



EIS 1020 Vol 1

AB019772

Mitchells Flat coal mine : environmental impact statement

NSW DEPT PRIMARY INDUSTRIES

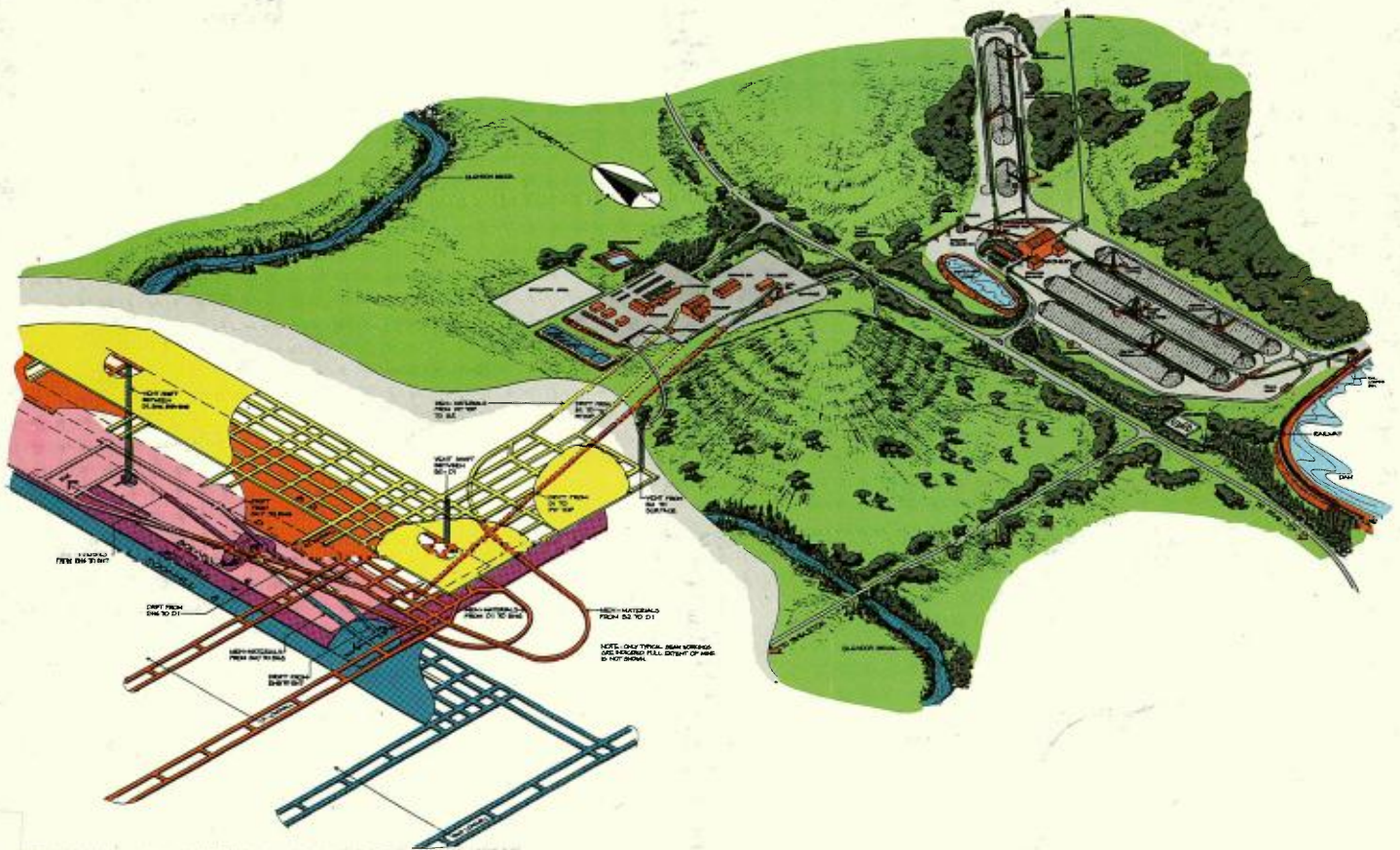


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MITCHELLS FLAT COAL COMPANY PTY LTD

MITCHELLS FLAT COAL MINE Environmental Impact Statement

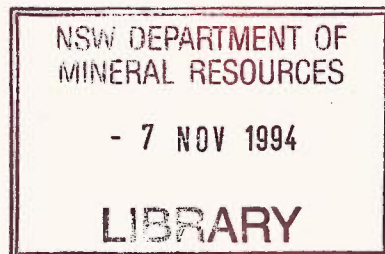


EIS 1020

MITCHELL McCOTTER

MITCHELLS FLAT
COAL MINE

Environmental Impact
Statement



MITCHELLS FLAT
COAL COMPANY PTY LTD

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MITCHELL McCOTTER
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SPIT JUNCTION. N.S.W. 2088

FORM 4

ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979

(SECTION 77 (3) (d))

ENVIRONMENTAL IMPACT STATEMENT

This Statement has been prepared by or on behalf of MITCHELLS FLAT COAL COMPANY PTY LIMITED being the applicant making the development application referred to below.

The Statement accompanies the development application made in respect of the development described as follows:

ESTABLISHMENT OF AN UNDERGROUND COAL MINE AT MITCHELLS FLAT WITH ASSOCIATED SURFACE FACILITIES COAL HANDLING AND PREPARATION PLANT REFUGE DISPOSAL AND TRANSPORT INFRASTRUCTURE

The development application relates to the land described as follows:

No. Street.

Locality/Suburb

Property Real description SEE ENVIRONMENTAL IMPACT STATEMENT NOT GOOD ENOUGH!

(e.g. Lot, D.P./M.P.S., Vol./Fol., Parish, Portion)

The contents of this statement, as required by Clause 34 of the Environmental Planning and Assessment Regulation, 1980, are set forth in the accompanying pages.

Name, Qualifications and Address of person ROBERT FRANK McCOTTER

who prepared Environmental Impact Statement BE (HONS), DIPBDGSCI, FIE AUST 66 SPIT ROAD, SPIT JUNCTION NSW 2088

Certificate

I, ROBERT FRANK McCOTTER of MITCHELL McCOTTER AND ASSOCIATES PTY LTD

hereby certify that I have prepared the contents of this Statement in accordance with Clauses 34 and 35 of the Environment Planning and Assessment Regulation, 1980.

R.F. m. c. o. t. t. e. r.

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1.0 INTRODUCTION

1.1 THE PROJECT

Mitchells Flat Coal Company Pty Limited is seeking development consent to establish a new underground coal mine north of Branxton in the Hunter Valley of New South Wales. A plan showing the location of the proposal is given in Figure 1. The mine is planned to ultimately produce 2.4 million tonnes of saleable coal per year which will be exported to the Company's overseas customers.

Major elements of the project include a new underground mine with associated surface facilities, coal handling equipment and a coal preparation plant. Existing road infrastructure and a coal loading facility at Branxton will require upgrading. During the second stage of the project, a rail spur line will be constructed to the site.

1.2 THE SITE

The project site is about 15 kilometres northwest of Branxton and 12 kilometres northeast of Singleton. It includes Authorisations to Prospect Nos. 17 and 212. The Company, or interests associated with it, have purchased land for some elements of the mine. Contracts for purchase have been obtained for most of the remaining land required for the development. Purchase negotiations are well advanced for the final land parcel.

1.3 HISTORY OF THE DEVELOPMENT

Site exploration of the area was commenced by the Joint Coal Board in 1948. In 1975, Barix Pty Limited commenced an extensive drilling and exploration programme. This progressively confirmed coal reserves and coal quality parameters. Environmental investigations began in 1980 and the site has been assessed through a series of base line monitoring programmes. Detailed scientific investigations of the site and its surrounding ecology have therefore proceeded for almost nine years.

1.4 THE DEVELOPMENT APPROVAL PROCESS

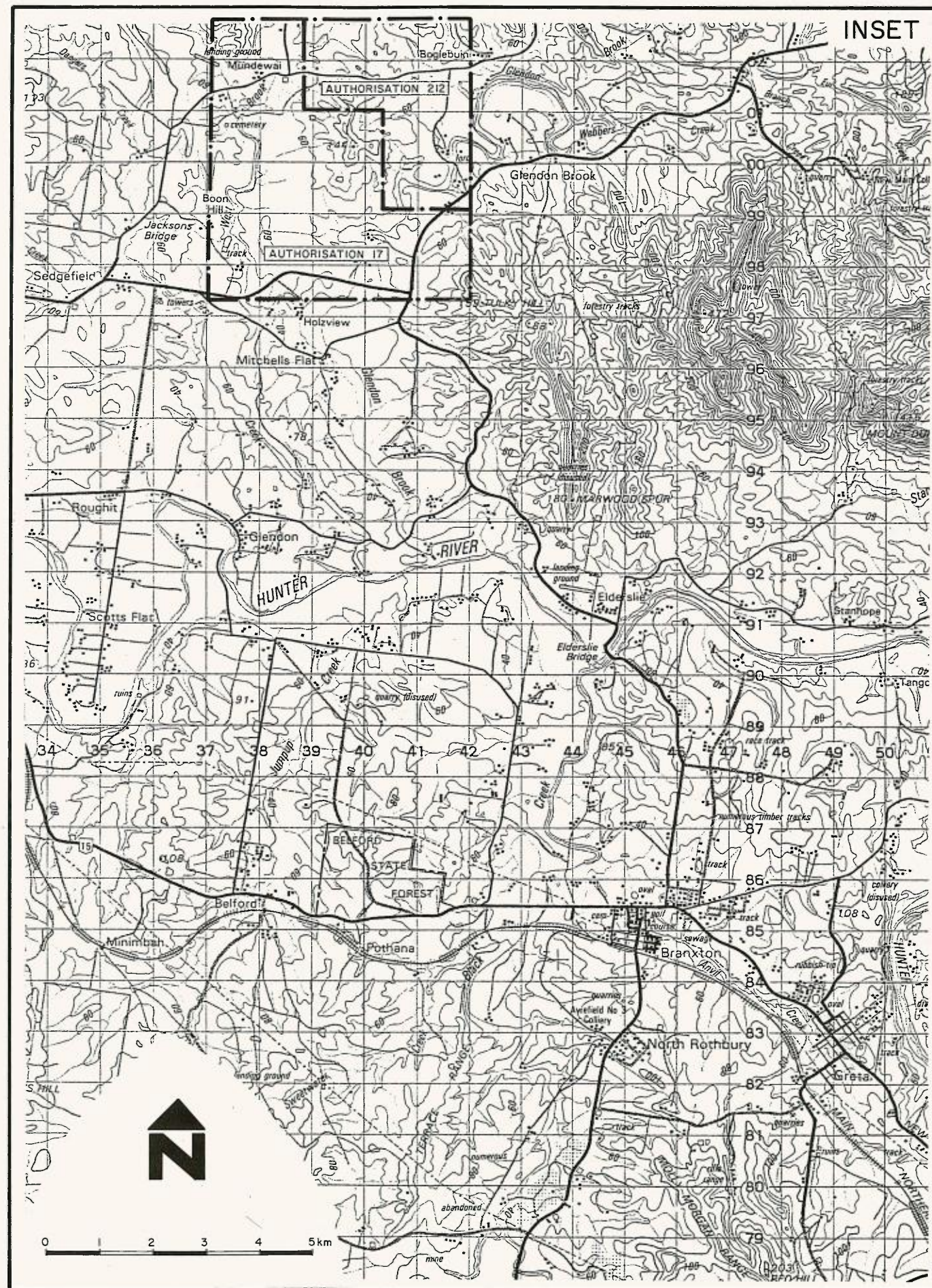
1.4.1 Authorities Involved

Before commencing a coal mine, a proponent company requires a variety of consents from Local, State and Federal Governments. Each Authority responds to concerns in its own area of statutory responsibility. Between 35 and 40 Authorities have interests in particular aspects of the development. These include the Department of Planning, Joint Coal Board, Department of Minerals and Energy and the State Pollution Control Commission. To facilitate coordination amongst the Authorities, a series of "Planning Focus" consultation meetings were held. These provided a comprehensive range of public sector inputs to the planning of the project.

