

**AVOCA TRANSPORT COMPANY
MERRYWOOD COAL MINE**

**ENVIRONMENTAL ASSESSMENT AND
MANAGEMENT PLAN**

REGISTERED

ML 103 m/84

ML 31 m/92

JOHN MIEDECKE AND PARTNERS PTY LTD

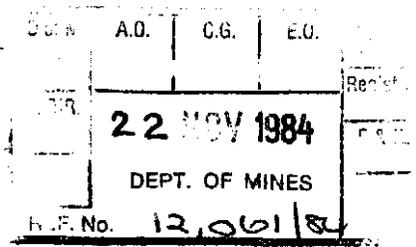
environmental, engineering and planning consultants

NOV. 1984

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1.0 INTRODUCTION AND OBJECTIVES

1.1 Introduction

Avoca Transport Company Pty. Ltd. (hereafter called the Company) is the holder of Exploration License 21/82 which covers an area of approximately 20 square kilometres North - East of Royal George in Northern Tasmania. The Company has concentrated its exploration activity to an area in close proximity to old mine workings which were operated as a small underground and open cut mine after the Second World War.

This mine, which was operated by the Merrywood Coal Company, closed down when its markets were lost to oil in the early 1960's. The Company plans to reopen the mine and extend the old open cut to initially recover coal from the underground workings and thereafter the whole seam.

1.2 Objectives

The Company is proposing to reopen the mine to supply the local market. The local coal market is supplied by the Cornwall Coal Company which has two underground mines. This Company presently has problems supplying local demands and has contracted to initially purchase 20,000 tonnes of coal. The rates of coal production and as a result, the scale of the operation after this initial period are flexible, and will be determined by market demands.

1.3 Location and Access

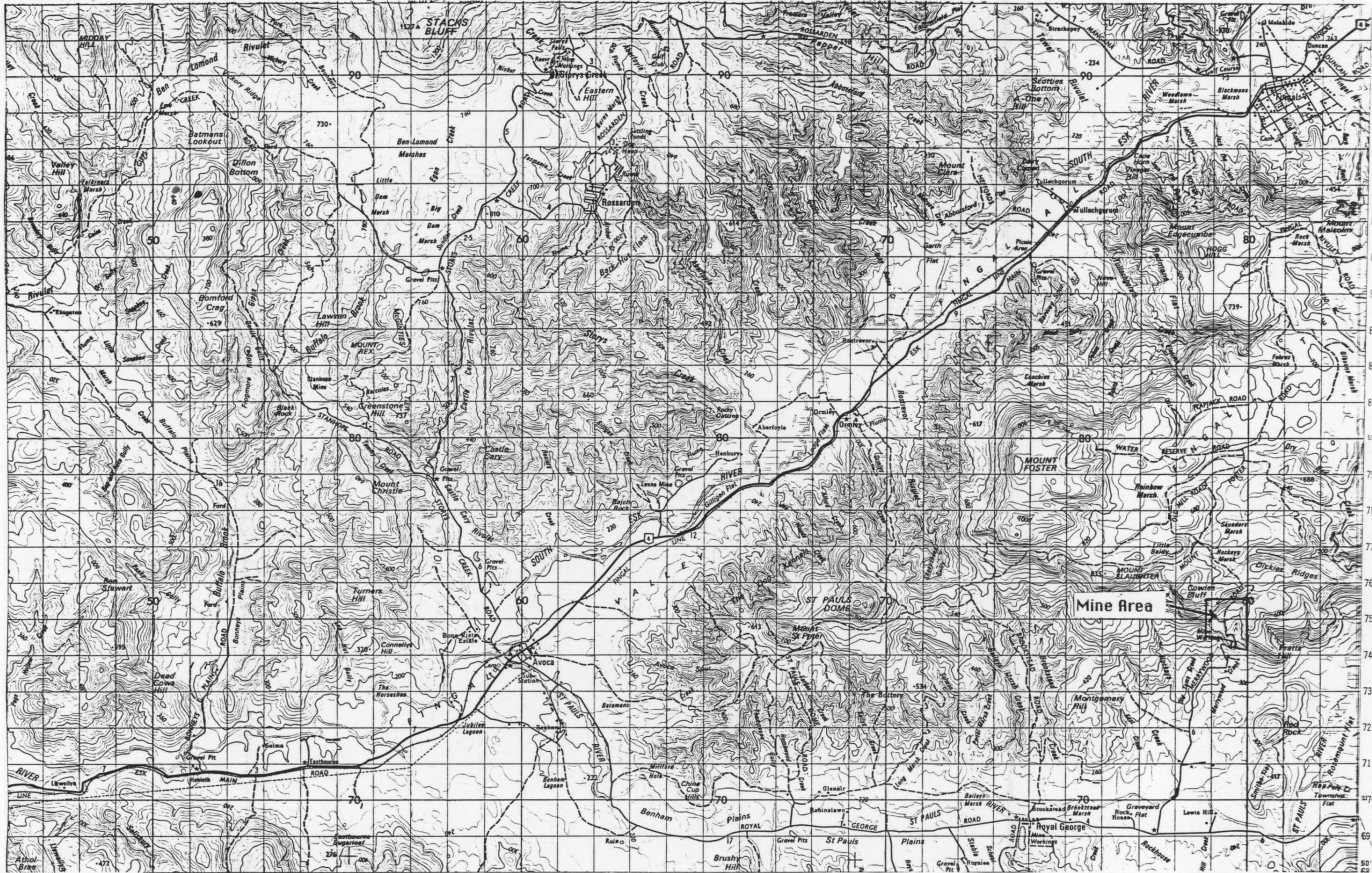
The Lease area is located within a state forest approximately 6km north - east of the small settlement of Royal George (Figure 1). Access is by sealed road from Avoca to approximately 2km east of Royal George where an unsealed road runs through the lease area to Forestry operations in the forests to the north.

1.4 Purpose of the Report

This document has been prepared to support the Companies application for a Mine Lease from the Department of Mines and an Environmental License from the Department of Environment.

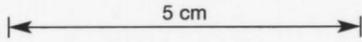
Information is included on the proposed operation, the existing environment and the environmental management and safeguard procedures which will be adopted to mitigate any adverse effects.

The Company has adopted a philosophy to mitigate or eliminate environmental problems by carefull design and the mining operation will be developed according to modern environmental criteria and practices.



