter)

\* Topography

The construction of the quarry, dam and associated works will alter the topography.

Safeguards

Disturbance to the site will be restricted to the quarry, a circular access road and dam.

On completion the quarry site will be partly reshaped to the surrounding contour.

\* Soil

The overburden of humus, soil and vegetative material will be removed from the quarry site, roads and dam location.

Safeguards

The overburden from the quarry will be stockpiled. Sufficient material will be kept to recover the site on completion. Similarly the soil removed in road construction and dam location will be stockpiled and used in revegetation.

Nutrient displacement

The extraction operation and clearing of vegetation will be expected to remove nutrients from the site and release others into the local ecological systems faster than via natural processes.

Pollution caused by the leaching of fuels may occur.

Disturbance to the vegetation, exposure of parent material to the air and moisture will accelerate nutrient flows.

Safeguards

Clearing of vegetation will be kept to a minimum by marking of clearing boundaries and the use of a circular access and egress track.

During extraction and associated crushing, screening and loading activities all water falling on and entering the site will be controlled by a series of contour drains and sediment traps. This water will be gradually released to the surrounding vegetation. It is anticipated that that on release the water will contain a maximum of 50 ppm of sediment, wet weather flow.

All water used in the crushing and screening process will be kept in a closed system and recycled to prevent damage to the natural nutrient flow.

All service area runoff will be contained by a drainage sump.

\* Hydrology

The proposed operation has the potential to impact on local hydrological cycles through the pollution of the existing system, introduction of greater volumes of water than normal and reduction of volumes due to the dam construction.

Safeguards

As mentioned in the previous section, pollution of the waterways will be prevented by a system of sediment traps and contour drains. Greater volumes of water due to the ground disturbance will be gradually released via sediment ponds. Access roads will be constructed to Soil Conservation Standards and the watercourse crossing will be protected by a culvert. The quarry site will be isolated by diversion channels.

As the dam is part of the closed system to be used in the crushing process it is necessary to prevent flood flows breaching the dam wall. Hence it is necessary to design the dam to cater for these flows.

Initially, flows to the creek will be reduced until the dam fills.

In the long term, the hydrological systems will reach equilibrium as the dam fills and the hydrological safeguards are implemented.

- \* Flows in the water course and Malabar Creek will be at normal levels once the necessary works are completed.

\* Vegetation

The vegetation on the site has had a history of disturbance from fire and uncontrolled logging activity. Grazing has increased the number of cleared spaces especially on the valley floor. Four-wheel drive vehicles have created a number of tracks on the ridges.

Clearings have already been created for the test drillings and dam.

Safeguards

A buffer zone will be maintained and further vegetated to the south of the quarry site.

On completion topsoil will be respread and vegetated with local species.

The area is prone to bushfires coming from the west and south-west. Hence this hazard will need to be reduced by control burning of the nearby forest, especially to the west. The presence of the dam and implementation of on site safety measures will prevent fires originating from the development. The presence of the wet area of aquifers to the south will form an adequate barrier to the industrial estate.

\* Fauna

The proposed operation will have an impact on the fauna. Increased local noise levels, especially blasting will affect the fauna. The removal of some vegetation will reduce habitat potential.

Safeguards

Restricting the clearing of vegetation, stockpiling cleared vegetation for habitats, preserving the important gully sites and maintaining as many of the few mature trees as possible, will reduce the impact on the fauna.

The noise levels generated by the operation will frighten the more timid species. Observations at other similar operations suggest that the birds do gradually become used to increased noise levels.

The site area in relation to the habitat potential of the surrounding areas suggests that the long term impact on wildlife will be minimal.

\* Landscape - Visual Resource

The proposed operation has the potential to impact on the landscape as it falls within the visual catchment of isolated farms south of Moruya.

Safeguards

Maintaining the vegetation to the west and south will provide a visual barrier in these directions.

The construction of a berm and subsequent revegetation to the south of the quarry will reduce the visual impact in the long term from the areas. Careful location and design of access roads and crushing facilities will minimise the visual impact at short and middle distances.

The proposed tree planting plan for the nearby industrial estate will also reduce the visual impact. (See appendix 5)

Land Use

The previous land use was grazing and logging activity with recreation use of the tracks. The increased traffic associated with the project will marginally affect local industrial traffic levels and nearby highway use.

Safeguards

The operation will have little effect on grazing and logging activities. In the long term it will advantage both these uses of the area.

The site will be closed to the public and recreation use of the area will be prohibited.

The present roadway into the site will be replaced by an extension of the industrial subdivision road through the nearby industrial estate, so that permanent use by trucks of the Old Highway will be avoided.

Entry to the highway should be in accordance with local government and DMR requirements. The intersection now completed by the applicant will minimise traffic conflict at this point. (See DMR Letter)

Noise - see Noise Assessment. (Appendix 3a)

Dust - See Dust Assessment. (Appendix 3b)

0 ENVIRONMENTAL IMPACT

Table No.

INTERACTION	:SAFEGUARDS	SCALE	:SIGNIFICANCE
Habitat Displacement	:Rehabilitation	:Small/long term	: Low
:	:	:	:
Erosion/sedimentation	:Diversion banks :Sediment ponds :Dam :Energy dissipators :Mulching :Revegetation	:Small/short term	: Low
Visual intrusion	:Screening :Topographic placement	:Medium/long term	: Low
Groundwater displacement	:Dam :Retention ponds	:Small/long term	: Low
Water quality reduction	:Sediment ponds	:Small/short term	: Low
Noise	:Machine silencers :Blast pattern :Stemming/loading type :Topographic placement :Charge restriction :Hours restriction :Driver education	:Small/long term	: Medium
Dust	:Crusher sprays :Topographic placement :Stockpile wetting :Road sealing	:Small/long term	: Low

Monitoring

The proposal will be monitored annually to :-

1. Identify any inadequacies in safeguards and rehabilitation.
2. Recommend any further safeguards and/or alterations to existing safeguards.

Monitoring will consist of vegetation survey, drainage survey noise and dust surveys. Monitoring will occur during construction and operation.

0 Justification of Proposed Development

Environmental Considerations

With the implemented safeguards the proposal will have a limited impact on erosion, sedimentation, water quality reduction, flooding,

visual pollution, noise pollution, dust pollution and ground vibration.

#### Economic Considerations

The resource will provide a high quality road making material and hard rock supply. This will reduce supply pressure on existing river extractions and scalping operations. The multipliers extending from this base resource have implications for development, building and servicing industries.

#### Social Considerations

The project will employ a minimum of 14 people during construction and a minimum of 8 people during operation. Again the multiplier effect of this income will have implications to local services. Social disruption by landuse conflict will be minimised by the implemented safeguards.



APPENDIX 1

GOVERNMENT AUTHORITY CONSULTATIONS

GOVERNMENT AUTHORITY	REPLY DATE	REFERENCE	CONTACT
Department of Environment and Planning	21.7.86	86/1660	S. Jones
Soil Conservation Service	22.7.86	L.2	B. Duncan
The Electricity Commission of N.S.W.	30.7.86	54172 Prop/RWM	R. Mackenzie
Department of Main Roads	31.7.86	43/M.448	C. Johnstone
National Parks and Wildlife Service	1.8.86	SF:KJ:F/1771	S. Feary
Water Resources Commission	5.8.86	86/16484	M.Lan
Department of Environment and Planning	6.8.86	86/1660	G. Wright
Illawarra County Council	8.8.86	RI/1/4023	J. Wallace
Department of Environment and Planning	13.8.86	86/1660	L. Gray
Eurobodalla Shire Council	14.8.86	86/4067/ 10180	R. Nott
Department of Industrial Relations: Mines Inspection Division	21.8.86		G. Terrey
State Pollution Control Commission	5.9.86	281.119C/1 RAC:PA	J. Gorman
Public Works Department	5.9.86	MS.2402	D. Miller
Department of Main Roads	12.9.86	43/M.448 SRL:RFM	S. Lipman
The Electricity Commission of N.S.W. Report	15.10.86	54753TROP- RWM	R. Mackenzie

APPENDIX 2 REFERENCES

- |   |      |  |
|---|------|--|
| D. Benbow and Associates Pty. Ltd.      | 1986 | Noise Impact Statement for Proposed Granite Quarry at Lot 1 DP 732595 The Old Highway North Moruya<br>Unpublished : Parramatta |
| Department of Environment and Planning. | 1985 | <u>Manual for Environmental Impact Assessment</u><br>Department of Environment and Planning. Sydney.                           |
| Department of Industrial Relations      | 1985 | <u>Abstract of the Mines Inspection Act 1901 and General Rules</u><br>Department of Industrial Relations 1985                  |
| Department of Main Roads                | 1985 | Specification for the Supply and Delivery of Base and Sub Base Materials for Surfaced Road Pavements (MR. 744 1985.)           |
| Department of Main Roads                | 1985 | <u>Interim Guidelines for Erosion and Sediment Control</u><br>Department of Main Roads. Sydney                                 |
| Department of Main Roads                | 1979 | Specification for the Supply and Delivery of Caver Aggregate for Sprayed Bituminous Surfacing.                                 |
| Ecological Monitoring Services          | 1986 | A report on the Ecological Impact of a Quarry Site at Polluombra for Mr. John Nader<br>Unpublished : Tamworth                  |
| Galloway, R.W.                          | 1978 | <u>Construction Materials in land Use on the South Coast of N.S.W.</u><br>C.S.I.R.O. Canberra                                  |
| Soil Conservation Service               | 1985 | <u>Preliminary Guidelines for the Preparation of Environmental Impact Statements.</u><br>Soil Conservation Service. Sydney     |
| Soil Conservation                       | 1980 | <u>Urban Erosion and Sediment Control Guidelines</u><br>Soil Conservation Service. Sydney                                      |
| State Pollution Control Commission      | 1985 | <u>Environmental Noise Control Manual</u>  |

APPENDIX 3A

NOISE IMPACT STATEMENT  
FOR  
PROPOSED GRANITE QUARRY  
AT  
LOT 1 DP732595 SHELLEY ROAD,  
NORTH MORUYA.

Prepared by R.T. Benbow,

For Dick Benbow & Associates Pty. Ltd.,

Report No. EE1152M.

August - September 1986.

Dick Benbow & Associates Pty. Ltd.,

2/5-9 Hunter Street,

PARRAMATTA NSW 2150.

Telephone 635 5099

(ah) 635 1425

(047) 57 1366

1.0 INTRODUCTION

It is proposed to operate a granite quarry on Lot 1 DP732595, Shelley Road, North Moruya. The location of the proposed quarry is north of an existing industrial site and over 400 metres from the nearest residence. The quarry would be operated on a small scale with a capacity to produce a maximum of 500 tonne of crushed and screened rock per day.

The details contained in this report enable an assessment to be made of the effect noise and vibration emissions that the proposed quarry may have on the nearby area.

Specific measures to reduce the potential acoustic impact of the proposed quarry have been considered by the developer. These measures will be incorporated into the siting of the extractive area and the location of the crushing and screening plant.

## 2.0 ASSESSMENT CRITERIA

There are well established criteria that enable potential noise and vibration emissions from a hard rock quarry to be assessed. The criteria are based on maintaining control of noise emissions from the quarry so that the existing background noise levels at the nearest residences will not be increased by more than 5 dBA. There is also a provision for the gradual increase in noise level due to the land use zoning. An industrial estate is located adjacent to the site for the quarry and the nearest residences. This zoning would permit noise levels during daytime hours of 45 dBA at the residences. (Refer to SPCC Environmental Noise Control Manual, 21-1, row (d). (See Appendix))

The criteria for the effects of blasting operations have been established so that the comfort of residents is protected. The noise from blasting, defined as overpressure, is not to exceed 115 db (Lin Peak). The potential vibration from blasting is not to exceed a level of ground vibration of 5 mm/second. These levels for overpressure and ground vibration would apply between the hours of 9.00 am - 3.00 pm, (Monday - Friday). 9.00 am - 1.00 pm Saturdays. The above assessment criteria have been established by the State Pollution Control Commission (S.P.C.C.). If the proposed quarry is operated within these criteria, there is minimal potential to cause annoyance to the nearest residents.

### 2.1 Role of Regulatory Authorities

The operation of a hard rock quarry comes under the control of the State Pollution Control Commission (SPCC) and the Mines Inspection Division of the Department of Industrial Relations.

A hard rock quarry is classed as a scheduled premises under the Noise Control Act, the Clean Air Act and the Clean Waters Act. The operation of a hard rock quarry must therefore comply with the requirements of these Acts. Prior to operating the quarry, approval must be obtained from the SPCC. A detailed application is required. The Commission conducts an assessment to ensure that the proposed operations will satisfactorily meet their acoustic criteria. Officers of the Commission conduct routine inspections of the quarry and monitor noise, overpressure and ground vibration.

A hard rock quarry must also comply with the requirements of the Mines Inspection Act. This Act is administered by the Department of Industrial Relations through the Mines Inspection Division. Routine inspections are conducted. The operation of the quarry must meet minimum safety requirements for the operation of plant and equipment. Blasting operations must be conducted in accordance with the safety requirements of the Act.

## 3.0 EXISTING ACOUSTIC ENVIRONMENT

The existing acoustic environment is determined by measuring the levels of background noise in the area adjacent to existing residences. The predicted level of noise emissions from the proposed quarry are then compared to the measured background noise levels to assess the likely impact of the proposed quarry.

The background noise measurements were conducted using two sets of instruments. A Bruel & Kjaer Statistical Level Analyser, Model 4426, was fitted with a 12.5 mm diaphragm microphone and wind shield. The microphone was mounted on a tripod and located approximately 1.2 m above ground level. Measurement periods in excess of 15 minutes were used. A Bruel & Kjaer precision sound level meter fitted with an octave band filter (Models 2209, 1613) were used to obtain a frequency spectrum of the existing acoustic environment. The instruments were calibrated before and after the measurement periods using a Bruel & Kjaer calibrator, model 4230. The weather conditions during the monitoring periods were suitable for conducting measurements. The background noise levels are shown in Tables 1 and 2. The location of the noise measurement locations are shown on Diagram 1. The terms used to describe the existing acoustic environment appear complex. The background noise is described using the term L90. Simply, this means the level of noise that is exceeded for 90% of the time, as such the L90 level is the average minimum of the fluctuations in noise levels that occur. The other acoustic term that is used is the L10 level. This is the level of noise exceeded for 10% of the time and is the average maximum of the noise fluctuations.

Table 1. Statistical Noise Levels 21st August 1986.

<u>Location</u>	<u>Time</u>	<u>L90</u>	<u>dB(A)</u>		
			<u>L10</u>	<u>L1</u>	<u>L50</u>
1 Site	10.30 am	<30	36	41.5	31.5
2 Site	10.40 am	33	43	55	36
3 Lot 12	11.50 am	36	42.5	48	39
4 Lot 11	12.10 pm	35	36.5	41.5	35.5
5 Lot 10	11.25 am	31	38.5	53	33.5
6 Lot 9	1.50 pm	34	39.5	48	36.5
7 Lot 8	1.30 pm	31.5	39.5	45	34
8 Hargrave	12.55 pm	31	42	48	34.5
9 Lot 6	12.35 pm	31	38	46	32.5

Table 2. Octave Band Levels 21st August 1986.  
db lin at centre frequencies in Hertz

<u>Location</u>	<u>Time</u>	<u>dB(A)</u>	<u>63</u>	<u>125</u>	<u>250</u>	<u>500</u>	<u>1k</u>	<u>2k</u>	<u>4k</u>	<u>8k</u>
1	10.30 am	32	38	36	28	27	23	20	19	15
2	10.40 am	34	37	37	34	32	30	29	26	18
	Note A	40	40	38	36	38	33	29	30	26
3	11.50 pm	40	46	48	43	36	30	28	29	21
	Note B									

A. Noise emissions from industrial area south of location of proposed quarry cause the level to increase from 34 to 40 dBA.

B. Noise levels during activity from industrial estate. Increase in level at 125 Hertz due to electrical substation.

### 3.1 Description of Existing Noise Sources

The proposed quarry site is located on the boundary of a zoned industrial area. There are several factories operating at the southern end of the industrial estate. Several of these factories are involved in the manufacture of products. East of the industrial estate, alongside the Old Highway, an electrical substation is located.

The nearest residences are located on the eastern side of the Old Highway. Traffic on the Princes Highway was clearly audible at the noise measurement locations adjacent to lots 9 and 12. The electricity substation was clearly audible at lot 12. Other sources of noise typical of all lots along the Old Highway were: birds, local cars, farm animals, insects.

The existing noise levels along the Old Highway are all less than 36 dBA. The land use zoning adjacent to the industrial estate permits an increase in the background level to 45 dBA during daytime hours. Away from the industrial estate where the land use is zoned for rural residential, the allowable noise levels from a proposed quarrying operation would be 5 dBA above the existing background noise levels.

## 4.0 DESCRIPTION OF PROPOSED QUARRYING OPERATIONS

The proposed quarrying operations are fully detailed in the body of the Environmental Impact Statement. Therefore a full description of the proposed operations will not be repeated in this report. The essential aspects of the proposed quarrying operations are the equipment noise emissions and the frequency of operation. The size of the proposed quarry is limited with a small crushing/screening plant to be operated. The frequency of drilling and blasting will also be limited. It is essential that these aspects be clearly understood as the nature and size of the proposed quarry limits the potential for high levels of noise to be constantly emitted.

### \* 4.1 Times of Operation

It is proposed to operate the quarry from 7.00 am - 6.00 pm Monday to Friday, 7.00 am - 1.00 pm Saturday. Blasting operations would be restricted to 9.00 am - 3.00 pm Monday to Friday. 9.00 am - 1.00 pm Saturday.

### 4.2 Frequency of Operation

The crushing and screening plant would have the capacity to process a maximum of 500 tonnes of material per day. It would operate for at least 150 days per year. To provide material for crushing it will not be necessary to blast frequently. It is expected that there will be approximately 7 - 10 blasts per year after the face has been established. Therefore it will be necessary to operate drilling equipment for approximately 30 - 40 days per year.

### 4.3 Location of Operations

The location of the extractive area, and the crushing/screening plant are shown in detail in the Environmental Impact Statement. The extractive area has been sited so that blast operations will

take place in the direction facing the industrial area and towards the vacant land to the west - south west of the site. No blasting will take place in the direction facing the industrial area and towards the nearest residences. The majority of the residences are located to the rear of the extractive area. There exists a permanent buffer area between the quarry site and the majority of these residences. There are also topographical features in the buffer zone that will provide significant noise attenuation.

The proposed equipment to be used in carrying out the quarrying operations will be located behind natural topographical features that exist on the site. There has been emphasis placed on restricting the extractive area so that vegetation screening towards the Old Highway will be retained. The operator of the proposed quarry has decided to sterilise areas of high quality granite in the direction towards the residences along the Old Highway. This emphasis on establishing good environmental management practices will greatly assist in ensuring the community of the proponent's concern to limit the potential impact of the proposed quarry.

The following distances separate the residences from the quarrying operations.

Table 3. Buffer Distances

Residence	Distance from Extractive Area	Distance from Plant
Lot 12	400m	550
Lot 11	400	550
Lot 10	500	700
Lot 9	900	1200
Lot 8	1150	1500
Lot 6	1400	1700
Hargreaves	1500	2000
Lot 2 Subdivision	400	700
Closest boundary		

There are topographical differences between both the location of the extractive area, the plant area and the residences along the Old Highway. The differences in topography will provide significant attenuation to the noise emissions from equipment operating at the proposed site during normal quarrying activities.

#### 4.4 Proposed Quarrying Equipment

The proposed quarrying equipment will consist of the following machinery which will emit the level of noise shown in Table 4, towards the nearest residences.

Table 4. Proposed Quarrying Equipment

Description	Noise Level
1. Airtrac drill rig or Hydraulic drill rig (Joy and Furukawa, both with Std compressors)	91 dBA at 7 m 88 dBA "
2. For large scale projects Front End Loader - Cat 988B	89 dBA "

- |    |  |        |   |
|----|--|--------|---|
| 3. | For usual production<br>Front end Loader - Cat 966B  | 86 dBA | " |
| 4. | For large scale projects<br>Dump Truck - 35 tonne  | 90 dBA | " |
| 5. | For usual production<br>16 or 22 tonne dump truck  | 86 dBA | " |
| 6. | Crushing & Screening Plant consisting of<br>primary, secondary and tertiary crushers,<br>two screen decks and conveyors. The plant<br>is fully described in the EIS. It has a<br>production capacity of up to 100 tonnes/hour. | 89 dBA | " |

The crushing and screening plant is portable and is readily set up or dismantled. The power supply for such plants is often a diesel powered generator. However, the plant will receive power from the local electricity supply.

#### 4.5 Blasting details

There would be 7-10 blasts per annum after the face is established. The blasting would be conducted by workmen competent within the requirements of the Mines Inspection Division of the Department of Industrial Relations. The following blast details would be typical of the blast design to be initially used at the quarry.

#### Table 5. Blast Details

Hole dia	:	75 mm - 87 mm, bench height	:	15 m
Explosive type	:	ANFO and Powergel		
Method of initiation	:	electric detonators		
Maximum Instantaneous Charge (MIC)		40 kg up to maximum		80 kg.
Blast pattern	:	Initially based on previous total blasts on the site. Blast pattern would be adjusted to suit specific requirements		
for		type of product being produced.		
Point of Initiation	:	Centre or western end of hole layout.		
No. of rows	:	Vary depending on production requirements volume of rock required.		

#### 4.6 Truck Movements

The access route for trucks entering and leaving the quarry would be through a public road in the industrial estate. Trucks would not need to pass by the residences along the Old Highway.

The complete details of the predicted truck movements are shown in the body of the EIS. The movements of trucks will vary from 15 up to a maximum of 40 per day. The trucks are over 400 metres from the nearest residence.

#### 5.0 PREDICTED NOISE LEVELS

The predicted impact of the proposed quarrying operations have been carried out based on the use of the larger equipment listed in Table



4. The effect of blasting has been determined based on maximum instantaneous charges (MIC) of up to 80 kg. The effect of truck movements is also discussed.

#### 5.1 Plant and Equipment Noise Levels

The calculation procedure used in determining the level of noise at the nearest residences are based on practices acceptable to the SPCC. The following would apply:

- . 6 dBA attenuation for each doubling of distance from the equipment to the nearest residence. (Refer to distance attenuation chart in SPCC Environmental Noise Control Manual, 205-2). (See Appendix)
- . attenuation due to topographical shielding. Plant area has 21 m height screening, extractive area up to 20 m. (Refer to attenuation chart in SPCC Environmental Noise Control Manual, 228-1). (See Appendix)
- . conservative allowance for excess attenuation due to vegetation and ground absorption.

Based on the data presented in Section 4 and the location of the work areas, the following noise levels apply for the nearest residence at Lot 12, the Old Highway.

##### 5.1.1 Lot 12 - Plant and Mobile Equipment

##### Combined Noise Level of Plant and Mobile Equipment 36 - 38 dBA

based on

- . attenuations for distance from the extractive and plant areas respectively.
- . attenuations due to topographical shielding, and the excess attenuations due to ground absorption and vegetation.
- . The combined noise levels of the airtrac drill rig complete with std. compressor, mobile equipment and the small crushing/screening plant. (The 966 FEL located adjacent to plant area, dump truck, 988 FEL located at face, drilling at benches)

##### 5.1.2 Lot 12 - Overpressure and ground vibration levels

The prediction of the effects from the blasting is based on experience from measurements conducted at numerous hard rock quarries. Monitoring of overpressure and ground vibration has taken place sufficient times to enable a predictive relationship between the effects of blasting, distance and MIC to be developed. This is the "scaled distance" relationship that was first derived in the early 1970's by studies conducted for the US Bureau of Mines. The scaled distance relationship relates distance and MIC in the following two formulae.

- . For overpressure  $SD = \frac{\text{distance}}{(\text{MIC})^{1/3}}$
- . For ground vibration  $SD = \frac{\text{distance}}{(\text{MIC})^{1/2}}$

Applying a scaled distance of 110 for overpressure and the condition that the blast faces will be oriented away from the residences along the Old Highway, overpressure will be controlled to 115 dB (lin pk). For ground vibration a scaled distance factor of 45 is required to maintain the level of ground vibration at less than 5 mm/sec. These two scaled distance factors will enable the quarry operator to vary the number of holes per delay and the bench height so that the maximum instantaneous charge of up to 80 kg is not exceeded.

