



EIS 477

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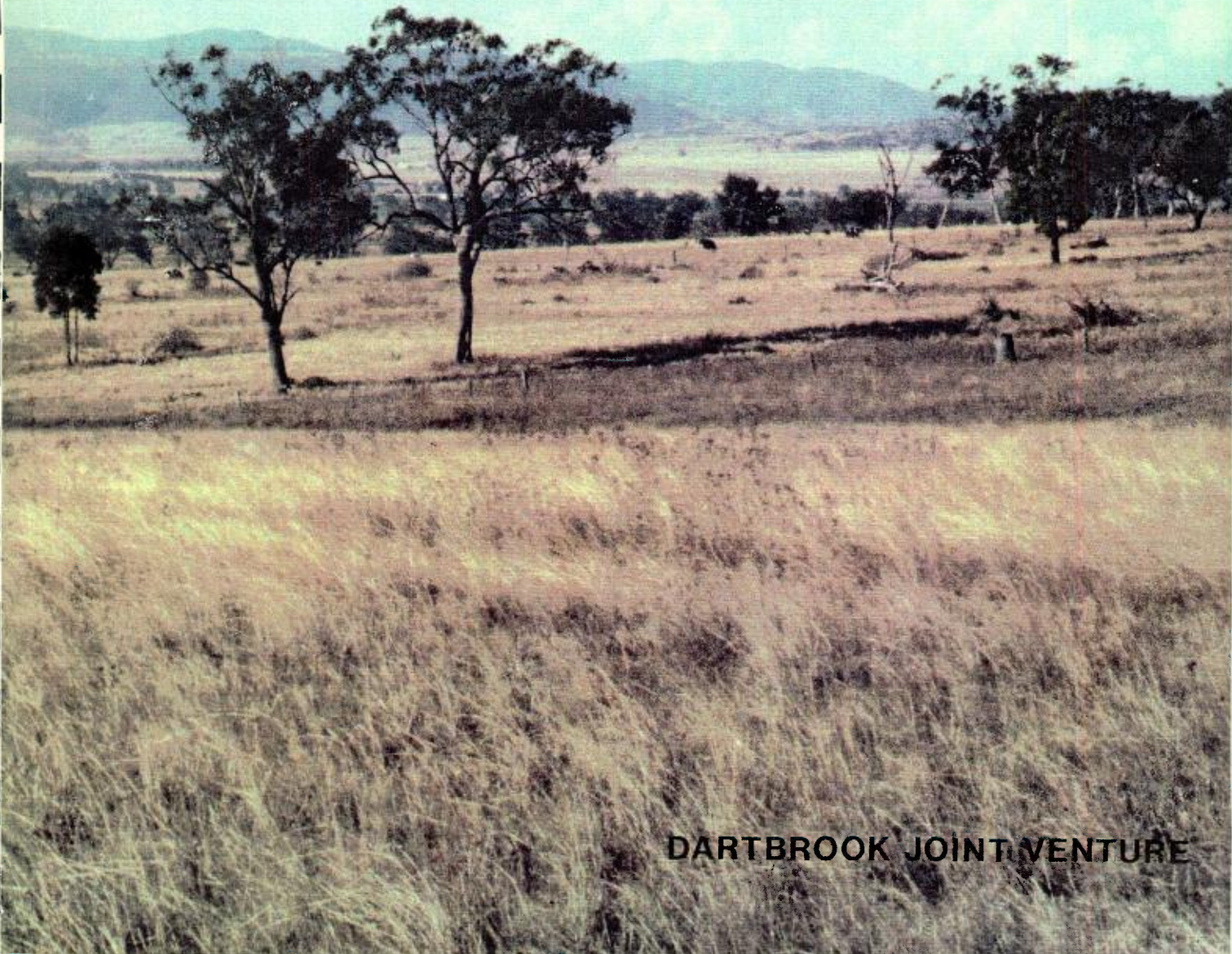
Dartbrook Underground Coal Mine Project : planning focus.

NSW DEPT. PRIMARY INDUSTRIES  
  
AB019142

SECRET  
COAL GEOLOGY  
EIS 477

# DARTBROOK

## UNDERGROUND COAL MINE PROJECT



DARTBROOK JOINT VENTURE

2ND PLANNING FOCUS. 4TH OCTOBER.

Overall 30% Rejects = tonnes

Q WHAT IS EVAPORATION POND

Q ? PROPOSED TAILINGS DAM AREA - TOP LEVEL VARIES BY  $\approx 20$  M

Q ? NO DETAIL ON TAILINGS DAM OR COARSE REJECT DISPOSAL AREA - OVERHEADS NOT INC AS FIGURES

Q ? SLOPE ON COARSE REJECTS WRT TO STABILITY WITH FUTURE U/G RECOVERY IN BROWNS MTN.

L FIGURE

MSC - ? TUNNELL.

S.D - SURFACE DUMPS - ? RUNOFF DIVERSION.

SOIL CON

- ? FINAL LAND CAPABILITY  
SALINITY OF EVAP. POND.

Q STRUCTURE + PERMIABILITY OF WYNN BEAM IN U/G CONVEYOR TUNNELL

? HYDRO ? CONNECTION OF WYNN BEAM TO H. RIVER. OVER APPROX 1 KM

### Cover

View to the north from centre of proposed underground mining area.

DARTBROOK

UNDERGROUND COAL MINE PROJECT

PLANNING FOCUS

Dartbrook Joint Venture  
August 1989

**Confidential:**

The contents of this report should not be divulged to any person or third party organisation without the express permission of the Dartbrook Joint Venture

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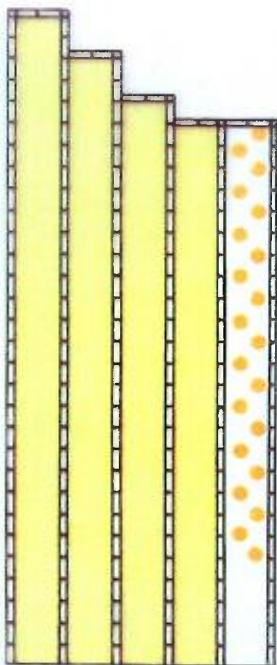
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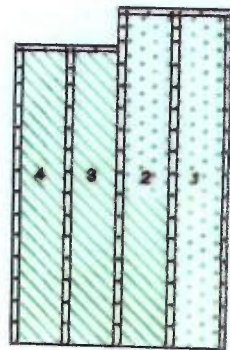
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## **PMBC SEAM**