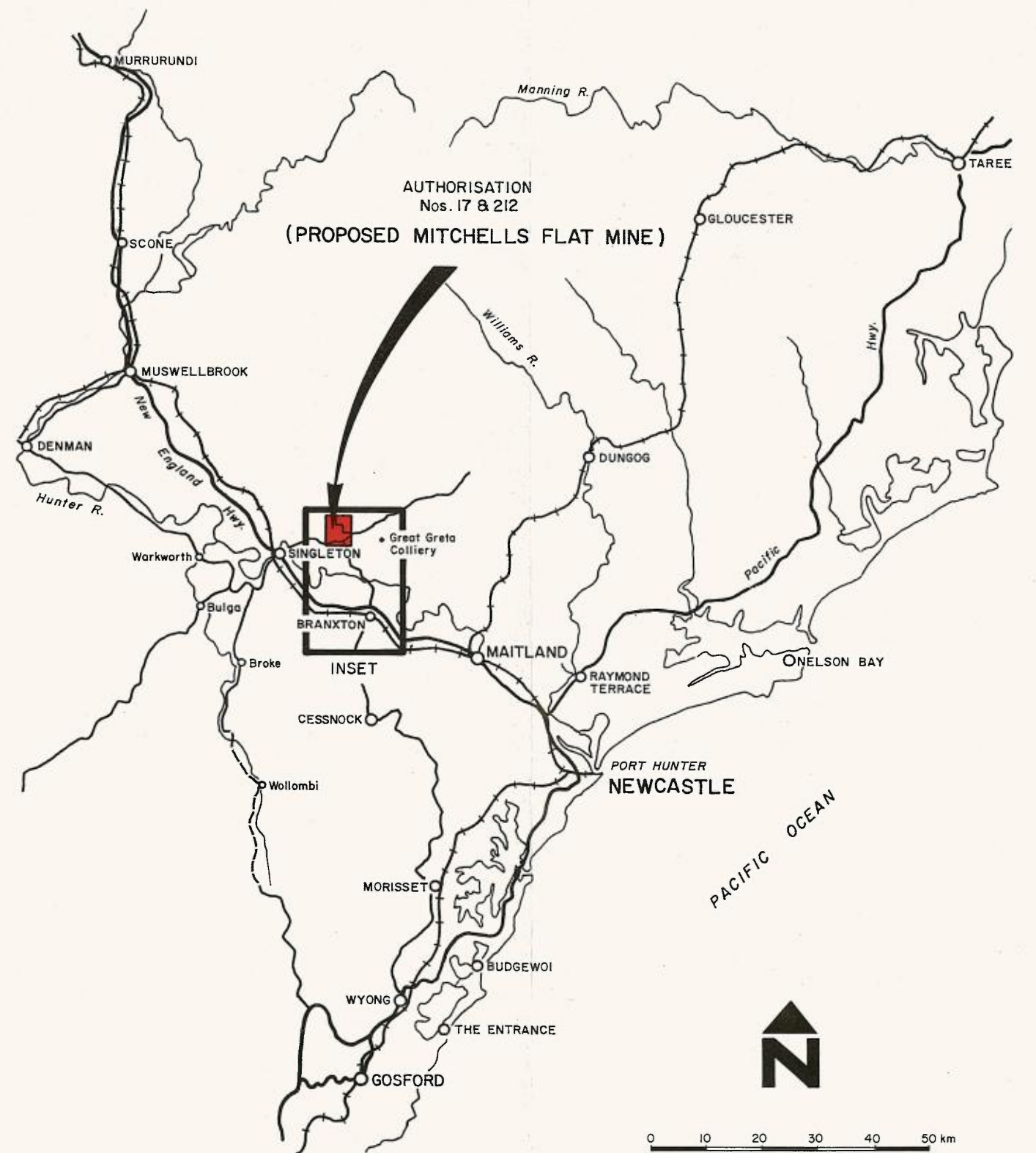
1.4.2 Function of an Environmental Impact Statement

An Environmental Impact Statement (EIS) is prepared as part of a Development Application under the Environmental Planning and Assessment Act, 1979. Certain major coal projects are subject to a Section 101 directive under the Act, empowering the Minister of Planning to determine the development application. Requirements on the form and content of the EIS were sought from the Director of the Department. The Director's response is reproduced in Appendix 1.

An EIS describes a project and outlines the physical, biological and social setting of the proposal. Safeguards to minimise environmental consequences are set out and residual impacts are assessed. Project alternatives are given and the consequences of not proceeding with the development are described.



Note : All values in metres above
Australian Height Datum



LOCALITY MAP

FIGURE 1

Since 1980, the environmental planning process has matured as a formalised process for interaction between a developer and the community. It provides a single communication document between a proponent and the Government, statutory authorities, interest groups and the general public. At a technical level it details the interchange between mine planners and environmental specialists. However, of greater importance, it provides a permanent and public record of undertakings given by proponents on matters relating to the environment.

1.4.3 Project Assessment

An important aim of EIS's is to involve the general public in the decision making process. Publication of the present EIS culminates several years of consultation with public leaders, Government Authorities and property owners. However it is never possible to consult directly with all those potentially interested. Public exhibition of the EIS allows people to provide comments and opinions of assistance to the Government and the proponent. The EIS is placed on display and comments invited from all interested parties. The Development Application will finally be determined by the Minister of Planning.

1.5 STRUCTURE OF THE ENVIRONMENTAL IMPACT STATEMENT

The Mitchells Flat project has benefited from the inputs of a range of environmental professionals. It addresses a wide audience from technical specialists, through special interest groups to individual members of the community. The present summary volume sets out the main aspects of the proposal including its context, setting, safeguards and predicted impacts. More detailed investigations are given in fifteen studies in a supplementary volume. These provide the findings of individual specialists and are mainly directed to those requiring a more complete understanding of the project.

The Environmental Impact Statement was prepared by Mitchell McCotter and Associates Pty Limited, assisted by specialists in a number of environmental disciplines. Details of the study team are given in Appendix 2.

2.0 THE COMPANY

Mitchells Flat Coal Company Pty Limited is associated with the FAI Mining Group. The Company was formed to manage the assets of the project and to operate the mine and associated infrastructure. FAI Mining Ltd is the principal resources development division of FAI Insurance Ltd.

The group's Australian coal activities include, Lambton, Teralba and West Wallsend No.2 Collieries in the Newcastle district, Great Greta Colliery in the Upper Hunter Valley and Rhondda Collieries in Queensland. The Company is also a joint venture partner in the Westfalen and Box Flat Colliery Holdings near Ipswich Queensland.

The FAI Insurance Group was founded in 1960 by the late Mr. Larry Adler, and has, since then, developed into a major force in the Australian general insurance market.

FAI is the largest Australasian general insurer with operating revenue of \$2.2 billion per year, total assets of \$3.2 billion and share holders funds of \$537 million. *

The Group operates in Australia and New Zealand employing over 3100 people in activities encompassing insurance, stockbroking, property development, general finance and resource development.

* Source: FAI Mining Ltd. Annual Report June 30th 1989.

3.0 EXISTING ENVIRONMENT

3.1 GEOGRAPHY

The proposed mine site is located on flat to undulating country about 15 kilometres northwest of Branxton and 12 kilometres northeast of Singleton, as shown in Figure 1. Surface gradients vary between 1 and 5°, with steeper slopes around Killyfuddy and Tulky Hill areas. An aerial photograph of the site is given in Figure 2.

Average annual rainfall is 720 millimetres and mean evaporation is estimated at 1795 millimetres per year. Rainfall is summer dominant and is exceeded by average evaporation in all months of the year. There is a strong regional wind pattern of northwesterly winds during winter and southeasterly winds in summer.

The site is drained by West Brook and Glendon Brook. These two meandering streams join near the village of Mitchells Flat and flow south to the Hunter River. Instantaneous river flows are highly variable, and sections of the site are flood prone from tributary inundation and from backwater flooding during extreme events in the Hunter River. Water quality is moderate to good, with West Brook being more saline than Glendon Brook. Groundwater from deep aquifers is highly saline, though shallow aquifers in recent alluvials bordering the main watercourses provide good quality water.

3.2 GEOLOGY

3.2.1 Site Geology

The deposit lies within the Wittingham Coal Measures, part of the Upper Permian sediments of the Singleton Super-Group. It is structurally isolated from the remainder of the Hunter Valley Measures by the Hunter Thrust to the north and east, and the West Brook fault to the west. Exploration drilling has located eight coal seams in two zones. Extraction is proposed in the flat lying zone at the centre of the site. The coal seams outcrop to the west in a steeply dipping zone.

3.2.2 Coal Geology

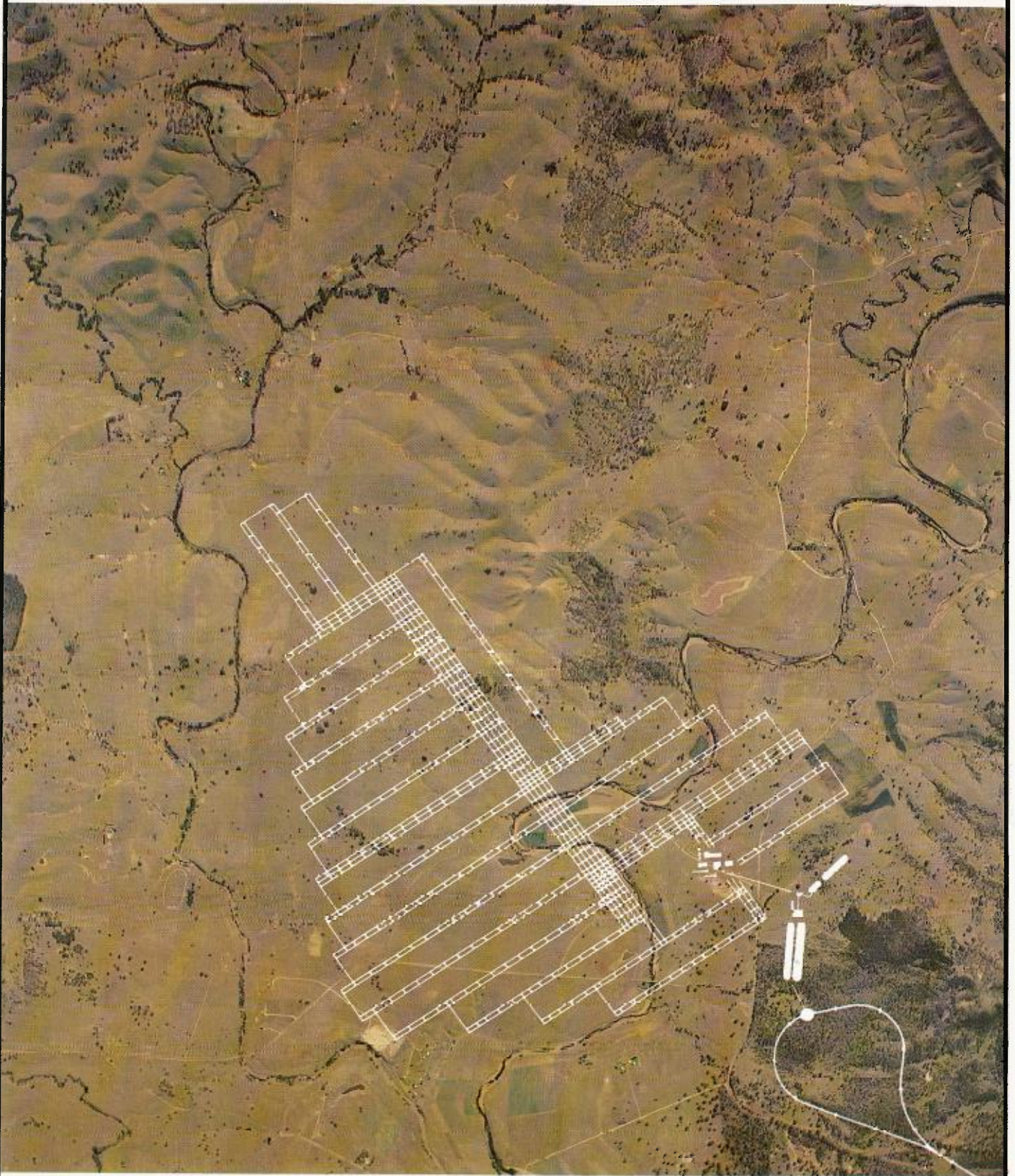
Total in-situ coal resources at Mitchells Flat are estimated to be 276.3 million tonnes, and total in-situ mineable reserves are 145.2 million tonnes. The mine will be able to produce steaming coal and soft coking coal.