## 5.2 Summary of Predicted Levels

The level of noise, overpressure and ground vibration from the proposed quarry have been determined for the areas listed in Table 3. The methodology follows from that outlined in Section 5.1.

A range of noise levels are listed based on whether a hydraulic or air trac rig is used.

### 5.2.1 Lot 12

Combined noise of plant and equipment 36 - 38 dBA.  
Overpressure 115 dB (lin pk) using a scaled distance of 110.  
Ground Vibration < 5mm/sec using a scaled distance of 46.

### 5.2.2 Lot 11

Combined noise of plant and equipment 36 - 38 dBA.  
Overpressure 115dB (lin pk,) using a scaled distance of 110.  
Ground Vibration < 5mm/sec using a scaled distance of 46.

### 5.2.3 Lot 10

Combined noise of plant and equipment 36 - 38 dBA.  
Overpressure 115 dB (lin pk).  
Ground Vibration < 5mm/sec.

### 5.2.4 Lot 9

Combined noise of plant and equipment 33 - 35 dBA.  
Overpressure 110 dB(lin pk).  
Ground Vibration < 5mm/sec.

### 5.2.5 Lot 6

Combined noise of plant and equipment 29 - 31 dBA.  
Overpressure 105 dB (lin pk).  
Ground Vibration < 5mm/sec.

### 5.2.6 Hargreaves

Combined noise of plant and equipment 27 - 29 dBA.  
Overpressure 105 dB (lin pk).  
Ground Vibration < 5mm/sec.

### 5.2.7 Lot 2 Subdivision

(At closest boundary and allowing no further attenuations for

topography).

Combined noise of plant and equipment 37 - 39 dBA.

Overpressure 115 dB (lin pk).

Ground Vibration < 5mm/sec.

### 5.3 Truck Noise

The movement of trucks will not pass by residents along the Old Highway but will travel through the existing industrial area. The acoustic impact of trucks will be minimal. Noise from trucks will not exceed SPCC criteria.

### 5.4 Electricity Commission

As the crushing is WET CRUSHED little or no dust will be exuded. Town water may be connected in the case of necessity as it is within 100 metres of the plant.

Eden Drill and Blast will be the contract company for blasting. Mr. Bill Bell, the owner, has assured us that the blast can be regulated according to specifications and controlled blasts will prevent the malfunctions of high voltage equipment at the Moruya 132 KV substation. Our tests have shown the 4 mm per second requirement to be within specifications.

The Electricity Commission will be notified when our blasting will commence so as they can monitor the ground movements to ensure that there is no damage or maloperation of substation equipment.

## 0 6.0 STATEMENT OF IMPACT

Quarries by the nature of their operations have the potential to cause annoyance to residential areas. The community has often expressed concern at the effects of blasting on their residences.

The acoustic impact of a proposed quarry is viewed more strongly by the community than many other designated developments. An essential aspect required to alleviate the objections to a proposed quarry is to incorporate a high standard of environmental management practices in the design of the quarry layout. These practices serve to hide the quarry operations from the view of the nearest residences, control the level of noise to within accepted guidelines and allay the fears residents have that blasting will damage their homes.

The environmental management practices incorporated into the proposed quarry include restricting the extractive areas so that blasting does not take place directly towards residences, retaining a vegetation cover to shield the quarry from view of the nearest residences, locating the plant and extractive areas so that significant attenuation of noise will result from the topography, minimising the impact of truck movements by constructing an access road through the nearby industrial area.

The proposed quarry will be able to operate within the acoustic criteria required by the State Pollution Control Commission (SPCC).

Controlled blasting will enable the quarry to conduct this process without exceeding the comfort criteria of the SPCC. A detailed application to the SPCC will be required under the Noise Control Act before the quarry begins operation. Blast monitoring will take place for the first series of blasts at the quarry to ensure the SPCC requirements are being met.

Our assessment of the noise impact of the proposed quarry indicates that the quarry will have negligible acoustic impact at the nearest residential areas. The proposed site adjacent to the industrial area is ideally suited.

R.T. Benbow,

Principal Consultant.

Appendix 3(b)

1.0 Dust Generation

The proposal has the capacity to generate dust from the following sources:

- a) Wind-blown dust from stripped areas and dust emitted during the winning operation.
- b) Dust emitted by processing and crushing.
- c) Wind-blown dust from stockpiles.

1.1 a) Stripped Areas and Winning Operation

Quantitative analysis of the amount of dust likely to be generated by this process has not been undertaken. Test blasting on the site has not given rise to significant dispersal of dust from this type of material.

The Airtrac or hydraulic drill to be used for boring holes for explosives has an attached dust catcher and that operation is therefore dust free.

Reference to the wind climate confirms that predominant winds lie between the north-east - south-east and north-west - south-west sectors depending upon season and time of day. The winds which occur with the least frequency are those which are generally in the northerly and southerly sections.

The profile of the quarry will be such that the quarry walls will provide a barrier which will reduce the emission of dust from the site during afternoon east to north-easterly winds.

During morning westerly winds and afternoon westerly winds during Winter, the quarry walls provide a shield, which will minimise the strength of wind entering the excavation.

Progressive rehabilitation and restoration of surface growth will further minimise dust emission from this source.

1.2 b) Processing and Crushing

The operation of the proposed transportable crushing and screening plant will have the capacity to generate dust. It is proposed to install appropriate fixed water spraying apparatus to the plant to the satisfaction of the State Pollution Control Commission to ameliorate this nuisance. A dam will be constructed in the location shown on Map 5.

- i) as a reservoir to store water which will be required in the spraying operation referred to above, and
- ii) as a settling pond to entrap soil particles contained in

the effluent drained from the quarry surfaces during wet weather.

Regular cleaning out of the dam will be undertaken and the tailings so won will be utilised in conjunction with overburden stripped from the site for the re-shaping and rehabilitation of the surface.

Water pumped from the dam will be compressed to produce an air and water spray. This will result in the material being sufficiently damp to ensure that the crushing process is dust free. The standard water requirement to alleviate this at maximum output is 1% weight/volume which amounts to 500 tonnes of water or 500,000 litres annually. A wetting agent additive is available if required.

### 1.3 c) Stockpiles

Product will still be damp when stockpiled, and experience in other quarries has shown that fine particles tend to bind, into a crust, thereby virtually eliminating dust emission from stockpiles when dry.

Evidence of this property of crushed aggregate is demonstrated by examination of any roadside D.M.R. stockpile depot. Even during high winds, blown dust is not normally in evidence.

In the unlikely event that dust is emitted from this source, adequate pumping facilities will be available on site to dampen stockpiles, entirely eliminating dust emission.

Appendix 4

RECOMMENDED OUTDOOR BACKGROUND NOISE LEVELS

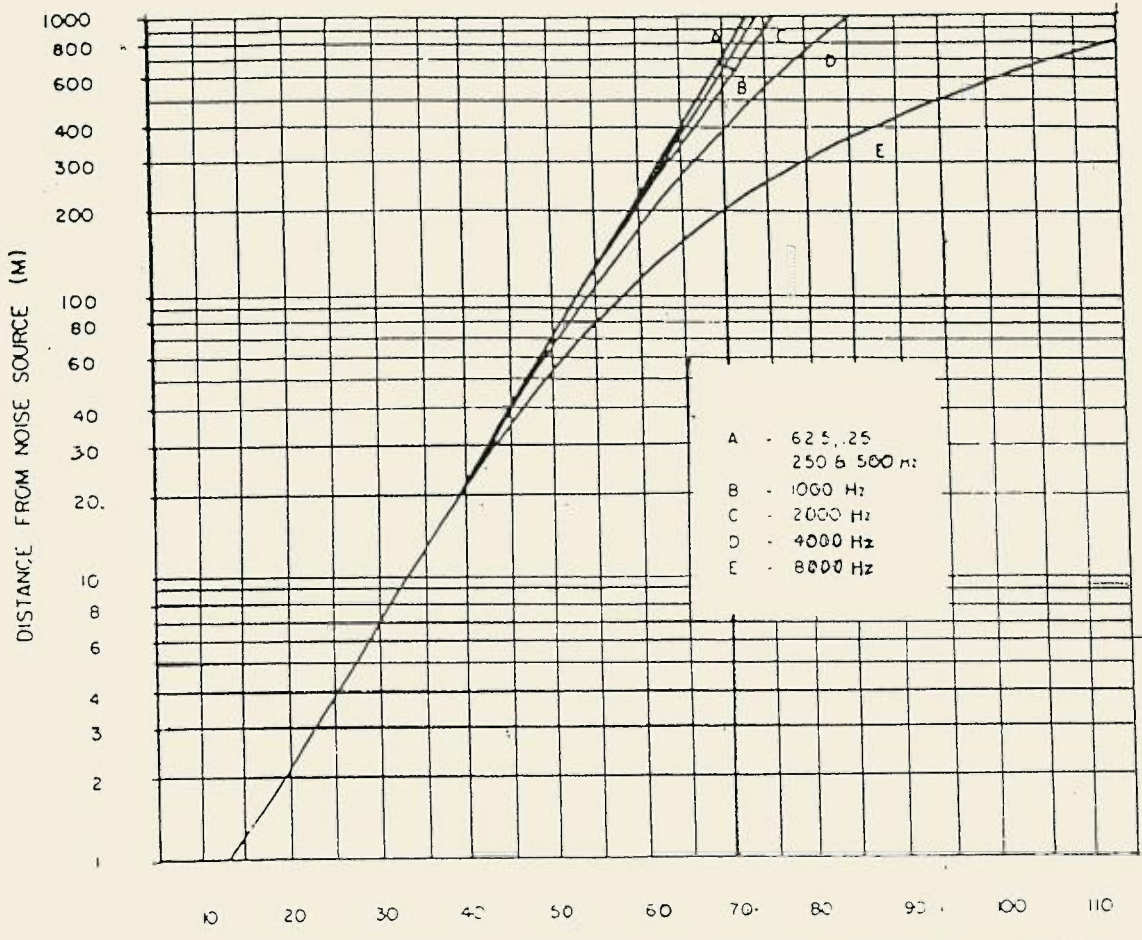
:R :O :W	:Zoning of :noise re- :ceiver area	: Predominant : land-use of : receiver area	: Time : Period	: L90 background	
				: noise level (dB(A) : Acceptable! : Limit	: Extreme : Limit
:(a)	:Rural :(approx :R1 :AS1055	:Residential, :church, hospital	: Day : Night	: 45 : 35	: 50 : 40
:(b)		:Residential, :church, hospital :school	: Day : Night	: 45 : 35	: 50 : 40
:(c)	:Residential :area :(approx :R1-R2 :AS1055)	:Shop or commercial :office	: Day : Night	: 50 : 40	: 55 : 45
:(d)		:Light industry	: Day : Night	: 55 : 45	: 60 : 50
:(e)	:Residential :area on a :busy road :or near an	:Residential, :church, hospital :school	: Day : Night	: 50 : 40	: 55 : 45
:(f)	:industrial :area or :commercial	:Shop or commercial :office	: Day : Night	: 55 : 45	: 60 : 50
:(g)	:area :(approx :R2-R3 :AS1055	:Light industry	: Day : Night	: 60 : 50	: 65 : 55
:(h)		:Residential, church :hospital, school	: Day : Night	: 55 : 45	: 60 : 50
:(i)	:Industrial :area :(approx :R4-R6 :AS1055)	:Shop or commercial :office	: Day : Night	: 60 : 50	: 65 : 55
:(j)		:Factory office or :factory	: Day : Night	: 65 : 65	: 70 : 70
:(k)	:Passive :recreation	:Picnic grounds, :public beaches :bush walks	: Day : Night	: 40 : 40	: 50 : 50

NOTE From Monday to Saturday, daytime is defined as 7.00 am to 10.00 pm and night time is 10.00 pm to 7.00 am. On Sundays and Public

Holidays daytime is 8.00 am to 10.00 pm and night time is 10.00 pm to 8.00 am. Levels applicable to commercial offices in the schedule would also apply to such premises as hotels, motels, clubs, dance halls and theatres.



DISTANCE ATTENUATION  
IN AIR AT 20°C. AND 95% R.H.



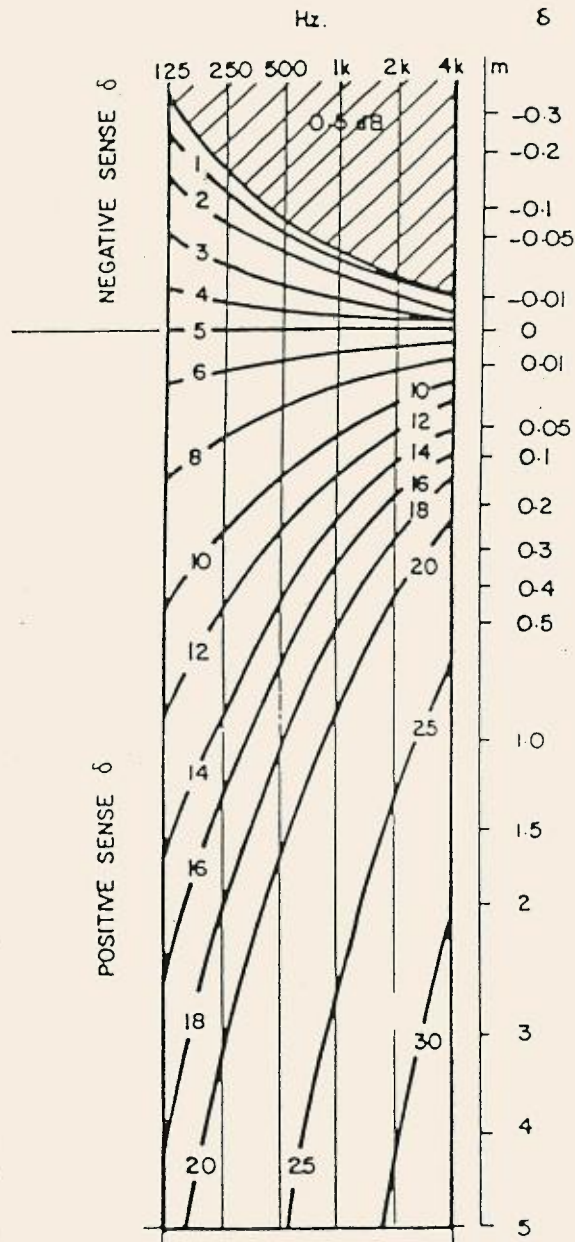
CORRECTION FOR HEMISPHERICAL DIFFUSION AND MOLECULAR ABSORPTION  
S.P.L. (dB re 20 micropascals) TO SWL (dB re  $10^{-12}$  watts)

1. The above chart applies to hemispherical radiation for noise from a point source in a free field. The chart does not apply for a line source, where attenuation by diffusion increases by only 3 dB per doubling of distance.
2. Example: Knowing the S.P.L. spectrum at 50 m. from the source, find the S.P.L. spectrum at 400 m. from the source.

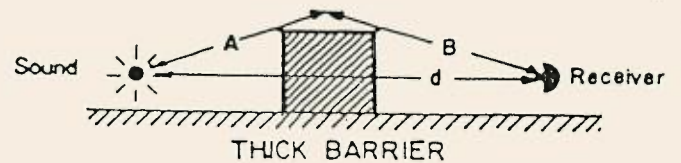
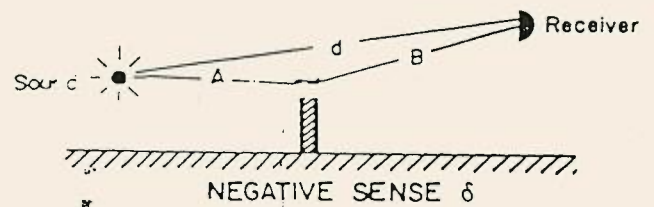
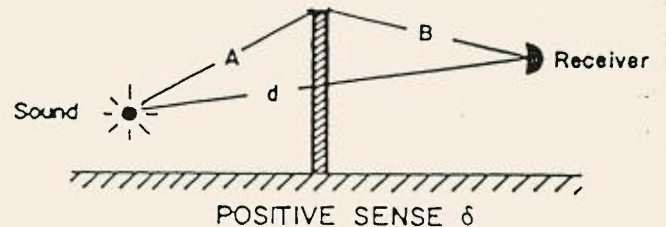
Octave Centre Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
a. Measured S.P.L. at 50 m	75	77	81	86	82	75	65	55
b. Correction Factor at 50 m	47	47	47	47	47	47	47	49
c. Correction Factor at 400 m	65	65	65	65	65	66	70	87
d. Difference in Correction Factors (c minus b)	18	18	18	18	18	19	23	38
e. Calculated S.P.L. at 400 m (a minus d)	57	59	63	68	64	56	42	17

3. Reference: "Handbook of Noise Control" by Cyril M. Harris.  
S.W.L. = S.P.L. + 20 Log r + 7.9; where r = dist. from source in metres.

## ATTENUATION DUE TO BARRIERS AND SCREENS



$$\delta = A + B - d$$



Reference: "Noise Control in Mechanical Services" by Sound Attenuators Ltd, U.K.

1. Attenuation due to distance must first be accounted for. See chapter 205.
2. The chart assumes an infinitely long wall. The factor  $\delta$  (the difference between the direct and the indirect paths) is used to enter the chart and read off attenuation figures for each octave band.
3. The loss around a short barrier is found by predicting the loss over the barrier and around each end and logarithmically combining the three results. For example, if the figures are 10, 12 and 14 dB, the combined loss would be 7 dB.

BACKGROUND NOISE LEVELS (AS 1055-1984)

For reference only - please refer to chapters 19, 20 and 21 for the Commission's preferred background noise levels.

Noise Area Category	Description of differing areas containing residences.	Calculated Noise Level, dB(A)						
		Monday - Friday				Weekends and Public Holidays		
		Time of Day				Time of Day		
		6 am to 7 am	7 am to 6 pm	6 pm to 10 pm	10 pm to 6 am	7 am to 6 pm	6 pm to 10 pm	10 pm to 7 am
R1	Areas with negligible transportation	35	40	35	30	40	35	30
R2	Areas with low density transportation	40	45	40	35	45	40	35
R3	Areas with medium density transportation	45	50	45	40	50	45	40
R4	Areas with some commerce or industry or near to dense transportation	50	55	50	45	55	50	45
R5	Areas with some commercial districts or bordering industrial districts or adjacent to dense transportation	55	60	55	50	60	55	50
R6	Areas within predominantly industrial districts or very dense transportation	60	65	60	55	65	60	55

## APPROVAL APPLICATION

### Development and Building Approvals

It is Commission policy that applications for approval be determined only after any necessary approval required under the Local Government Act 1919 or the Environmental Planning and Assessment Act 1979, has been obtained. It is appropriate, however, for early contact to be made with the Commission so that any particular requirements or control measures can be included in the original proposal.

### Prescribed Form and Fee

Applications for approval of new works must be submitted on the prescribed form together with a fee as prescribed in the Regulation to the SPCC Act.

### TIMES OF OPERATION

The environmental impact of noise from industrial or other noise-generating operations depends to a large extent on the level of background noise in the area. The same noise made at night may have a greater impact than if it is made during the day. This is because the background noise level at night is usually lower, and an intruding noise is more easily noticed. Consequently, the times of operation are of great importance in assessing the noise impact of a proposal.

It is not necessary for the times of factory operation to be limited, so long as the Commission's criteria of acceptable noise levels can be met (see chapters 19, 20 and 21). However, approval usually is made conditional on times of operation being limited to those stated reflect their requirements accurately and cover emergencies and all other likely eventualities.

If at a later date, the applicant wishes to extend the approved times of operation, a further application must be lodged with the Commission.

Please note that extension of times of operation into the quieter periods of the night will generally require the installation of more effective and therefore more expensive noise control equipment. Commonly, for each further 5 to 10 decibels reduction of noise, the cost of noise control equipment may double. The applicant may therefore need to balance the commercial return from extended hours of operation against the cost penalty of more expensive noise control equipment, or seek a better location for the plant if noise control measures are not practicable.

Typical variations in background noise levels that may occur over a day are shown in the following table:

Time	Day	Typical background noise level variation from daytime reference (dBA)
Daytime 7 am to 6 pm	Monday to Friday	0 (reference)
	Saturday 0700-1300	0
	Saturday 0700-1800	-5
	Sunday and Public Holidays	-10
Evening 6 pm to 10 pm	Monday to Sunday	-5
Night-time 10 pm to 6 am	Monday to Sunday	-10
Morning 6 am to 7 am	Monday to Friday	-5
	Saturday	-5
	Sunday and Public Holidays	-10

#### Preferred Times of Truck Movements

Because of the disturbance generated by vehicle noise during normally quiet time at night, the following table sets out preferred times for trucks, having a gross vehicle mass of 2 tonnes or more, to enter or leave the scheduled premises.

	Preferred Hours of Operation	
Frequency of Vehicle Movement	Monday to Saturday	Sunday and Public Holidays
Normal frequency	7 am - 6 pm	Minimal movement, subject to individual assessment
At substantially reduced frequency	6 am - 7 am 6 pm - 10 pm	8 am - 6 pm
Minimal or isolated occurrence	10 pm - 6 am	6 pm - 8 am

Exceptions to the above preferred times of truck movements will be individually investigated. Acceptable times may be specified as a condition of approval if vehicular movement is likely to cause a noise problem.

NOISE CONTROL GUIDELINE

BLASTING

Times of day, airblast overpressure noise level and ground vibration peak particle velocity limits are suggested for those mining, quarrying and related operations which involve the repeated use of explosives. Criteria are specified for guidance only and may be varied according to local site conditions.

More stringent controls are included which might be applicable when blasting cannot be done during normal working hours.

Blasting operations should in most cases be confined to the periods Monday to Saturday, 9am to 3pm. Blasting outside of those times should be approved only where blasting during the preferred times is clearly impracticable, and should then be limited in number. Blasting at night should be avoided unless it is absolutely necessary.

In that context, the criteria for impact on residential premises are shown in Table 154-1.

Table 154-1 Limiting criteria for the control of blasting impact at residences

Time of blasting	Blast overpressure level (dB(linear))	Ground vibration, peak particle velocity (mm/sec)
<u>Monday - Saturday 9 am - 3 pm</u>	116	5
Monday - Saturday, 6 am - 9 am and 3 pm - 8 pm	105	2
Sunday and Public Holiday, 6 am - 8 pm		
Any day, 8 pm - 6 am	95	1

## COMMENTS

- (i) Comfort criteria have been adopted which are marginally lower than damage criteria. Department of Mineral Resources and Department of Industrial Relations current damage criteria are: airblast overpressure 120 dB(lin), peak particle velocity 10 mm/sec. The Commission has no responsibility with respect to damage to buildings except that such cases would involve excessive noise and vibration.
- (ii) All measurements are to be taken at any affected residence.
- (iii) Specialised monitoring equipment is necessary since the energy content of noise and vibration is predominately of ultra-low frequencies:
  - (a) airblast overpressure monitoring equipment should have a cut-off frequency of 2Hz and cover a range of at least 2Hz to 250Hz;
  - (b) ground vibration monitoring equipment should have a cut-off frequency of 4Hz and cover a range of at least 4Hz to 100Hz.
- (iv) Temperature inversions and wind can enhance the overpressure noise levels by as much as 20 dB at distances of 2 km or more from the centre of the blast. When temperature inversion is present, blasting operations should be confined to the hours of 11 am to 1 pm.
- (v) The Commission accepts that there could be some exceedance of the overpressure limit of 115 dB (lin) on infrequent occasions. This should be limited to not more than 5% of the total number of blasts and should not exceed 120 dB(lin) at any time.
- (vi) The ground vibration also may sometimes exceed the limit of 5mm/sec on infrequent occasions. This should be limited to not more than 5% of the total number of blasts and should not exceed 10 mm/sec at any time.
- (vii) Experience indicates that ground vibration for mines and quarries can generally be maintained below 1 mm/sec.
- (viii) The Commission accepts that where misfires have occurred, blasting should take place again as soon as possible for safety reasons.
- (x) In special circumstances such as underground mines in Broken Hill, the Commission has agreed to the peak particle velocity criterion of 5mm/sec extending over the time period 7 am to 11 pm because of specific shift and safety requirements.