EXTRACTION SCHEDULE

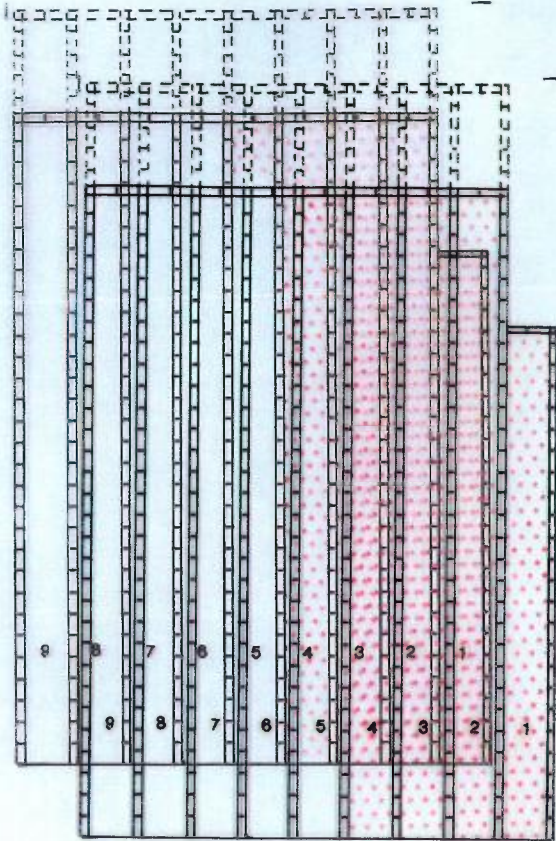
•• Year 10    ■ Years 11-14



## **KY SEAM**

EXTRACTION SCHEDULE

Year 15      Years 16-17



## PLA SEAM

EXTRACTION SCHEDULE

### PLA SEAM

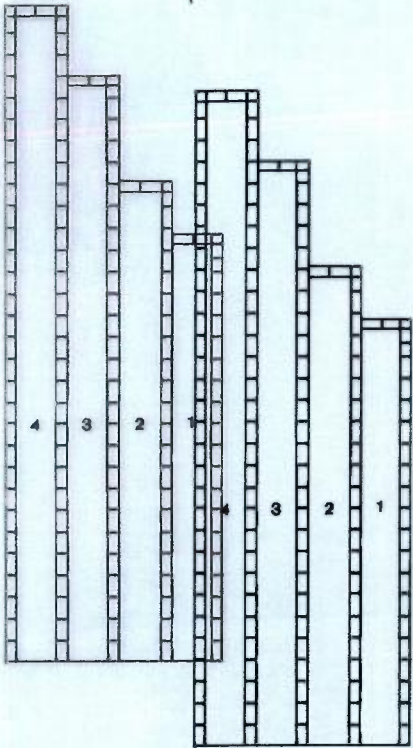
Years 17-20

EXTRACTION SCHEDULE

Years 17-20

**BO SEAM**

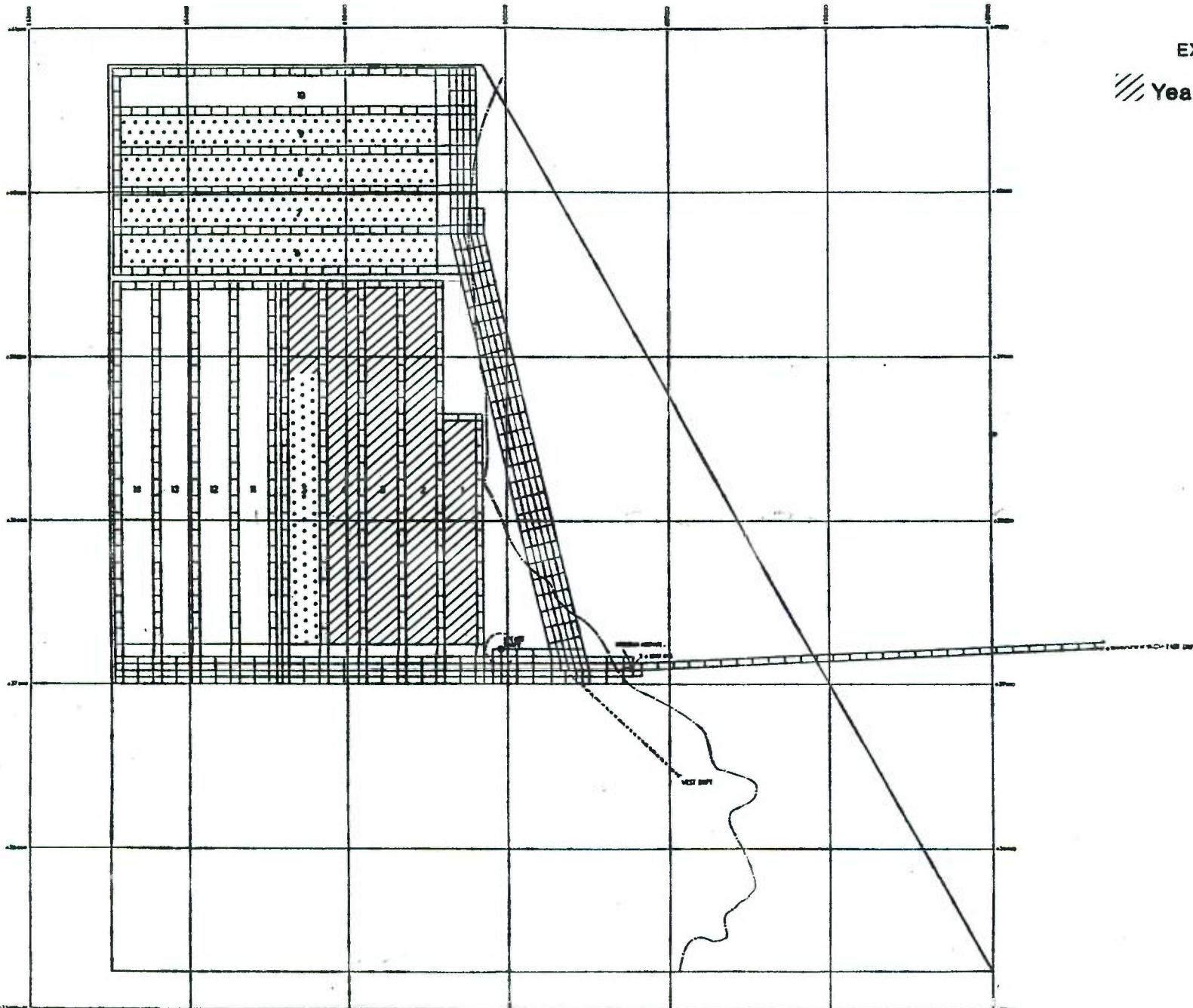
**BO SEAM**



# WUA SEAM

EXTRACTION SCHEDULE

▨ Years 1-5    ▩ Years 5-10



## MINE LAYOUT



## 1. ABSTRACT

A feasibility study is being carried out by the Dartbrook Joint Venture to examine the economic potential of an underground coal mine within Authorisation 256 (A256). Title to A256 was awarded to the Bellambi Coal Company Pty Limited (BCC) in 1980 and subsequently passed to Austen & Butta Limited (A&B) in 1984 when that company acquired the BCC shares. The Dartbrook Joint Venture is owned equally by A&B and The Shell Company of Australia Limited (SCOA).

A256 is located within A102 held by the NSW Department of Minerals and Energy (DME) and is situated in the Upper Hunter Valley to the northwest of Muswellbrook.

During the period 1981 to 1984 the joint venture examined the feasibility of a surface mine in the southern part of the Authorisation and concluded that because of high pre-production costs, project infrastructure requirements and concerns for the environment, a surface mine was not viable in the prevailing economic climate. More recent studies have confirmed that a surface mine remains non-viable.

There are numerous instances in Australia where underground mines using retreat longwall mining are achieving levels of productivity which are comparable with surface mines. Exploration and evaluation of the resources at Dartbrook has shown that it could support a highly productive retreat longwall mining operation producing some 2.5 million tonnes per annum for the export thermal coal market. Five seams have been identified which contain reserves suitable for longwall mining. The seams are characterised by having economic working sections of up to 4.0m thick. A mining proposal has been prepared which will result in the maximum extraction of these reserves consistent with accepted mining practice and subsidence limitations.

Extraction of the economic reserves at Dartbrook by underground mining methods is seen to have substantially less effect on the local environment than would surface mining. Surface disturbance is minimal, the visible parts of the operation intrude less into the local scenery and there is less nuisance due to noise, dust and vibration than could be expected from a surface mine. By placing the major part of the mining operation underground, disturbance is kept to a minimum.

Surface facilities to provide access for men and materials to the underground workings will be located on a 22ha site on elevated ground near the western edge of the Hunter River alluvial plain close to the village of Kayuga. The facilities at this site will include a bath house for some 220 workers, an administration block, a maintenance workshop, warehouse and compound. No coal will be brought to the surface at this site once the initial underground development has been completed.

Coal from the mining area will be transported underground by conveyor to a coal handling and rail loadout facility located on a 36ha site near Browns Mountain on the eastern side of the New England Highway. During the first ten years of operations, surface activities will be limited to the stockpiling of product coal and rail loading of coal for despatch to the Port of Newcastle. This site will also accommodate the washplant when it is built and the coarse refuse and tailing disposal areas will be located close by.

The underground conveyor will be installed in one of two roadways to be driven under the alluvial plain in a coal seam lying between 85m and 120m below the surface. At this depth there will be no interference with the water resources of the Hunter River alluvial plain. By placing the coal transport system underground the visual amenity of the river flats, with their background of rising foothills to the west will be preserved.

The initial underground development will be in the Upper Wynn (WUA) Seam (lowest of the 5 target seams) where the first longwall face will be installed. A substantial benefit is obtained by mining this seam during the early years of the mine life because it is low in ash and can be marketed without washing. Mining will continue in the WUA Seam for the first 10 years of the mine life before operations are transferred to the Middle Piercefield (PMBC) Seam which is the top seam in the sequence in which economic reserves have been identified. Thereafter, the economic reserves of each of the target seams will be mined in descending order.

Hydrological testing on a number of boreholes, including two boreholes drilled on the alluvial plain show that the coal measure strata including the seams, have low permeability. Any ingress of water to the mine during normal mining operations is not likely to be a problem.

The objective of minimising the environmental impact of the development has been a prime consideration. The underground workings have been laid out in such a way that there will be no effect on the Hunter River or the alluvial plain. Subsidence will occur over the mining area. The underground mine layout has been designed to minimise subsidence depressions which could result in the formation of permanent swamps or surface ponding in areas where the land is low lying.

The land surface covering that part of A256 in which underground mining is proposed is mainly used as grazing land. Four domestic dwellings occur within the area. Other properties will be affected by the proposed surface facilities. Ownership of the affected properties has been established by Title Search and in due course the joint venturers will seek the agreement of the owners to the development.

## 2. INTRODUCTION

The Dartbrook Joint Venture is carrying out a feasibility study for an underground coal mine at Dartbrook, located in the Upper Hunter Valley in N.S.W. (Figure 2.1)

As part of the process of gaining the necessary approvals, licences and other authorisations, the Joint Venture has accepted the opportunity to use the process of Planning Focus, whereby details of the proposal can be made known to interested parties within local and State government instrumentalities.

This document provides a summary of the feasibility study so far completed and describes the proposed development and likely environmental impacts as a basis for discussion prior to preparing an Environmental Impact Statement.