ST. PAULS
SHEET 8414
TASMANIA
EDITION 1

MERCURY-WALCH



Scale 1:100,000

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MERRYWOOD COAL MINE

LOCATION

Fig. 1

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2.0 PROJECT DESCRIPTION

2.1 General Development Plan

The lease area contains insitu coal reserves of some 500,000 - 750,000 tonnes in one seam to depths of approximately 30 metres. The reserves are recoverable by surface mining methods which optimise resource recovery. The coal seams are relatively flat lying and the limits of open cut mining are restricted by a fault to the north, and rising topography in the east. The mining plan is to initially recover the 20,000 tonnes by extending the old open cut workings to the north as shown in Figure 2 and mine the remaining pillars in the underground workings. The surface area of coal exposed will be in the vicinity of 4,200 m², or approximately 50m by 85 m. The coal will be loaded and transported to the Cornwall Coal Companies washery at Fingal. There will be no washing on site.

Current plans are for the mining of additional coal by extending the open cut in a easterly direction as indicated in Figure 2. Figure 3 illustrates the basic mining operation. A central haul road and pit will be maintained to allow coal haulage and access. This road will also serve to drain the open cut.

The existing Forestry Commission road, the Mt. Foster Road, will be relocated when mining operations approach this area.

Actual mining experience and the practicalities of mining the underground workings will ultimately determine the way the deposit is mined.

2.2 Development Schedule and Production

The development timetable is for operations to commence virtually immediately to supply the immediate market and thereafter as market demands dictate. The latter cannot be forecast at this time but it is unlikely that a major operation will eventuate because of the limited size of the resource and the equipment. An annual production rate from 10,000 to 50,000 tonnes per annum is likely to be the range.

The initial production period will cover a period of 1 to 2 months.

2.3 Mining Operations

The mining is a simple operation and will use bulldozers, scrapers, off-road trucks and excavators. Operations will not be continuous and will be restricted to daylight hours, generally 8am to 5pm. The equipment is normal earthmoving equipment owned by the Company and will be transported and removed from the mine, as required.

The major steps in the mining operation are described below:

1. Clearing

All tall vegetation will be cleared ahead of the mining operation. This is mainly eucalypts which have no commercial value and a scrub understorey (see Sect. 3.6). All commercial timber will be salvaged, as directed by the Forestry Commission.

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NORTH

5375500

600

550

Probable Fault

Initial Coal Production Area

Underground Workings

Approximate Surface Mine Area

5375000

Direction of Mining

Main Adit

500

Initial Spoil Dump

Open Cut

Mt. Foster Road

Approx. Seam Subcrop

450

Merrywood Creek

5374500

400

5374000

579000

579500

580000

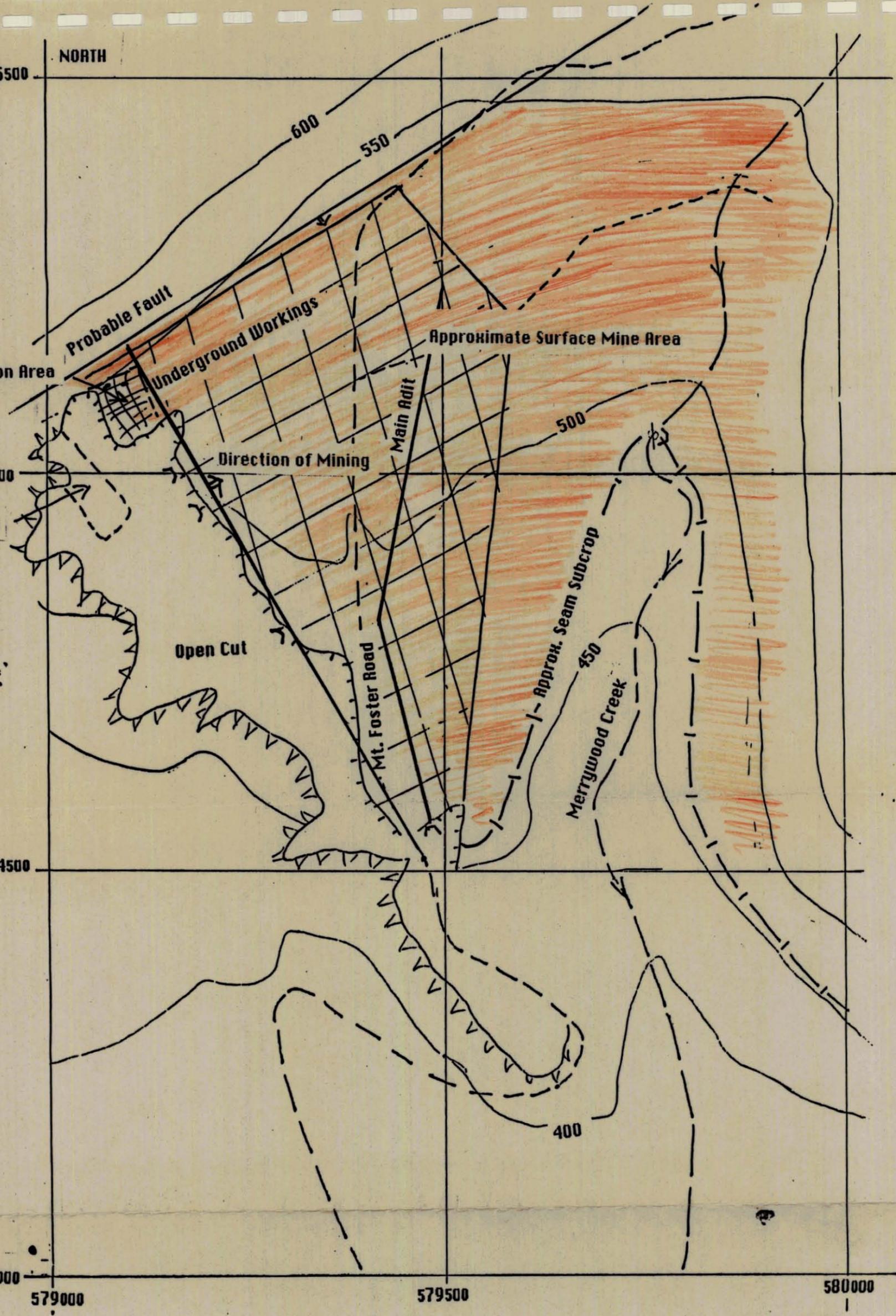
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MERRYWOOD COAL MINE MINE PLAN