## NOTES

See also Australian Standard AS 2187-1979; Part 2, Use of Explosives.

The Australian Division of the Institute of Quarrying includes the following recommendation in its "Guidelines for Quarrying Practice".

The methods to be investigated to reduce the effects of ground vibration at a particular site include:

- \* Reduce maximum instantaneous charge (MIC) by use of delays, reduced hole diameter, and/or deck loading.
- \* Ensure that broken rock and excessive humps or "toe" are removed prior to the firing of the main blastholes.
- \* Optimise blast design (change burden and spacing by altering drilling pattern and/or delay layout, alter hole inclination).
- \* Exercise strict control over the spacing and orientation of all blast drill holes and use the minimum practicable sub-drilling which gives satisfactory toe conditions.
- \* Establish times of blasting to suit the situation, e.g. fire all quarry blasts at a set time acceptable to neighbours and preferably when background noise is highest. It is preferable to fire at times when neighbours are out or moving about, rather than when they are seated for meals.

Quarry operators should attempt to reduce the airblast overpressure to as low a level as practicable.



Appropriate action would be:

- \* Reduce the maximum instantaneous charge (MIC) to the lowest possible level.
- \* Ensure stemming is adequate.
- \* Eliminate exposed detonating cord. (Cover with at least 300 mm of quarry dust or road base).
- \* Eliminate secondary blasting. (Instead of popping, use rock breaker or drop hammer). Also make extra efforts to eliminate the need for toe shots, (e.g. better control of drill patterns).
- \* Assess weather conditions at the time of the blast. (Avoid heavy cloud cover and avoid firing if a strong wind is blowing towards residences. In particular, avoid days of severe temperature inversion).
- \* Consider not loading a shot with explosives if the weather forecast is unfavourable.
- \* Orientate quarry faces where possible so that they do not face directly towards residences.
- \* Ensure that the holes are spaced in such a manner that the explosive force is just sufficient to break the stone to the required size.
- \* Exercise strict control over the spacing and orientation of all blast drill holes.
- \* Take particular care where the face is already broken and where it is strongly jointed, sheared, or faulted.
- \* Consider deck loading where appropriate to avoid broken ground or cavities in the face (from back break, etc.).

Relevant quarry personnel should be given on-going training in the above aspects. To ensure a good relationship is maintained with quarry neighbours and with statutory authorities, blast performance should be regularly reviewed, and possible improvements implemented.

Appendix 5

Raising Seedlings

As suggested earlier it is possible to collect seed from trees around the site and grow seedlings in an open rooted form for planting out in autumn and suitable weather conditions.

The seed is collected when the capsules are ripe, a brown colour and before they open. They should then be placed in the sun, in a paper bag and allowed to ripen when seed will fall out.

The seed is sown, much the same as carrot seed in a well prepared bed.

Each bed should be made up of half coarse sand as exists in Dooga Creek, three-eighths bush leaf mulch and one-eighth loam.

The beds should be boarded up say to 10 inches high and laid on coarse road gravel (about 6 inches deep).

The seed should be sown in small clumps with about 3-5 seeds per clump - the clumps about 6 inches apart to allow easy separation.

The wattle seeds need a pre treatment of placing in a dish of boiling water and left overnight. Those that sink are ready to plant.

Sowing should take place in spring, making sure seeds are just covered with a mixture of sand and leaf mold.

The beds should be gently watered each day so that they do not dry out during germination.

Once the seedlings have two leaves, watering can be less frequent but must be thorough to allow good root development. Weeds need to be removed and any sickly plants.

Purchasing Seedlings

In the short term you may wish to purchase seedlings in a tubed form. - This can be done throughout the Forestry Commission - catalogue is enclosed, local producer.

Again planting should be in the autumn.

Another method is to purchase seedlings and then pot on in larger pots for eventual planting out. Soil mix needs to be one-third coarse sand, one-third leaf mold or peat moss and one-third loam.

Tube Growers Australia, P.O. Box 76, Terry Hills. 2084, are about the best and can supply at competitive rates.

Planting Out

The site needs to be grass free and deep ripped to a depth of 18 inches preferably a month or so before planting.

There is no need to stake plants if they are less than two feet in height.

They should only be watered on planting, well once a week for a month - then leave them unless drought conditions prevail.

Remove sickly plants and any showing severe insect attack. A half a cup of "blood and bone" should be applied when planting and then a full cup once a year.

Weeds and grass need to be controlled for the first year.

Plant at four feet centres.

### SELECTION

It is important to select trees in relation to the environmental factors at each site which include moisture and height.

#### For Wetter Sites

- Swamp Mahogany
- Swamp Oak
- River Oak
- Tea Tree
- Grey Myrtle
- Swamp Paper Bark
- Aspen
- Willows
- Black Wattle
- River Peppermint

#### For Dry Hard Sites

- Spotted Gum
- Rough-barked Apple
- Red Bloodwood
- Mugga Ironbark
- Tuart
- Pepper Tree
- Sally Wattle

#### Feature Trees

To be ultimately left on their own.

- Spotted Gum
- River Peppermint
- Tallowood
- Tuart
- Tasmanian Blue Gum
- Lemon Scented Gum
- Ribbon Gum
- Pepper Trees
- Groups of Poplars
- Yellow Gum
- Coast Myall
- Chinese Elm (groups)
- Chinese Tallow (groups)

Red Flowering Gum  
Liquid Amber

For Avenues - one row

Spotted Gum  
River Oak  
Tallowwood  
Tasmanian Blue Gum  
Chinese Elm  
Chinese Tallow

For Total Screening (leaves to ground)

Plant at TWO metre centres with short lived wattles in between.

River Oak  
Swamp Oak  
Tallowwood  
Turpentine  
Lilly Pilly  
Grey Myrtle

For High Visual Impact

Such as entrance roads and visual boundaries. Plant in groups or separate rows.

- |                   |                |
|-------------------|----------------|
| 1. Turpentine     | 2. Chinese Elm |
| Tallowwood        | Planes         |
| Lilly Pilly       | Poplars        |
| Spotted Gum       | Liquid amber   |
| Lemon Scented Gum |                |

I have left the landscaping up to you as you know what you want. In essence you need to follow these steps.

1. Decide on the effect you want i.e. avenue, single tree, cluster etc. Remember clusters of the same tree have more impact than one tree.
2. Assess the soil and moisture conditions.
3. Decide on the ultimate height.

Pat Brogan

RECOMMEDED TREES

Group 1. TALL Screening Windbreak trees.

A. Native to the Area.

A. Native to the Area

Spotted Gum  
Forest Red Gum  
Blue Gum  
Swamp Mahogany  
Silver Top Ash  
Rough Barked Apple  
River Oak  
Swamp Oak  
Coastal Grey Box  
Grey Gum  
Woolly Butt  
River Peppermint  
Red Bloodwood  
Mugga Ironbark

Eucalyptus maculata  
Eucalyptus tereticornis  
Eucalyptus saligna  
Eucalyptus robusta  
Eucalyptus sieberi  
Angophora floribunda  
Casuarina cunninghamiana  
Casuarina glauca  
Eucalyptus moluccana  
Eucalyptus punctata  
Eucalyptus longifolia  
Eucalyptus elata  
Eucalyptus gummifera  
Eucalyptus sideroxylon

B. Exotic

Tallowwood  
Tasmanian Blue Gum  
Tuart  
Lemon Scented Gum  
Ribbon Gum  
Turpentine

Eucalyptus microcorys  
Eucalyptus globulus  
Eucalyptus gomphocephala  
Eucalyptus citriodora  
Eucalyptus viminalis  
Syncarpia glomulifera

Group 2. Medium sized trees

A. Native to the Area

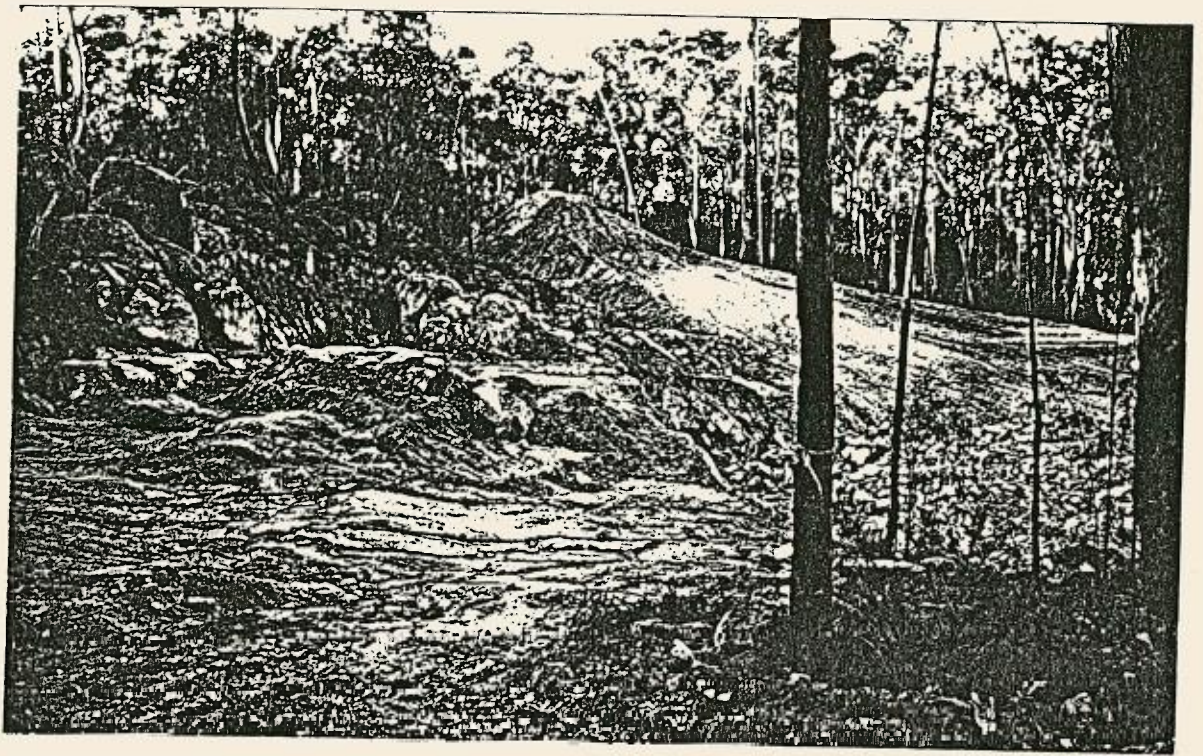
Black Wattle  
Black Wattle  
Mabels Wattle  
Sally Wattle  
Tea Tree  
Grey Myrtle  
Crimson Bottlebrush  
Swamp Paper Bark

Acacia mearnsii  
Acacia decurrens  
Acacia mabellioe  
Acacia floribunda  
Letospermum lanigerum  
Backhousia myrtifolia  
Callistemon citrinus  
Melaleuca ericifolia

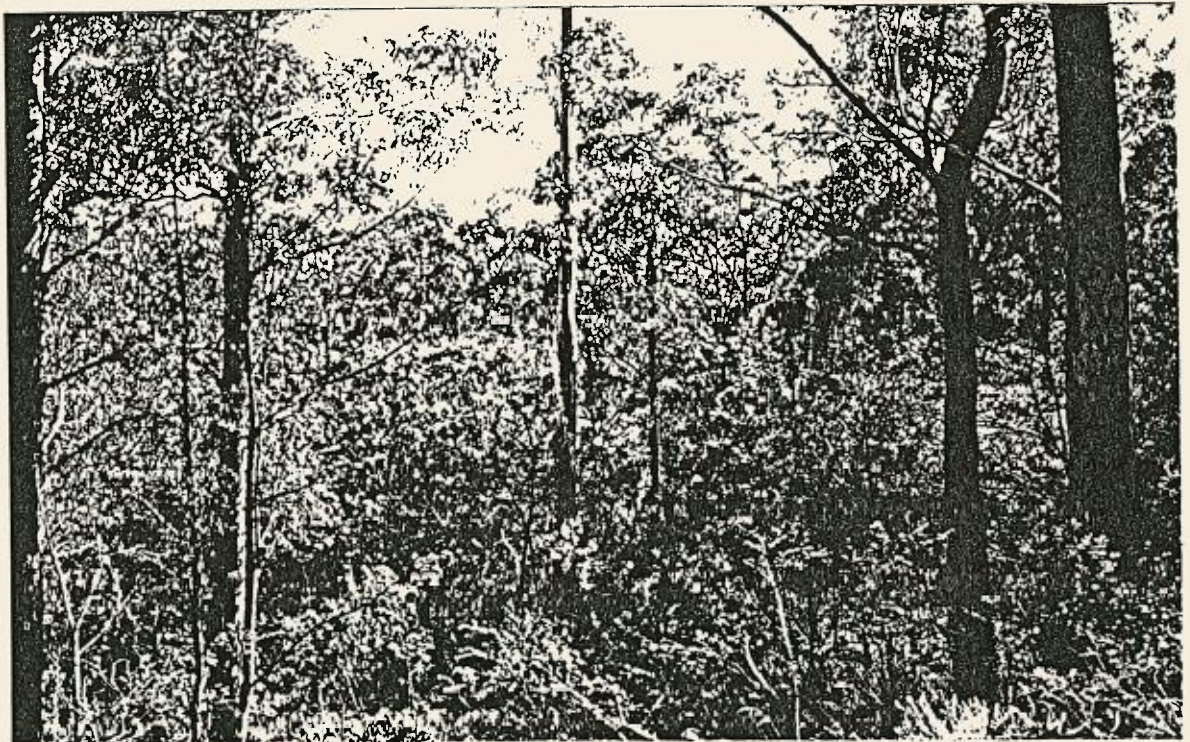
B. Exotic

Hakea  
Peppermint Tree  
Poplar  
Aspen  
Coast Myall  
Yellow Gum  
Weeping Willow  
Chinese Elm  
Lilly Pilly  
Flowering Gum  
Chinese Tallow  
London Plane  
Liquid Amber

Hakea laurina  
Schinus areira  
Populus nigra  
Populus tremula  
Acacia binervata  
Eucalyptus leucoxydon  
Salix babylonica  
Ulmus parvifolia  
Acmena smithii  
Eucalyptus ficifolia  
Sapium seciferum  
Platanus hybrid  
Liquidamber styraciflua



TEST AREA



VEGETATION COVER RETAINED AT TEST

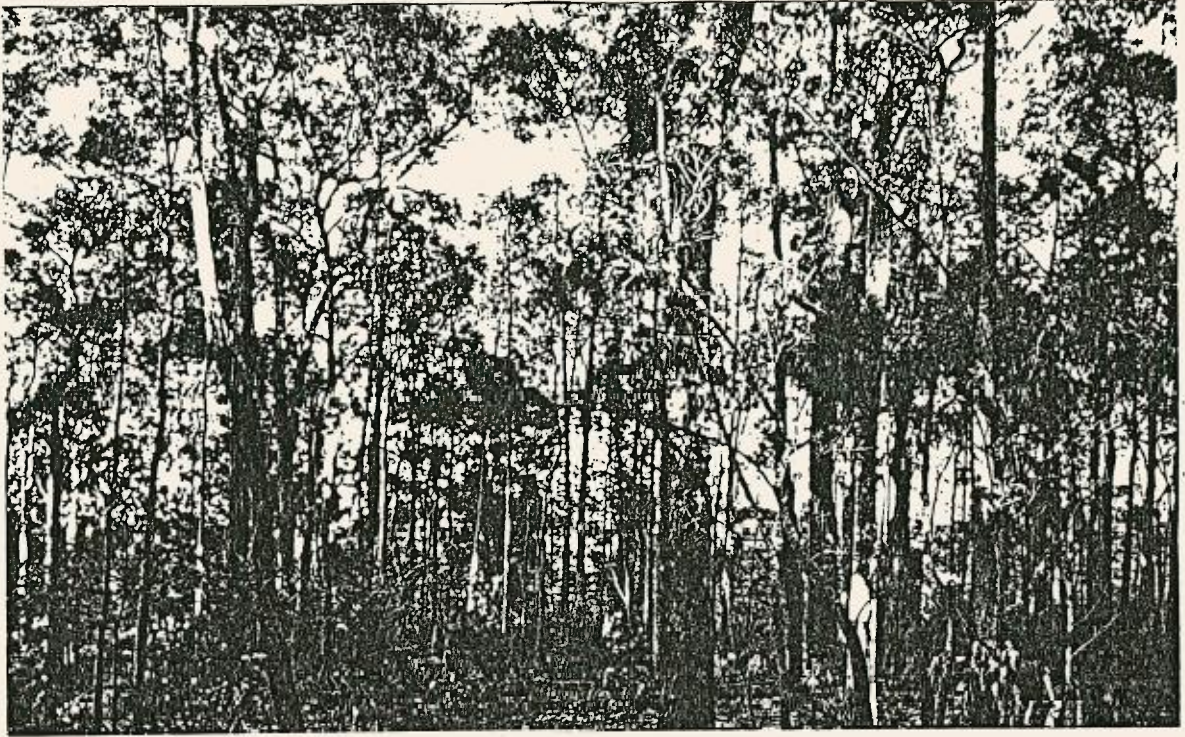
TEST AREA

VEGETATION COVER RETAINED ON SIGHT

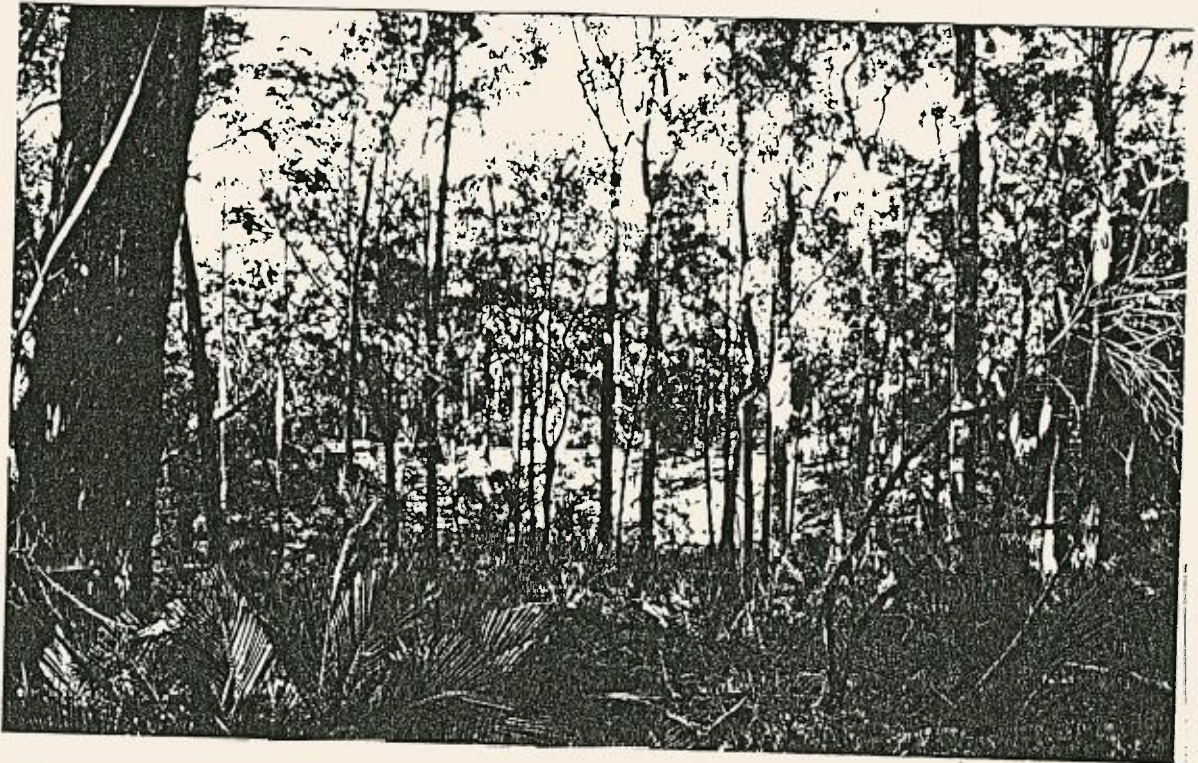
OVERMATURE TREES RETAINED ON THE SIGHT FOR HABITAT

TYPICAL VEGETATION COVER ON SIGHT





OVERMATURE TREES RETAINED ON THE SIGHT FOR HABITAT



TYPICAL VEGETATION COVER ON SIGHT

**Department of Environment and Planning**

Jack Horne,  
Coastline Plan Service,  
13 Lyttle Street,  
BROULEE. N.S.W. 2537

Remington Centre,  
175 Liverpool Street, Sydney 2000  
Box 3927 G.P.O. Sydney 2001  
DX 15 Sydney

Telephone: (02) 266 7111 Ext. 7234

Contact S. Jones

Our reference: 86/1660

Your reference:

Dear Sir,

PROPOSED EXTRACTIVE INDUSTRY,  
LOT 1, D.P. 732595, PARISH OF TOMAGO

Thank you for your letter of 20 June, 1986 indicating that you are consulting with the Director with regard to the preparation of an environmental impact statement (EIS) for the above development.

2. As development consent is required for the proposal and it is a designated development within the meaning of Schedule 3 of the Environmental Planning and Assessment Regulation, 1980, as amended, an EIS must accompany the development application to the Eurobodalla Shire Council. The EIS shall be prepared in accordance with clause 34 of the Regulation and shall bear a certificate required by clause 26(1)(b) of the Regulation (see Attachment No.1).

3. In addition, pursuant to clause 35 of the Regulation, the Director requires that the following matters be specifically addressed in the EIS:

- . proposed access arrangements to the area of extraction;
- . a full description of any proposed entry or exit points onto Princes Highway, with particular attention to safety aspects; and
- . any possible effects of the proposal on the ecology of Malabah Creek.

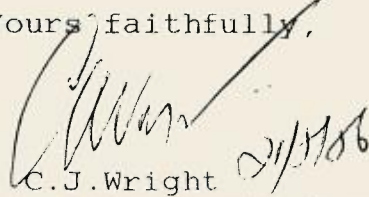
4. During the preparation of the EIS, you should approach the Soil Conservation Service with regard to issues such as sedimentation, prevention measures and methods of rehabilitation. It is also considered appropriate for you to consult with the Department of Main Roads with regard to access arrangements from Princes Highway.

5. Attachment No.2 is a guide to the type of information most likely to be relevant to the development you propose; not all of the matters raised therein may be appropriate for consideration in the EIS for your proposal; equally, the guide is not exhaustive.

6. In preparing your EIS you should approach Eurobodalla Shire Council and take into account any comments Council considers may apply to its determination of the proposal.

7. Should you require any further information regarding this matter please do not hesitate to contact us again.

Yours faithfully,

A handwritten signature in dark ink, appearing to read 'C.J. Wright', with a date '2/1/86' written to the right of the signature.

C.J.Wright  
Manager, Assessments Branch  
Delegate for the Director

DEPARTMENT OF ENVIRONMENT AND PLANNING  
ATTACHMENT No.1

STATUTORY REQUIREMENTS FOR ENVIRONMENTAL IMPACT STATEMENTS.

In accordance with Part IV of the Environmental Planning and Assessment Act, 1979, an environmental impact statement (EIS) must meet the following requirements:

Pursuant to clause 34 of the Environmental Planning and Assessment Regulation, 1980, as amended, the contents of an EIS shall include the following matters:

- (a) full description of the designated development proposed by the development application;
- (b) a statement of the objectives of the proposed designated development;
- (c) a full description of the existing environment likely to be affected by the proposed designated development, if carried out;
- (d) identification and analysis of the likely environmental interactions between the proposed designated development and the environment;
- (e) analysis of the likely environmental impacts or consequences of carrying out the proposed designated development (including implications for use and conservation of energy);
- (f) justification of the proposed designated development in terms of environmental, economic and social considerations,
- (g) measures to be taken in conjunction with the proposed designated development to protect the environment and an assessment of the likely effectiveness of those measures;
- (g1) details of energy requirements of the proposed development and measures to be taken to conserve energy;
- (h) any feasible alternatives to the carrying out of the proposed designated development and reasons for choosing the latter; and
- (i) consequences of not carrying out the proposed development.

The EIS must also take into account any matters required by the Director of Environment and Planning pursuant to clause 35 of the Regulation, which may be included in the attached letter.