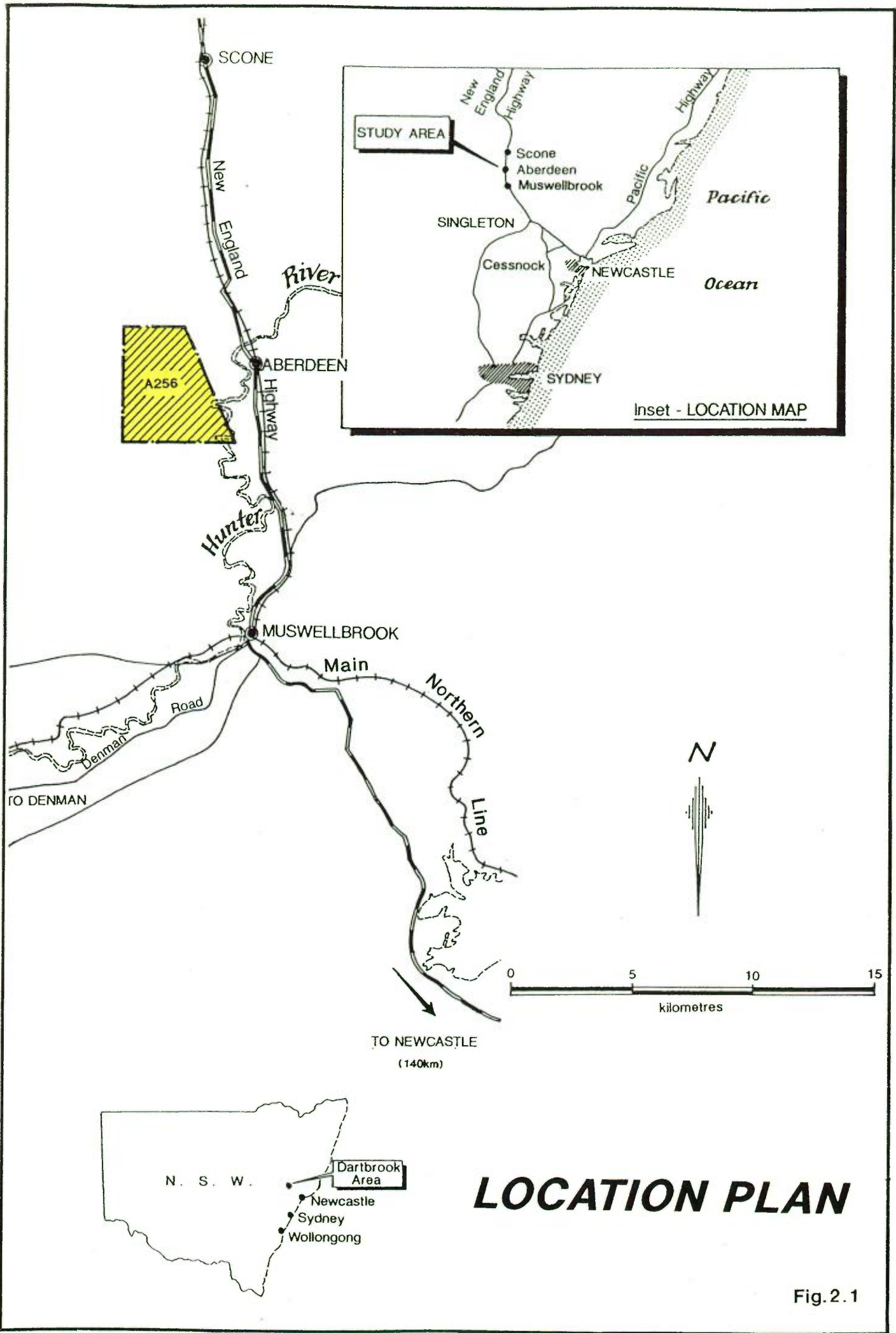


Fig.2.1

### 3. BACKGROUND

The site of the proposed underground coal mine is within A256, located 11km northwest of Muswellbrook and 4km west of Aberdeen. The small town of Dartbrook, provides the name for the area. The New England Highway and the Main Northern Railway Line connects Aberdeen with Newcastle 140km to the southeast. The proposed mine straddles the boundary between the Shires of Muswellbrook and Scone.

The Hunter River lies close to the eastern boundary of the Authorisation, flowing through an alluvial river plain where intensive farming is practised. A narrow strip of the river flats lies within the Authorisation, the remaining land being used for grazing and feed crop production. Apart from the small area of river flats, the topography of the area is gently undulating rising towards the west.

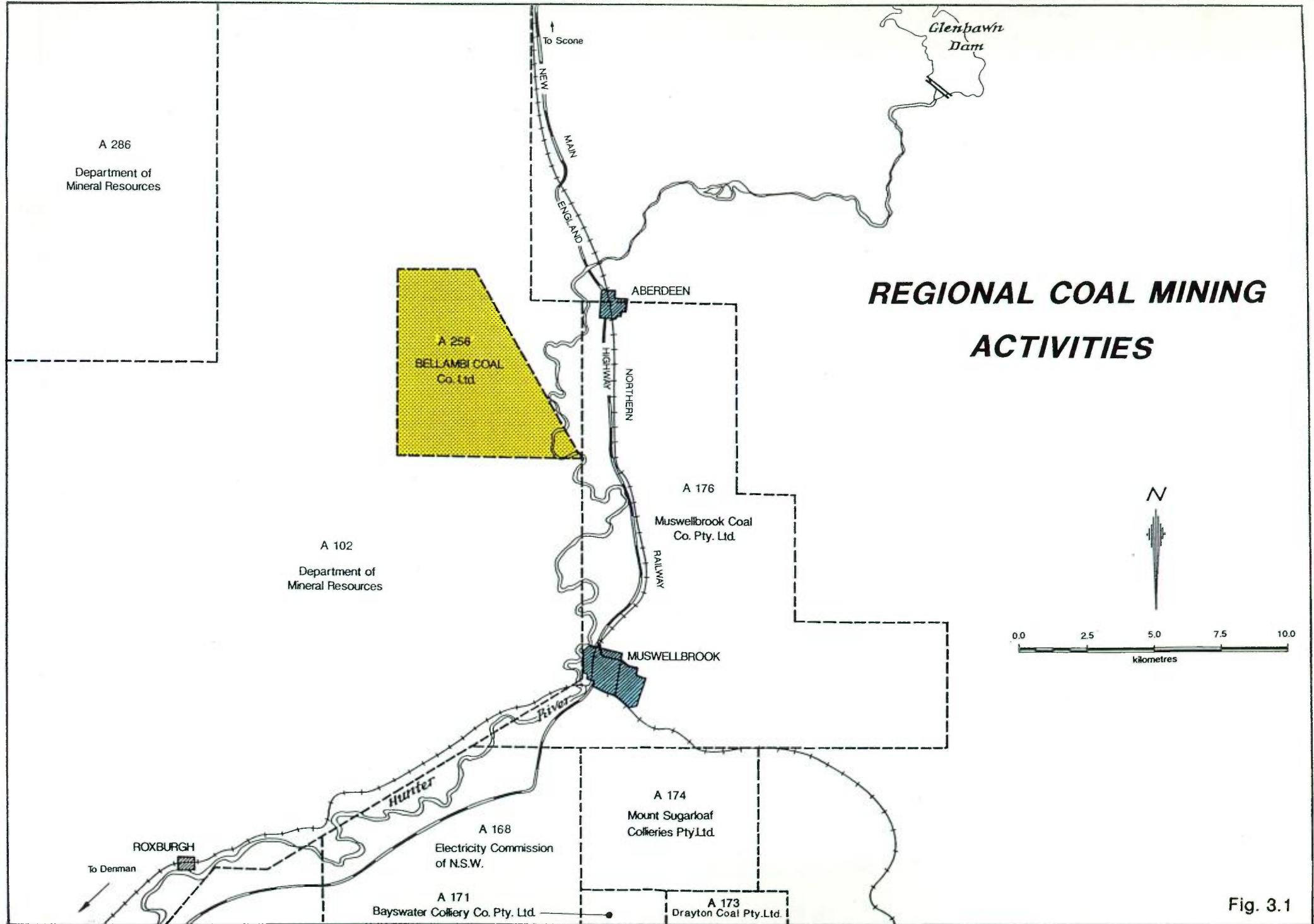
*MIN -4°*  
*MAY -45°*  
The region has a warm, temperate climate with a mean temperature range of 10°C to 23°C. The driest months are May to September and the highest rainfalls occur in the period from December to March. The population in close proximity to the Authorisation totals 12,500 of which 1,500 live in the township of Aberdeen, 4km to the east and 10,000 who live in Muswellbrook to the south, with the balance living on farm properties throughout the district. The town of Scone (population 9500) lies 12km to the north of the Authorisation.

Exploration for coal in the area prior to 1980 was carried out by private companies and by the DME within their Authorisation 102. Data gathered during these early stages of exploration established that A102 contained very large coal resources, much of which were amenable to surface mining.

In 1980, A256 was granted to the BCC over an area of 22sq.km within A102. (Figure 3.1). Bellambi explored the coal measures within A256 and delineated areas in which surface mining could take place. A geological model was established from which the most prospective open cut areas were selected as a basis for a detailed feasibility study.

By 1984, the economic climate for the Australian export thermal coal industry had declined dramatically and a period commenced in which no new mine developments were started in N.S.W. A feasibility study conducted at that time concluded that the development costs of a surface mine at Dartbrook could not be supported, due to the large volume of overburden which needed to be hauled to external pit dumps, the extensive infrastructure needed to support the development and the cost of providing thorough mitigation of environmental impacts.