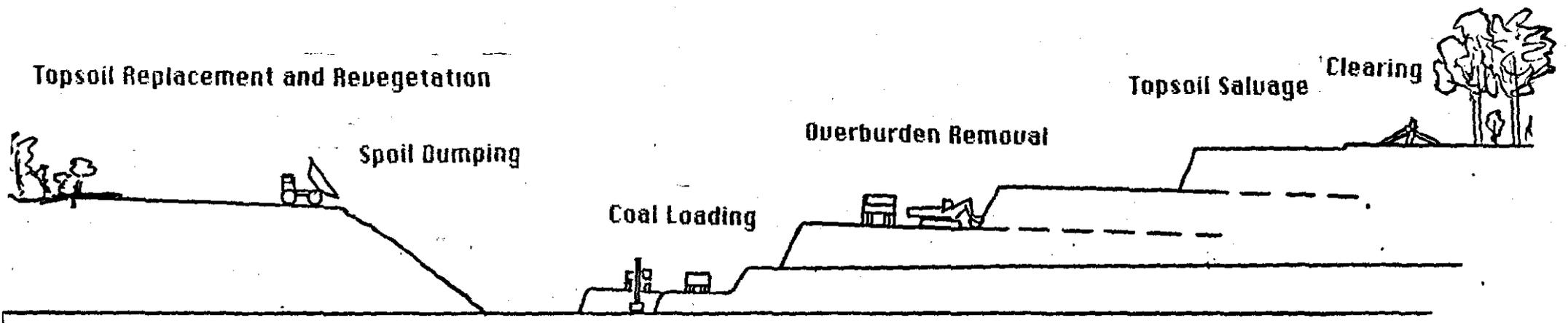
Fig. 2

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Direction of Mining →



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MERRYWOOD COAL MINE

TYPICAL MINING CROSS SECTION

Fig. 3

AVOCA TRANSPORT COMPANY

Nov. 1984

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Wherever possible the vegetation will be recovered with the topsoil to aid in revegetation. The remaining vegetation will be pushed to the side of the clearing and burnt, or dumped in the worked out pit.

2. Topsoil Salvage

The surface organic layer of the soils will be stripped ahead of the main overburden clearing operation for use in rehabilitation. This is discussed in more detail in Section 4.1.

3. Overburden Removal

Overburden will be removed in benches down to the surface of the coal. The number of benches will be determined by the depth of overburden and any operational restrictions caused by the underlying underground workings. The overburden is principally mudstones which should not require blasting except in local areas.

The overburden will be hauled via the benches and haul road ramps to the dump site on the other side of the pit, as shown in Figure 3.

The initial spoil disposal site is indicated on Figure 2. A volume of approximately 50,000 cubic metres will be dumped in this area which is the surface of old overburden dumps from the previous open cut workings. As the operations extend to the east the spoil dumps will also be extended in a series of benches.

The spoil dumps will be graded and contoured to form slopes similar to the natural topography and revegetated. This is discussed in detail in the Rehabilitation Plan (Sect.4.1)

4. Coal Handling

When the overburden is stripped to the surface of the coal, the coal will be removed. The full seam is expected to be mined, which averages approximately 3metres. The coal will be loaded by excavator into highway trucks for transport. Only limited, if any, stockpiling will be required.

2.4 Coal Transport

The coal will be transported via public road to the Cornwall Coal Companies washery at Fingal. Contract road transport trucks will be used with a capacity of approximately 10 tonnes. The existing unsealed road in the vicinity of the mine will be locally upgraded, the remaining road being in good condition.

The Fingal Council is aware of the proposal and discussions are in progress regarding these matters.

Future transport options are being investigated, including a more direct route via Forestry Commission roads to the north via Mt. Foster.

2.5 Infrastructure

Virtually no infrastructure is required for the operation because of its small size and limited periods of operation. Transportable buildings or caravans and toilets will be used for the operators and supervisory staff. These facilities may be upgraded if production warrants.

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The workforce of 3 to 8 will be the Companies own operators who will travel to the site each day or find temporary accomodation locally. Casual labour will also be employed locally. Security fencing and signs will be installed to protect the mine and maintain safety precautions.

3.0 EXISTING ENVIRONMENT

3.1 Regional Setting

The Lease Area lies near the edge of the St. Pauls river valley at an elevation of approximately 450m. Most of the valley has been cleared and developed for agricultural purposes. The higher ground with poorer soils has been left undeveloped and most of these areas of natural vegetation have been dedicated as State Forest.

The Lease Area lies wholly within the State Forest.

The area has a history of mining, both tin and coal, which commenced at the turn of the century. Most of the local community have had at least one member of the family working in the old Merrywood Mine.

The nearest significant centre is the small village of Royal George which with Avoca, housed the previous workforce.

3.2 Land Use

Land use is entirely State Forest managed by the Forestry Commission. The area has previously been logged and as discussed previously, mined for coal by both open cut and underground methods.

3.3 Topography

The mine area consists of a small plateau of gently sloping ground on the edge of Cowies Bluff. Steeply rising topography borders this plateau and effectively limits the potential mine area. The local topography has been modified locally by previous mine workings, as shown in Figure 2.

3.4 Soils and Overburden

The soils and overburden (materials overlying the coal) constitute the materials which will be disturbed during mining and are the materials which will determine the success or otherwise of later revegetation efforts. Their characteristics will also determine the magnitude of dust and any water quality problems.

3.4.1 Soils

The soils within the mine area have developed from two major sources of parent materials, namely;

- Alluvium and/or colluvium derived from weathering of the surrounding Dolerite scree.
- Residuum of weathered mudstone - sandstone insitu overburden.

By far the greatest influence has been the Dolerite scree and almost all of the soil exposures in the area showed that a stony gradational soil has developed overlying the mudstones and sandstones of the sediments above the coal seam.

Photograph 1 illustrates the typical soil profile. A shallow organic layer is formed on the surface and is the best material for rehabilitation

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Photograph 1
Soil Profile



Photograph 2. Soil and Overburden Profile Exposed in the Open Cut.

purposes. The total depth is variable, as illustrated in Photograph 2. However, there is a more than an adequate supply of soils to cover the spoil dumps.

The principal hazard associated with these soils is sheet erosion.

3.4.2 Overburden

The overburden materials overlying the coal seam are associated with the Parmeener Super-Group sediments of marine origin. The upper part of the sequence which contains the coal consists of lithic sandstone with interbedded mudstone, siltstone and claystone. In the general region these sediments have been extensively intruded by Jurassic dolerite and some parts of the coal bearing sequence have been rafted upward and lost. The dolerite forms a protective capping on much of the high plateau area around Merrywood. Faulting accompanying the dolerite intrusion and occurring later in the Tertiary has disrupted the continuity of the coal seam. A fault forms the northern boundary of the mine.

In the area of the old open cut and the future mine, the dolerite has been eroded leaving a thin mudstone and sandstone overburden. Some dolerite talus also remains.

Photograph 2 shows the typical overburden sequence exposed in the open cut. The dolerite talus forms the surface layer grading to mudstones. Samples were taken of the different overburden materials to determine their chemical characteristics. The major factors which are of concern with overburden are the acidity and salinity.