The EIS must bear a certificate as required by clause 26(1)(b) of the Regulation.

DEPARTMENT OF ENVIRONMENT AND PLANNING  
ATTACHMENT No.2

ADVICE ON THE PREPARATION OF AN ENVIRONMENTAL IMPACT STATEMENT (EIS) FOR AN EXTRACTIVE INDUSTRY.

A definition of extractive industry may be found in paragraph (n) to Schedule 3 of the Environmental Planning and Assessment Regulation, 1980, (as amended). These industries are operations undertaken for the purpose of winning sand, gravel, clay, turf, soil, rock, stone or similar substances. The definition of extractive industry specifically excludes coal, petroleum or minerals which are prescribed under the Mining Act, 1973. Extractive industries may take the form of dredging operations, quarrying operations, turf farms or various forms of land excavation etc. Processing of extracted material on the same site as the winning of the material may also constitute an extractive industry.

Extractive industries have prompted considerable public controversy in the past since, among other things, they affect visual amenity, generate heavy vehicle movements, raise dust and cause disturbance through noise and blasting. This is the prime reason for designation of extractive industries under the Environmental Planning and Assessment Act, 1979.

The purpose of this paper is to outline various issues relevant to the preparation and consideration of an EIS for extractive industries. It is intended to assist the preparation of the EIS. However, it is the applicant's responsibility to identify and address as fully as possible the matters relevant to the specific development proposal in complying with the requirements for EIS preparation (see Attachment No.1).

The matters nominated in this paper are not intended as a comprehensive identification of all issues which may arise in respect of an extractive industry. Some of the issues nominated may not be relevant to a specific proposal. On the other hand, there may be other issues, not included, that are appropriate for consideration in the EIS.

Information provided should be clear, succinct and objective and where appropriate be supported by maps, plans, diagrams or other descriptive detail. The purpose of the EIS is to enable members of the public, the consent authority (usually the Council) and the Department of Environment and Planning to properly understand the environmental consequences of the proposed development.

### 1. Description of the proposal.

The description of the proposal should provide general background information on the location and extent of the works proposed, an indication of adjacent developments, and details of the site, land tenure, zonings and relevant forward planning proposals and any other land use constraints.

The EIS should address the compatibility of the proposal with any regional strategy for extractive industries in the area and with the provisions of the Local Environmental Plans for existing and proposed development.

This section should provide specific information on the nature, intent and form of the development. It should, as far as possible, include such details as the processes involved (highlighting any proposed crushing or blasting), disposal of wastes, landscaping and site rehabilitation. A description should also be provided of associated operations such as the transport of materials and use of the end product if likely to have environmental implications.

Particular details that may be relevant include:

- . Characteristics and economic significance of the resource
- . Resource availability of alternative resources.
- . Quantity of materials to be extracted.
- . Methods of extraction / plans of operations.
- . Details of any blasting and/or crushing.
- . Effects of vibrations.
- . Type of machinery and equipment to be used.
- . Expected life of the operation.
- . Number of persons to be employed.
- . Hours of operation.
- . Details of necessary stockpiling.
- . Access arrangements - truck routes, truck numbers etc.
- . Site drainage and erosion controls.
- . Proposals for rehabilitation.

### 2. Description of the Environment.

This should provide details of the environment in the vicinity of the development site and also of aspects of the environment likely to be affected by any facet of the proposal. In this regard, physical, natural, social, archaeological and economic aspects of the environment should be described to the extent necessary for assessment of the environmental impact of the proposed development.

### 3. Analysis of Environmental Impacts.

Environmental impacts usually associated with extractive industries are listed below. Where relevant to the specific proposal, these should be addressed in the EIS, taking into account the adequacy of safeguards proposed to minimise them.

- . The flow of any affected rivers or watercourses.
- . The effect of the extraction on the sediment transport rate of any affected rivers or watercourses.
- . The bed and bank stability of any affected rivers during and after completion of the operations.
- . Any possible siltation, sedimentation or downstream effects of the operation.
- . Any likely cumulative effects of the proposed operation when considered together with other operations in the vicinity.
- . Details of floods and any likely effects of the operation on flood liability of surrounding lands.
- . The possible effects of flooding on the operation.
- . Effects on flora and fauna.
- . The agricultural viability of the landholding.
- . Likely noise/vibration disturbance caused by the operations, including transport operations, on nearby residences.
- . Other impacts of trucking movements, including access over railways and onto highways.
- . Dust nuisance likely to be caused.
- . Effects on water quality of nearby watercourses.
- . Disposal of waste material.
- . Effects on the visual environment.
- . Any likely affectation of sites of Aboriginal archaeological or European heritage value if located in the vicinity of operations.

In addition, any potential for hazard or risks to public safety and any proposals to monitor and reduce environmental impacts should be included.

#### 4. Contact with relevant Government Authorities.

In preparing the EIS, it is suggested that authorities, such as those listed below, should be consulted and their comments taken into account in the EIS.

- . The State Pollution Control Commission in regard to air, water and noise impacts and relevant pollution control legislation requirements;
- . The Soil Conservation Service regarding appropriate erosion control and rehabilitation procedures;
- . The Department of Agriculture if prime agricultural land may be affected by the proposal; and
- . The Heritage Council of NSW if the proposal is likely to affect any place or building having heritage significance for the State; the National Parks and Wildlife Service if aboriginal places or relics are likely to be affected.

It is the responsibility of the person preparing the EIS to determine those Departments relevant to the proposed development.

# The Council of the Shire of Eurobodalla

ALL COMMUNICATIONS TO BE ADDRESSED TO  
THE SHIRE CLERK  
P.O. BOX 99, MORUYA, 2537  
PHONE: 741000  
S.T.D. AREA CODE: 044  
DX 4873



COUNCIL CHAMBERS  
MORUYA, 2537

IN REPLY PLEASE 86/4067-10180  
QUOTE REFERENCE No. ....

{ ENQUIRIES Mr R Nott/CI ..... }  
{ PHONE: EXT. (044) ..... }

14 August, 1986

Coastline Plan Services,  
13 Lyttle Street,  
BROULEE NSW 2537

ATTENTION: MR J HORNE

Dear Sir,

Re: Environmental Impact Assessment Advice  
for PollWombra Granite Quarry Lot 1  
DP 732595 Old Princes Highway North Moruya

Further to your letter of 31 July, 1986 please be advised of the following:

Council will accept an Environmental Impact Statement carried out pursuant to the Act in line with the advice given by the Assessments Branch of the Department of Environment and Planning. You should refer to the assessment advice dated 25 July, 1986 and note that the Environment Impact Statement should be prepared in accordance with Clause 34 of the Environmental Planning and Assessment Act Regulation accompanied by a certificate required by Clause 26 1(b) of the Regulation.

In addition to the Clause 35 matters outlined, the advice also specifies special attention be given to the following items:

1. Proposed access arrangements to the extraction area.
2. A full description of the proposed entry and exit points onto the Princes Highway.
3. The possible effects of the proposal on the ecology of Malabar Creek.

In respect of this you should look particularly at the erosion and sediment controls, drainage and hydrology.

Specifically these issues should be backed up by Engineering calculations outlining the amount of runoff, the capacity of any proposed retention structures and the nature of any drainage structures. In this regard you should refer to any of Council's Environmental Impact Statements and specifically the appendices. In regard to the safety aspects onto Princes Highway you should note the existing traffic flows, the proposed traffic flows onto the highway and the effect of truck movements onto and off that highway.

.... /2



14TH AUGUST, 1986

A similar analysis should be undertaken in respect of access to and from the actual extraction area.

Turning to page two of the Department of Environment and Planning's attachment number two please note the particular details that may be relevant. Each of these issues should be addressed specifically and as outlined by the Department of Environment and Planning. Again I refer you to the Council's Environmental Impact Statements for extractive operations.

Council will be particularly interested in the effects of blasting and or crushing and the noise impact on the surrounding locality. In this regard calculations should be undertaken to ascertain the level of noise and the distance that that level will carry.

Access, transport and truck movement have emerged as significant issues with extractive industries and in this regard you should identify as accurately as possible the truck routes, the numbers and the specific access arrangements.

The Environmental Impact Statement should be accompanied by a detailed site plan of a scale large enough to identify particular drainage structures, the quarry face, access trails, existing vegetation, retention ponds and any onsite plant and machinery.

Turning to page three you should note the need for analysis of environmental impacts and in particular the flow of any affected rivers or water courses. The effects of extraction on sediment transport and the rate of affected transportation, bed and bank stability of any affected water courses, the issues of siltation, sedimentation and these cumulative down-stream effects and additionally the possible effects on flooding, should be analysed.

The Environment Impact Statement should also be accompanied with relevant Government Authority correspondence, advices and meetings.

In conclusion Council would like to see an Environmental Impact Statement carried out pursuant to the Act and in line with the advice offered by the Assessment branch of the Department of Environment and Planning. The issues, statements and directions outlined in that advice should be accurate and succinct.

Yours faithfully,

K. M. BLANCH  
Shire Clerk

Per: 

# THE ELECTRICITY COMMISSION OF N.S.W.

TELEGRAMS: ELECTRICOM, SYDNEY  
TELEX: 20454 TELEPHONE: ~~2688XXXX~~

JC EXTENSION 268 8212



HYDE PARK TOWER  
PARK AND ELIZABETH STREETS, SYDNEY  
POSTAL ADDRESS:  
G.P.O. Box 5257, SYDNEY, N.S.W. 2001

15. OCT. 1986

Mr J Nador  
Moruya Granite Quarry  
PO Box 183  
MORUYA NSW 2537

YOUR REF:

OUR REF: 54753 Prop/RWM

Dear Sir

ULLADULLA - MORUYA 132 kV TRANSMISSION LINE  
LOT 1 DP 732595 THE OLD HIGHWAY, NORTH MORUYA

I refer to correspondence previously forwarded to the Commission by Coastline Plan Service relating to the preparation of an Environmental Impact Statement relative to the proposed extraction of gravel from the Moruya Granite Quarry, Lot 1 DP 732595, The Old Highway, North Moruya.

It is understood that Coastline Plan Service is no longer acting on your behalf and consequently this reply is being forwarded to you direct.

Following examination of this matter I am pleased to advise that the Commission will raise no objections to the proposed works, provided that:

1. That the stability of any transmission line structures is not compromised by the blasting and that excessive dust is not generated.
2. Blasting would have to be controlled to prevent the malfunction of high voltage equipment in Moruya 132 kV Substation. It would be necessary to limit ground particle movement at the substation to less than 4 mm per sec.
3. On commencement of blasting on site the Commission be notified so that it can monitor the ground movement and ensure that there is no damage or maloperation of substation equipment.

Yours faithfully

  
R W MACKENZIE  
FOR SECRETARY



# Soil Conservation Service



Mr. Jack Horne,  
Coastline Plan Service,  
13 Lyttle Street,  
BROULEE, N.S.W. 2537

BOMBALA OFFICE,  
P.O. BOX 4,  
BOMBALA, N.S.W. 2632

Telephone 0648 83052

22nd July, 1986

Contact: MR. B.N. DUNCAN

Our reference: L.2

Your reference: CPS 85-862

Dear Sir,

Moruya Granite Quarry  
Lot 1 D.P. 732595 Moruya

I refer to your letter of 16th July and my inspection on 26th June, 1986.

To reduce soil erosion to a minimum and reduce undesirable effects on the environment, the following is recommended.

Road Access Built to an acceptable engineering standard, suitable for the density of traffic with special care being taken with drainage, including pipes, revegetation of batters, and a suitable creek crossing, preferably by a small bridge.

Topsoil Topsoil is an important part of successfully revegetating disturbed earth batters. Prior to excavation, topsoil should be stockpiled away from any watercourses and later spread on bare batters before seed and fertiliser is applied.

Water Control Where excavating for the quarry it may be necessary to divert water from above the excavation by the installation of contour banks. This will reduce the flow of water into the quarry area and also reduce erosion of excavation batters resulting in reduced sediment.

Runoff from the quarry and treatment areas should best be collected in some form of sediment dam.

Batters & Bare Earth While many of the batters will be of stable rock, care will be required to shape all earth batters to a stable slope (1:3 where possible). Spread topsoil and revegetate bare earth using a suitable pasture seed and fertiliser mixture as recommended by the Soil Conservation Service.

Water Supply & Sediment Control Dams Choice of sites and soils will be important for their successful construction. Should a detailed design be required, this is available from this Service at a fee.

Should you require any further information or assistance in this matter, please feel free to contact me.

Yours faithfully,

A handwritten signature in black ink, appearing to be 'B.N. Duncan', written in a cursive style with a long horizontal stroke extending to the right.

B.N. DUNCAN,  
District Soil Conservationist.



Department of Environment and Planning



Jack Horne,  
Coastline Plan Service,  
13 Lyttle Street,  
BROULEE. N.S.W. 2537

Remington Centre  
175 Liverpool Street, Sydney 2000  
Box 3927 G.P.O. Sydney 2001  
DX. 15 Sydney

Telephone. (02) 266 7111 Ext. 7234

Contact S. Jones

Our reference 86/1660

Your reference.

Dear Sir,

PROPOSED EXTRACTIVE INDUSTRY,  
LOT 1, D.P. 732595, PARISH OF TOMAGO

Thank you for your letter of 20 June, 1986 indicating that you are consulting with the Director with regard to the preparation of an environmental impact statement (EIS) for the above development.

2. As development consent is required for the proposal and it is a designated development within the meaning of Schedule 3 of the Environmental Planning and Assessment Regulation, 1980, as amended, an EIS must accompany the development application to the Eurobodalla Shire Council. The EIS shall be prepared in accordance with clause 34 of the Regulation and shall bear a certificate required by clause 26(1)(b) of the Regulation (see Attachment No.1).

3. In addition, pursuant to clause 35 of the Regulation, the Director requires that the following matters be specifically addressed in the EIS:

- . proposed access arrangements to the area of extraction;
- . a full description of any proposed entry or exit points onto Princes Highway, with particular attention to safety aspects; and
- . any possible effects of the proposal on the ecology of Malabah Creek.

4. During the preparation of the EIS, you should approach the Soil Conservation Service with regard to issues such as sedimentation, prevention measures and methods of rehabilitation. It is also considered appropriate for you to consult with the Department of Main Roads with regard to access arrangements from Princes Highway.

DEPARTMENT OF ENVIRONMENT AND PLANNING  
ATTACHMENT No.1

STATUTORY REQUIREMENTS FOR ENVIRONMENTAL IMPACT STATEMENTS.

In accordance with Part IV of the Environmental Planning and Assessment Act, 1979, an environmental impact statement (EIS) must meet the following requirements:

Pursuant to clause 34 of the Environmental Planning and Assessment Regulation, 1980, as amended, the contents of an EIS shall include the following matters:

- (a) full description of the designated development proposed by the development application;
- (b) a statement of the objectives of the proposed designated development;
- (c) a full description of the existing environment likely to be affected by the proposed designated development, if carried out;
- (d) identification and analysis of the likely environmental interactions between the proposed designated development and the environment;
- (e) analysis of the likely environmental impacts or consequences of carrying out the proposed designated development (including implications for use and conservation of energy);
- (f) justification of the proposed designated development in terms of environmental, economic and social considerations,
- (g) measures to be taken in conjunction with the proposed designated development to protect the environment and an assessment of the likely effectiveness of those measures;
- (g1) details of energy requirements of the proposed development and measures to be taken to conserve energy;
- (h) any feasible alternatives to the carrying out of the proposed designated development and reasons for choosing the latter; and
- (i) consequences of not carrying out the proposed development.

The EIS must also take into account any matters required by the Director of Environment and Planning pursuant to clause 35 of the Regulation, which may be included in the attached letter.

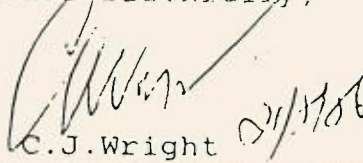
The EIS must bear a certificate as required by clause 26(1)(b) of the Regulation.

5. Attachment No.2 is a guide to the type of information most likely to be relevant to the development you propose; not all of the matters raised therein may be appropriate for consideration in the EIS for your proposal; equally, the guide is not exhaustive.

6. In preparing your EIS you should approach Eurobodalla Shire Council and take into account any comments Council considers may apply to its determination of the proposal.

7. Should you require any further information regarding this matter please do not hesitate to contact us again.

Yours faithfully,



C.J. Wright  
Manager, Assessments Branch  
Delegate for the Director

received  
25<sup>th</sup> July, 86  


DEPARTMENT OF ENVIRONMENT AND PLANNING  
ATTACHMENT No.2

ADVICE ON THE PREPARATION OF AN ENVIRONMENTAL IMPACT STATEMENT (EIS) FOR AN EXTRACTIVE INDUSTRY.

A definition of extractive industry may be found in paragraph (n) to Schedule 3 of the Environmental Planning and Assessment Regulation, 1980, (as amended). These industries are operations undertaken for the purpose of winning sand, gravel, clay, turf, soil, rock, stone or similar substances. The definition of extractive industry specifically excludes coal, petroleum or minerals which are prescribed under the Mining Act, 1973. Extractive industries may take the form of dredging operations, quarrying operations, turf farms or various forms of land excavation etc. Processing of extracted material on the same site as the winning of the material may also constitute an extractive industry.

Extractive industries have prompted considerable public controversy in the past since, among other things, they affect visual amenity, generate heavy vehicle movements, raise dust and cause disturbance through noise and blasting. This is the prime reason for designation of extractive industries under the Environmental Planning and Assessment Act, 1979.

The purpose of this paper is to outline various issues relevant to the preparation and consideration of an EIS for extractive industries. It is intended to assist the preparation of the EIS. However, it is the applicant's responsibility to identify and address as fully as possible the matters relevant to the specific development proposal in complying with the requirements for EIS preparation (see Attachment No.1).

The matters nominated in this paper are not intended as a comprehensive identification of all issues which may arise in respect of an extractive industry. Some of the issues nominated may not be relevant to a specific proposal. On the other hand, there may be other issues, not included, that are appropriate for consideration in the EIS.

Information provided should be clear, succinct and objective and where appropriate be supported by maps, plans, diagrams or other descriptive detail. The purpose of the EIS is to enable members of the public, the consent authority (usually the Council) and the Department of Environment and Planning to properly understand the environmental consequences of the proposed development.



## 1. Description of the proposal.

The description of the proposal should provide general background information on the location and extent of the works proposed, an indication of adjacent developments, and details of the site, land tenure, zonings and relevant forward planning proposals and any other land use constraints.

The EIS should address the compatibility of the proposal with any regional strategy for extractive industries in the area and with the provisions of the Local Environmental Plans for existing and proposed development.

This section should provide specific information on the nature, intent and form of the development. It should, as far as possible, include such details as the processes involved (highlighting any proposed crushing or blasting), disposal of wastes, landscaping and site rehabilitation. A description should also be provided of associated operations such as the transport of materials and use of the end product if likely to have environmental implications.

Particular details that may be relevant include:

- . Characteristics and economic significance of the resource
- . Possible availability of alternative resources.
- . Quantity of materials to be extracted.
- . Methods of extraction / plans of operations.
- . Details of any blasting and/or crushing.
- . Effects of vibrations.
- . Type of machinery and equipment to be used.
- . Expected life of the operation.
- . Number of persons to be employed.
- . Hours of operation.
- . Details of necessary stockpiling.
- . Access arrangements - truck routes, truck numbers etc.
- . Site drainage and erosion controls.
- . Proposals for rehabilitation.

## 2. Description of the Environment.

This should provide details of the environment in the vicinity of the development site and also of aspects of the environment likely to be affected by any facet of the proposal. In this regard, physical, natural, social, archaeological and economic aspects of the environment should be described to the extent necessary for assessment of the environmental impact of the proposed development.

## 3. Analysis of Environmental Impacts.

Environmental impacts usually associated with extractive industries are listed below. Where relevant to the specific proposal, these should be addressed in the EIS, taking into account the adequacy of safeguards proposed to minimise them.

- . The flow of any affected rivers or watercourses.
- . The effect of the extraction on the sediment transport rate of any affected rivers or watercourses.
- . The bed and bank stability of any affected rivers during and after completion of the operations.
- . Any possible siltation, sedimentation or downstream effects of the operation.
- . Any likely cumulative effects of the proposed operation when considered together with other operations in the vicinity.
- . Details of floods and any likely effects of the operation on flood liability of surrounding lands.
- . The possible effects of flooding on the operation.
- . Effects on flora and fauna.
- . The agricultural viability of the landholding.
- . Likely noise/vibration disturbance caused by the operations, including transport operations, on nearby residences.
- . Other impacts of trucking movements, including access over railways and onto highways.
- . Dust nuisance likely to be caused.
- . Effects on water quality of nearby watercourses.
- . Disposal of waste material.
- . Effects on the visual environment.
- . Any likely affectation of sites of Aboriginal archaeological or European heritage value if located in the vicinity of operations.

In addition, any potential for hazard or risks to public safety and any proposals to monitor and reduce environmental impacts should be included.

#### 4. Contact with relevant Government Authorities.

In preparing the EIS, it is suggested that authorities, such as those listed below, should be consulted and their comments taken into account in the EIS.

- . The State Pollution Control Commission in regard to air, water and noise impacts and relevant pollution control legislation requirements;
- . The Soil Conservation Service regarding appropriate erosion control and rehabilitation procedures;
- . The Department of Agriculture if prime agricultural land may be affected by the proposal; and
- . The Heritage Council of NSW if the proposal is likely to affect any place or building having heritage significance for the State; the National Parks and Wildlife Service if aboriginal places or relics are likely to be affected.

It is the responsibility of the person preparing the EIS to determine those Departments relevant to the proposed development.



## Illawarra County Council

Head Office Bridge Street, Coniston  
All mail to General Manager County Clerk, P O Box 1249,  
Wollongong 2500  
Telephone: (042) 28 7511 Telex 29203 DX5204 Wollongong

Our Ref: R1/1/4023  
JRW:DFH  
Your Ref: CPS:85-862

Contact: Mr. J. Wallace,  
P.O. Box 119, Moruya. N.S.W.  
Phone (044) 742-322

8th August, 1986

The Manager,  
Coast Line Plan Services,  
13 Lyttle Street,  
BROULEE. N.S.W. 2537


Dear Sir,

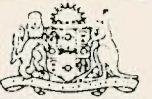
LOT 1 DP 732595 OLD PRINCES HIGHWAY, NORTH MORUYA

Further to your letter of 23rd July 1986, your reference CPS:85-862, Council wishes to advise that, subject to your client agreeing to an offer for supply of electricity to the site and payment of any necessary Capital Contribution, electricity supply can be made available to the site. *500 m. 8-8*

One of the conditions of supply will be that any necessary clearing for the route of the power lines be carried out to the satisfaction of Council by your client. Generally the width of clearing is ten metres either side of the line but may be wider if particularly long span lengths are encountered.

Yours faithfully,

  
K. E. DAVIS  
General Manager/County Clerk



# National Parks and Wildlife Service

SOUTH EASTERN REGION



J. Horne  
Coastline Plan Service  
13 Lyttle Street  
BROULEE NSW 2537

Level 1  
34 Lowe Street  
Queanbeyan  
P.O. Box 733  
Queanbeyan N.S.W. 2620

Our reference: SF:KJ:F/1771

Your Reference: CPS 85-862

Telephone: (062) 97 6144

Telex: AA61582

1st August 1986

Dear Sir

RE: PROPOSED EXTRACTIVE INDUSTRY.  
LOT 1 D.P. 732595. NORTH MORUYA

I refer to your letter of 16 July concerning the impact of this proposal on Aboriginal sites. No sites have been recorded from the subject area, the closest being about 1km to the west, near Dooga Creek.

The area was inspected briefly by the Regional Archaeologist on 27 June 1986 during a wider survey of gravel pits in Eurobodalla Shire. No signs of Aboriginal occupation were observed during the inspection. The probability of sites being present in the work area is low, since the terrain is too steep to be suitable for camping. Similarly areas adjacent to Malabar Creek are boggy and thickly vegetated and are unlikely to contain sites.

The Service has no objections to the proposal on archaeological grounds. If any sites are found during quarrying, works must cease immediately and the archaeologist at this office notified.

Your proposal has been forwarded to our Narooma office for comment on nature conservation values.