A proportion of the coal resources in the northern part of A256 occur at depths which preclude economic surface mining. Improvements in the performance of longwall operations during the 1980's have been sufficiently encouraging to warrant an examination of these seams to determine whether a viable underground mine could be developed. In 1985, the title to A256 passed to A&B. In 1988, the Dartbrook Joint Venture (50% A&B, 50% SCOA) was formed to carry out a feasibility study for an underground mine at Dartbrook to produce some 2.5 million tonnes per annum of thermal coal for export. The study which commenced in January 1989 has been managed by SCOA on behalf of the Dartbrook Joint Venture.



# REGIONAL COAL MINING ACTIVITIES

Fig. 3.1

#### 4. GEOLOGY

The Dartbrook Authorisation is situated on Late Permian Wittingham Coal Measures, which occur extensively throughout the Upper Hunter Valley of NSW. The coal measures are over 800m thick and in the Dartbrook area, contain thirteen coal seam groups in three main coal bearing formations, namely the Foybrook, Burnamwood and Mt Thorley Formations.

Six coal seam groups, the <sup>WJW</sup> Upper, <sup>MA</sup> Middle and <sup>PPD</sup> Lower Piercefield, Kayuga, Vaux and Broonie, subcrop in the Dartbrook lease area (Figure 4.1) and a further seven seams (including the Bayswater and Wynn) are present at mineable depths within the Authorisation. The major seams are represented by several splits, which are shown in Figure 4.2.

The stratigraphic sequence at Dartbrook shows a good correlation with the regional stratigraphy. The locally defined Kayuga Seam is believed to equate to the lower split of the Mt Arthur Seam worked elsewhere in the Hunter Valley.

The coal seams dip generally at 3 to 5° to the north-west, with a west-north-west trend upwards through the stratigraphic section. Although the dips are typically gentle, there are areas of steeper dips (up to 9°) where seam splitting occurs.

Drill hole information does not indicate any major faulting within the lease area. Seam splitting and the variation in interburden thickness makes minor fault (less than 5m throw) identification difficult.

Igneous activity is mainly found in the north-west corner, with isolated occurrences in the southern portion of the Authorisation. Drillhole evidence suggests that dykes are the dominant type of intrusion present, although small sills are likely to be associated with the dykes.

Table 4.1 details in situ coal resources of 667 million tonnes and mineable reserves of 174 million tonnes within the proposed underground mining area.

The Upper Piercefield Seam is banded and present at depths of less than 100m throughout the western part of the Authorisation. This seam is considered an open cut resource and is not included in this study.

The coal is export quality with a low ash content. Indicative quality for each seam is shown in Table 4.2.

The WUA Seam will be the only seam mined during the initial stage of the project and due to the absence of in-seam partings, will not require beneficiation. Once mining of the overlying seams has commenced, a wash plant will be installed to maintain product quality.

The coal is classified on the ASTM standard as Bituminous High Volatile B and as Class 6 on the Australian system.

Table 4.1

DARTBROOK PROJECT  
 PROPOSED UNDERGROUND MINING AREA <sup>LEASE</sup>

IN SITU RESOURCES AND RESERVES

(MILLIONS OF TONNES)

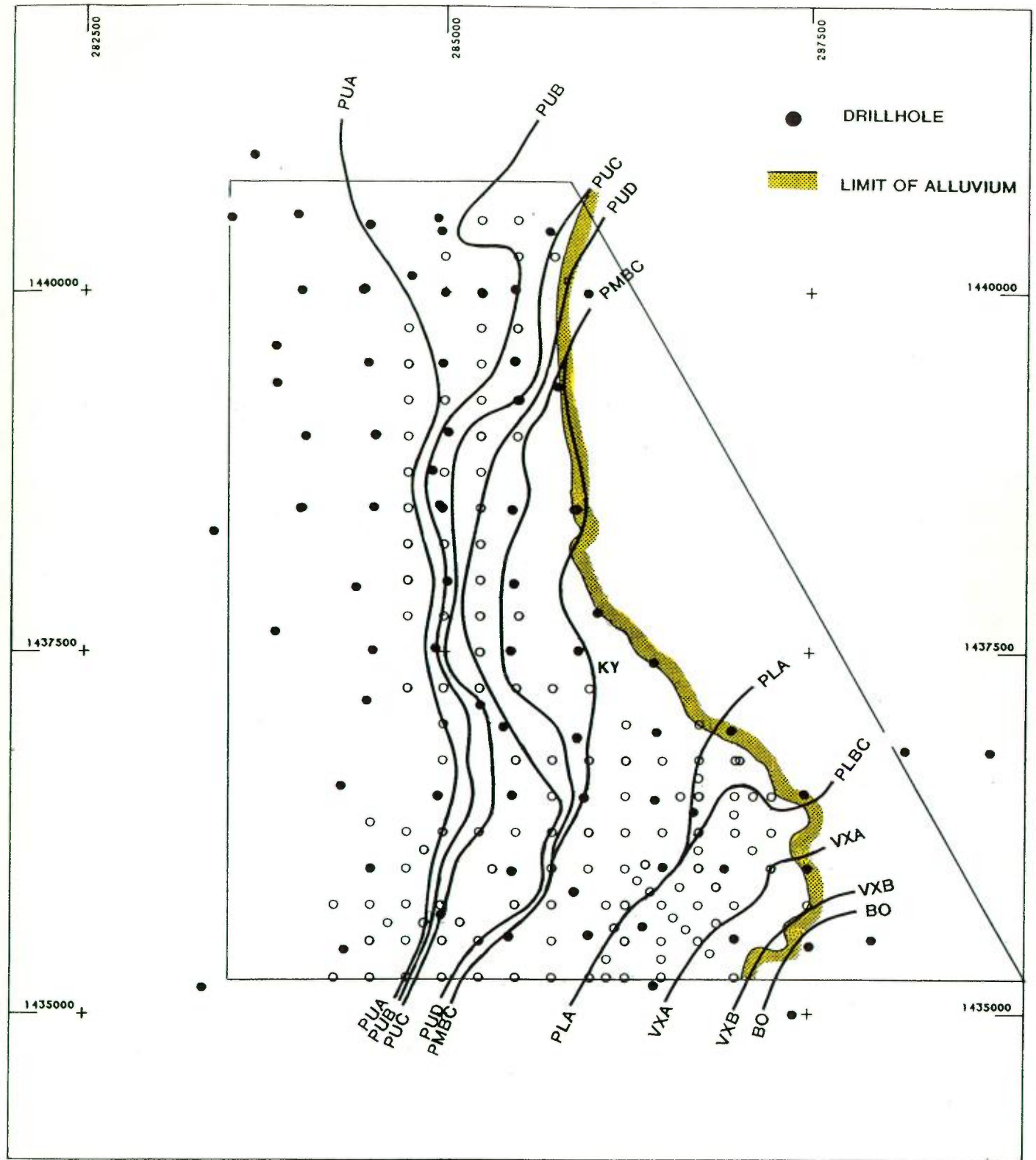
SEAM	GEOLOGICAL RESOURCES		<sup>U/G</sup> MINEABLE RESERVES	
	Tonnes	Ash%	Tonnes	Ash%
Upper Piercefield	79.2	26	-	-
Middle Piercefield	51.0	25	24.7	19.9
Kayuga	35.8	25	19.7	20.6
<sup>PLA</sup> Lower Piercefield	119.5	26	47.7	21.8
Vaux	44.2	28	-	-
Broonie	54.9	25	35.0	20.9
Bayswater	167.4	27	-	-
Upper Wynn	115.2	24	47.3	10.5
* EDDERTON EDINGLASSIE	x x			
Total	667.2		174.4	