Any overburden materials which have undesirable characteristics may have to be selectively handled to minimise revegetation and water pollution problems and any provision for this should be made in the mine planning.

Table 1 shows the results of the analyses.

Table 1 Overburden Analyses

Material	Dolerite Talus	Mudstone	Mudstone
Depth (m)	0.5 - 3	5	8
PH.	6.3	7.1	8.0
Electric. Cond. (mS/cm)	0.092	0.236	0.358
Acid Hazard*	non acid	non acid	non acid
Salinity Hazard*	low	low	low
Water Sal. Hazard*	low	low	low

* Refer Appendix A for Assessment Criteria.

The overburden is non acid and non saline and no selective handling will be required. The criteria which are used to make this assessment are shown in Appendix A.

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3.5 Hydrology

Surface and groundwater flows are of importance in designing a mine drainage system and for any water supply purposes.

3.5.1 Surface Water

The lease area lies on the edge of the St. Pauls river plain. It is drained by two minor creek systems which flow in the winter months and usually dry in the summer.

Figure 4 shows the location of these creeks and their catchments.

The creek draining the open cut workings has been formed by the original earthmoving operations and most of its flow is from groundwater flowing from the underground workings.

Other than these two creek systems surface water flows are negligible because most of the rain rapidly permeates the dolerite talus which overlies the area. This is then discharged as groundwater to the major creeks.

A water sample was collected from the stream draining the open cut and the results are shown in Appendix B. The water is of excellent quality which reinforces the assessment of the overburden materials.

3.5.2 Groundwater

Groundwater within the Lease Area is derived from precipitation that percolates downward through the soil and rock materials. As is common in coal measure sequences, the coal seam is the main groundwater aquifer. The direction of groundwater flows will therefore follow the dip of the seam which is to the south-east.

Recharge to the aquifer generally occurs in topographically higher areas and discharge in lower areas, such as the open cut where the underground entrances are exposed and the creeks.

The water quality is reflected in the water sample discussed above, and is very good.

3.6 Vegetation

A vegetation survey was carried out over the area. The report of the survey by Dr. J.B. Kirkpatrick is included in full in Appendix C.

Three intergrading forest alliances occur at the site :

- Eucalyptus viminalis* open forest around the margins of the existing open cut.
- Eucalyptus delegatensis* open forest which covers most of the area.
- Eucalyptus brookerana* open forest to the east in the lower part of Merrywood Creek.

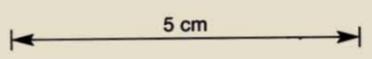
The four endemic higher plant species are all widespread and well reserved. Two of the Eucalypt alliances are well reserved while the third, *E. Brookerana* is not. However, this forest type is relatively common and in the opinion of Dr. Kirkpatrick could probably be better reserved elsewhere

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-  Catchment Boundary
-  Creek
-  Settling Dams

Scale 1:5,000



MERRYWOOD COAL MINE
HYDROLOGY AND MINE DRAINAGE **Fig. 4**

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(Appendix C).

The existing spoil piles have to a certain extent revegetated naturally being colonised by *Poa labillardieri* and *E. Viminalis*. However, cover is poor.

3.7 Archaeology

An archaeological survey did not reveal any Aboriginal sites. Furthermore, it was regarded as highly likely that any Aboriginal use of this area would have been marginal and more concentrated within the St. Pauls River valley.

The report of the survey by Mr. Richard Cosgrove is included in full in Appendix D.

4.0 MANAGEMENT PLAN.

The environmental management procedures which are proposed to minimise the impacts of the mining operation are described in this Section.

4.1 Rehabilitation

The objective of rehabilitation is to return the areas disturbed during mining to as near as practical to their original land use - native forest. This will be achieved by the replacement of the existing topsoils on the surface of the mine spoil which will be replaced to resemble the existing topography. Topsoil replacement will be supplemented by seeding if this is needed to ensure the return of a viable native forest.

4.1.1 Topsoil Handling

Provision has been made to salvage topsoil ahead of the mining operation and either stockpile or directly handle the soil to cover the surface of the recontoured spoil dumps. The depth of soil is variable, however on average a depth of 150 - 300 mm will be stripped and replaced. Wherever possible the topsoil will be handled directly and not stockpiled. This is cheaper, as it avoids double handling, and it also retains the viability of the natural seed source and reduces soil degradation which occurs in stockpiling and handling.

4.1.2 Overburden shaping

The mining method using trucks, excavators and scrapers gives the flexibility to create a final landform which is similar in contour to the existing topography. The overburden studies have shown that none of the overburden materials is likely to be deleterious to revegetation and therefore no selective handling is required.

After the final spoil surface has been graded the topsoil will be replaced. It is unlikely that the spoil will weather to a hardpan or form a crust. However, if a smooth surface is left, the spoil will be ripped to provide a key for the soil and assist in minimising soil erosion.

4.1.3 Erosion Controls

Water erosion occurs in two main ways; by raindrop splash and as gully or sheet erosion by flowing water. Raindrop splash cannot be controlled except by some surface protection such as vegetation. However, the low rainfall intensities experienced in Tasmania mean that this is not a significant problem.

Gully and sheet erosion are a function of the velocity of water flows and the cohesiveness of the soil particles, and as such can be controlled. Rapid revegetation will therefore increase cohesiveness and resistance to erosion and this is the most effective method of erosion control.

The flow velocity of surface runoff can be controlled by the slopes. Existing slopes are relatively gentle except in local areas, and the majority of slopes after mining will be similar. The commonly used structural earthworks in soil conservation - contour furrows, banks and

watways will be used if local needs dictate. This will ensure the control of surface flow and these will be integrated into the mine drainage scheme as part of the water management plan.

4.2 Water

Because of the overburden characteristics no water quality problems will arise other than an increase in sediment loads in runoff running over disturbed areas. Surface water flows are not large and can be easily controlled.

The general philosophy of the control of water on the site is as follows;

Surface Water will be diverted around the mine site so that it does not run across disturbed areas or interfere with mining operations.

Runoff resulting from rainfall on areas disturbed by mining and groundwater intercepted during mining will be directed via sediment dams to reduce sediment loads.

Spoil dumps will be restricted to the existing open cut area and its catchment to allow the collection of runoff and direction to sediment dams (see Figure 4).

The water management plan will be updated as the mining operations progress in the easterly direction.

These controls will minimise any sediment loads in the runoff from the mine area.

4.3 Dust

The mining operations themselves will not create any significant dust problem because of the remote location and the high moisture content of the overburden and coal.

The transport of coal by the unsealed road may create local dust problems.

Two properties are located near the road : Merrywood and Merryvale. The owners of these properties are aware of the project and the Company has agreed to apply sump oil to the road surface if dust proves a nuisance.