Thank you for your cooperation on this matter.

Yours faithfully

SUE FEARY  
Archaeologist  
FOR DIRECTOR



DEPARTMENT OF MAIN ROADS, N.S.W.  
SOUTH COAST DIVISION  
167 Auckland Street, Bega

Please address communication

The Divisional Engineer,  
P.O. Box 399,  
Bega, N.S.W. 2550.  
DX 4908

and quote our reference

43/M.448  
CRJ:JLH

Telex - 61096  
Telephone - 2 1600

Mr J E Horne  
Coastline Plan Service  
13 Lyttle Street  
BROULEE NSW 2537

Mr Johnstone

30 JUL 1986

CONSULTATION FOR MORUYA GRANITE QUARRY. LOT 1 DP 732595.  
THE OLD HIGHWAY, NORTH MORUYA.

Dear Mr Horne

There are only two areas in which the proposed quarry may be of concern to this Department. These are:

- 1) Access Arrangements
- 2) Drainage

Access

The access arrangements appear satisfactory providing all access is via the existing highway. In your letter under reply no reference is made to the amount of traffic generated or the type of traffic. Assuming the traffic generation is similar to other existing quarries in the area the junction should be upgraded to a standard Type 4 junction. Before further comment is made more information is required.

Drainage

Provided the access roads, dams etc. do not alter the existing drainage patterns adjacent to the Highway, no objections will be raised. However, the effects of the proposal on drainage should be carefully evaluated.

Yours faithfully

R H T Harris  
Divisional Engineer



# Water Resources Commission



Mr. Jack Horne  
Coastline Plan Service,  
13 Lyttle Street,  
BROWLEE. N.S.W 2537

Ibis House  
201/211 Miller Street,  
Box 952, P.O.,  
North Sydney,  
N.S.W. 2060  
Telegrams: "Aquacomm"  
Telex: "Watcom" 21188

Contact: Name

Mr. M. Lau

Our reference

86/16484

Telephone: 922 0121  
Extension

737

Dear Sir,

Moruya Granite Quarry  
Your Ref: CPS 85-862

Thank you for your letter of 23rd July 1986 requesting Commission's requirements for the Environmental Impact Statement to be prepared by your firm for the above quarry proposal.

Please find attached a copy of the Commission's "General Requirements" for a similar development. Your attention is particularly drawn to Section (B) - River Management of the attachment where the design criteria for the proposed dams are given. Also, flows in Malabar Creek are tidal and the Public Works Department is responsible for the river and flood management in the area.

The Commission would be pleased to assist you further if required.

Yours faithfully,

for G.S. Forster,  
Acting Secretary.

WATER RESOURCES COMMISSIONNEW SOUTH WALESGENERAL REQUIREMENTS OF ENVIRONMENTAL IMPACT STATEMENTS  
FOR HARD ROCK QUARRIES

A comprehensive environmental impact statement for a hard rock quarry should include consideration of water resources aspects of the development, as provided for in Clause 56 of the Environmental Planning and Assessment Regulation, 1980. This is important as it will allow the Commission when reviewing the proposal to ensure that the water resources are adequately protected and efficiently utilised.

To enable the Commission to gain a clear understanding of the proposal, its likely impacts on the water resources and safeguards proposed, the following matters should be outlined in the statement and where appropriate supported by maps, plans, diagrams, photographs etc:-

(A) Water Resources

- . Surface water and groundwater hydrology of the site and other relevant areas.
- . Design criteria adopted for water control and storage works to manage the natural run-off, site run-off and effluents, tailings water, groundwater inflow and overburden and stockpile leachates.
- . Annual potable and quarry water demand for different phases of the proposed operations, and the preferred and alternative sources of supply.
- . Possible loss of streamflows or groundwater, and remedial measures proposed.
- . Effects on existing bores in the vicinity of the site.
- . Monitoring and assessment arrangements for make-up water pumping and the performance of any stream diversion works.
- . Provision of on-site fuel storage as well as treatment and disposal facilities for industrial and domestic wastes, tailings and contaminated or toxic leachates.

- . Rehabilitation proposals and management of any final voids.
- . Impacts on wetlands.

(B) River Management

All works proposed should be designed, constructed and operated so as not to cause damage or increase flood levels in watercourses. The following requirements are relevant:-

- (a) No works that would impede flow are to be located in floodways;
- (b) Bridge waterway openings are to be adequate to pass a 1 in 100 year floodflow;
- (c) No sediment dams are to be constructed on defined watercourses;
- (d) The storage of a sediment dam is to be sufficient to contain runoff from a 1 in 10 year storm with 24 hours duration and the dam be desilted when its capacity is reduced by 10 per cent;
- (e) The spillway capacities of all dams are to be sufficient to pass a 1 in 100 year flood discharge;
- (f) For creek diversion works, improvement or protection works are to be carried out where necessary to maintain bank and bed stability and to allow passage of flows for downstream water users without causing additional flood hazards.

The developer is advised to adopt the dam design criteria (d) and (e) but they may be modified according to the life of the proposal and actual site conditions in the light of sound hydrologic and engineering practices.

(C) Water Management Plan

A water management plan describes the water requirements, sources of supply, storage arrangements and drainage facilities. A comprehensive plan can best be depicted by using flow diagrams, tables or plans delineating elements of the proposal and containing the following information :-

- The hydrologic design of water control, storage and supply works.
- Procedures for obtaining, storing, using, treating and disposing of water.
- The impacts on the quantity and quality of surface water and groundwater resources including any effects of surface drainage and overburden leachates.
- The water budget for the various phases of the development.

*Doing for HTR*



(D) Licensing

The following water related legislation is relevant to obtaining the necessary clearance for the development:-

- (i) The Rivers and Foreshores Improvement Act requires a permit for operations within 40 metres of a river (see copy of section 23A)
- (ii) The Water Act requires
  - . a permit to remove trees within 20 metres of a prescribed stream (see copy of the section 26D);
  - . a license for earthworks within a designated floodplain;
  - . a license for a bore;
  - . a license for a pump on a stream for mining or industrial purposes.
- (iii) The Clean Waters Act requires a license for the water management works and any discharges therefrom.

This Commission administers the Rivers and Foreshores Improvement and Water Acts while the State Pollution Control Commission administers the Clean Waters Act.

(E) Maps and Plans

Appropriate topographic maps should be used to identify the locations of the proposed site and associated operations, existing dams, bores, levee banks, access roads and wetlands, and all the proposed water management works. Watercourses which would be affected by the operations and to which site runoff and effluents would discharge, should also be identified.

Plans in suitable scales should be provided with sufficient technical details to show the general arrangements of the proposed water management works. These works may include clean water, sediment and tailings dams; water storage ponds; drainage and flow diversion works; creek crossings; bank protection works as well as storage, treatment and disposal facilities for tailings and contaminated, toxic or waste effluents.

NOTE

The foregoing requirements have been prepared to guide developers when preparing environmental impact statements. Because of the scale and location of the quarry, some aspects will not require extensive treatment and may be covered in simple statements.



Department of Environment and Planning



SOUTH EAST REGIONAL OFFICE

Mr Jack Horne  
Coastline Planning Service  
13 Lyttle Street  
BROULEE NSW 2537

271 Lyttle Street, Queanbeyan 2620

Telephone: (063) 27 6911

Director: G. Wright

Telephone: 86.1660

Telex: 28200

- F I

Dear Mr Horne,

(Crushed) Granite Quarry Operation on Lot 1, DP 732595,  
The Old Princes Highway, North Moruya

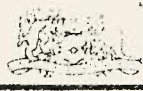
I refer to your letter dated 23 July 1986 on the above matter.

The Department has no further comments at this stage on the content of the environmental study other than those conveyed to you by letter of 21 July 1986 from Assessments Branch.

(Lois) Following telephone conversations between yourself and Ms Gray on the question of access, the Council will apparently need to confine access to a public road where such access is proposed in a zone which prohibits extractive industries.

Yours faithfully,

*for*   
E. Schultheis  
Regional Manager (South East)



# Public Works Department

Mr Jack Horne  
13 Lyttle Street  
BROULEE NSW 2537

Telephone: (08) 277 547  
Facsimile: (08) 277 547  
Port Kembla, N.S.W. 2507  
Telex: 29052

Our reference: *MS 2402*

Telephone: (08) 277 547

Officer: D Miller

Dear Sir

Re: Consultation Under the Environmental Planning and  
Assessment Act For Moruya Granite Quarry Lot 1 D.P.  
732595 The Old Highway, North Moruya

Reference your letter of the 23 July 1986. There are no requirements  
the Department wishes to impose on the quarry proposal.

Yours faithfully

J Hetherington  
Acting District Engineer  
Port Kembla

*per: M. Phillip*  
*5-9-86*

Department of Environment and Planning



SUBJECT TO THE OFFICE

Mr Jack Horne  
Coastline Planning Service  
13 Lyttle Street  
BROULEE NSW 2537

L. Gray  
86.1660

Dear Mr Horne,

Extractive Industries: Lower South Coast

Further to your letter of 23 July 1986 and to your telephone conversation with Ms Gray on 8 August 1986 concerning a regional strategy for extractive industries on the Lower South Coast, I advise that the Department has no such strategy at this point in time.

Yours sincerely,

E. Schultheis  
Regional Manager (South East)



DEPARTMENT OF MAIN ROADS, N.S.W.  
SOUTH COAST DIVISION  
167 Auckland Street, Bega

Please address communications

The Divisional Engineer,  
P.O. Box 399,  
Bega. N.S.W. 2550.  
DX 4908

and quote our reference

43/M.448  
SRL:RFM

Telex — 61096  
Telephone — 2 1600

Mr Lipman

Mr J Nader  
Moruya Granite Quarry  
PO Box 183  
MORUYA NSW 2537

12 SEP 1986

Dear Mr Nader

I am writing in reply to your letter dated 19 August regarding your proposed quarry on Lot 1 D.P.732595 at North Moruya. After review of your traffic estimates it is considered that the existing intersection is adequate provided roadwork and linemarking is completed to the standard proposed by the original developer.

Yours sincerely

*RHT Harris*  
R H T Harris  
Divisional Engineer



# Mines Inspection Division



Mr. J. Horne,  
13 Lyttle St.,  
BROULEE 2537

C.A.G.A. Centre  
8-18 Bent Street  
Sydney  
Postal Address:  
GPO Box 5288  
Sydney, NSW 2001  
Telex AA21708

Our reference:

Your reference:

For further  
information ring:

Telephone: 231 0922  
Extension:

21st August, 1986.

CONSULTATION UNDER THE ENVIRONMENTAL PLANNING  
& ASSESSMENT ACT FOR MORUYA GRANITE QUARRY  
LOT 1 D.P. 732595 THE OLDE HIGHWAY, NORTH MORUYA  
-----

In confirmation of our discussions of 14th, 20th August, 1986, and those and on-site examinations by Mr. C. Brophy, Regional Inspector of Mines, Wagga Wagga, I am writing (in Mr Brophy's absence) to highlight some of the provisions of the Mines Inspection Act that should be addressed in your EIS.

- 1, Blasting
  - a. The method you adopt should yield a vibration of less than 10 mm/sec peak particle velocity at the quarry boundary (General Rule 2 refers).
  - b. Dust from blasting, as from all other activities has to be restricted or allayed to proper levels (General Rules 55, 65, 65A, 65B refers in particular
  - c. flyrock must be prevented from leaving quarry (General Rule 2 refers).
2. Quarry walls The batters and boundaries shall be in accordance with the inspectors directions, and it is standard practice to have faces no more than 15m high, and berms of 9 m width where the faces are vertical.

3. Miscellaneous

In addition to the specific provisions of the Act and General Rules, an inspector may require, under powers given to him by sections 36, 37 and 37A, any health, safety, or welfare matter to be rectified or the hazard removed. These matters need not be addressed in detail in an EIS but could include warning signs and a requirement for visitors to report to the main office on entry - as discussed with Mr Brophy.

Yours faithfully,



GRAHAM TERREY

Deputy Chief Inspector of Mines



# State Pollution Control Commission



Mr J. Horne,  
Coastal Plan Service,  
13 Lyttle Street,  
BROULEE N.S.W. 2537

A.M.P. Building  
166 Keira Street  
Wollongong 2500  
P.O. Box 1665, Wollongong 2500

Our reference: 281,119C/1 RAC:PA

Your reference:

Telephone: 28 5755  
28 5192  
28 5966

Dear Sir,

Preparation of Environmental Impact Statement  
Proposed Granite Quarry - Lot 1 DP732595  
On Behalf of Moruya Granite Quarry

I refer to your recent correspondence regarding the Commission considerations in your preparation of the above E.I.S. for a hard rock quarry at North Moruya.

The proponent, after obtaining development consent, will need to obtain approval from the Commission under Section 17 of the State Pollution Control Commission Act 1970 for matters relating to air, water and noise pollution, in accordance with the information sheets enclosed. It may be advantageous for the applicant to address the following items in the preparation of the E.I.S. in order to ensure adequate detail is available to the determining authority:-

Water

- a) Sedimentation controls for the treatment of all storm flows prior to discharge to waters.
- b) Recirculation of all process waters without discharge to waters.
- c) Protection and isolation or relocation of any natural watercourse passing through the premises.

Air

- d) Dust emissions from unsealed roadways.
- e) Dust from processing operations.
- f) Covering of vehicle loads.
- g) Dust from blasting and excavation operation.



- 2 -

Noise

- h) Blasting - "Environmental Noise Control Manual"
- i) Processing - " " " "

Rehabilitation or Redevelopment

- j) The ongoing maintenance of air and water pollution controls after the expiration of the quarry's operating life. Who will finance and maintain ongoing air and water pollution controls at the site.

Satisfactory completion of the E.I.S. detailing the above matters together with the information sheets enclosed should ensure prompt processing by the Commission.

Yours faithfully,



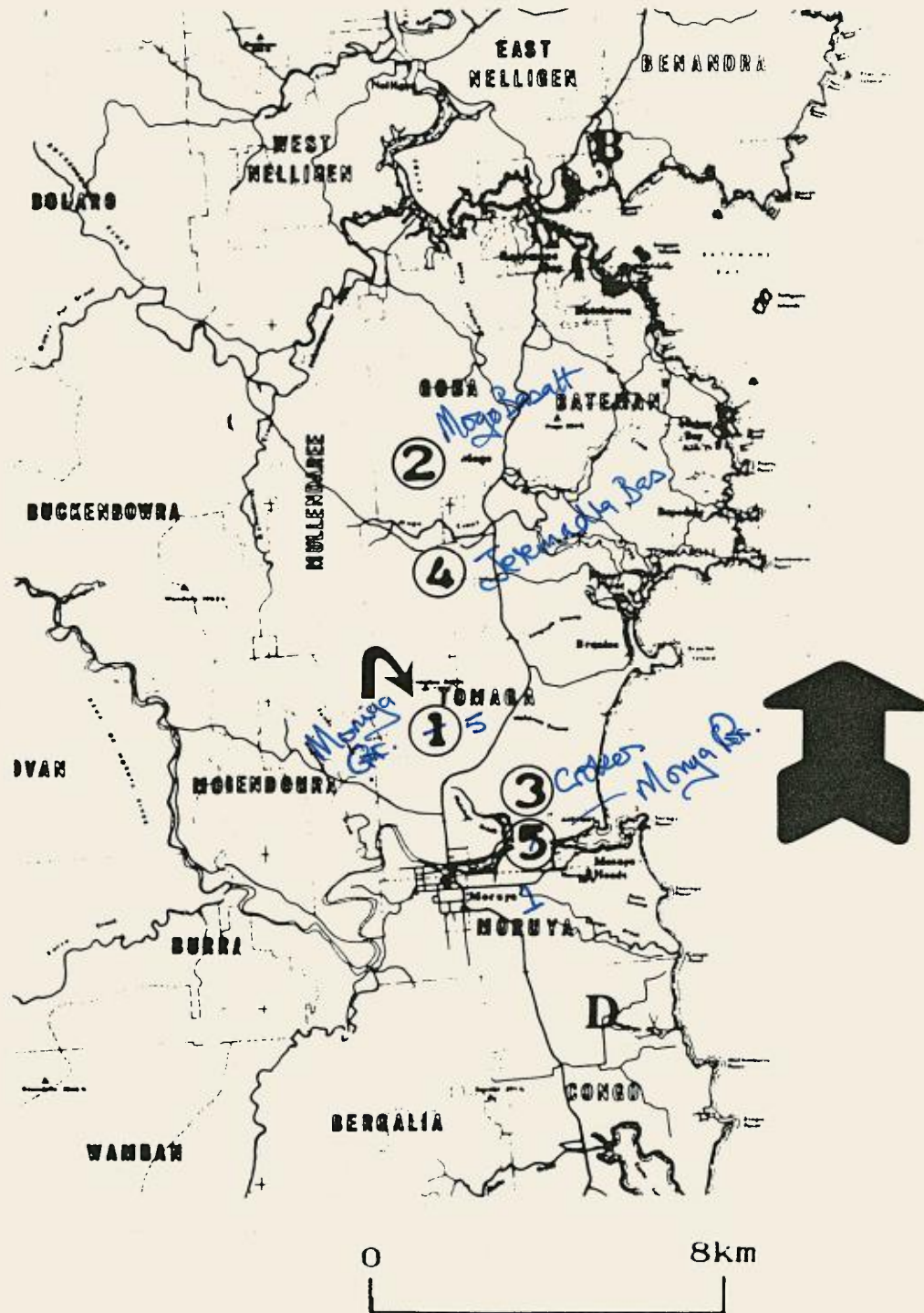
J.P. O'GORMAN,  
for Secretary.

5 SEP 1985

Encl.

# MAP 1

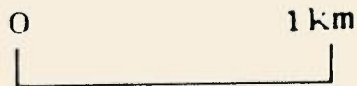
## ALTERNATIVES COMPARISON



# MAP 2

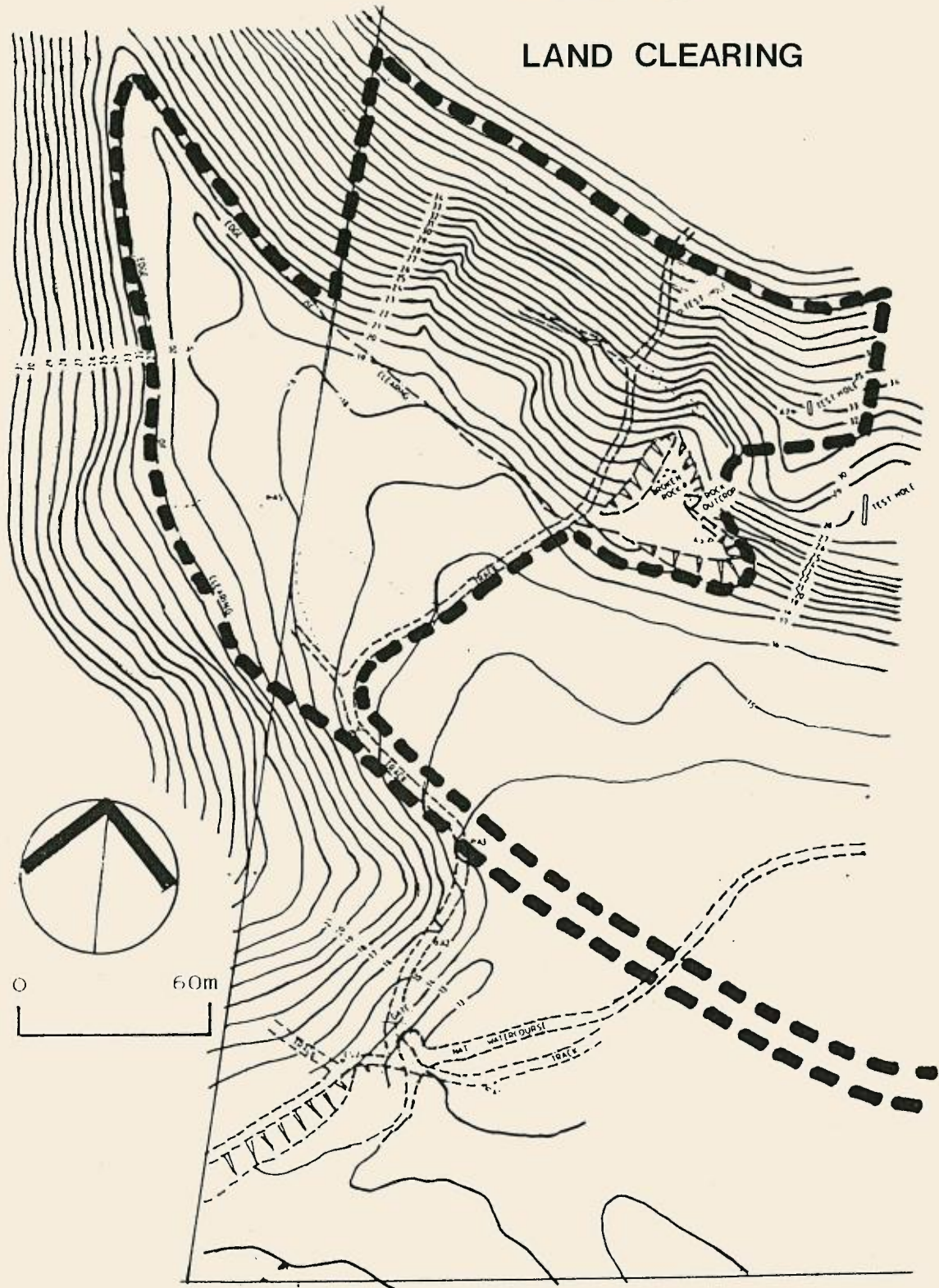
## SITE

Base Map 1:25000 Topo. C.M.A.