\* DOES NOT INCLUDE SOUTHERN OPEN CUT AREA RESOURCES

\* DOES NOT INCLUDE RESOURCES RESERVES IN { EDINGLASSIE }  
 SEAM IN LEASE AREA { OR EDDERTON }

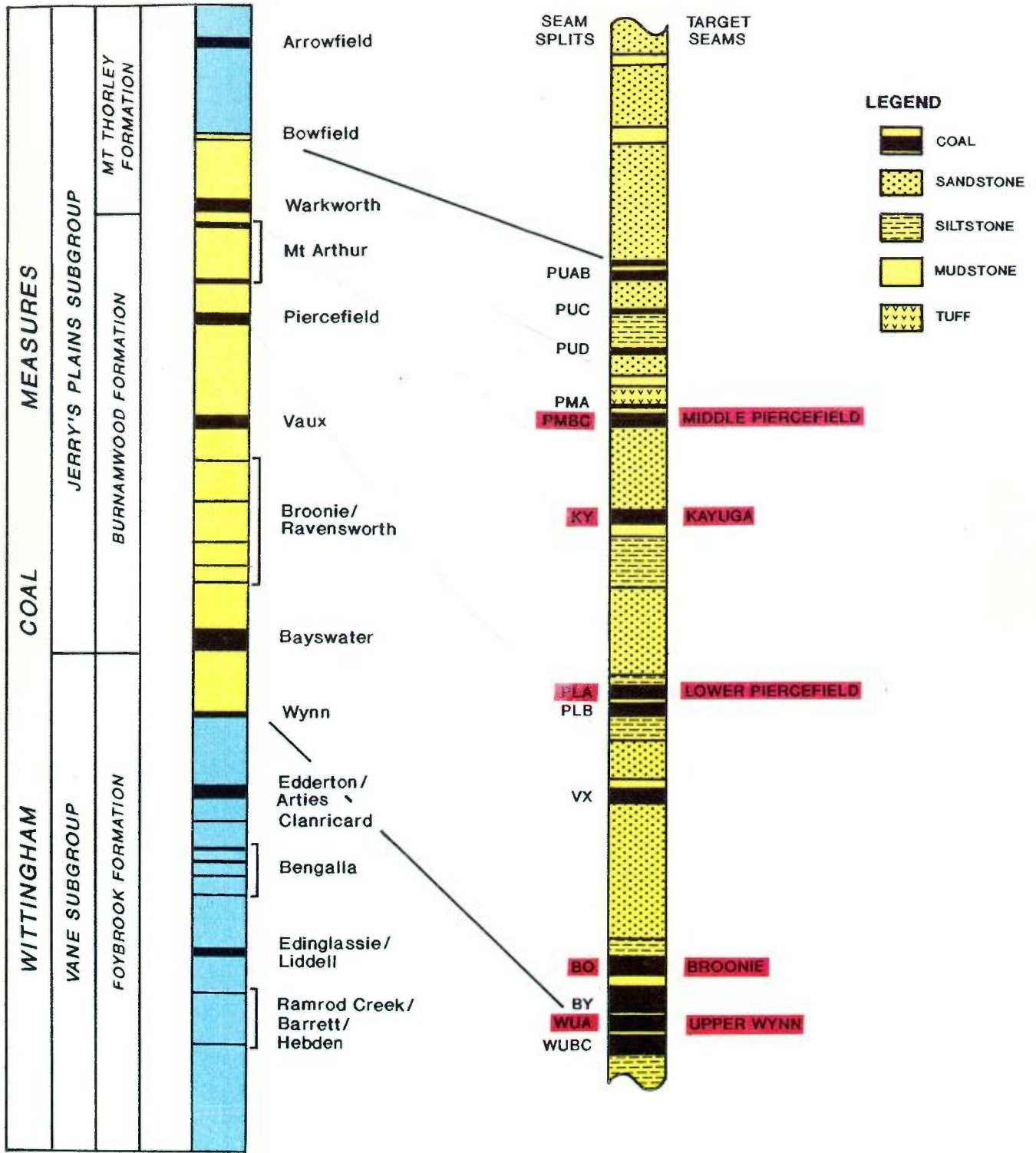
Table 4.2  
**DARTBROOK PROJECT**  
**INDICATIVE COAL QUALITY**  
**PRODUCT COAL**

	PMBC	KY	PLA	BO	WUA
Total Moisture (ar) %	12.0	12.0	12.0	12.0	11.0
Analysed Moisture (ad) %	5.5	5.5	5.0	5.0	5.0
Ash Content (ad) %	11.0	11.0	11.0	11.0	11.0
Volatile Matter (ad) %	31.0	33.0	33.0	31.6	29.7
Fixed Carbon (ad) %	52.6	50.5	51.0	52.4	54.4
Total Sulphur (ad) %	0.32	0.30	0.43	0.45	0.27
Phosphorus (ad) %	0.026	0.036	0.082	0.028	0.046
Specific Energy (Gad) kcal/kg	6688	6659	6733	6793	6735
Specific Energy (Gar) kcal/kg	6228	6201	6237	6292	6310
Hardgrove Grindability Index	53	56	55	51	53
<b>ASH FUSION TEMP<sup>o</sup>C (Red.Atm.)</b>					
Initial Deformation	1280	1260	1240	1290	1280
Spherical	1500	1480	1460	1550	1350
Hemispherical	1510	1490	1480	1550	1360
Flow	1530	1510	1500	1550	1390
<b>ULTIMATE ANALYSIS % (Daf)</b>					
Carbon	81.7	81.1	81.7	82.3	82.3
Hydrogen	5.15	5.30	5.56	5.41	4.97
Nitrogen	1.99	2.00	1.96	1.93	1.79
Sulphur	0.36	0.35	0.54	0.53	0.33
Oxygen	10.8	11.2	10.2	9.8	10.7
Carbonate (ad)	0.10	0.14	0.12	0.07	0.38
<b>ASH ANALYSIS % (db)</b>					
SiO <sub>2</sub>	66.3	61.2	59.2	65.4	46.9
Al <sub>2</sub> O <sub>3</sub>	25.0	25.4	25.1	25.3	26.0
Fe <sub>2</sub> O <sub>3</sub>	3.96	4.90	3.88	1.90	5.60
CaO	0.47	1.12	2.31	0.60	11.67
MgO	0.47	0.79	0.61	0.21	2.32
TiO <sub>2</sub>	0.92	1.32	1.34	1.64	1.05
Na <sub>2</sub> O	0.80	1.27	1.34	0.83	0.76
K <sub>2</sub> O	0.43	1.67	1.03	0.58	0.34
P <sub>2</sub> O <sub>5</sub>	0.509	0.998	2.000	1.030	1.097
Mn <sub>3</sub> O <sub>4</sub>	0.100	0.100	0.050	0.029	0.090
S <sub>2</sub> O <sub>3</sub>	0.700	0.960	1.460	0.610	4.260



**DRILLHOLE LOCATION MAP  
WITH SEAM SUBCROPS**

Fig. 4.1



**REGIONAL STRATIGRAPHY**

PRINCIPAL COAL SEAMS

(Not to scale)

**DARTBROOK STRATIGRAPHY**

SEAM SPLITS AND TARGET SEAMS

(Scale 1:2000 approx.)

**STRATIGRAPHY**

Fig. 4.2

## 5. MINING

The proposed underground coal mining operation is planned to take place in 5 seams in the northern part of A256. A 200m retreating longwall face will be used to mine some 50 million tonnes of coal over the 21 year lease period (see Table 5.1). Continuous miners will develop each seam preparatory to longwalling.

### Underground Access

Access entries to the underground mining area will be via slope drifts from the surface. A western site access will be used solely for personnel and mining materials transport once the initial underground development stage is completed. An eastern site access will be used to transport coal from underground to the surface and for inspection of underground conveyors.

Intake air will enter the mine through both access drifts and be withdrawn by an exhaust fan on a service site some 1.5km from Kayuga village.

An underground connection in the WUA Seam 85 to 120m below the alluvial plain will allow coal to be transported from the mining area to the coal handling area without having to cross the alluvial plain and river. (Figure 5.1). Two parallel roadways, 4km long will be driven from the eastern site to connect with the mine workings developed from the western site. Connection of the underground coal transport system is timed to coincide with the commissioning of the coal handling and rail load out facilities.

### Underground Mining

Longwall mining will commence in the WUA Seam (lowest of 5 target seams) as this is the only target seam that does not require beneficiation to meet export market requirements. Mining will continue in the WUA Seam for the first 10 years of the mine life before operations are transferred to the PMBC Seam (the uppermost seam in the sequence), thereafter the economic reserves of the target seams will be mined in descending order. (Refer Figure 5.2 for a schematic representation of inter seam access connections. Figures 5.3 and 5.4 illustrate the mining sequence in plan and cross section format.)

Research by subsidence engineers from the DME has established that where the interval between seams exceeds 12 to 15 times the thickness of the lower seam, undermining of overlying seams is possible without significantly affecting them. Mining in the WUA Seam has been restricted so as not to sterilise mineable coal reserves in the overlying target seams.

Extractive mining will not take place under the alluvial plain. The WUA Seam development roadways located under the alluvials to maximise the area of mineable coal will have no effect on the water resources or land surface within the lease area.

A barrier will be left between the edge of the alluvials and extracted areas equal in width to half the depth from the surface to the coal seam. For the purpose of protecting the alluvials the edge of the barrier has been taken to be

a line where the ground surface is 1.5m above the western edge of the alluvial plain.

### **Subsidence**

An examination has been made of the subsidence effects of underground mining at Dartbrook and limitations have been placed on the number of seams to be mined under low lying areas, particularly the Sandy Creek valley which crosses the northern part of the area.

Wherever possible mining extraction has been maximised consistent with seam thickness, coal quality and other mining constraints applicable to longwall mining.

### **Hydrology**

Hydrological testing has been carried out to evaluate ground water conditions. Testing shows that the strata has low permeability, therefore high volumes of mine water are unlikely to occur. Before coal washing occurs it is possible that, even with the low volumes of mine water anticipated, the mine may have excess water to dispose of. Salinity levels indicate that mine water should not be discharged except in times of high rainfall and stream flows. At other times any excess will be disposed of by means of an evaporation pond. Once coal beneficiation commences it is anticipated the mine will become a net water user.

Table 5.1

DARTBROOK PROJECT  
 PRODUCTION SCHEDULE

YEAR	PRODUCT TONNES (KT)	SEAM BEING MINED
-1	100	WUA
1	400	WUA
2	1200	WUA
3	2900	WUA
4	3100	WUA
5	2900	WUA
6	2800	WUA
7	2800	WUA
8	2700	WUA
9	2800	WUA
10*	2600	WUA-PMBC
11	2500	PMBC
12	2500	PMBC
13	2500	PMBC
14	2600	PMBC
15	2300	PMBC-KY
16	2100	KY
17	2100	KY-PLA
18	2200	PLA
19	2300	PLA
20	2400	PLA

\* Coal washing commences in Year 10.