4.4 Noise

Noise from the operations will not be noticeable because of the distance from any residence and the absence of any major blasting.

Coal transport may be noticeable to residences near the road but cartage will be limited to normal working hours. The passage of trucks on the main Royal George road and onward to Fingal will not be so noticeable because of background traffic, including log trucks.

4.5 Visual

The mine will not be seen from the Royal George road and will be locally visible only from the Mt. Foster Road which carries virtually no traffic.

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The rehabilitation of disturbed areas will serve as the most effective control and in the long term render any visual impacts significant.

4.6 Fire

The possibility of fire escaping from the mine area is of concern to the Forestry Commission. A total fire ban will be enforced when fire hazards are high, and any burning off will be restricted to periods when the Forestry Commission gives its permission.

5.0 ASSESSMENT OF IMPACTS

The proposed mine is well located being remote from any residences and in an area with no "consevation interest".

In the short term, the most significant impacts will be the clearing and landform change of the mined areas. Associated with this will be increased soil erosion, dust and noise generation, and changes in water quality. However, because of the location of the mine, the characteristics of the materials to be disturbed, and the environmental management procedures to be adopted, these impacts will be minimised, and will not be significant. Mined land will be progressively returned to a native forest and will be returned to the Forestry Commission after mining is completed.

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6.0 APPENDICES

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APPENDIX ACriteria for Assessment of Results**Acid Hazard**

The acid hazard rating is based on the nature of the saturation extracts and the net acid producing potential (NAPP) calculated from the total sulphur content less the inherent neutralising capacity. NAPP is calculated as follows:

$$\text{NAPP (\%CaCO}_3\text{)} = \% \text{ S} \times 3.13 - \text{ANC (\% CaCO}_3\text{)}$$

where ANC = acid neutralising capacity

Four acid categories are determined as follows:

1. Non-acid: overburden will not generate acid leachate or acid spoil and selective disposal is not required.
2. Potentially acid: these units have the potential to become acid in the long term and may require burial or treatment.
3. Acid: generate a low concentration of acid following exposure and will continue to generate acid. Will require lime plus limestone treatment or burial.
4. Highly acid: these are the most toxic units. They generate a high concentration of acid and have the potential to generate acid for a long time. It is uneconomic and ineffective in the long term to treat this spoil with lime. The overburden must be buried.

The criteria used for the acid hazard rating are shown in table A1. All criteria in each box must be satisfied to give a 'yes' classification.

Salinity Hazard

Salts in leachates can contaminate surface and ground water and salts in the spoil prevent or restrict revegetation. The salinity ratings for using spoil as a plant growing medium (subsoil) are as follows:

Table A1 : Acid Toxicity Criteria

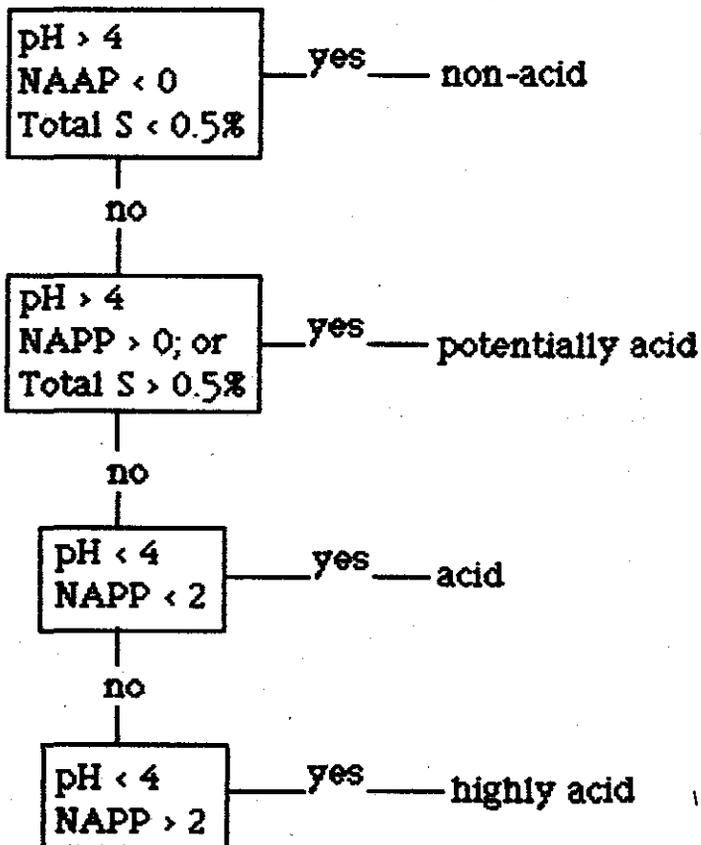


Table A2: Soil Toxicity Rating

Salinity Hazard	Electrical Conductivity Saturation Extract (mS/cm)	Effect on Plants
Low	0-2	negligible
Medium	2.1-4	sensitive plants restricted
High	4.1-8	many plants restricted
Very High	8.1-16	only tolerant plants grow
Extreme	> 16	very few plants grow

The existing surface waters have a low salinity (electrical conductivity 0.2 mS/cm) and they are NaHCO₃ type. The following criteria were used for determining the water salinity hazard.

Table A3: Water Salinity Hazard

Salinity Hazard	Electrical Conductivity Saturation Extracts (mS/cm)
Low	0-0.5
Medium	0.51-1.5
High	1.51-2.5
Very High	2.51-4.0
Extreme	> 4.0

Sodic Hazard

A high proportion of sodium ions in soil or spoil is of particular concern because of the adverse effects on clay stability and the permeability of soil. This can result in surface crusting, increased erosion, subsurface piping and collapse of spoil, and moisture stress on plants.

An estimate is made of the sodic nature of spoil by determining the sodium adsorption ratio (SAR) on saturation extracts. The SAR is defined as :

$$\text{SAR} = (\text{Na} + \text{Mg}) / \sqrt{(\text{Ca} + \text{Mg})/2}$$

where Na, Ca and Mg are in meq / l.

The criteria used for rating the sodic hazard are as follows:

Table A3 Sodic Hazard

Sodic Hazard	SAR
low	0 - 6
medium	6 - 12
high	> 12

Heavy Metal Hazard

The criteria presented in table A3 were used for assessing the heavy metal status of the total rock and the toxicity of leachates. To assess the impact of metals on receiving waters, dilution from uncontaminated runoff and attenuation by the environment must be considered.