3.2.3 Soils

A detailed soils survey was carried out on land affected by mining or associated infrastructure. Boundaries between soil types were delineated from maps and aerial photographs and then confirmed by site inspection. A series of test pits were sunk and soil samples logged and field tested.

The site is overlain by yellow, brown and red podzolic soils. Topsoil will mainly be required to rehabilitate coal refuse emplacements. Suitable material is not abundant, due to a lack of soil structure, shallow depths, restricted drainage or high percentages of gravel.

A rural land capability assessment was undertaken to determine the highest agricultural use to which the existing land could be put and to anticipate what soil conservation measures would be required to minimise erosion. Most of the site is Class IV and V grazing land, with some Class II near Glendon Brook and pockets of Class VI around Killyfuddy and Tulky Hills.



**AERIAL PHOTO
OF SITE**

FIGURE 2

3.2.4 Coal Reject Geochemistry

Saturated leachate testing of coal rejects was carried out to identify any potentially toxic material which could inhibit rehabilitation. It was found that compared with other Wittingham Measure rejects, Mitchells Flat is less acidic and sodic, with relatively low sulphur and average total salinity concentrations. Selective placement of refuse will not be required and rehabilitation should not be difficult. Surface runoff is likely to be low in salinity while reject leachate will be of similar quality to groundwater.

3.3 ECOLOGY

Three ecological surveys of the site were performed between 1981 and 1988. Most areas have been cleared or highly disturbed by earlier agricultural activities. Remaining vegetation is similar to surrounding communities and is regenerating in areas not being grazed. No plants of particular significance were found, though examples of common Maiden Hair Fern were identified and the finding of *Brachycome rigidula* extends its geographic range. The Grey Crowned Babbler (*Pomatostomus temporalis*) was sighted, whilst the possibility that Koalas once used the area was suggested.

3.4 AIR QUALITY

Existing air quality has been monitored since March 1981 in a series of baseline programmes. It was found that when measured in accordance with current Australian standards, annual average monthly dust deposition is less than 1 gram/square metre/month. This is consistent with other regions in the Hunter Valley. Between half and two thirds of this material is inorganic in composition.

3.5 WATER QUALITY

Water quality data are available from June 1980. Individual results are strongly dependent on location and volumetric flows. Watercourses are slightly alkaline and non turbid, except during floods. West Brook is about thirty per cent more saline than Glendon Brook, with median conductivities of 1080 and 850 microsiemens/centimetre respectively. There is a slight trend for salinity to increase in a downstream direction.

3.6 BACKGROUND NOISE

Daytime background noise levels range from 29 to 38 dB(A) along Elderslie Road, increasing to 48 dB(A) on the New England Highway. Existing daytime L₁₀ values vary from 40 to 62 dB(A) along Elderslie Road and from 58 to 78 dB(A) on the Highway. Noise sources include vehicular traffic, insects and farm machinery. At night, background noise away from the Highway is higher than during the day. This apparent anomaly is due to noise from frogs and crickets.

3.7 TRANSPORT INFRASTRUCTURE

The region is well served with transport infrastructure, including the New England Highway and Main Northern Railway. There are existing rail loading facilities at Branxton which provide a linkage to the three export coal loaders at the Port of Newcastle. The proposed mine site is about 15 kilometres away from the nearest railway at Branxton. Access is available via Elderslie Road, a two lane sealed rural road. This route is presently being used to carry product coal from Great Greta Mine to Branxton. Road conditions are variable. Some sections are narrow with poor horizontal or vertical alignments and defective road pavement. There are also three narrow bridges at Mitchells Flat, Brinkburn Creek and the Hunter River.

The most recent traffic counts indicate a daily volume on Elderslie Road ranging from 353 to 787 vehicle movements per day. Peak hours are not well defined and are distributed throughout the day, depending on location.

Thirty four traffic accidents were recorded in the five years 1982-86 inclusive between Mitchells Flat and Branxton Coal Loader. Twenty of these accidents occurred on the New England Highway and a further nine took place between the Highway and Elderslie Bridge. Accident frequency corresponded with traffic volume, but not road conditions, suggesting that drivers are aware of the limitations imposed by road geometry. Accident rates were analysed statistically and found to be well below corresponding state averages. None of the accidents appeared to involve coal trucks.

Finally, road capacity or the volume of traffic that can be carried by a road at a given level of service was calculated. It was found that the present road provides an intermediate level of service (Level C), which is mainly dictated by the geometric standard of the carriageway.

3.8 ABORIGINAL AND EUROPEAN HERITAGE

3.8.1 Aboriginal Heritage

Archaeological surveys of Tulky Hill and a small area near West Brook were carried out. A site consisting of a single scatter of stone artefacts was located on Tulky Hill and a further isolated artefact was also recorded. Further expert archaeological advice was received on the upper reaches of the rejects emplacement sites. It was determined in consultation with the National Parks and Wildlife Service that the development should not be objected to on archaeological grounds.

3.8.2 European Heritage

The area around Singleton was first settled between 1820 and 1835. Sheep and cattle grazing with some cropping were the main agricultural pursuits. Small scale coal production commenced in about 1850, though the most significant expansion in mining has occurred over the last twenty years.

The National Trust identified ten items of heritage significance in the vicinity of the coal authorisation areas or the proposed transport corridors. Seven of these were buildings or structures in Branxton. The other items were:

- . the Graham Family Cemetery at West Brook, Sedgefield;
- . Kirkton Winery and Vineyard, Lower Belford; and
- . Elderslie Bridge over the Hunter River at Elderslie.

3.9 LAND USE AND PLANNING

3.9.1 Current Land Use

The major land use in the vicinity of the site is grazing, including beef cattle, dairying and some horses. Cultivation, mainly for stock crops, occurs along the floodplains of West and Glendon Brooks. Non agricultural land uses included quarrying and an electricity sub-station.

Further south along Elderslie Road the main land use is grazing. Other uses including hobby farming, poultry production, forestry and orcharding. Non agricultural land uses are native bushland, residential development and a private landing field.

There are forty nine dwellings along Elderslie Road between the mine and Branxton. These were contacted in a house to house survey as part of the environmental investigations. Most had lived at their present address for between five and ten years, and about half were families with school age children.

3.9.2 Land Use Planning

The proposal is broadly compatible with all relevant Regional Environmental Planning Policies. Statutory planning controls are supplied under the Singleton Planning Scheme Ordinance, 1961. The site and surroundings are zoned either Non-urban 1(a) or 1(b), under which the proposal is permissible with the consent of Council. However, as it is subject to a Section 101 Direction under the Environmental Planning and Assessment Act, the Minister for Planning will determine the development application.

3.10 REGIONAL EMPLOYMENT PATTERNS

A steady population growth occurred in the Upper Hunter Valley throughout the 1980's, mainly associated with an expansion in coal mining. Statistically, the current population is younger than the State average, and residents of Muswellbrook and Singleton have almost three times the New South Wales average proportion of high income earners. The most important employment sectors are wholesale/retail, followed by mining, community services and manufacturing.

Substantial changes have recently taken place in employment patterns within the coal mining industry. In the early years of the present decade, there was a significant shortage of skilled miners and a measure of labour competition occurred with other employment sectors. However, the current strength of the Australian dollar and the highly competitive nature of international coal markets have led to widespread mine closures and rationalisations in the industry. This has particularly impacted on older underground mines concentrated in the Newcastle and Lower Hunter areas. Employment data indicate that up to 1,200 miners have been retrenched or are facing retrenchment in the Lower Hunter, and about 660 workers have been displaced in the Upper Hunter.

There are large numbers employed in industries related to mining which form an additional potential labour pool. These include relevant tradesmen, plant and machinery operators and labourers. Finally, workers will be drawn from the unemployed and will be retrained to the specialist needs of the industry. Census information shows that the possible labour pool in these two categories would be almost 100,000 people.

3.11 ECONOMIC STRUCTURE

The Hunter Region is characterised by a strong dependence in mining, which provides over four times the State's average share of employment. Utilities are important, especially the production of electricity and there is a strong manufacturing base. This is compensated by less than average levels of employment in agriculture, wholesale/retail, communications, business and finance. Agriculture and manufacturing are declining in favour of tertiary industries, though manufacturing remains a major regional economic activity.

Between 1981 and 1987, coal production in the local area increased by 93 per cent with the commissioning of major export mines. This flowed through to other sectors of the economy, such as building and construction. Manufacturing is not a strong activity in the local area and there has been a steady increase in tourism.

4.0 THE PROPOSAL

4.1 OVERVIEW

The Company is seeking development consent for the establishment of a modern underground coal mine at Mitchells Flat. Major elements of the proposal are shown on Figure 3. Coal from a series of underground seams will be extracted by underground longwall mining technology. Entry to the coal reserves will be made by a series of tunnels located to the west of Gresford Road. Pithead facilities will be developed adjacent to the entry drifts and will consist of employee amenities, workshops and an administrative centre.

Raw coal will be conveyed from the underground mine to a breaker station on the eastern side of Gresford Road. Crushed coal will be stockpiled and washed in a nearby coal preparation plant. It will subsequently be stored in a series of product stockpiles before being transported to Newcastle for export. During the initial phases of mining, a dual transport system will be used involving road and rail haulage. When a second longwall unit is introduced, a branch line will be constructed from the Main Northern Railway and all production will be rail hauled from site.

During the first stage of development, the mine will produce approximately 1.6 million tonnes of raw coal per annum, yielding just over 1.2 million tonnes of product coal. With the introduction of a second longwall, raw coal output will be boosted to 3 million tonnes per annum, providing about 2.4 million tonnes of saleable coal. A range of product coals will be produced from steaming coal to soft coking blends. The mine's output will be directed to export customers, particularly in the Asia/Pacific region.