## 6. SURFACE DEVELOPMENTS

The Dartbrook underground mine will require surface developments at three locations (Figure 6.1). One, the western site near Kayuga village will be the operational centre for the mine. A second small ventilation fan site is to be located about 1.5km from Kayuga village near the road to Dartbrook, and a third, the eastern site will be located between the Main Northern Railway Line and Browns Mountain. *+ tailings dam east of B. Mtn.*

### Western Site

The 22ha western site (Figure 6.3) will be recontoured during the construction phase, using spoil from the mine access drift to create a working area screened from the nearest properties by bund walls which will be covered with topsoil and planted with suitable vegetation. Within the working area, mine facilities including a bath house, mine office, store building, materials compound and maintenance workshop will be located. A suitable choice of building design, layout and materials selection together with a landscaped setting will greatly reduce the visual impact of the site.

Waste water from the bath house will be treated by means of an on-site sewerage treatment plant and then pumped to evaporation ponds.

Miners will enter the mine from this site and it is expected that they will travel by car from surrounding areas. Sufficient parking will be provided for employees and visitors. Supplies of materials, equipment and fuel will be delivered to this site, by road vehicles normally during daylight hours.

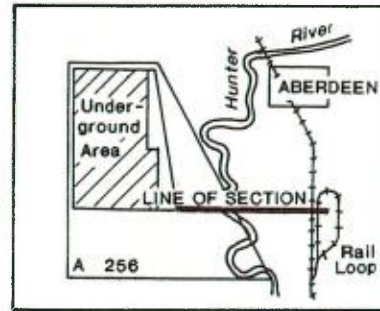
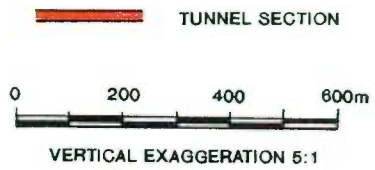
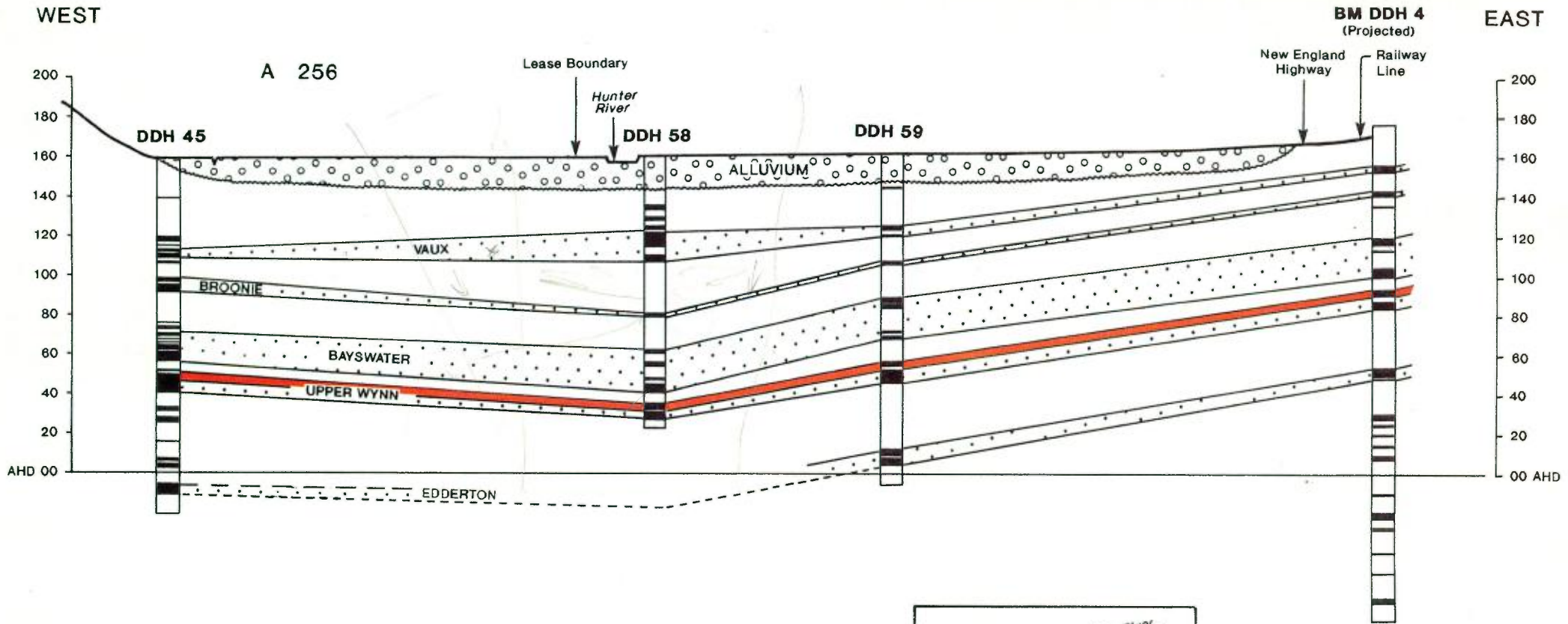
### Ventilation Fan Site

The ventilation fan site will be located some 400m from Kayuga homestead. Other services located at this site will include the mine electrical substation, bulk stone dust silo and a compressor house. Normally, no personnel will be based at this site but regular inspections will be necessary. Careful attention will be paid to the minimisation of noise and dust nuisances at this site; the mine fan will have sound attenuation provisions, and stone dust will be transferred pneumatically to the silo. Apart from the silo, all of the structures will be of single storey construction and vegetated bunds will substantially enclose the area.

During the shaft sinking period of approximately 1 year the area occupied will be 1.5ha, reducing to 0.5ha after commissioning, the remainder being taken up by the landscaped surrounds. The site will be fenced and protected by locked security gates.

### Eastern Site

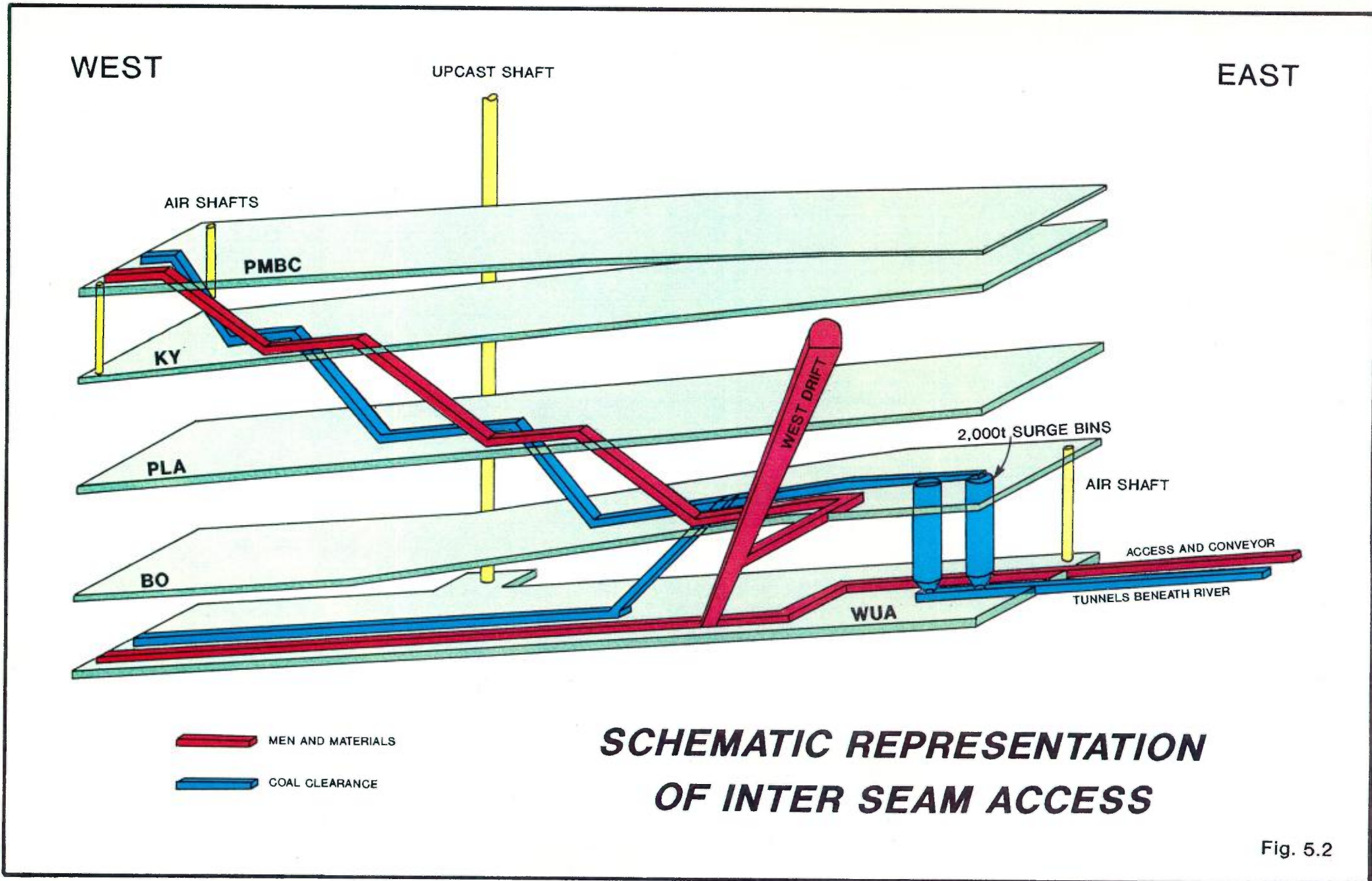
Coal from the underground workings will be conveyed to the surface at the eastern site (Figure 6.2). After being crushed the coal will travel by a system of conveyors to one of two 600m long stockpile areas, where it will be stacked in windrows up to 17m high by a mobile stacker. The system of operation used by the Port of Newcastle authorities makes it necessary to stockpile large volumes of coal at the mine in readiness for a cargo to be assembled. Storage for up to 330,000 tonnes has been provided. Coal will be reclaimed from the



\* DIP CHANGE IN SECTION ?