Table A5: Heavy Metal Hazard

Element	Normal Range (ppm)		Acceptable Upper Limit(mg/l)		
	Sediments	soil	Soil solution	Drinking water	Aquatic organisms
As	7.7	1-50	.02-7.5	.05	.01
Hg	0.19	.01-.3	na	.001	.0002
Pb	19	2-200	3-20	.05	.01
Mn	770	20-3000	1-100	.2	.02
Zn	95	10-300	60-400	5.0	.03
Cu	33	2-100	.5-8	1.0	.005
Cd	.17	.01-.7	.2-9	.005	.0002
Fe	4.1%	7-55%	10-200	.3	.3
Al	7.2%	1-30%	.1-30	na	.1
B	100	1-100	1-5	5	5
Se	.42	.2-2	1-2	.01	.01

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DEPARTMENT OF MINES—TASMANIA

LAUNCESTON OFFICES
287 WELLINGTON STREET
SOUTH LAUNCESTON 7250

TELEPHONES:

Metallurgical Research }
Laboratory } 44 2431-2
Mines Inspection } (2 lines)
Explosives & Inflammable Liquids }

9th November 1984

Mr. J. Miedecke,
20 Rees Street,
LAUNCESTON

Water Analyses Reg. No 841392

Dear Sir,

Please find below results of water sample submitted to this office on the 25th Oct'84 and stated to be from Merrywood Coal Mine.

<u>Reg. No</u>	<u>841392</u>
pH	7.8
Cond. uS/cm	270
CO ₃ mg/l	Nil
HCO ₃ "	130
Cl "	10.5
SO ₄ "	27
SiO ₂ "	15.0
Ca "	25
Mg "	10.5
Fe "	<0.1
Al "	<0.2
K "	2.0
Na "	12.0
TDS "	180
Hardness Perm	Nil
Hardness Temp	105
Alk. as CaCO ₃	105

Date 25.10.84

Locality Merrywood Coal Mine

Analyses by. *A. D. ...*

H. K. Wellington

(H. K. Wellington)
Chief Chemist & Metallurgist

Fee Paid

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THE VEGETATION AT THE MERRYWOOD COAL MINE SITE, ST PAULS RIVER
VALLEY, EASTERN TASMANIA

J.B. KIRKPATRICK

GEOGRAPHY DEPARTMENT, UNIVERSITY OF TASMANIA

INTRODUCTION

The Merrywood coal mine closed down in 1962 for economic reasons, but with the recent resurgence of the market for Tasmanian black coal has become an attractive prospect for reopening. Approximately 40 ha of eucalypt forest would be cleared to allow the open cut mining of the remainder of the accessible coal. This report briefly describes the vegetation and higher plant flora of this site, assesses its conservation significance and discusses appropriate rehabilitation procedures.

THE VEGETATION

Three intergrading forest alliances occur at the site. *Eucalyptus viminalis* open-forest occurs around the margins of the open cut mine. The subordinate strata in this community consist of a two to four m tall open-scrub layer in which *Acacia dealbata* is prominent and a ground layer dominated by the tussock grass *Poa labillardieri*. Most of the site is occupied by *Eucalyptus delegatensis* open forest in which *E. dalrympleana* is subordinate in the dominant stratum. A three to five metre tall closed-scrub dominated by *Bedfordia salicina* or *Olearia lirata* occurs beneath the trees. The lower part of the gully to the east of the site is occupied by *Eucalyptus brookerana* open-forest with a 4-8 m tall understorey

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dominated by *Pomaderris apetala*. A sparse intermediate stratum is formed by occasional individuals of *Acacia melanoxylon*.

Outside the forest there are a few small artificially created wetlands in which *Typha* dominates reed swamp and *Juncus* spp. dominate sedgeland. There are also extensive areas of waste from the previous mining operations that have been recolonized by a thirty to seventy percent cover of *Poa labillardieri* with 1-3 m tall, highly twisted individuals of *Eucalyptus viminalis* being local in those areas close to forest.

THE CONSERVATION STATUS OF THE HIGHER PLANT SPECIES AND THE VEGETATION TYPES

The four endemic higher plant species are all widespread (Kirkpatrick and Brown 1984) and well-reserved (Brown et al. 1983). The non-endemic native plant taxa are also all thought to be adequately reserved in Tasmania (Duncan, personal communication).

The vegetation of the study site has been disturbed by past mining activity, cattle grazing and selective logging. Ten percent of the plant species found within the forest have been introduced to Tasmania since European settlement. *Eucalyptus viminalis* open-forest and *E. delegatensis* open-forest are adequately reserved while *E. brookerana* open-forest may not be adequately reserved. This latter forest type occurs throughout the eastern highlands of Tasmania (e.g. Duncan et al. 1981; Kirkpatrick et al. 1980), and is probably best reserved elsewhere than the disturbed environment of Merrywood.

REHABILITATION AFTER MINING

Revegetation by *Poa labillardieri* or wetland species has occurred after the previous mining operation, but is sparse in cover and poor in

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species. The lack of re-establishment of complete native plant cover could be remedied in future operations by the transport of topsoil from those areas about to be mined to those areas from which coal had recently been removed. Some taxa, such as the eucalypts, will require artificial sowing with the use of this method, but most species would establish from seed stored in the topsoil or from wind-dispersed disseminules.

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027

TAXA OBSERVED AT THE MERRYWOOD OPEN CUT

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COAL MINE SITE OCTOBER 1984

PTERIDOPHYTA

ASPIDIACEAE

Polystichum proliferum

ASPLENIACEAE

Asplenium flabellifolium

BLECHNACEAE

Blechnum nudum

Blechnum wattsii

DENNSTAEDTIACEAE

Pteridium esculentum

DICKSONIACEAE

Dicksonia antarctica

ANGIOSPERMAE

MONOCOTYLEDONEAE

CYPERACEAE

Carex appressa

Gahnia grandis

Scirpus sp.

GRAMINEAE

Agrostis avenacea

Agrostis parviflora

+ *Aira* sp.

Danthonia sp. 1

Danthonia sp. 2

Festuca plebeia

Poa labillardieri

JUNCACEAE

Juncus sp. 1

Juncus sp. 2

Juncus sp. 3

Luzula sp.

LILIACEAE

- Dianella tasmanica*
- Drymophila cyanocarpa*
- Lomandra longifolia*

ORCHIDACEAE

- Caladenia carnea*
- Chiloglottis gunnii*
- Corybas dilatatus*
- Pterostylis* sp.

TYPHACEAE

- +? *Typha* sp.

DICOTYLEDONES

CAMPANULACEAE

- Wahlenbergia* sp.