4.2. THE MINE

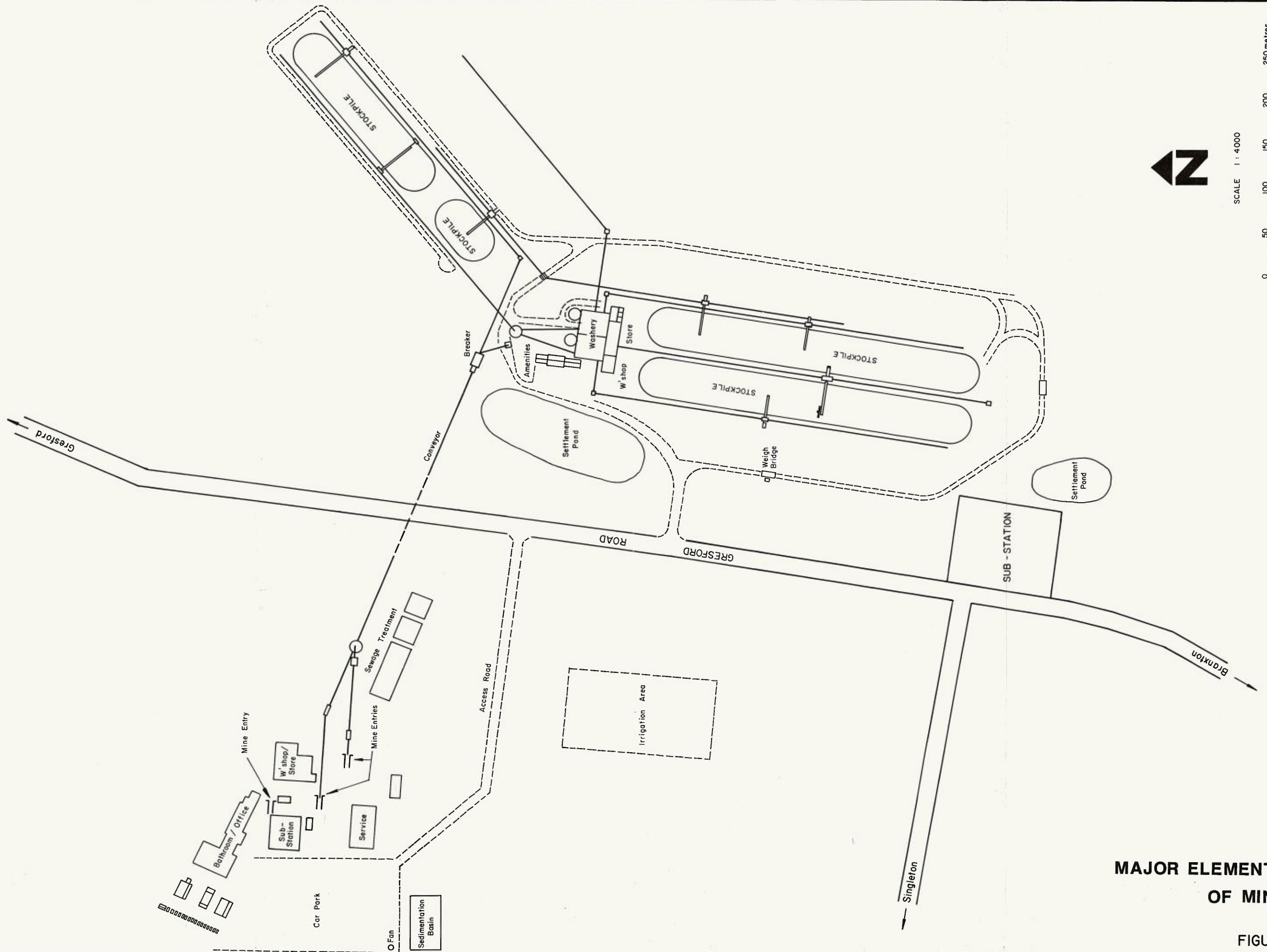
4.2.1 Market Setting

One of the first issues is why there is a need for another new coal mine in the Hunter Valley, particularly an underground mine. Market conditions for export coal sales are difficult, with strong international competition. Australia has never produced and exported more coal, nor received more in dollar value for its export earnings. However, the return to coal producers per tonne of coal has declined. To survive in the current climate, the industry has been forced to restructure and rationalise its operations. New mining technology has been introduced and the output per manshift has steadily improved. There has also been a trend in favour of opencut mining for new developments. However, not all reserves can be extracted by opencut means. Underground mines can compete, but only using modern, high capacity mining techniques. Mining conditions are not always suitable to allow the introduction of new techniques into existing operations. It can very often be more appropriate to start a mine from scratch than to seek to adapt existing developments and infrastructure.

It has been claimed that there is significant under utilized production capacity in the Hunter and therefore there is no need to commence a new mine. Some mines are producing well below approved levels and others with development consent have not proceeded. A new mine can only succeed if it can produce at a price competitive with output from elsewhere in the world. The Company has carefully assessed available market opportunities and believes that sufficient markets are available to justify investment in the Mitchells Flat project.

4.2.2 Opportunities and Constraints

The proposal has a number of advantages including adequate reserves of good quality coal, an experienced workforce, industrial infrastructure and existing transport links. Constraints include the coal extraction sequence, the presence of surface watercourses over the mine and the adequacy of local transport infrastructure.



SCALE 1 : 4000



MAJOR ELEMENTS OF MINE

FIGURE 3

4.2.3 The Proposed Mine

To create an economically viable mine, the Company believes there is no alternative to the use of new high production longwall mining technology. To obtain target outputs, two longwall units will operate simultaneously. Twin longwalls will make Mitchells Flat the largest underground mine in Australia. Under favourable conditions the mine will produce up to four million tonnes of raw coal annually. In 1986/87 only two underground mines in Australia produced more than two million tonnes of raw coal per annum.

4.3 MINE DEVELOPMENT

4.3.1 Mine Layout

The mine will consist of a series of blocks or panels of coal approximately 180 metres wide which will be extracted by retreating longwall methods. The panels will be oriented in a general southwest to northeast direction to achieve relatively constant panel lengths and a minimum variation in panel seam thicknesses. Extraction will commence in the shallowest B2 Seam and continue in the underlying D1, D4 and Boonhill Seams. Workings will be accurately superimposed so that supporting coal pillars are left adjacent to underground access ways. Access headings will be excavated by continuous miners served by electric shuttle cars. These will give men and materials and ventilation access to the coal seams. A general perspective of the mine workings is given in Figure 4.

4.3.2 Production Schedule

Run-of-mine output from the mine will vary from year to year depending on seam thicknesses, panel lengths and ash contents. In the 21 years following granting of development consent, it is expected that 56.9 million tonnes of run-of-mine production will be extracted, yielding some 45.7 million tonnes of combined steaming and coking coals. Initial production from continuous miners will be nominal until the installation of the first longwall extraction panel. Between Years 4 and 6, output will increase with the introduction of a second longwall unit. Thereafter, production will remain relatively constant, responding to variations in seam thickness and coal quality.

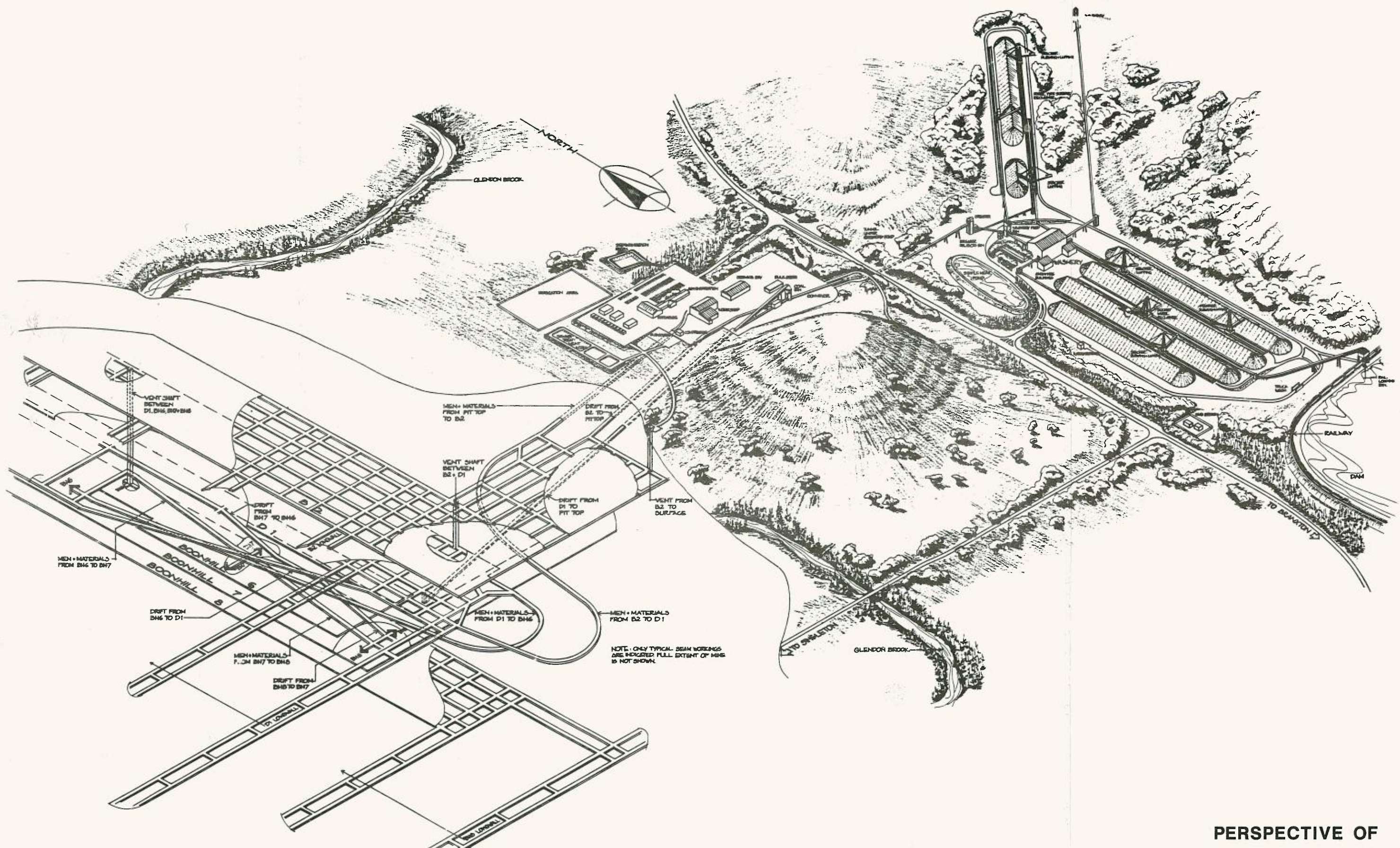
4.3.3 Mining Operations

The first longwall unit will be introduced into the B2 Seam in Year 2. Introduction of the second longwall unit will depend on the confirmation of satisfactory mining conditions and the finalisation of adequate markets. The earliest that the second longwall unit can commence extraction is Year 4 whilst the latest is Year 6. Temporary roof support will be provided by hydraulic chock shields. A ranging arm drum shearer will cut the coal which will be conveyed to the mine surface. Power supplies, lighting, communications and mine ventilation will be provided as required.

4.3.4 Safeguards

The Coal Mines Regulation Act, 1982 provides a comprehensive set of statutory controls to assist in achieving a safe work environment. Statutory requirements include the designation of suitable staff, comprehensive training schemes, gas monitoring, stone dusting and adequate support for strata control.