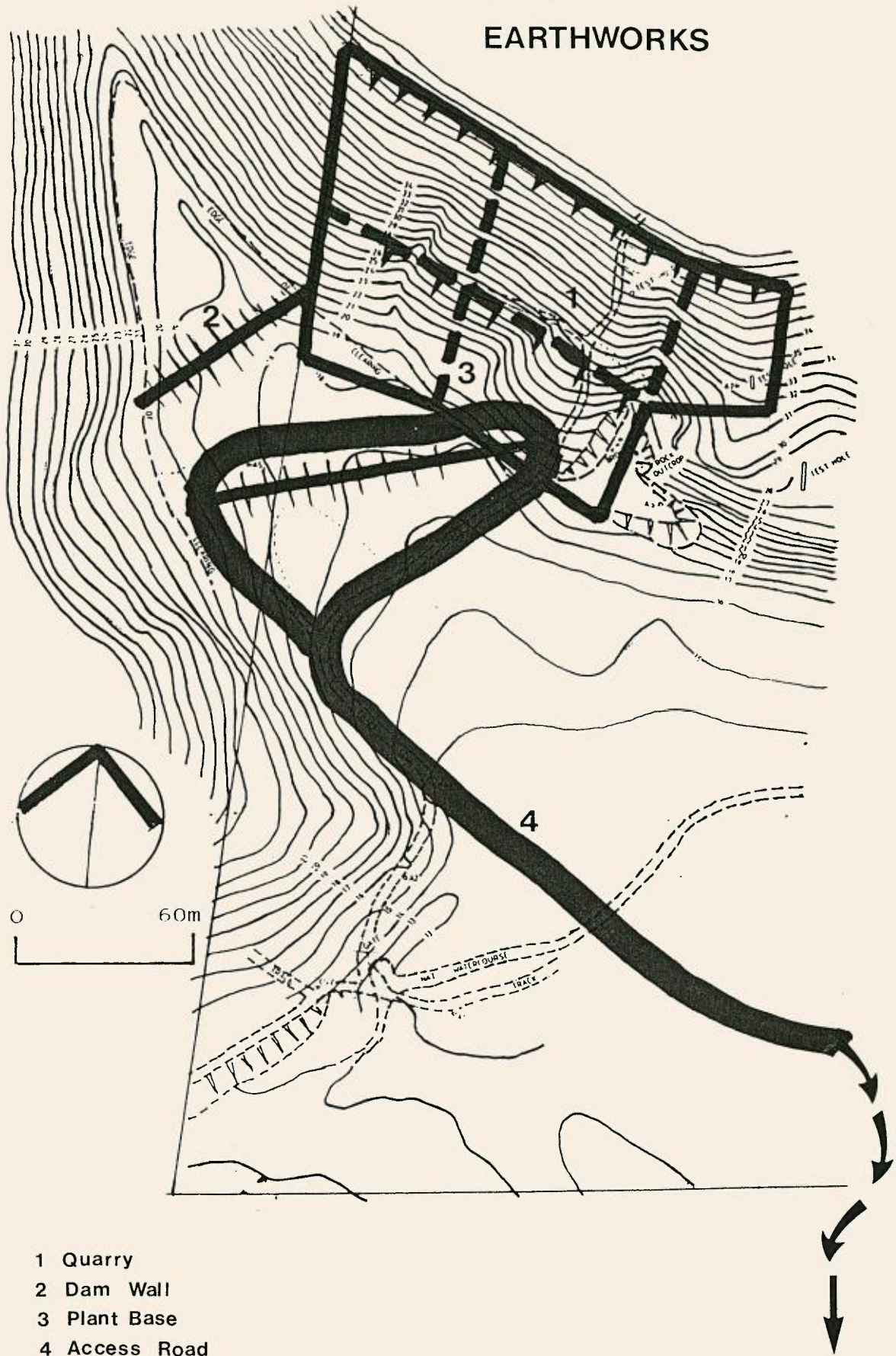
# MAP 3

## LAND CLEARING



# MAP 4

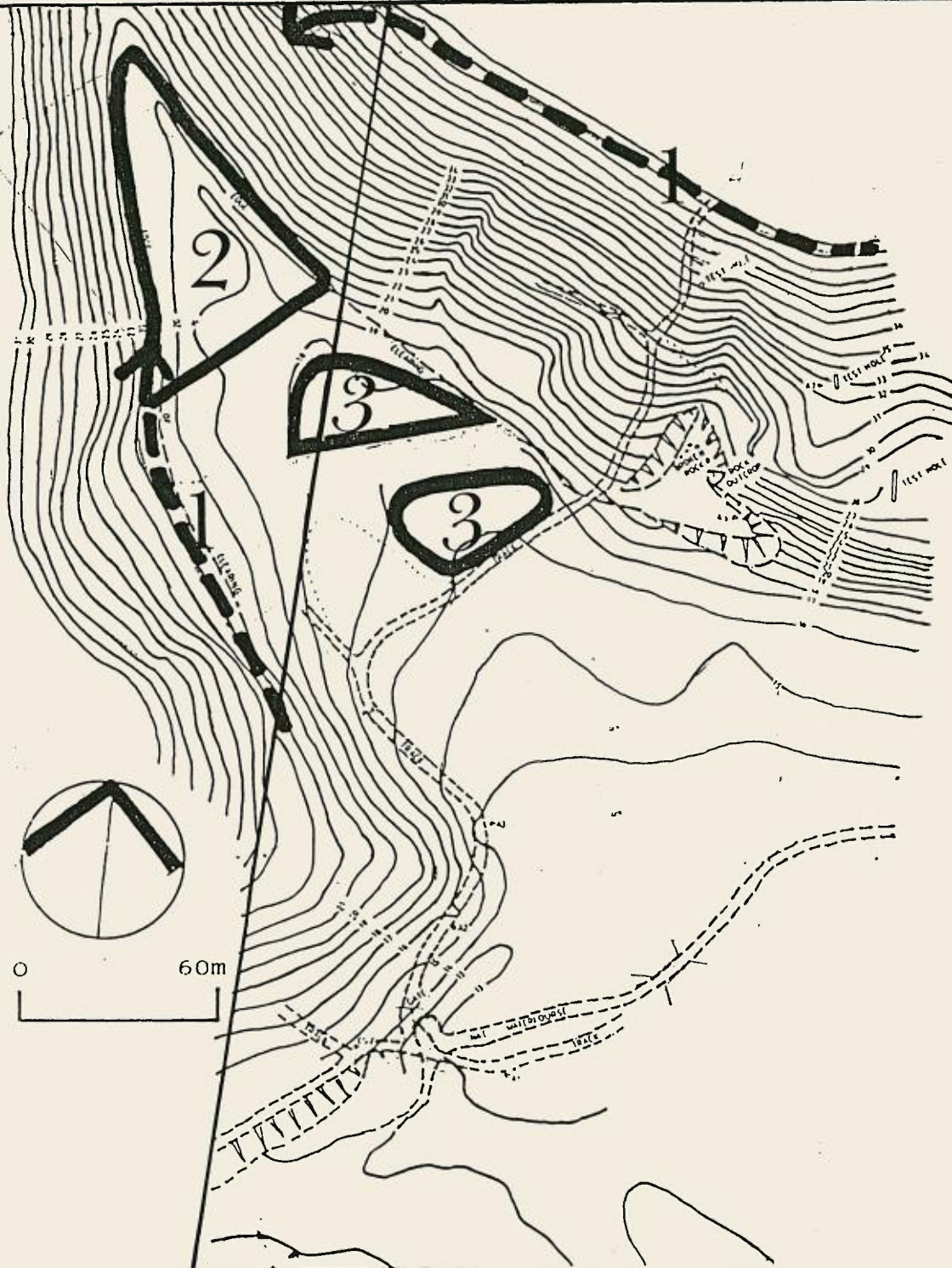
## EARTHWORKS



- 1 Quarry
- 2 Dam Wall
- 3 Plant Base
- 4 Access Road

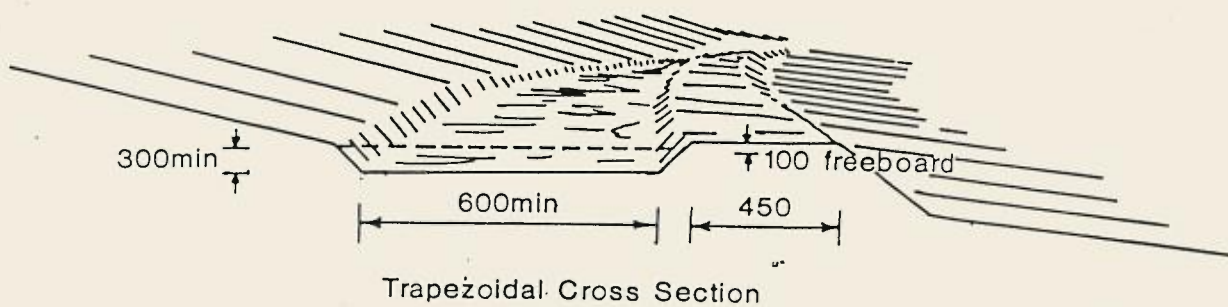
# MAP 5

## DRAINAGE CONSTRUCTION



- 1 Diversion Banks
- 2 Dam
- 3 Sediment Ponds

## DETAIL **A** DIVERSION BANKS



Source: Interim Guidelines for the Control of Erosión and Sedimentation in Roadworks. Department of Main Roads.

# DETAIL B DAM

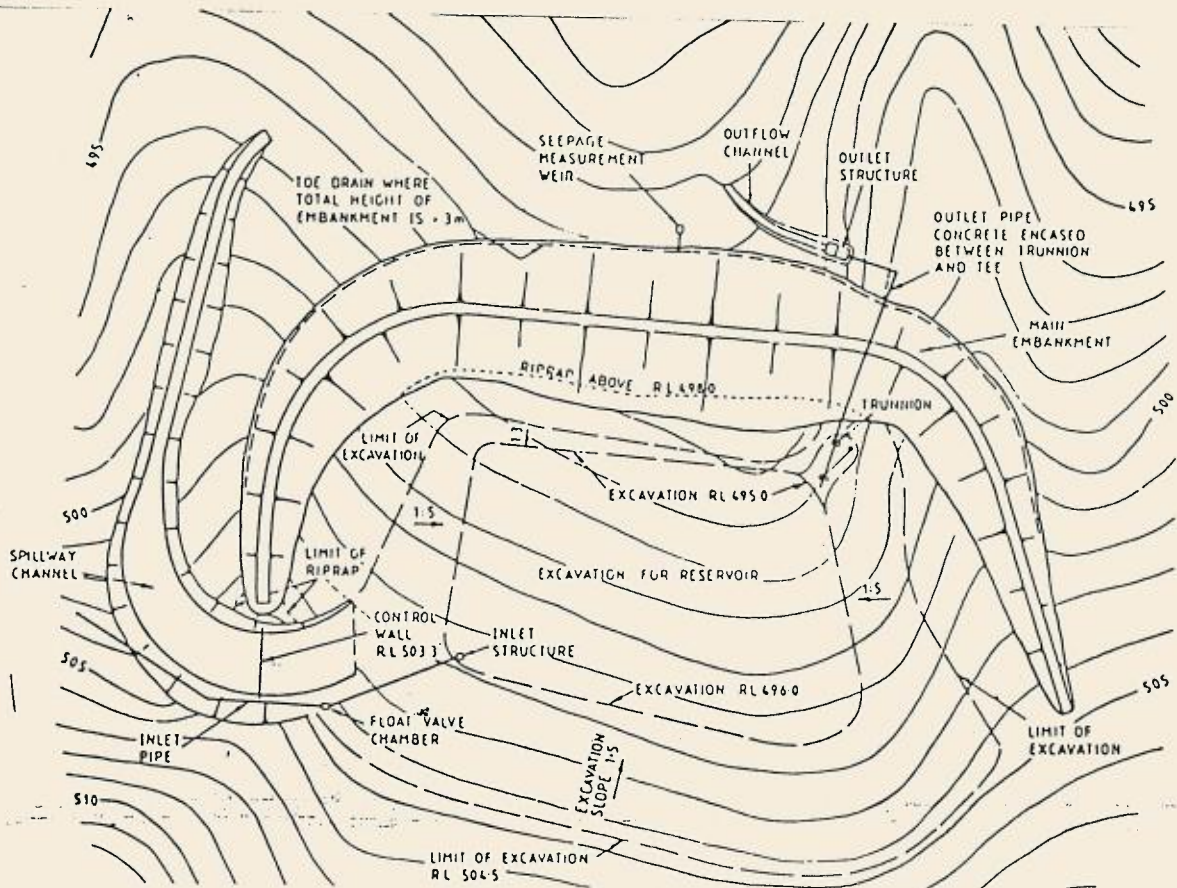


Figure 1  
150 ml Murrurundi Storage General Arrangement

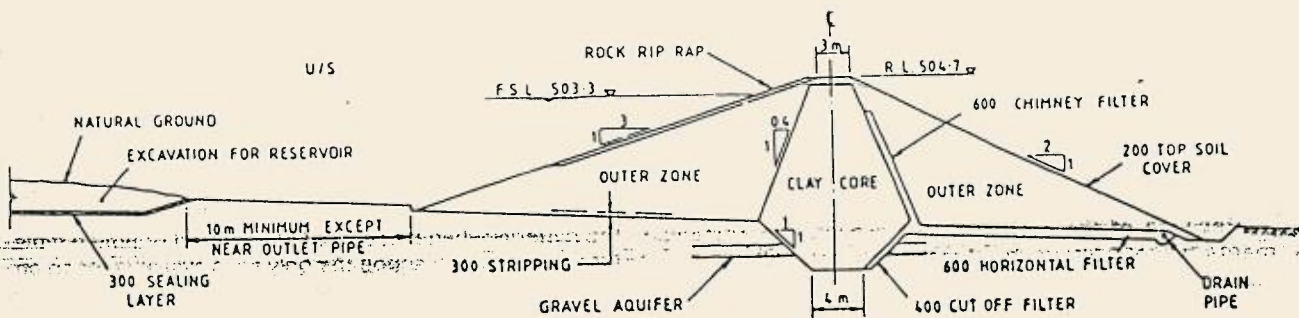
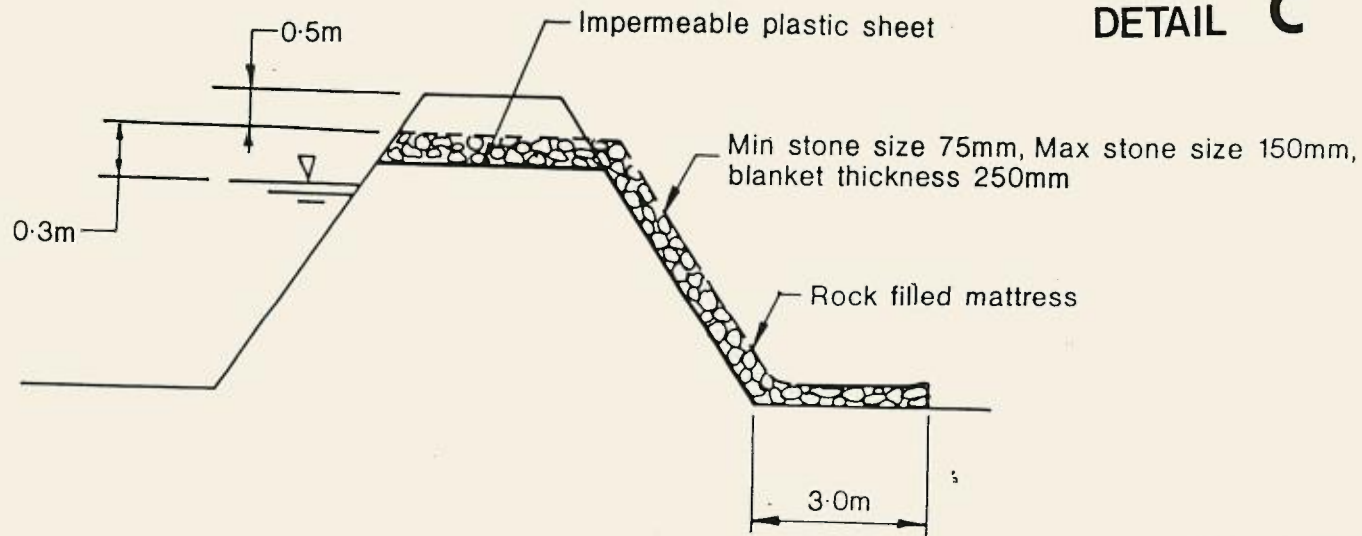


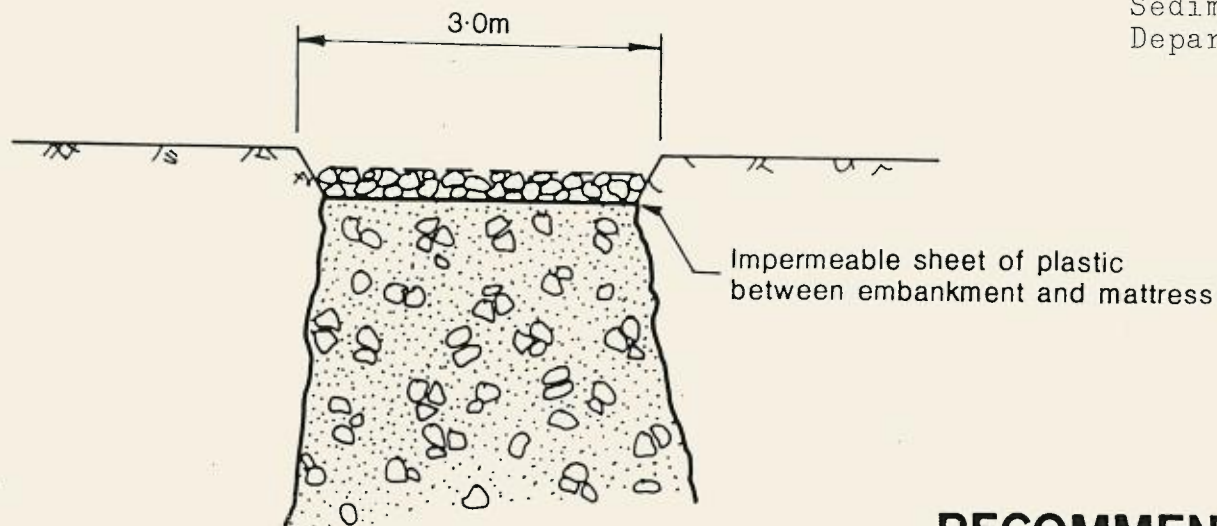
Figure 2  
150 ML Murrurundi Storage Typical Section



# DETAIL C

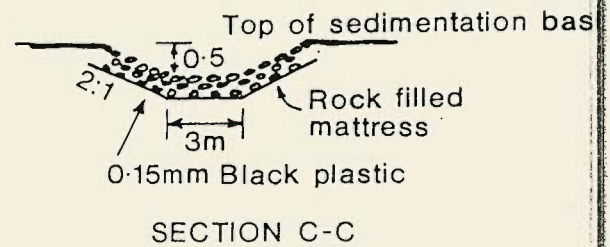
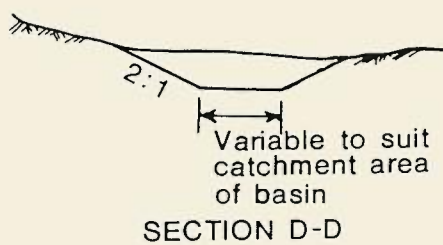
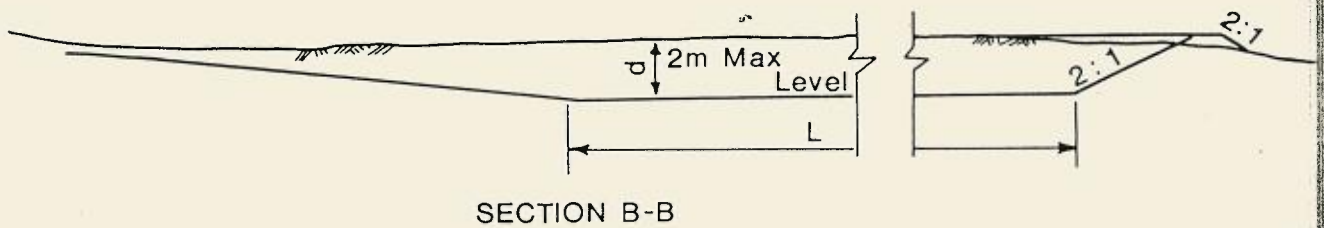
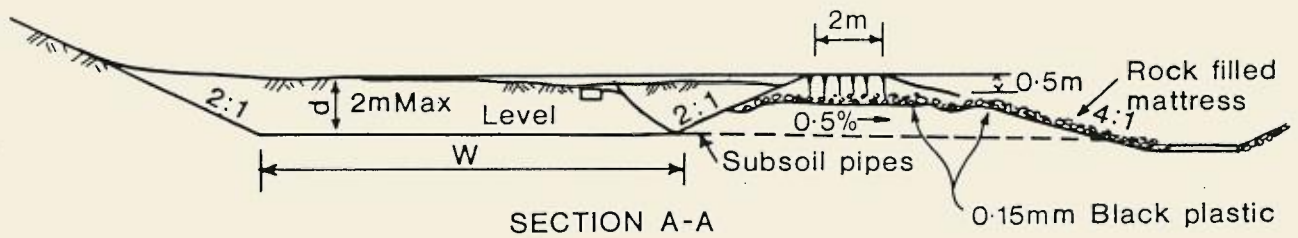
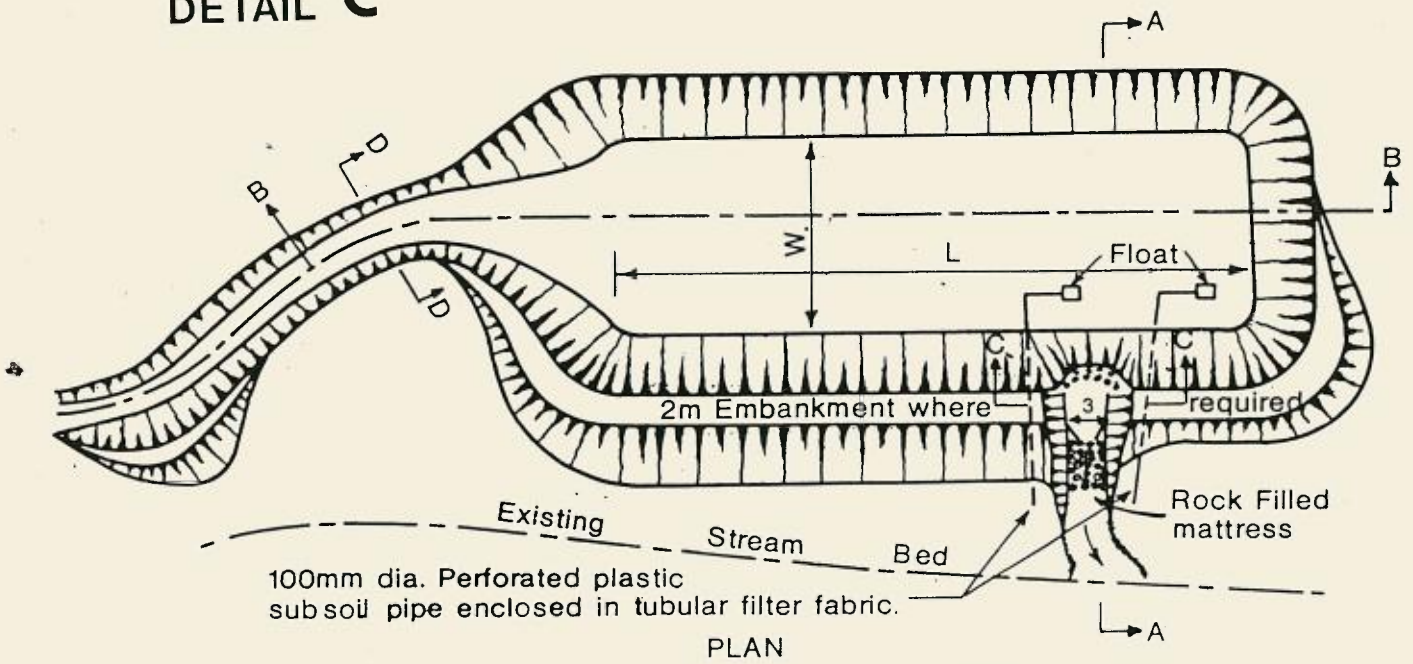


Source: Interim Guidelines for the control of Erosion and Sedimentation in Roadworks. Department of Main Roads.



**RECOMMENDED TREATMENT FOR  
SEDIMENT BASIN SPILLWAY**

# DETAIL C

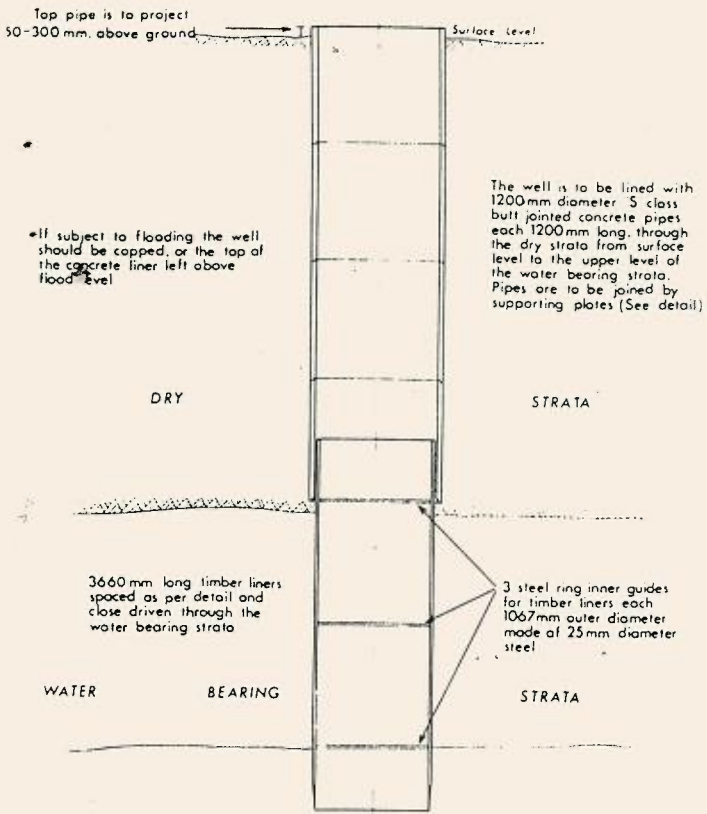


Source: Interim Guidelines for the Control of Erosion and Sedimentation in Roadworks.

Department of Main Roads.