**CROSS SECTION BENEATH HUNTER RIVER**

Fig. 5.1



***SCHEMATIC REPRESENTATION  
OF INTER SEAM ACCESS***

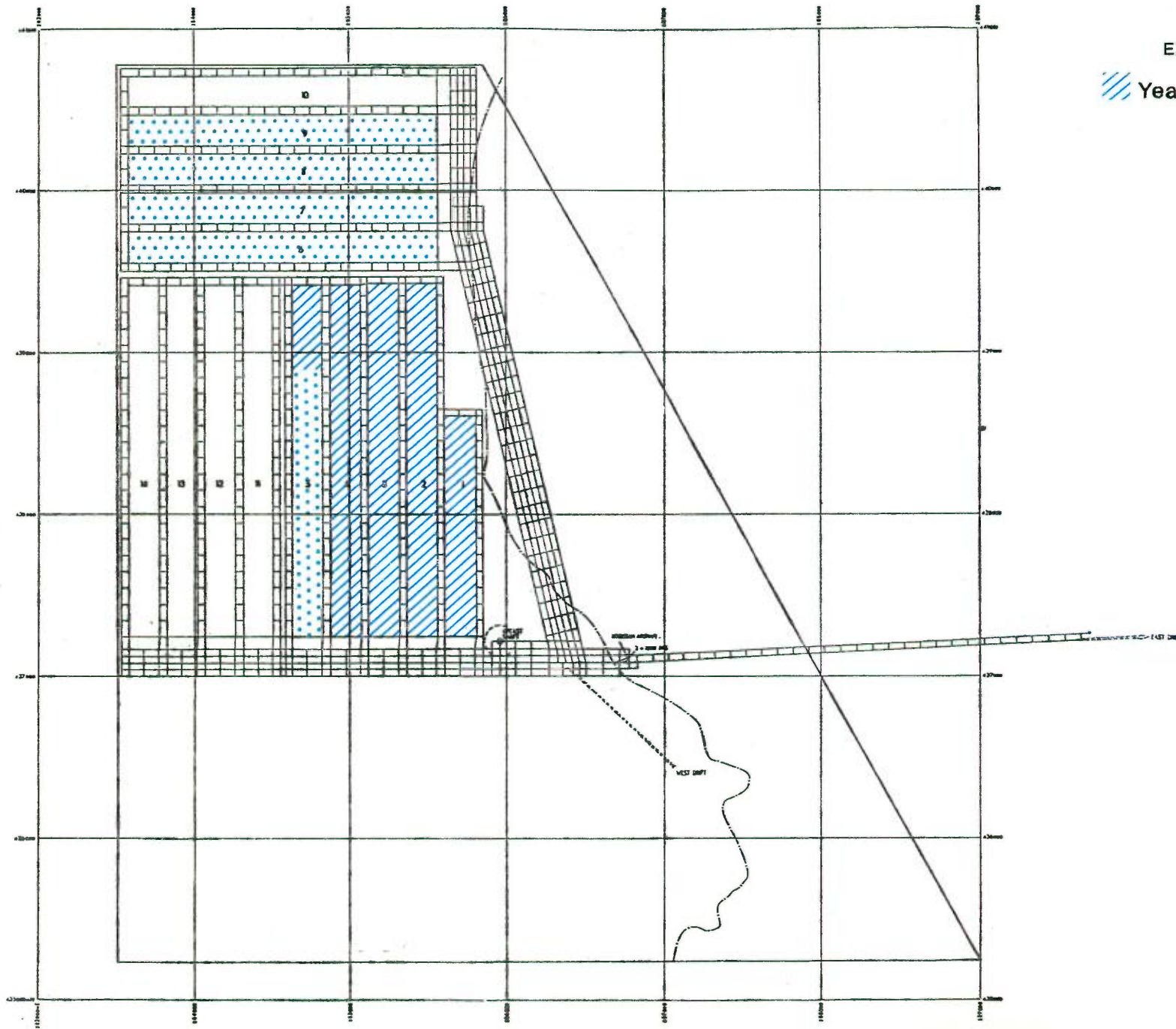
Fig. 5.2



# WUA SEAM

EXTRACTION SCHEDULE

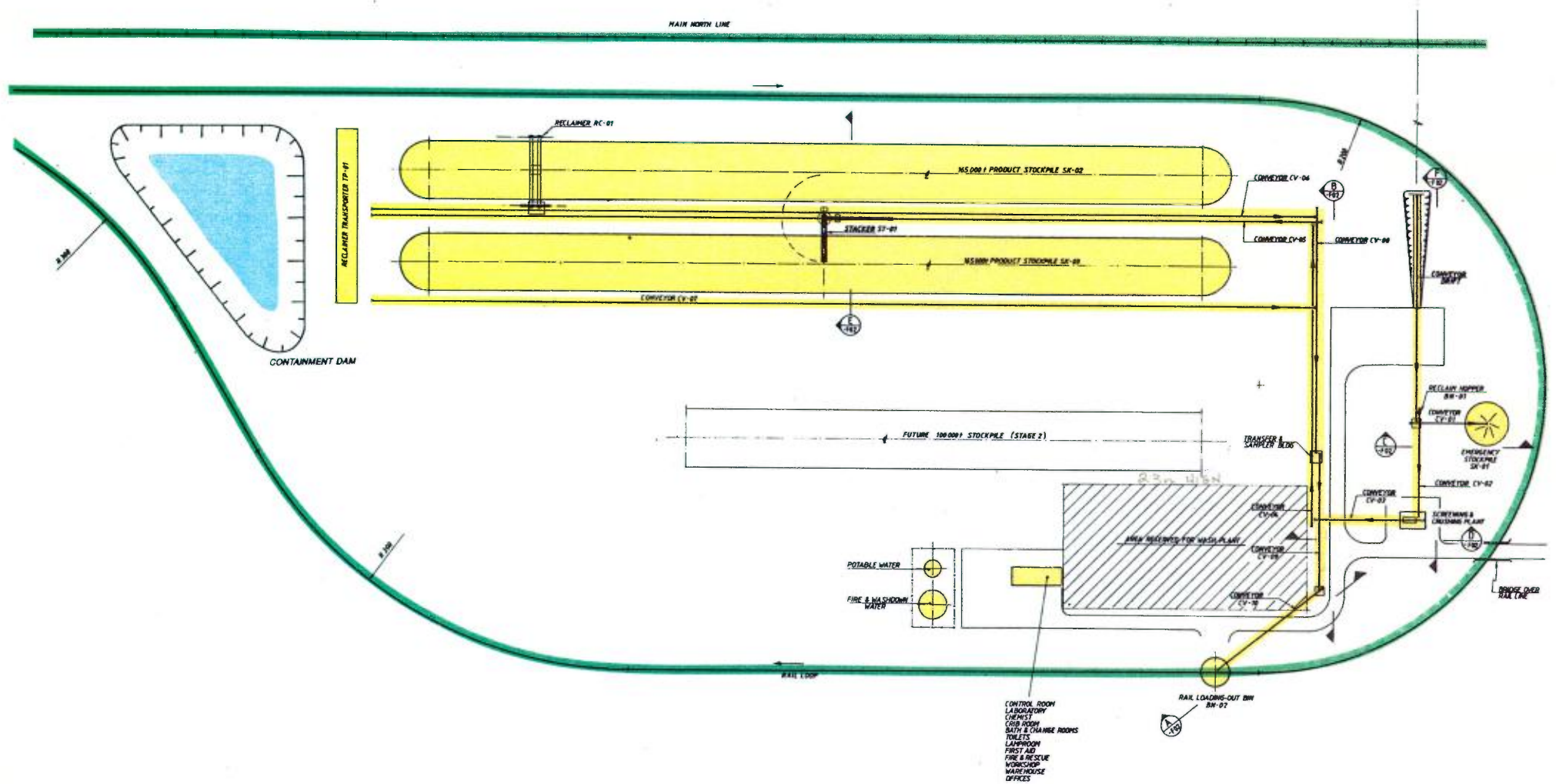
 Years 1-5     Years 5-10



## MINE LAYOUT

0    0.5    1 km

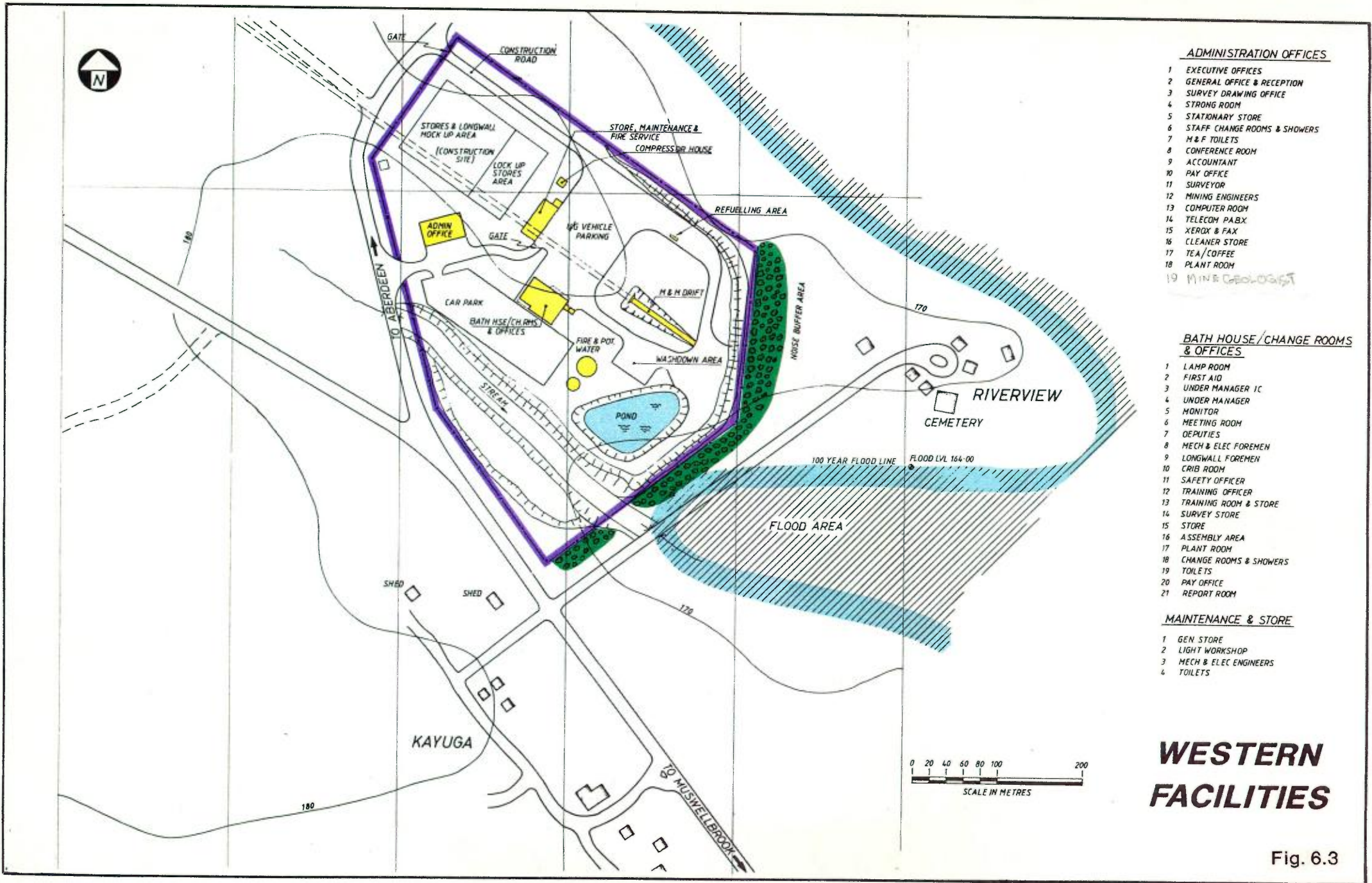
Fig. 6.3



# EASTERN COAL HANDLING AREA



Fig. 6.2



**ADMINISTRATION OFFICES**

- 1 EXECUTIVE OFFICES
- 2 GENERAL OFFICE & RECEPTION
- 3 SURVEY DRAWING OFFICE
- 4 STRONG ROOM
- 5 STATIONARY STORE
- 6 STAFF CHANGE ROOMS & SHOWERS
- 7 M & F TOILETS
- 8 CONFERENCE ROOM
- 9 ACCOUNTANT
- 10 PAY OFFICE
- 11 SURVEYOR
- 12 MINING ENGINEERS
- 13 COMPUTER ROOM
- 14 TELECOM PABX
- 15 XEROX & FAX
- 16 CLEANER STORE
- 17 TEA/COFFEE
- 18 PLANT ROOM
- 19 MINE GEOLOGIST

**BATH HOUSE/CHANGE ROOMS & OFFICES**

- 1 LAMP ROOM
- 2 FIRST AID
- 3 UNDER MANAGER IC
- 4 UNDER MANAGER
- 5 MONITOR
- 6 MEETING ROOM
- 7 DEPUTIES
- 8 MECH & ELEC FOREMEN
- 9 LONGWALL FOREMEN
- 10 CRIB ROOM
- 11 SAFETY OFFICER
- 12 TRAINING OFFICER
- 13 TRAINING ROOM & STORE
- 14 SURVEY STORE
- 15 STORE
- 16 ASSEMBLY AREA
- 17 PLANT ROOM
- 18 CHANGE ROOMS & SHOWERS
- 19 TOILETS
- 20 PAY OFFICE
- 21 REPORT ROOM

**MAINTENANCE & STORE**

- 1 GEN STORE
- 2 LIGHT WORKSHOP
- 3 MECH & ELEC ENGINEERS
- 4 TOILETS

**WESTERN FACILITIES**

Fig. 6.3

stockpile area and loaded into a 3,000 tonne capacity rail loading bin. Conveyor and bin capacities have been selected to provide rapid loading facilities for 84 wagon trains. The entire coal handling plant will be automated and controlled from a single control room.

The rail loop which encloses the coal handling facilities has been designed to meet State Rail Authority (SRA) standards. Cutting and filling along the formation line, together with waste rock from the drift excavation and a small ventilation shaft result in a material balance so that no waste material will need to be taken from the site during the construction period.

The coal handling site will be the incoming point for the power supply to the mine. After metering, power will be taken from the main substation via an overland line to the western surface facilities.

Road access to the eastern site will require a new rail overpass near Aberdeen and a sealed road parallel to the Main Northern Railway Line. Water requirements for dust suppression will be supplied from the underground mine, thus disposing of a substantial part of the mine water. A reservoir will be used to allow settlement to take place and to ensure that water is always available. Fire fighting water will be taken from the same source.

An external supply of clean water will be required for drinking water and bath house usage. Waste water will be treated in a similar way to that at the western site.