Ground subsidence will occur above much of the underground mine area. A mining company can only cause surface subsidence if specific approvals are given by the State Government. If subsidence causes damage to surface improvements these can be compensated under the Mines Subsidence Compensation Act, 1961. The Act is administered by the Mines Subsidence Board which either repairs damages to assets or compensates landowners concerned. The Board's activities are funded by a levy on all coal producers. This provides a mechanism for safeguarding the interest of property owners effected by mining. Maintenance of satisfactory underground working conditions will be ensured by adequate ventilation, use of water sprays on equipment and management of groundwater. These are detailed further below.



**PERSPECTIVE OF
MINE WORKINGS**

FIGURE 4

4.4 COAL HANDLING AND BENEFICIATION

4.4.1 Coal Handling

Raw coal will be conveyed from the mine to a 1,000 tonne steel surge bin. The coal will then be fed by conveyor to a breaker station and be crushed to less than 100 millimetre. Crushed coal will be stacked onto an 80,000 tonne raw coal stockpile. The coal will be mechanically reclaimed and transferred by conveyor to the coal preparation plant. Clean product coal from the plant will be conveyed to one of two product stockpiles located to the south of the washery. During Stage 1, coal will be reclaimed from these stockpiles by front end loader directly into highway trucks. In Stage 2 of the development, a rail mounted bucket wheel reclaimer will be installed which will direct product coal to a rail loadout bin.

4.4.2 Coal Beneficiation

The coal preparation plant will be of modular design and will be capable of producing both coking and steaming coal blends. The plant will utilize wet screening, dense medium cyclones and spiral separators.

4.4.3 Rejects Disposal

The coal preparation plant will produce coarse rejects and tailings. Coarse rejects from the preparation plant and rejects from the breaker station will be conveyed to a 500 tonne rejects bin located approximately one kilometre from the washery. Rejects will be transported from the bin by truck and formed into a waste emplacement. Several alternative sites were considered for a suitable emplacement. The Company's preferred alternative is a series of gullies in the northeastern foothills of Tulky Hill. To accommodate rejects in the latter years of mining, a further emplacement area will be required at Brooks Hill to the southeast. If suitable arrangements can be made to utilise more land at Tulky Hill, the Company will seek a consent variation to extend the emplacement rather than moving to Brooks Hill.

Fine rejects will be partly dewatered in an upflow thickener. Initially, settled solids will be pumped to an interim tailings pond. In the longer term, fine rejects will be mechanically dewatered and emplaced with coarse refuse. If this is found to be not feasible, larger tailings dams will be constructed in the rejects emplacement area.

4.5 PRODUCT TRANSPORT

4.5.1 Transport Alternatives

The Company investigated a number of transport alternatives to move product coal to Newcastle. State Government policy provides for rail transport of bulk material such as coal wherever possible. Almost all coal mines in the Hunter use rail transport either exclusively, or in conjunction with other haulage modes. In addition to rail, the Company assessed road haulage, belt conveyors, an aerial ropeway, pneumatic capsules and slurry pipelines. Options other than the rail haulage of coal direct from the mine site all required some form of remote loading facility. Alternatives were broadened to include the haulage of raw coal with offsite washing as well as the transport of product coal. These included the possible use of Ayrfield No. 3 washery, either as a first stage of operations, or as the ultimate washing site. Remote loaders were considered at the existing coal siding at Branxton, on vacant land further to the west of Branxton or at Ayrfield No. 3.

4.5.2 Preferred Transport Option

Rail freighting of product coal was found to be the most acceptable transport mode and one that is in accordance with State Government policy. This would involve construction of a rail spur from the Main Northern Railway to the site with provision of a balloon loop, rail loadout bin and product coal handling facilities. Proposed coal transport routes are shown on Figure 5. Unfortunately, the capital cost of a rail spur cannot be supported by the



**PROPOSED
COAL TRANSPORT ROUTES**

FIGURE 5

mine until output is increased by the introduction of a second longwall unit. Earlier construction of the rail spur would threaten the financial viability of the project.

Choice of an appropriate Stage 1 transport mode was governed by operational and economic viability as well as environmental acceptability. Any of the alternatives except truck haulage along public roads involved a private dedicated coal transport system, the capital cost of which could only be supported when the mine operates at peak capacity. To enable the mine to be developed and to operate viably during Stage 1, the feasibility of road haulage along Elderslie Road was considered.

There are limitations on the capacity of Elderslie Road to accommodate heavy traffic. These include road geometry, traffic safety and the potential for unacceptable noise impacts. It is believed that the road would not be able to cope with the volume of traffic produced during Stage 2 of the mine's development, and that upgrading works would be required to use the road for haulage during Stage 1. Views of the existing condition of Elderslie Road are given in Figure 6.

4.6 AUXILIARY FACILITIES

4.6.1 Surface Infrastructure

The mine's surface facilities will be separated into two areas as indicated on Figure 4. The underground mine entry and associated employee facilities, workshops and administration offices will be centred to the west of Gresford Road, whilst coal handling, coal preparation and stockpiling will occur to the east of Gresford Road. Major mine utilities infrastructure will include roads, water supply, sewerage, electricity and telecommunications. Access will be gained via two tee intersections from Gresford Road. Designs for these intersections will be finalised following detailed discussions with the Department of Main Roads and Singleton Shire Council.

Makeup water will be pumped from the Hunter River via a series of low level and high level pumps. This water will be treated for potable purposes and will be used to supplement site harvested and recycled water for dust suppression and the coal preparation plant. Electric power will be drawn from an existing Shortland Electricity substation and Telecom has been consulted on the mine's requirements for telephone and data links.

4.6.2 Buildings and Site Works

The pithead facility located west of Gresford Road will consist of a site administration centre, bathhouse, carparking, a workshop/store, service building, a mine ventilation fan, various storage areas for mine consumables and water pollution controls. The latter will include sedimentation basins for stormwater runoff, trade waste collection system and sewage treatment plant. All buildings will be architect designed to be visually compatible with the surroundings.

Coal handling and washery facilities will be established to the east of Gresford Road. These will consist of conveyors, raw and product coal stockpiles and the coal preparation plant. There will be an 80,000 tonne raw coal stockpile and product stockpiles of 125,000 and 130,000 tonnes for coking and steaming coals respectively. During stage 1, product coal will be reclaimed by front end loader for truck haulage, whilst for stage II a loadout bin and rail loop will be constructed.

The coal preparation plant will be housed in a building approximately 28 metres high. It will consist of a structural steel framed building clad in colourbond metal sheeting.

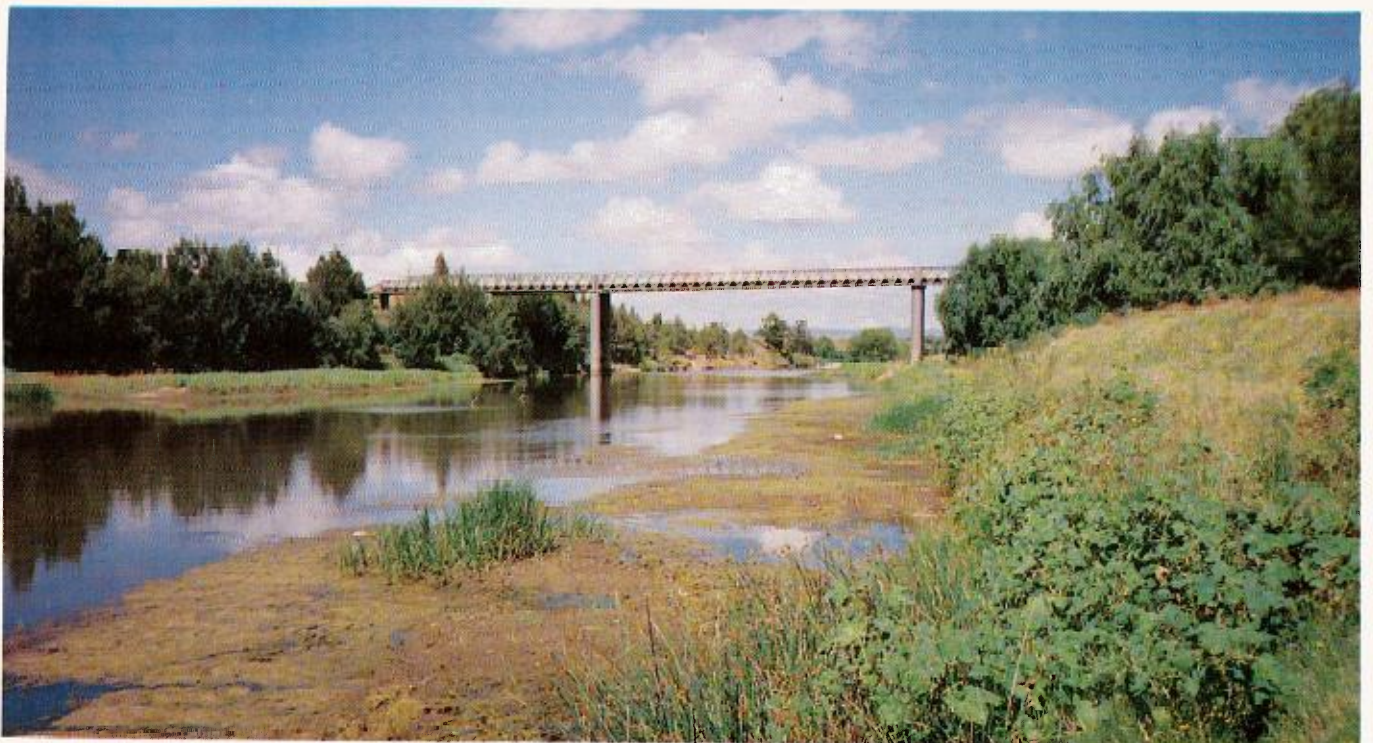
4.6.3 Branxton Coal Loading Facility

An existing privately owned rail siding at Branxton is currently used to transfer coal from road to rail. It serves Great Greta mine and a portion of the output from a number of other collieries. A photograph of the loader from Branxton Heights is given in Figure 7. It is proposed to upgrade these facilities by the construction of a rail loop



VIEWS OF ELDESLIE ROAD

FIGURE 6



**BRANXTON LOADER AND
ELDERSLIE BRIDGE**

FIGURE 7

and improved stockpiling facilities. As Mitchells Flat is only programmed to use the siding for between 4 and 6 years, major capital expenditure cannot be justified at Branxton. However the changes indicated, together with improved noise bunding and drainage controls, would be adequate for Stage 1 of the mine.

4.7 WORK FORCE

Construction of the mine and associated facilities is expected to take about 22 months. The average construction work force will be 60 people, peaking at 132 in month 11 of the construction programme. The rail spur and balloon loop for Stage 2 will require a construction work force of about 94 people.

The mine's operational work force will total 360 employees at full production level. A breakdown of likely staff numbers includes:

management and staff	46
mechanical trades	52
electrical trades	37
deputies	29
plant and equipment operators	174
building trades	13
apprentices	9
Total	360

The mine will operate on three or four shifts per day six days per week.

4.8 WATER MANAGEMENT

A detailed water management program has been developed to provide sufficient water to operate the mine whilst at the same time safeguarding downstream watercourses against loss of flow or pollution. Individual water requirements were investigated and it was determined that the mine will require between 605 and 874 megalitres of water per year.