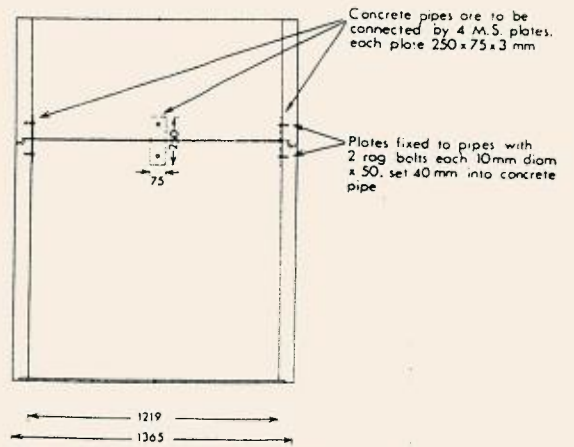
## TYPICAL SEDIMENTATION BASIN

# DETAIL D



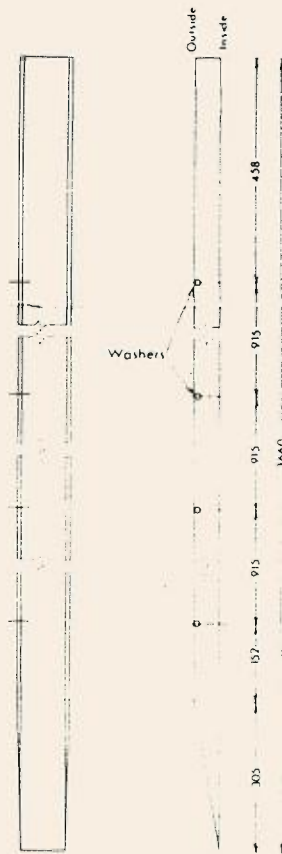
SECTION SHOWING WELL LINING INSTALLED

Scale 1:50



PIPE LINER DETAIL SHOWING SUPPORTING PLATES

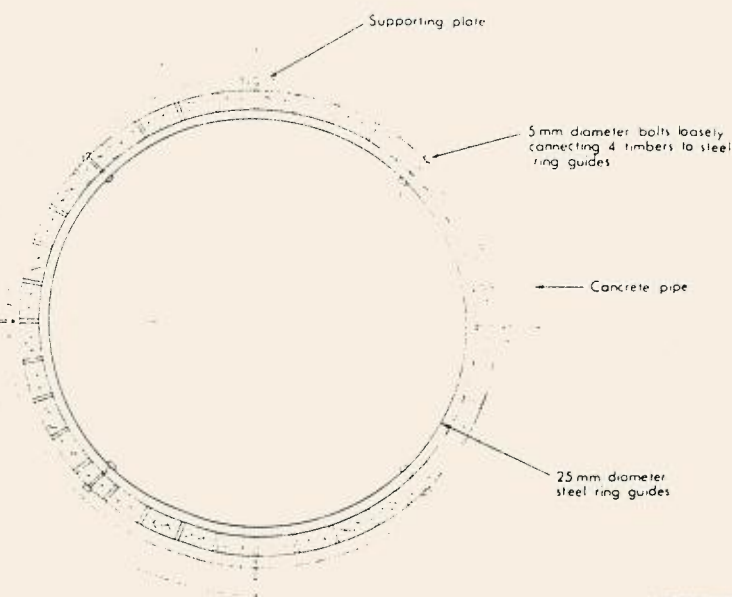
Scale 1:25



NOTE: 1. Timbers to be chamfered to 89mm out of 100 x 50 mm hardwood  
 2. Four washers to be 25mm diam x 3mm steel fixed on one side of each timber with counter sunk screws. Washers may be thicker than 3mm if water bearing gravel is known to be coarse  
 3. This method of construction may not be satisfactory in fine grained water bearing materials. If in doubt contact Hydrogeological Section, W.R.C.

DETAIL OF TIMBER LINER

Scale 1:10



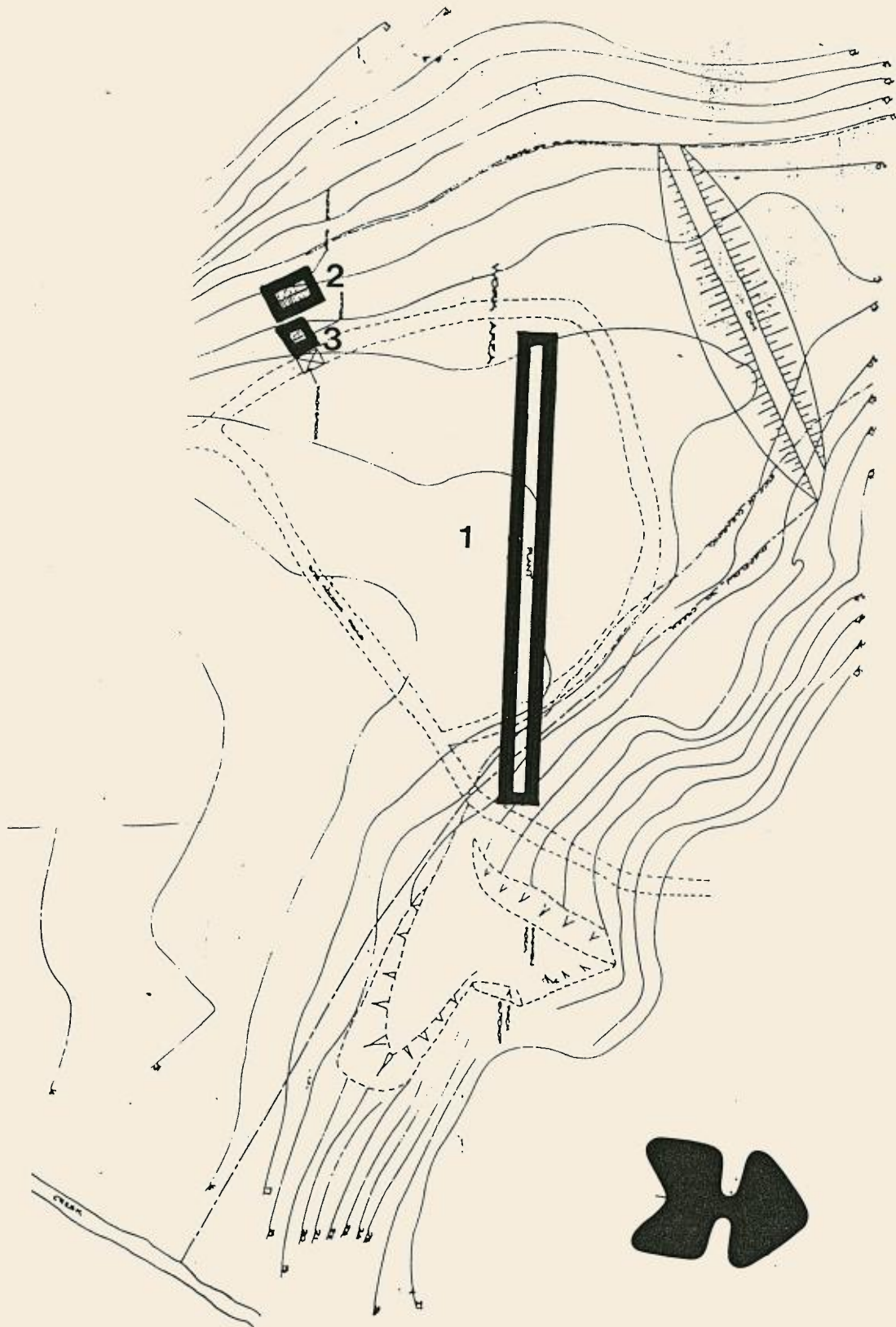
PLAN SHOWING WELL LINING IN POSITION

Scale 1:12.5

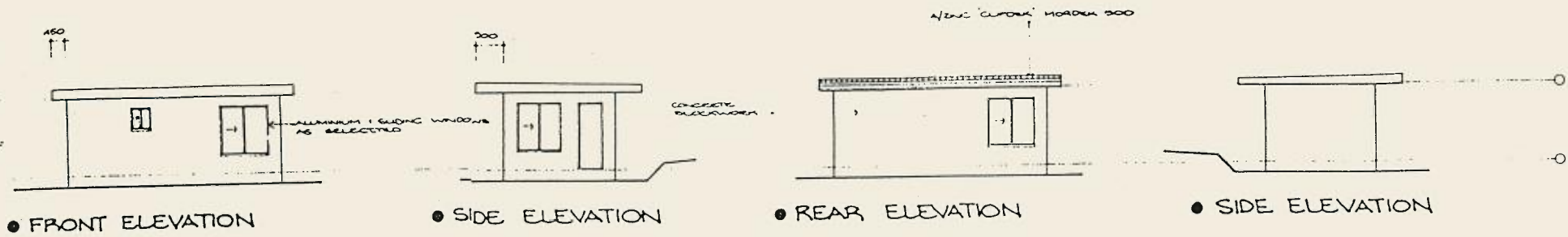
WATER RESOURCES COMMISSION  
 HYDROGEOLOGICAL SECTION - WATER RESOURCES BRANCH

## CONCRETE PIPE and TIMBER LINING for a 1200mm DIAM. WELL

Scales as shown



- 1 Plant
- 2 Workshop
- 3 Weighbridge/Office



● FRONT ELEVATION

● SIDE ELEVATION

● REAR ELEVATION

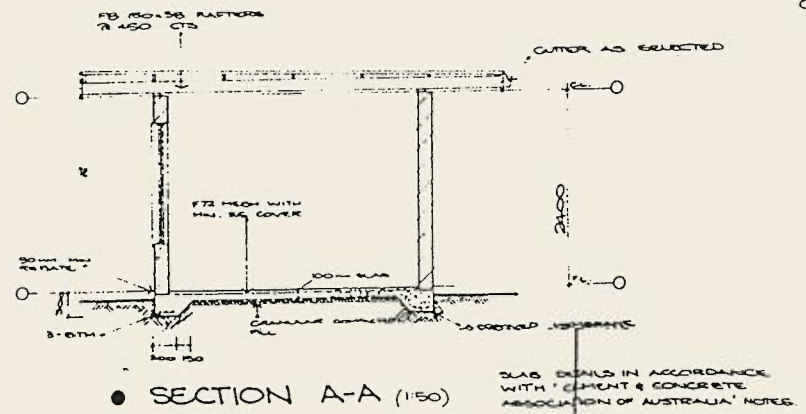
● SIDE ELEVATION

● PERFORMANCE SPECIFICATION:

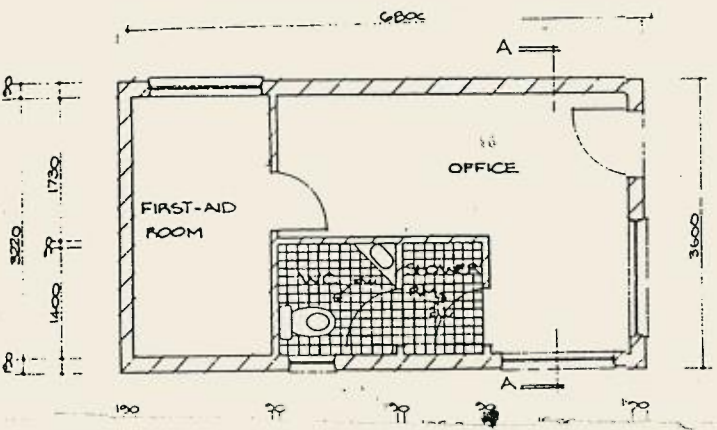
GENERALLY: ALL PROPOSED WORKS ETC. TO BE CARRIED OUT IN ACCORDANCE WITH ORD.70 & ALL STANDARDS MENTIONED THERE IN, ALSO WITH ANY REQUIREMENTS SET-OUT BY LOCAL COUNCIL CURRENT CODES. ALL MATERIALS TO BE THE BEST OF THEIR RESPECTIVE KINDS. METHOD & WORKMANSHIP TO BE IN ACCORDANCE WITH GOOD BUILDING PRACTICE.

● NOTE:

ALL LEVELS & DIMENSIONS TO BE CHECKED ONSITE PRIOR COMMENCEMENT OF WORKS.



● SECTION A-A (1:50)



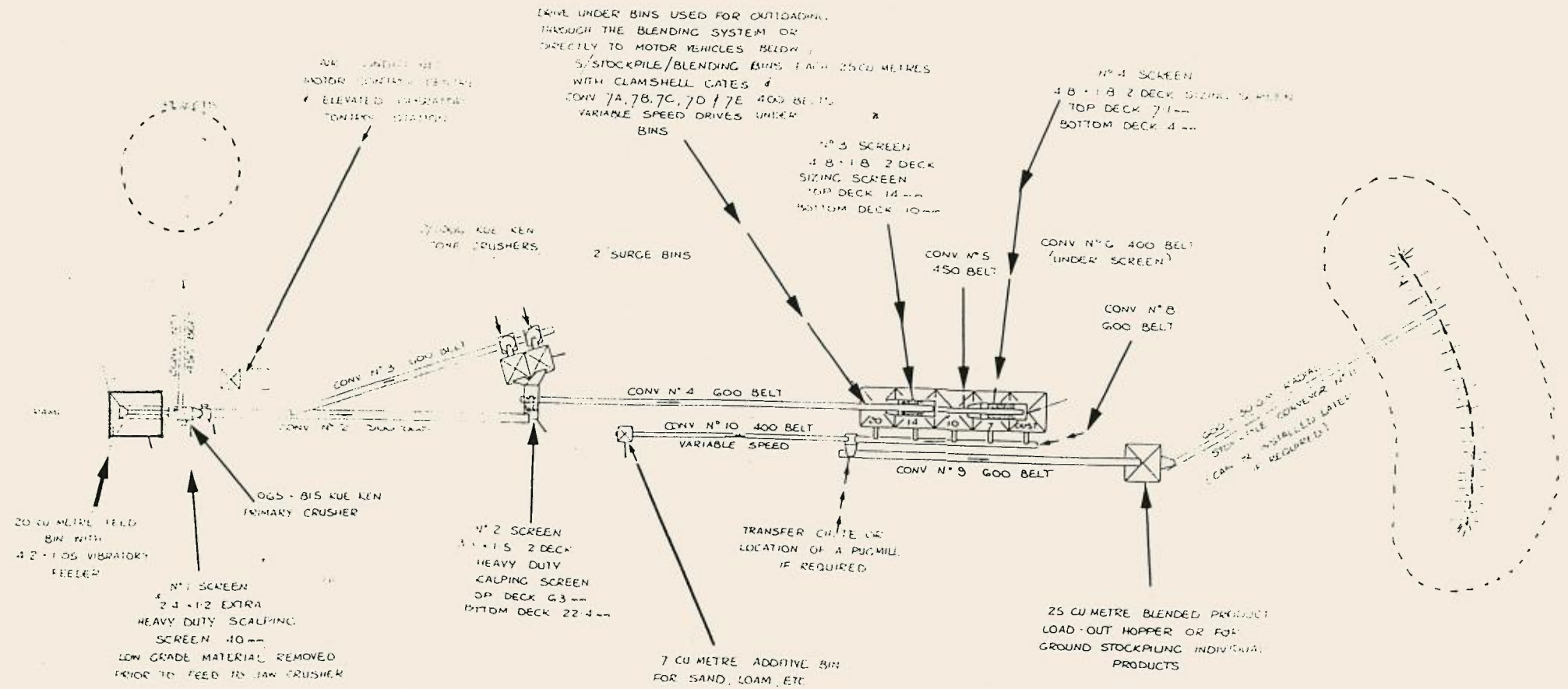
ISSUE	AMENDMENTS	DATE
<b>SAPPHIRE DESIGN &amp; DRAFTING SERVICE</b> SDOOS UNIT 3/4 FORD ST MORUYA PH (044) 743239		
CLIENT		
MR J. NADER		
PROJECT		
PROPOSED MORUYA GRANITE QUARRY WEICH BRIDGE SITE SHED		
PRICE		

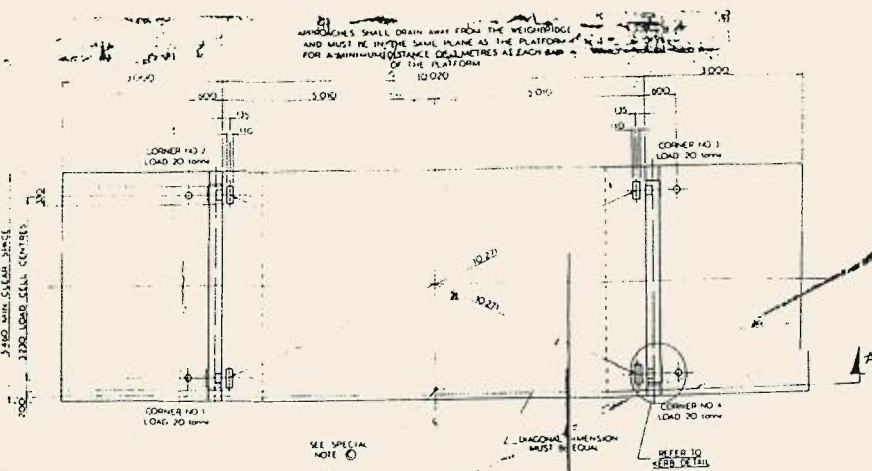
Drawing 3

# PLANT

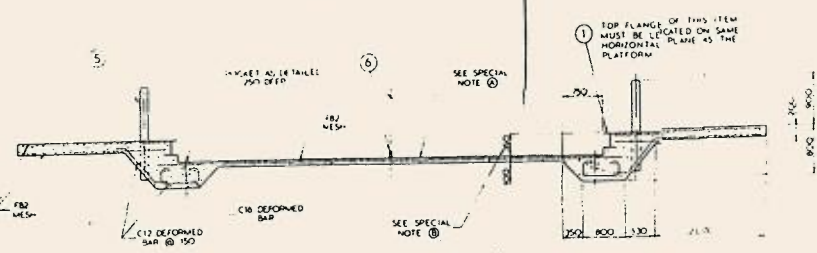
## NOTES

- (a) FOR SIMPLICITY THE PLANT IS SHOWN DIAGRAMMATICALLY IN A STRAIGHT LINE ARRANGEMENT. THE ACTUAL LAYOUT WOULD VARY WITH SITE CONDITIONS.
- (b) IT HAS BEEN ASSUMED THAT THE SITE IS LEVEL.





SITE & INSTALLATION SHALL COMPLY WITH SECTION 2  
Code of Practice for Weighbridge Installation, Weighing Indust. Assoc.  
A the appropriate State Legislation

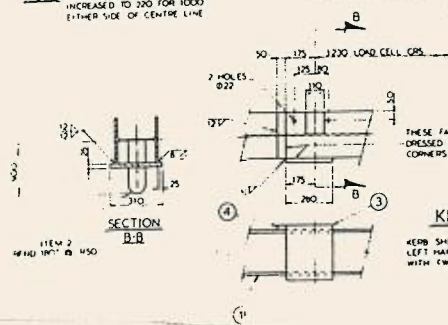


NOTE SPACING OF C12 BARS CAN BE INCREASED TO 200 FOR 1000 EITHER SIDE OF CENTRE LINE

SECTION A-A

**SPECIAL NOTATIONS**

- (A) FOUNDATION BARS TO BE BORED TO FULL DEPTH OR WELDED TO REINFORCEMENT.
- (B) THIS DIMENSION IS VARIABLE, IT MUST BE DIMENSIONED TO MATCH THE DIMENSIONS SPECIFIED IN THE WEIGHTS & MEASURES REQUIREMENTS.
- (C) B12 STEEL CONCRET SHALL BE 100MM MINIMUM COVERAGE TO ALL REINFORCEMENT. B12 ANCHOR CLEATS SHALL BE POSITIONED AS SHOWN ON THE SIDE OF THE REINFORCEMENT PLATFORM AS INDICATED BY DIMENSIONS.
- (D) DIMENSIONS WITH WEIGHTS & MEASURES REQUIREMENTS THE REINFORCEMENT PLATFORM IS INDICATED BY DIMENSIONS.
- (E) 2500C DEFORMED BAR @ 150



KERB SHEAR PLATES TO BE PROVIDED TWO (2) LEFT HAND AS DRAWN ARE REQUIRED TOGETHER WITH TWO (2) RIGHT HAND OPPOSITE TO DRAWN

IN ADDITION TO ITEMS DETAILED CUSTOMER SHALL SUPPLY ALL MATERIALS REQUIRED FOR THE CONSTRUCTION OF THE FOUNDATIONS FOR MACHINE NO \_\_\_\_\_