CARYOPHYLLACEAE

- + *Cerastium glomeratum*

COMPOSITAE

- Bedfordia salicina* E
- Cassinia aculeata*
- + *Cirsium vulgare*
- Gnaphalium collinum*
- Helichrysum rosmarinifolium*
- Helichrysum scorpioides*
- + *Hypochaeris radicata*
- Lagenophora stipitata*
- Olearia argophylla*
- Olearia lirata*
- Olearia viscosa*
- Senecio linearifolius*
- + *Taraxacum officinale*

EUPHORBIACEAE

- Poranthera microphylla*

GERANIACEAE

- Geranium potentilloides*
- Geranium sessiliflorum*

HYPERICACEAE

- Hypericum gramineum*

LABIATAE

- Ajuga australis*
- Prostanthera lasianthos*

LEGUMINOSAE

- Acacia dealbata*
- Acacia melanoxylon*
- Acacia mucronata*
- Indigofera australis*
- Pultenaea juniperina*
- + *Trifolium* sp.
- + *Ulex europaeus*

MYRTACEAE

- Callistemon pallidus*
- Eucalyptus amygdalina* E
- Eucalyptus brookerana*
- Eucalyptus dalrympleana*
- Eucalyptus delegatensis*
- Eucalyptus viminalis*

OLEACEAE

- Notelaea ligustrina*

ONAGRACEAE

- Epilobium* sp.

OXALIDACEAE

- Oxalis corniculata*

PLANTAGINACEAE

- Plantago varia*

PITTOSPORACEAE

- Pittosporum bicolor*

POLYGALACEAE

Comesperma volubile

PROTEACEAE

Lomatia tinctoria E

RANUNCULACEAE

*Clematis aristata**Ranunculus* sp.

RHAMNACEAE

Pomaderris apetala

ROSACEAE

Acaena novae-zelandiae

RUBIACEAE

*Coprosma quadrifida**Galium albescens* E

SANTALACEAE

*Exocarpos cupressiformis**Leptomeria drupacea*

SCROPHULARIACEAE

Veronica calycina

THYMELACEAE

Pimelea drupacea

UMBELLIFERAE

Hydrocotyle javanica

VIOLACEAE

Viola hederacea

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031

**AN ARCHAEOLOGICAL SURVEY OF THE
MERRYWOOD MINE AREA, EASTERN TASMANIA**

FOR JOHN MEDECKE AND PARTNERS

by

RICHARD COSGROVE

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1. INTRODUCTION

The consultant was required to undertake an archaeological field survey of the Merrywood Mine area for John Miedecke and Partners. It is located about eight kilometres north-east of Royal George and covers an area of approximately 40 hectares (Figure 1). Previous open cut coal mining operations have exposed a large pit adjacent to the Mt. Foster Road and the study area. The position of the proposed mining operations is shown in Figure 2. A map of the exact mine area was made available by John Miedecke and Partners. The exact perimeter of the proposed mining operations as marked in the field by survey pegs and a bulldozed track. Several more tracks criss-crossed the study area and costean pits had been cut in two locations within the proposed mine.

The field team consisted of Richard Cosgrove, who was accompanied by Dr. Jamie Kirkpatrick (Geography Department, University of Tasmania) and Mr. John Miedecke (Environmental Consultant). The study was carried out over a one day period on the 25th October 1984.

2. ENVIRONMENTAL SETTING

The mine is located in an area of moderate to steep terrain of dolerite geology. The site is at present covered with *Eucalyptus* woodland with a dense understorey of scrub. Unlike areas to the north of the Fingal Valley, this area has not been included in the land systems of region 4 (Pinkard 1980).

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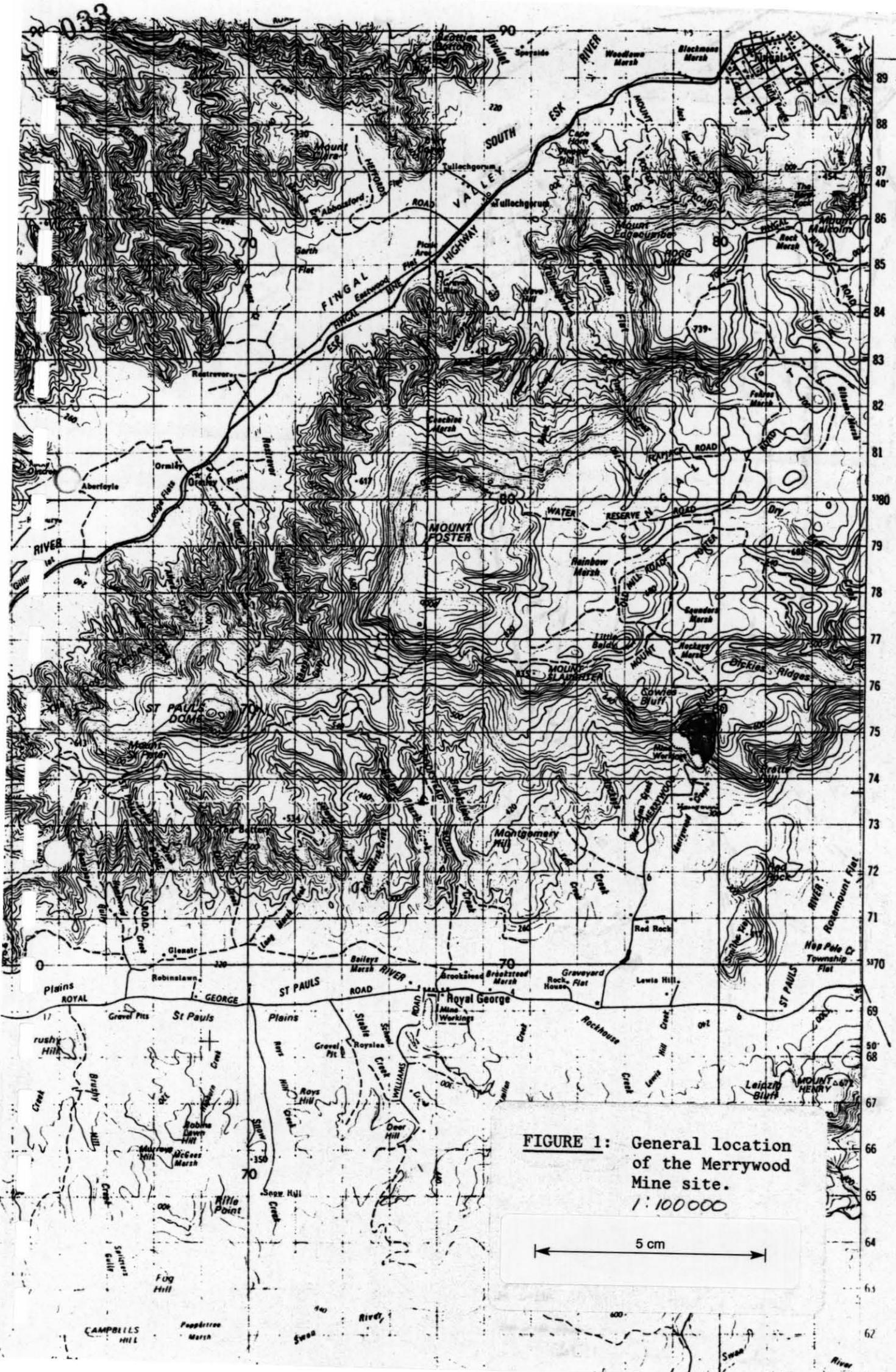