Various options were considered to meet these requirements. These included on-site harvesting, recycling of water from various mine processes, harvesting of water from Glendon Brook and a supply pipeline from the Hunter River. It was considered that Glendon Brook would not provide sufficient water to reliably supply the mine without depriving downstream uses of water during low flow conditions. Instead, a mixed strategy involving recycling, on-site harvesting and a supply pipeline from the Hunter River is proposed.

A water balance model was developed to compare mine water demands with quantities generated on-site. Various scenarios were considered, depending on stage of mine development, groundwater inflow rates and prevailing meteorological conditions. It was established that under all operating conditions, the mine will be a nett consumer of water. There will therefore be no requirement to discharge excess water into receiving watercourses.

4.9 AIR QUALITY MANAGEMENT

Contemporary controls will be applied to minimise dust emissions from the mine. These will include the enclosure of conveyors, water sprays on raw and product stockpiles, the sealing of permanent access roads and the use of water carts on refuse emplacement haul roads. Wind erosion will be reduced by minimising areas disturbed for refuse emplacement and by the prompt establishment of vegetation cover on rehabilitated areas.

4.10 NOISE MANAGEMENT

All major noise sources in the vicinity of the operation have been calculated via a computer based three dimensional noise model. Specific controls have then been developed to comply with criteria set by the State Pollution Control Commission. Measures include bunding at critical locations, the limitation of certain machinery on the refuse emplacement to daylight hours only and bunding along the edge of the main refuse haulage road. Operational noise sources will also be required to comply with strict noise specifications when equipment is purchased.

Noise control measures along Elderslie Road include selective roadway improvements, limitations on truck haulage speeds, limitations on haulage to daylight hours only and acoustic treatment of the nearest dwelling to the roadway.

At Branxton siding, advantage will be taken of excess excavation material to form more extensive acoustic and visual bunds. These will include further bunding on the northern side of the facility and also on the eastern boundary.

4.11 VISUAL SAFEGUARDS, LANDSCAPING AND REHABILITATION

Careful attention has been given to the siting of major elements of the mine. It is relatively well shielded from main thoroughfares and visibility is generally restricted to localised sections of public roads. Buildings and carparks within the mine will be appropriately landscaped. A forward tree planting program will also be established to supplement existing screening adjoining Gresford and Elderslie Road next to the mine. Discussions will be held with a small number of farming property holders to determine whether they wish to have appropriate screening vegetation near their houses. All bund walls and refuse emplacements will be progressively revegetated to minimise visual exposure.

The refuse emplacement area has been designed to create a landform which will be compatible with adjacent natural surfaces. The landform will be finished with a stable erosion free surface.

Considerable expertise has been developed in the Hunter Valley on the rehabilitation of mine reject emplacements. Proposed rehabilitation techniques are outlined in Study 11 of the EIS. They involve shaping the outer surfaces of the emplacement to give a suitable series of slopes, drainage patterns and dams. Topsoil will be applied and the land sown to pasture grasses.

4.12 ENERGY PRODUCTION AND CONSERVATION

The mine will be a net energy producer and will provide an average annual energy output of about $13,053 \times 10^{15}$ joules. Total annual inputs to achieve this production will only be about 4.4×10^{15} joules, or about 0.3% of the total energy output of the mine.

In the cost competitive environment of contemporary mining, energy conservation is an economic necessity. Haul roads are constructed and maintained to reduce fuel costs. Equipment is subject to planned field and workshop maintenance programmes with fuel conservation as one of the major objectives. Finally, coal yields are maximised by the active involvement of regulatory authorities in extraction plans and by the technically advanced nature of the coal preparation plant.

4.13 PROJECT TIMETABLE

Major development projects require adequate times for planning and assessment and the sourcing of necessary project funding. The current development approval process in New South Wales gives the opportunity for significant public sector and community involvement which must also be accommodated in the project timetable.

The Company is therefore only one of the many parties in the premining phase of the project and cannot directly determine the total time involved.

Following the granting of development consent, an adequate period must be available for detailed design, the obtaining of statutory approvals and the construction and commissioning of plant items. Approvals are normally granted for twenty one years of operation. Assuming that development consent is granted for the project in 1990, the Company would expect to commence coal production in 1992.

5.0 ENVIRONMENTAL IMPACT ANALYSIS

5.1 LANDFORM, SOILS AND AGRICULTURAL CAPABILITY

The impacts of subsidence on surface improvements and natural features are detailed in Study 5. Although the average cumulative subsidence is expected to be almost 3 metres, the resulting landform will not be out of character with existing undulating landforms. The subsided land will generally continue to be freedraining, though in the latter years of mining, localised depressions will occur on two areas of the St John of God property. These will either be used as stock watering dams or will be filled or drained to maintain current land productivity.

Mine subsidence will make an area adjoining Glendon Brook more prone to flooding. During a 1 in 2 year flood an additional 58 hectares would be inundated, while a 1 in 100 year event would flood a further 85 hectares.

Apart from more frequent flooding, the agricultural capability of land above the underground mining area will not be affected, with the exception of approximately 36 hectares adjoining the Glendon Brook loop. In this localised area, a perched groundwater table could be brought within 2 metres of the land surface which may cause water logging or the formation of a salt pan. Although advice will be sought from the Soil Conservation Service on ways to manage this land, the effect is unavoidable and one of the adverse consequences of proceeding with the project.

Elsewhere, the most significant modification to existing landforms will take place in the refuse emplacement areas. The most natural landform will be created if mechanical dewatering proves successful and the Company is able to dispose of fine and coarse refuse in the same area. If tailing ponds become necessary, less flexibility will be available in final landforms. Whichever alternative is adopted, the refuse emplacement areas are visually well screened and landforms will be created that are stable and able to be rehabilitated.

On the more elevated sites away from Glendon Brook, soils are relatively thin and infertile. It will be necessary to carefully conserve available topsoil for rehabilitation purposes. The most productive agricultural use of elevated lands is for grazing. The rehabilitation programme will be directed to maintaining current land capability.

5.2 BIOLOGICAL RESOURCES

5.2.1 Flora

Over the life of the project, clearing will progressively result in the loss of about 90 hectares of remnant and regenerating vegetation. This clearing is not considered to be of real significance because of the already disturbed nature of existing vegetation.

5.2.2 Fauna

Vegetation clearing will result in a loss of available habitat to those fauna presently utilising the site. The movement of some migratory fauna will also be reduced. Such changes are not considered to be of major significance.

5.3 WATER RESOURCES

5.3.1 Ground Water

Ground water flows into the underground workings are expected to be low and mainly derived from coal seam aquifers rather than surficial aquifers associated with river alluvium. All registered boreholes in the general area of the mine are shallow wells in the alluvial deposits adjacent to Glendon Brook. No reduction in yield or quality of water is expected as a result of mining and little change is expected to the groundwater system. Groundwater from the coal seams is expected to be saline and will therefore be used in the coal preparation plant.

5.3.2 Glendon Brook

Make up water will not be drawn from Glendon Brook, so there will be no reduction in water available to downstream consumers. Coal extraction will not take place in the shallowest coal seam beneath Glendon Brook to safeguard against surface water inflows to the mine. Due to the depth of underlying seams, coal extraction will comply with guidelines for mining under standing waters such as lakes and oceans. There is therefore expected to be no damage to the bed of Glendon Brook which would lead to dangerous mining conditions or the loss of flow in the watercourse.

Differential mine subsidence will cause ponds to form in the bed of Glendon Brook. The ponds on balance are likely to be beneficial to adjoining land owners and are not likely to disrupt sediment transport mechanisms in the Brook.

5.3.3 West Brook

No mining will take place beneath West Brook and all mine facilities are in a separate drainage catchment. There will therefore be no adverse effect on West Brook from the mine.

5.3.4 The Hunter River

Under average rainfall conditions and production levels, approximately 380 to 490 megalitres of water would be required from the Hunter River per annum. This is about 0.05% of the average annual yield of the river at Singleton and about 0.3% of total annual water demand in the Upper Hunter. As such, impacts on downstream water uses will be negligible.

5.4 AIR QUALITY

5.4.1 Air Quality Modelling

Dust emission inventories were prepared for each major dust source at the mine site and at Branxton. A computer model of dust dispersion based on Gaussian Plume theory was then used to predict dust deposition and concentration rates. The model used has been previously independently validated against monitoring results from an operating mine. It gave a systematic agreement between prediction and measurement for all time intervals examined and consistently over predicted dust fallout by between 15 and 20%.

5.4.2 Dust Deposition Predictions

The two houses nearest to the mine are predicted to experience dust deposition increases of between 0.5 and 0.7 grams per square metre per month, taking total deposition to between 1.5 and 1.7 grams/square metre/month. This is well below the lower limit of 3 grams/square metre/month considered by the State Pollution Control Commission to be the point at which residential amenity commences to be adversely affected.

At Branxton, the nearest residential properties in Russell and Fleet Streets are predicted to receive increases of less than 1 gram/square metre/month expressed as an annual mean. When added to the currently recorded background level, this brings the annual mean deposition rate to about 2 grams/square metre/month or less, well below the SPCC accepted criterion. The annual average increment further away from the coal loader will be limited to about 0.5 grams/square metre/month or less.

5.4.3 Dust Concentration Predictions

Annual average dust concentrations are given in Study 9. In the vicinity of the mine site, it is expected that no adjoining residence will experience a dust increase of more than $10\mu\text{g}/\text{m}^3$. When added to the existing background dust concentration level, cumulative dust concentrations will be significantly less than the maximum permissible level of $90\mu\text{g}/\text{m}^3$ specified by the National Health and Medical Research Council of Australia. At Branxton, increases in annual total suspended particulate concentrations of between 15 and $20\mu\text{g}/\text{m}^3$ are predicted for the leading edge of the residential area, and about $10\mu\text{g}/\text{m}^3$ are estimated for the majority of remaining residences. Once again, this is well below the National Health and Medical Research Council limits.

In addition to average annual values, modelling of short term episodes under extreme meteorological conditions was undertaken. A calculation with very conservative input parameters at Branxton yielded a maximum 24 hour concentration of about $161\mu\text{g}/\text{m}^3$ at the nearest residence. This peak value can be compared with the primary health standard of $260\mu\text{g}/\text{m}^3$ adopted by the United States Environmental Protection Agency.

5.4.4 Dust Impacts

A range of air pollution safeguards will be implemented at both the mine site and coal loading facility at Branxton to minimise the emission of dust particles. Results of dispersion modelling showed that neither residential amenity nor public health will be adversely affected by the proposal.

5.5 NOISE

5.5.1 Noise at the Mine Site

Noise at the mine site was calculated using a computer model originally developed for the Environmental Noise Council of Australia. Resultant cumulative noise levels at all nearby residences were then compared with the noise criteria developed by the State Pollution Control Commission (SPCC). With no additional safeguards, the daytime criterion was met at all properties except one. However, for acceptable night time conditions, a range of noise controls were required including additional bunding, limitations on some activities and control of individual noise sources. With these additional controls, noise levels at all times are expected to meet the SPCC limits.

5.5.2 Road Haulage of Coal

To comply with SPCC criteria for road haulage, product transport will be limited to daylight hours. It was calculated that all residences 20 or more metres from Elderslie Road will meet specified SPCC limits. There is one property closer than 20 metres. Discussions will be held with the relevant property owner so that the facade of the house can be acoustically treated to reduce noise levels inside the house prior to the commencement of road haulage.

5.5.3 Rail Haulage of Coal

During Stage 2 of the mine's development, noise from rail transport will be required to meet limits on peak and average noise. It was determined that all existing dwellings will comfortably comply with both these criteria.