MAP 7  
TRANSPORT

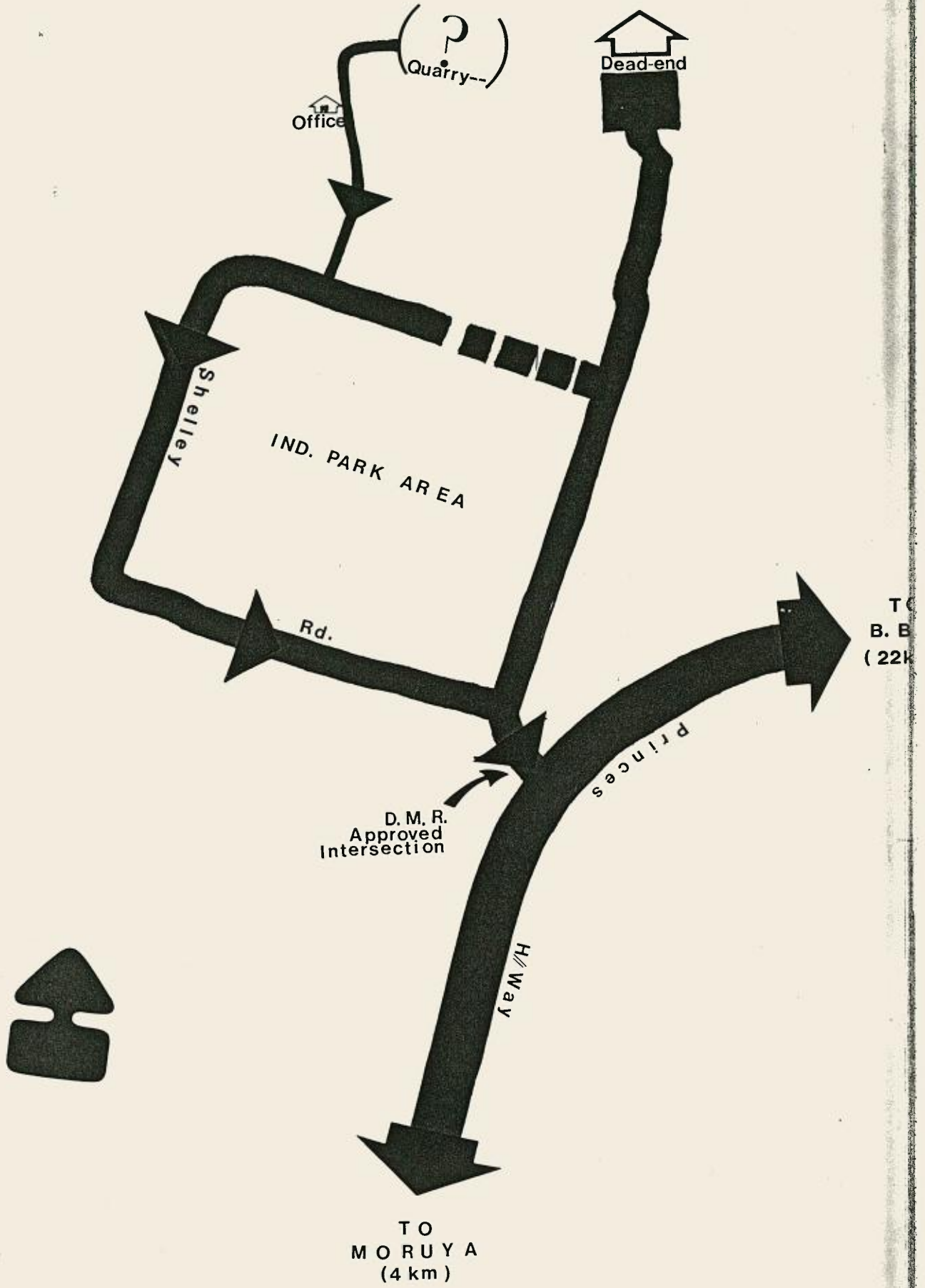
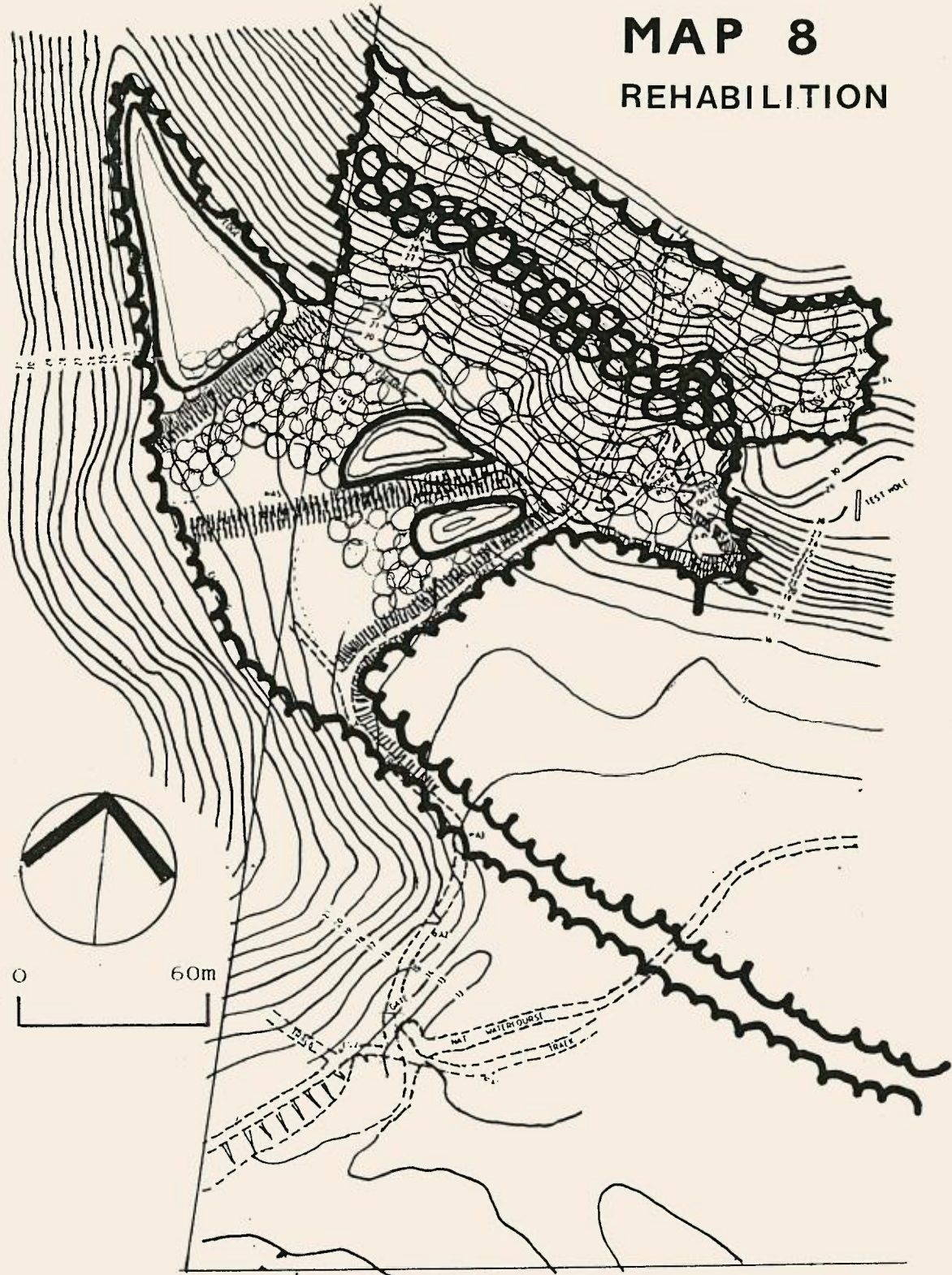




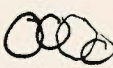

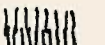
DIAGRAM ONLY - NOT TO SCALE



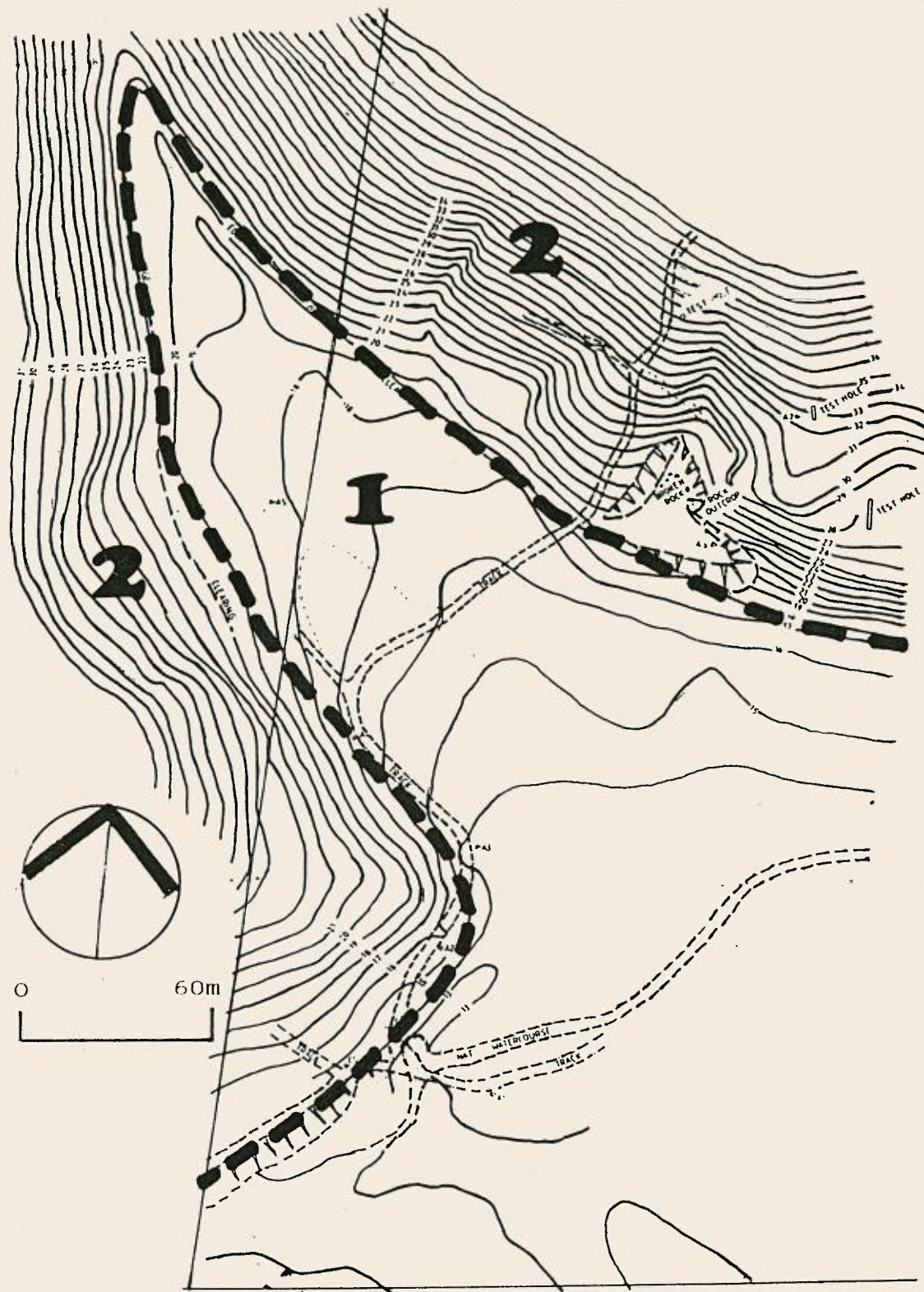
# MAP 8

## REHABILITATION



-  BENCH PLANTINGS AND TOPSOIL RESPREADING
-  REPLANTED MELALEUCA ASSOCIATION AND TOPSOIL RESPREADING
-  REPLANTED EUCALYPTUS ASSOCIATION AND TOPSOIL RESPREADING
-  POND EMPLACEMENT/DAM
-  MULCHING/MESH STABILISATION

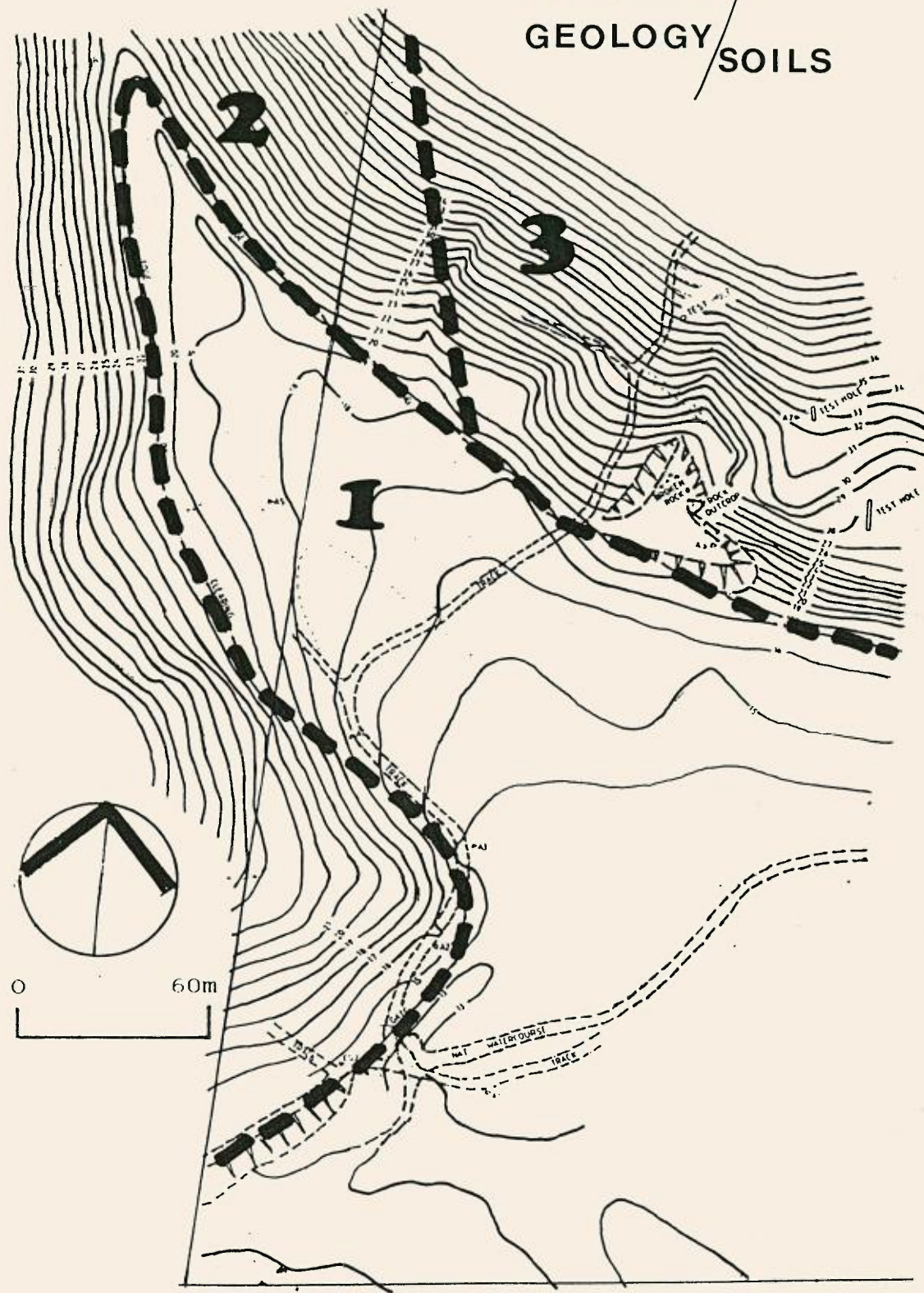
MAP 9  
TOPOGRAPHY



- 1 ALLUVIAL PLAIN
- 2 HILLY FOOTSLOPES

# MAP 10

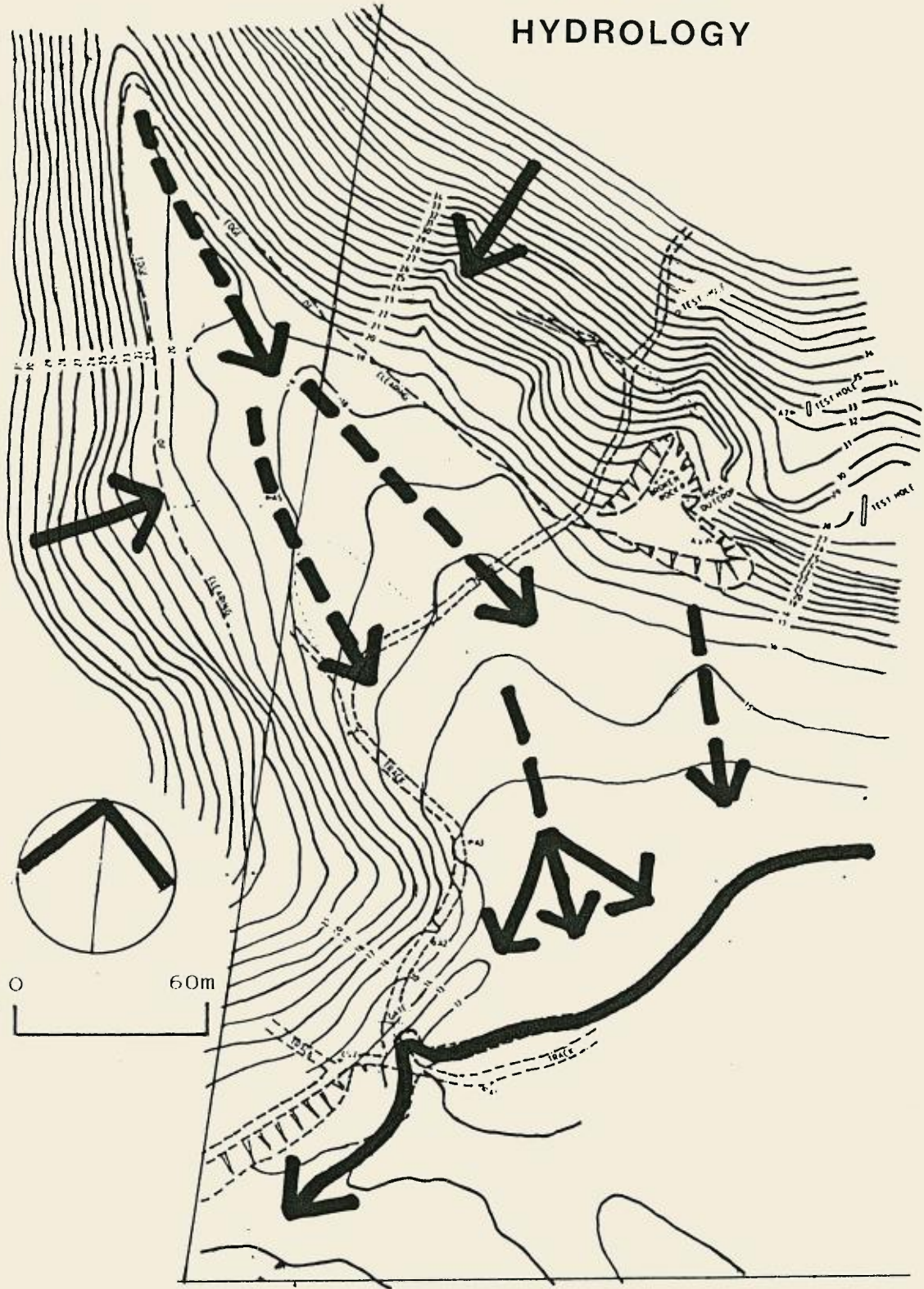
GEOLOGY / SOILS



1. CONTEMPORARY CLAYS, GRAVELS, SAND
2. DUPLEX SKELETAL SOILS ON METASEDIMENTS
3. DUPLEX SKELETAL SOILS ON GRANITE

# MAP 11

## HYDROLOGY

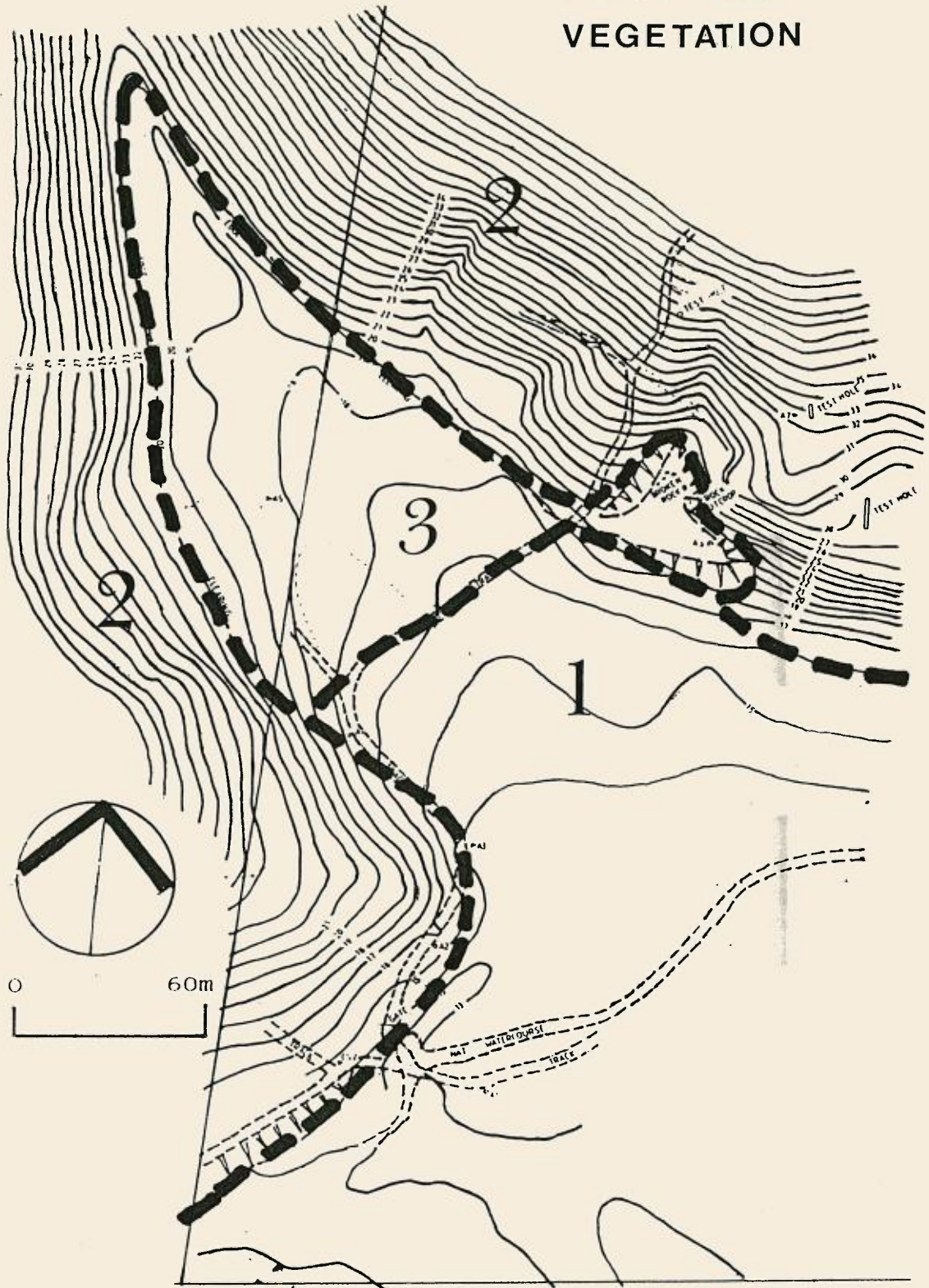


SUBSURFACE FLOW

SURFACE FLOW (SHEET AND CHANNEL)

# MAP 12

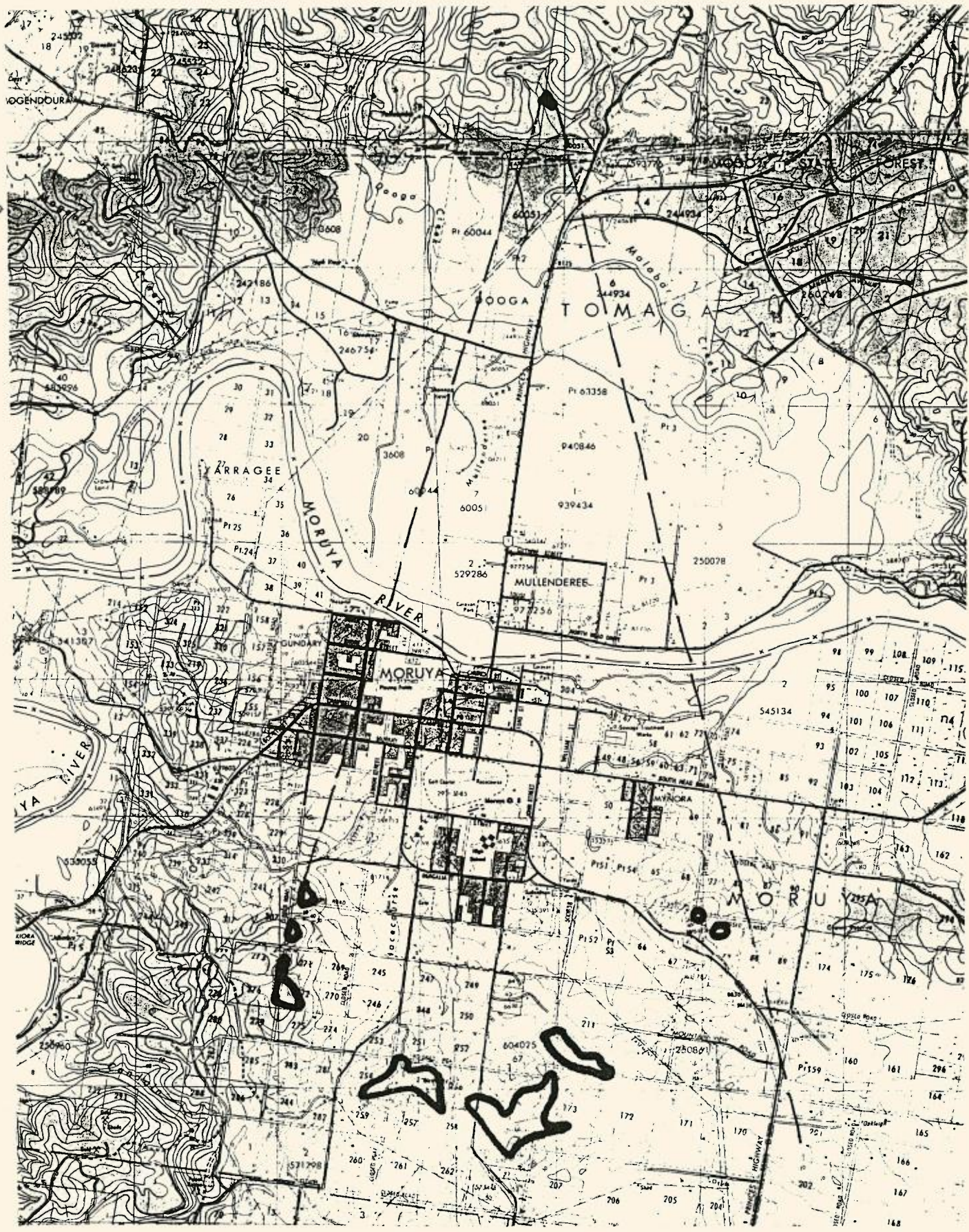
## VEGETATION



1. MELALEUCA ASSOCIATION ON ALLUVIALS
2. EUCALYPT ASSOCIATION ON GRANITE AND METASEDIMENTS
3. CLEARED AREA.



MAP 13 VISUAL RESOURCES



TOP 2 METRES OF QUARRY CREST VISIBLE FROM THESE AREAS.  
BASE MAP 1:25,000 TOPO MORUYA

EIS 674

NADER, J.

EIS  
674

Moruya granite quarry