FIGURE 1: General location of the Merrywood Mine site.
1:100 000

5 cm

SWANSEA 41 km

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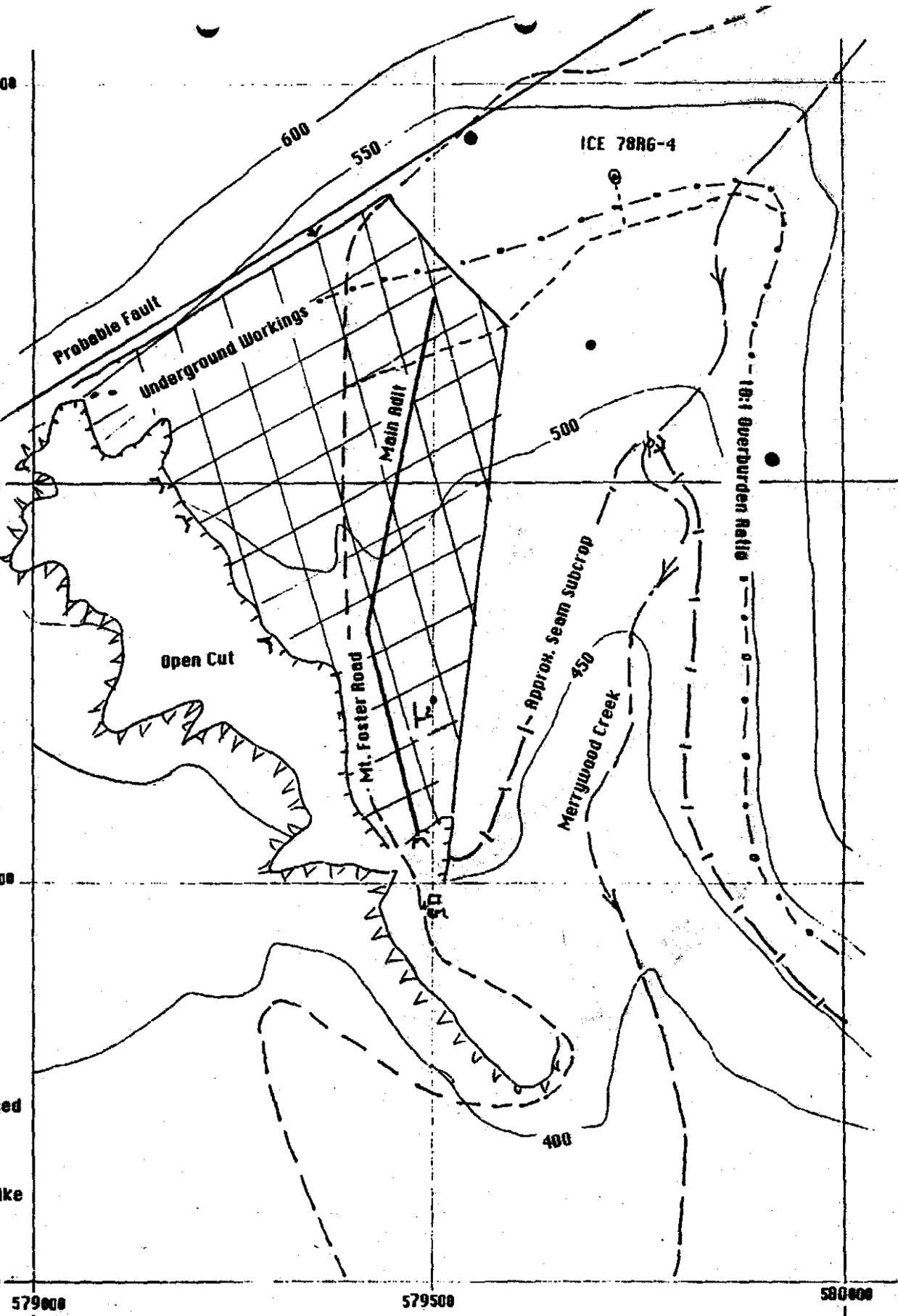
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- Drill Hole
- Drill Hole - proposed
- Adit
- ▬ Seam dip and strike

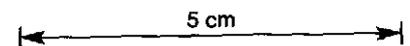
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STUDY AREA

Scale 1:5,000



E.L. 21/02
MERRYWOOD MINE AREA

FIG. 1

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3. ASSESSMENT PROCEDURES

Upon field inspection it became apparent that the whole area was covered in dense bush and it was felt that inspection of the entire mine area was not warranted (Figure 3). This was because conditions of surface visibility were so bad that it was unlikely that archaeological sites could be detected even if present.

More promising exposures were found along the bulldozed tracks (Figures 4 and 5) and within costean pits (Figure 6). These tracks and exposed areas were surveyed closely, especially where the tracks and pits cut deeply into the earth exposing good soil sections. Both the Mt. Foster Road and the old eroded spoil heap on the west side of the road were inspected for Aboriginal relics.

These surveys provided a basis for assessing the likely impact on archaeological sites that removal of overburden and coal extraction would have.

4. FIELDWORK AND RESULTS

Field reconnaissance was carried out along all exposed sections and the specific areas walked are outlined in pink on Figure 2.

No Aboriginal sites were located.

A number of variables must be considered when assessing the effectiveness of the field strategy in detecting archaeological sites.

1. Surface visibility was good along all exposed sections of track. Here the top soil had been removed and any large scatters of Aboriginal artefacts would not have been difficult to detect.

2. It is highly likely that Aboriginal use of this steep terrain would have been marginal and more concentrated within the St. Pauls River valley. Although there is ample evidence to show that Aboriginals utilised forested environments, (Plomley 1966: 117, 118, 119, 204, 217, 368, 369, 372, 374, 375, 376, 377, 378, 383, 398) many of the larger archaeological sites are located at the interface of forests and more open tracks of land (Cosgrove 1984).

5. ASSESSMENT AND RECOMMENDATIONS

On the basis of the field inspection, it is unlikely the Aboriginal sites occur within the mine area. It is recommended that, provided the mining operations are confined to the area marked out in Figure 2, the Merrywood Mine be allowed to proceed without further archaeological investigations.

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