5.5.4 Branxton Siding

Since trains could be loaded at night, the night-time noise limits imposed by the SPCC are the more important for noise assessment. With appropriately constructed earth mounds, it was determined that noise from coal loading and from trains waiting to join the main line both meet the night-time criteria.

5.6 MINE REHABILITATION AND VISUAL ASSESSMENT

Refuse emplacements have been designed to reflect where ever possible the surrounding landscape in terms of diversity and drainage patterns. It would not be possible to achieve exactly the same soil profile, diversity of flora and ecological habitats of the present site. However, experience in rehabilitation in the Hunter Valley shows that a stable and non eroding vegetation cover will be successfully achieved. All earthworks, including the surface facilities and rail spur line will be protected by contemporary soil conservation measures.

The mine site is not visually prominent, with visibility being restricted to short sections of Gresford, Elderslie and Singleton Roads and a limited number of nearby residences. The main thrust of the proposed landscaping treatment will be to retain and, where necessary, supplement vegetation bordering roads and to landscape buildings, parking areas and other features to full contemporary standards. The single largest element is the proposed refuse emplacement area. The preferred site is located between two ridge lines and is obscured from most residences and vantage points. This makes the site unusually well screened from adjoining residences.

The spur railway and balloon loop will be visually reinforced by earthworks and the Hunter River crossing. Although clearly noticeable, railways across rural lands are not uncommon, and the presence of the line is not considered to be a significant impact on the visual environment. Earthworks will be properly rehabilitated and bridge structures have been designed to be relatively unobtrusive.

The new balloon loop at Branxton coal loader will generally be hidden from residential development to the north and east by topography and an extension of earth bunds. Parts of the coal stockpiles will continue to be visible from elevated areas of Branxton Heights, though proposed bunding and landscaping will improve the present appearance of the loader, thereby reducing visual impacts. The loader and mine site will both be illuminated at night. Although lighting will be directed to the working area, there will be a reflected glow which will be observable to some local residents. This should not cause a conscious intrusion on residential amenity.

5.7 TRANSPORT

5.7.1 Stage 1 Transport

Sections of Elderslie Road will be upgraded to maintain traffic capacity and enhance vehicular safety. A number of measures are proposed including improvements to road width, pavement condition, horizontal and vertical geometry and sight distances. Selected intersections are to be improved and it is suggested that Elderslie Bridge be converted to one way service, either by retention of the existing yield sign or the installation of traffic signals.

The acceptability of short term road transport during Stage 1 of the mine's development is undoubtedly one of the key environmental issues associated with the project. Although additional traffic will increase traffic congestion and provide a potential for greater risk of accidents, an objective assessment of the proposal did not disclose any area in which the local community would be exposed to unacceptable risk or loss of residential amenity. The level of service of the roadway will continue to be Category C, owing to geometric constraints that restrict average travel speed. Elderslie Road has been used for the carriage of coal for four decades and available data do not point to significant problems in accident frequency or severity.

One way flow of traffic on Elderslie Bridge will increase delays to road users. It has been calculated that the mean delay in either direction will be approximately 44 seconds and the average queue length just over two vehicles. To reduce delays to south bound vehicles from loaded coal trucks ascending the rise beyond Elderslie Bridge, a truck storage bay is proposed to facilitate overtaking. Although sections of Elderslie Road are deficient by contemporary highway standards, it has been successfully negotiated by coal trucks for many years and proposed road works will improve its capacity to cope with Stage 1 haulage requirements. A photograph of the present bridge is given in Figure 7.

5.7.2 Stage 2 Transport

A series of safeguards are proposed to mitigate construction impacts from dust, noise and water pollution during building of the private rail spur line. Operation of the railway will have some impact on the local noise environment, though all residences are far enough away to comfortably comply with SPCC noise criteria.

Commissioning of the Stage 2 development will substantially decrease total daily traffic along Gresford and Elderslie Roads, through the removal of coal trucks. There will be a minor increase in daily and peak hour employee traffic along Singleton Road, though this will not alter the level of service provided.

5.8 LAND USE AND ZONING

The proposal is compatible with the objectives of the Hunter Regional Environmental Plan. The site is zoned non urban 1(a) and 1(b) under the Singleton Planning Scheme Ordinance. Under these zonings, the proposal is permissible with the consent of Singleton Shire Council. However, coal developments are subject to a Section 101 Direction under the Environmental Planning and Assessment Act issued to Council in 1987, as a result of which, the Minister for Planning will determine the development application.

The proposal will prevent the immediate site being used for agricultural purposes during the operation of the mine. Approximately 36 hectares of land near Glendon Brook is likely to be permanently reduced in agricultural capability. The mine is not expected to make any non-company owned dwellings uninhabitable, although it could temporarily inhibit future land subdivision immediately adjoining the surface facilities and coal preparation areas. While this is a notional impact of the proposal, there is no indication of demand for such land use that cannot be met elsewhere in Singleton Shire.

5.9 SOCIAL IMPACTS

The project will have favourable social impacts in the creation of up to 132 construction jobs and 360 permanent positions during the operation of the mine. The stimulus to local employment will flow to support industries through an increased demand for goods and services. It has been estimated that the total employment attributable to the mine will be approximately 877 positions. This is particularly welcome at a time when there has been significant rationalisation in the mining industry. The mine will make a valuable contribution in re-employing some of the underground miners retrenched in the closure of older mines. The Upper Hunter has a significant pool of unemployed persons with broader work skills. The project will provide new work opportunities close to an area with significant unemployment.

It is expected that virtually all employees for the mine will be drawn from the local region, with less than 1% coming from elsewhere in Australia. The project will not exert any significant demand for additional community services and facilities, and secondary impacts on other industries will be small.

The Company is actively seeking to purchase the Cope property, which is the only one likely to be significantly affected by the mine. Impacts at all other surrounding dwellings in the vicinity from air and water quality and noise will be below State Pollution Control Commission criteria.

5.10 ECONOMIC IMPACTS

Development of the mine will involve an initial capital investment of approximately \$145 million, while total capital expenditure over the 19 years of mining operations is estimated to be some \$304 million. The latter figure includes the cost of initial purchase and replacement costs for mine operating equipment incurred over the period covered by the present application. Most of this expenditure will be made in the Hunter Valley, with a proportion directed elsewhere in Australia and overseas. Underground mines have a much higher Australian component than

open cut operations, as much of the equipment and infrastructure is locally produced. This investment will lead to indirect and induced wealth. A direct capital expenditure of \$145 million could result in a total output expansion of up to \$270 million.

At current market prices, the annual value of the mine output would be about \$117 million, which will lead to an equivalent improvement in Australia's foreign exchange earnings. The total annual value of regional output is expected to increase by \$256 million per annum.

Wages and salaries paid to employees will directly increase household income in the region. Mine workers will receive an estimated \$17.3 million per year and total regional income will increase by about \$33.1 million. Annual payments to Local, State and Federal Government will total about \$62 million.

5.11 UTILITIES

Advice has been received from the State Rail Authority that adequate main line capacity exists to accommodate rail traffic from the mine. It is also understood that the coal loaders at Newcastle have ample capacity.

In the short term, the project will cause an adverse impact on the pavement life of Elderslie Road from the haulage of product coal. The Company proposes to undertake upgrading works prior to the commencement of road haulage, and is prepared to enter negotiations with Singleton Shire Council to make contributions for annual road maintenance.

Roads and other utilities infrastructure are physical improvements under the Mine Subsidence Act. Should mining be permitted that will cause subsidence, any damage will be made good in accordance with the provisions of the Act. This includes pipelines, electricity and Telecom transmission lines, roads and drainage structures. Particular attention has been paid to the concrete bridge spanning Glendon Brook on Singleton Road. A view of the bridge is given in Figure 8. Mine workings are proposed beneath the bridge in the latter years of the mine. It is considered that mining will be feasible without causing unacceptable damage to the bridge. Subsidence monitoring will be undertaken throughout the life of the mine, so a significant body of information will be available to confirm the technical feasibility of the proposal.

5.12 ENERGY

The mine is planned to extract and process coal in an energy efficient manner. Input energy will only be about 0.3% of the total output energy of the mine.

Mine layouts have been designed to recover as large a percentage of the coal resource as is possible, consistent with economic and mining constraints. The adoption of longwall mining technology permits the extraction of a higher amount of insitu energy than would be possible by alternative techniques.



BRIDGE OVER GLENDON BROOK

FIGURE 8

6.0 PROJECT ALTERNATIVES

6.1 PROJECT ELEMENTS

Mine planning for the Mitchells Flat proposal has taken place over an extended period, which has allowed careful consideration to be given to options for each of the major project elements. Many of these are detailed in the 15 specialist studies forming part of the Environmental Impact Statement. The present chapter briefly summarises some of the key alternatives, including the option of rejecting all coal extraction. The coal resource is a valuable one, being of good quality and with geological characteristics which allow the development of a major underground mine. It is served by utilities infrastructure, a large and skilled workforce and an established industrial base. However, it is constrained by surface watercourses and the adequacy of some existing infrastructure.

6.2 MINING TECHNIQUE

Alternatives to the favoured mine plan are discussed in Study 5. The deposit was investigated for open cut potential and a small area of the deposit was confirmed as complying with Department of Minerals and Energy criteria. However, the area concerned was insufficient to develop a surface mine and open cut workings would seriously jeopardize the feasibility of far more extensive underground operations.

Several mining techniques were considered, including conventional longwalls, double longwalls, shortwalls and continuous miners. It was found that a mining sequence could be developed that permitted two longwalls to be introduced, though not working in tandem. Some experience has been gained in the tandem operation of longwalls, particularly in Poland, but the technique is commercially extremely risky as it may be difficult to maintain continuity of production. The safety of such a proposal has never been evaluated under Australian conditions. A number of different mine layouts were considered, including heights of extraction and panel orientation. No other alternative gave a better degree of resource recovery and more uniform flow of raw coal.

A number of different seam entry points were investigated, as detailed in Study 5. It was found that the favoured location to the west of Gresford Road did not sterilize coal and provided early access to the first major coal seam. None of the other entry points offered any environmental advantages and were therefore rejected.

6.3 SURFACE FACILITIES AND COAL HANDLING

Various configurations of surface facilities and coal handling infrastructure were considered. The preferred layout has the disadvantage of separating surface facilities from coal handling and preparation, which is not optimal from the point of view of administration. However, separating the major elements of the mine had distinct environmental advantages in reducing visual impacts and improving the mine's ability to segregate different classes of water.

6.4 REFUSE EMPLACEMENT

Coarse and fine rejects will be produced during coal beneficiation processes. Fluidised bed combustion of rejects to produce industrial heat and to generate electricity is technically possible. However, it is not considered a feasible option for Mitchells Flat, given the overall economics of the development. However, it is proposed to confine rejects to discrete areas and if fluidised bed disposal becomes feasible in the future, the rejects will be readily available.

The Company's preferred alternative involves the mechanical dewatering of fine rejects and co-disposal with coarse refuse. Study 7 is candid on some of the difficulties inherent in mechanical dewatering and contingency planning has therefore included allowances for conventional tailings ponds. It is proposed to establish a rejects emplacement in a well concealed gully in the foothills of Tulky Hill. Rejects from the latter stages of mining will be directed to a land parcel on the side of Brooks Hill.

6.5 COAL TRANSPORT

As the proposed mine is not immediately adjacent to the Main Northern Rail Line, a number of transport alternatives were considered to move product coal to the Port of Newcastle. Options included off-site coal preparation at Ayrfield No. 3 colliery and the establishment of new coal loaders near Branxton. Haulage modes included rail, road, belt conveyor, aerial ropeway, pneumatic capsules and slurry pipelines. Although each option had benefits and drawbacks, it was concluded that full rail haulage from the site was the preferred alternative. To reduce capital costs during the Stage 1 level of production, there appears to be no feasible alternative to the interim use of road haulage.

6.6 IMPLICATIONS OF PROJECT CANCELLATION

Should the project not proceed, the foregone coal production would presumably be obtained by developing alternative deposits either in Australia or overseas. If these deposits are not in Australia, the national economy will not benefit from the foreign exchange earnings generated. Unless the alternative source is within the Upper Hunter the local economy will not receive the advantage of major investment nor the generation of an estimated 877 new employment positions. On balance, it is believed that the Mitchells Flat deposit provides a good opportunity to develop a contemporary colliery with the benefits of existing physical and social infrastructure. Although it is considered that an environmentally satisfactory project can be constructed and operated on the site, this can only be done by safeguarding the interests of property owners near the mine. These specifically include the dwellings along Elderslie Road to Branxton. Environmental controls on new mines are extensive and will ensure that local residents will not suffer a significant loss of environmental amenity from the development.

APPENDIX 1
DIRECTORS SPECIFICATIONS



Department of Environment and Planning



Superintendent -
Mine Planning and Development,
Barix Pty. Limited,
P.M.B. 4,
SINGLETON. N.S.W. 2330. 62.

Remington Centre
175 Liverpool Street, Sydney 2000
Box 3927 G.P.O. Sydney 2001
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Telephone: (02) 266 7111 Ext. 7235

Fax No. (02) 266-7599

Contact:

V. Thomson/C. Wrigh

Our reference:

86/2307

Your reference:

HH:CG 109/87

Dear Sir,

RE: PROPOSED MITCHELLS FLAT COAL MINE

Thank you for your letter of 6th February, 1987 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 Singleton 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, subsequent to the planning focus meetings held on this project and pursuant to clause 35 of the Regulation, the Director requires that the following matters be specifically addressed in the EIS:

3.1 Environmental Setting and Goals

An appropriate network of environmental monitoring should be established and accounted for in the EIS to provide base line data of physical parameters relevant to an assessment of the potential impact of underground coal mining in a greenfields environment in terms of surface and ground water hydrology, water and air quality, acoustic climate, topography (subsidence), land uses, transport and socio-economics, etc. The EIS should also define environmental goals for air, water and noise impacts, and proposals for monitoring the performance of the mine.

3.2 Transport

(a) Coal Transport

A fully detailed description and assessment of the coal transport options considered, using road haulage/rail/conveyor modes for both the initial and ultimate developments, including an appropriate cost analysis for each alternative, and generally in accordance with the issues nominated for inclusion in the EIS in the submissions of the Ministry of Transport and Department of Main Roads to the second planning focus meeting.

With regard to road haulage for the initial stage, the EIS should specify the sections of road to be reconstructed and design standards to be adopted (with particular regard for MR 220, its crossing of the Hunter River, and its access on to the New England Highway), and account for the proposed trucking operations including their impacts on road safety and residential amenity en route including the villages of Enderslie and Branxton, taking into account traffic associated with the Great Greta Colliery, and including for the views of the Singleton and Cessnock Councils. The EIS should satisfy proposals for handling coal at the Branxton siding associated therewith, including any necessary upgrading of facilities required by the State Pollution Control Commission (SPCC), including the cost thereof and the defrayment of such investment upon commissioning of the rail spur. The possibility of an immediate introduction of a rail spur as suggested by the SPCC should also be assessed (including transport mode considerations for access to the rail head and for possible integration with the final scheme), and compared with the road option.

The EIS should fully describe and assess the ultimate road spur and balloon loop proposed at the mine site near Tulky Hill, including options for route and loop facilities, and associated cost/benefits. The implications of emergency road haulage associated with any temporary inability of rail to transport coal from the mine should also be addressed.

(b) Other Transport

Assessment of likely demands of employee and other vehicles associated with the mine on the local road system, with particular regard for MR 128 from Singleton and MR 220 from Branxton, and taken in conjunction with coal transport requirements.

3.3 Water Management

A comprehensive water management plan for the proposal accounting for the control and use of water resources relative to the mining and processing operations as well as the reject disposal site, including the water budget for various stages of the development, hydrological design criteria for the works, proposals for the supply/storage/use/treatment and disposal of water, and impacts on the quantity and quality of surface and ground waters relevant to the site. Safeguards and impact of the proposal on flooding potential. Proposals for erosion controls.

3.4 Mining Induced Subsidence

Study of subsidence potential from multi seam mining operations generally in accordance with advice contained in the submission of the Department of Mineral Resources to the second planning focus meeting, having regard for limiting subsidence movements acceptable for relevant land forms and surface works including land use capability, the integrity of water courses (particularly Glendon Brook), structures, improvements, wells, utilities, roads, etc. Consideration of effects of subsidence on water tables, surface flows and flooding characteristics including potential for penetration of waters into the mine. Subsidence predictions to be based on empirical and mathematical modelling techniques in liaison with the Department of Mineral Resources. Justification of mining plan in terms of optimum recovery of coal compatible with acceptable subsidence limits. Requirements of the Mines Subsidence Board. Potential for resource sterilisation.

3.5 Noise and Air Pollution

A noise study suitably quantified to determine the effects of noise generated by the mining and transport operations on residences close to the pit top site and along the transport corridor, together with proposals for noise control at source and formulation of remedial measures at receptors including house treatments where appropriate. Suitably quantified assessment of dust potential from pit head facilities, reject emplacement and coal loading facilities.

3.6 Rejects Disposal and Rehabilitation

Technical, environmental and economic evaluation of alternative methods of disposal of washery rejects including underground storage, backfill of open cuts, surface emplacement, fluidised bed incineration, tailings dewatering, etc. Comprehensive assessment of proposal for above ground emplacement of coarse and fine rejects including for staging and construction methods, transportation from washery, dust and erosion and water pollution controls, progressive rehabilitation, loss of visual amenity, and interaction with surrounding land uses.

3.7 Socio-Economic Implications

Assessment of the local and overall benefits of the project to the public, including a statement on the economic viability of the project having regard for a realistic prognosis of coal export marketability. Workforce demands and sources of skilled and unskilled labour for both construction and operation phases of the project. Proposals for meeting workforce accommodation requirements, likely demands on community infrastructure and Company commitments to same. Application of Government's infrastructure financing policy.

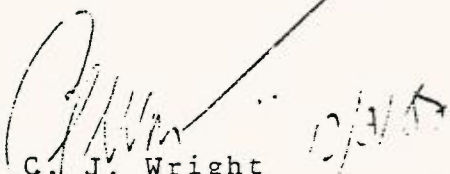
4. Attachment No.2 is a guide to the type of information most likely to be relevant to the development you propose. Not all of the matters raised therein may be appropriate for consideration in the EIS for your proposal; equally, the guide is not exhaustive. In preparing the document, appropriate regard should be made to other matters raised by the Government authorities et al in response to the planning focus meetings held on this project.

5. The proposed development is subject to a direction under S.101 of the Environmental Planning and Assessment Act and consequently the Minister for Planning and Environment would determine the development application.

6. In preparing your EIS you should approach Singleton Shire Council and take into account any comments Council considers may apply to this 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

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 UNDERGROUND COAL MINING OPERATION

The purpose of this paper is to outline various issues relevant to the preparation and consideration of an EIS for an underground coal mining operation. It is intended to assist 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 underground mining operation. 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.

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 location and extent of the underground mining of coal proposed, mine access works, ventilation shafts, and surface facilities involving proposals for coal handling, coal screening, crushing and washing, water management and treatment, disposal of wastes, and surface rehabilitation and landscaping. A description should also be provided of associated operations such as the transport of coal.

Particular details that may be relevant include:

- . Characteristics and economic significance of the resource
- . Quantity of materials to be mined.
- . Coal mining techniques, plans of operations.
- . Type of machinery and equipment to be used.
- . Coal handling at the pit head.
- . Coal preparation including any washing.
- . Expected life of the operation
- . Number of persons to be employed.
- . Hours of operation.

- . Power requirements.
- . Water management, including water supply, surface site drainage and erosion controls, proposals for dealing with interception of ground waters and containment of runoff, water reuse, treatment and discharge offsite.
- . Disposal of coarse and fine coal washery reject and proposals for mechanical dewatering.
- . Proposals for underground gas drainage and use or disposal.
- . Proposals for rehabilitation and landscaping of surface features.
- . Coal haulage on site and transportation offsite.
- . Proposals for environmental monitoring, including mining induced subsidence.

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 underground coal mining operations are listed below. Where relevant to the specific proposal, these should be addressed in the EIS and suitably quantified, taking into account the adequacy of safeguards proposed to minimise them.

- . Dust emissions from surface facilities, and controls.
- . Likely noise/vibration disturbance caused by the surface operations, including transportation, on any nearby residences.
- . Other impacts of transport movements, including access on to highways.
- . Water pollution potential.
- . Disposal of coal washery rejects.
- . Any effects on valuable fauna and flora.
- . Effects of surface facilities on the visual environment.
- . Potential effects on surface features and facilities due to mining induced subsidence.
- . Rehabilitation and landscaping of surface features.
- . Any likely affectation of sites of Aboriginal archaeological or European heritage value (including industrial heritage) if located in vicinity of operations.
- . Socio-economic implications including effects on the nearby community facilities and services, and proposals with regard to Government's Infrastructure Financing Policy.

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

.../3

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 Department of Mineral Resources in regard to requirements under the Coal Mining Act.
- . The Mine Subsidence Board with regard to relevant aspects of subsidence caused by the underground extraction of coal.
- . The Soil Conservation Service regarding appropriate erosion control and rehabilitation procedures;
- . The Water Resources Commission in regard to water supply and down stream water users.
- . 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 or 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.

APPENDIX 2

STUDY TEAM

**APPENDIX 2
STUDY TEAM**

This Environmental Impact Statement was prepared for Mitchells Flat Coal Company Pty Limited by the following project team:

Mitchell McCotter & Associates Pty Ltd

R.F. McCotter	Project Director
P.A. Mitchell	Land Use Planning
J. Parsons	Pollution Controls
C.J. Wright	Transport and Socio-Economic Impacts
J. Gaynor	Social Impacts
S. Cole	Land Use and Physical Geography
P. Cloke	Hydrology and Hydraulics
D.N. Snashall	Economics
D. Hee	Visual Impacts and Statutory Planning
A. Hill	Word Processing
L. Arthur	Word Processing

Sub-consultants

P. Zib & Associates Pty Limited	Air Quality
R. Tonin & Associates Pty Limited	Acoustics
S. Miller & Associates Pty Limited	Geochemistry
Bartrim & Martin	Flora and Fauna
J. Larcombe	Economics
L. Haglund	Archaeology
Brayshaw McDonald	Archaeology

Company personnel involved in the development of mine plans were directed by Mr. H.W. Harrison and Mr. P.G. Olsen. Key Company staff included:

R.O. Robson	Geology
B.W. Gould	Surveying and Monitoring
G.B. Walker	Graphics

The study team had the benefit of inputs from staff of Local and State Government Departments in the provision of data and definition of relevant environmental issues. Their assistance in the original Planning Focus responses and with subsequent inquiries is gratefully acknowledged.