Several major benefits result from enclosing the site within the rail loop. All dirty water is confined to the site, site noise is contained and the externally visible parts of the activity are greatly reduced. Water in small ephemeral creeks external to the site will be diverted to prevent entry to the site. Silt traps will prevent downstream contamination. The natural attributes of the site and the containment effect of the rail loop make this the preferred site of those examined.

Ten years after mining commences the underground operations transfer from the WUA Seam to the PMBC Seam, the uppermost seam in the mining sequence. From this time on all coal mined will require beneficiation. The output of saleable coal will decline and both coarse and fine waste will be generated from the coal wash plant.

A site for the washplant has been reserved within the rail loop. The building is expected to be up to 25m high, and will be located as far as possible towards the eastern side of the site where it will be less visible.

The final design of the plant cannot be determined until large samples of coal become available for washability testing. Sufficient work has been done to determine the most probable type of plant that will be required and the material balance that can be expected. The order of accuracy is such that reliable estimates of saleable coal, coarse refuse and tailings have been possible.

## Mine Refuse Disposal

A site to contain coarse refuse exists on the western flank of Browns Mountain, immediately adjacent to the rail loop. Although the site is visible from the south west, the proposed method of emplacement will reduce the visual impact.

X The coarse refuse emplacement area is a minor re-entrant feature and it is proposed to progressively raise the land surface in a series of bund structures starting at the lower level. As each bund is completed it will be surfaced with top soil and vegetation whilst the next bund is constructed behind it. In this way the overall appearance of Browns Mountain will not be dramatically changed. Slope angles will be similar to the natural slope angle of the land and the finished surface will be restored to a standard similar to that which exists today.

Tailings from the washery will consist of fine particles of material suspended in water, capable of natural separation with time. A suitable site for a pondage dam exists to the east of Browns Mountain in a shallow valley. Tailings would be partially dewatered in a thickener and then pumped to the pondage area. Initially a retaining dam with an impervious membrane would be built to a height of 10m and then raised periodically on an 'as required' basis. Existing creeks will be diverted around the pondage area and downstream contamination prevented by means of silt traps and settlement ponds. The tailings pondage area is remote from areas of public activity and not highly visible. The dam wall will be screened, with natural vegetation.

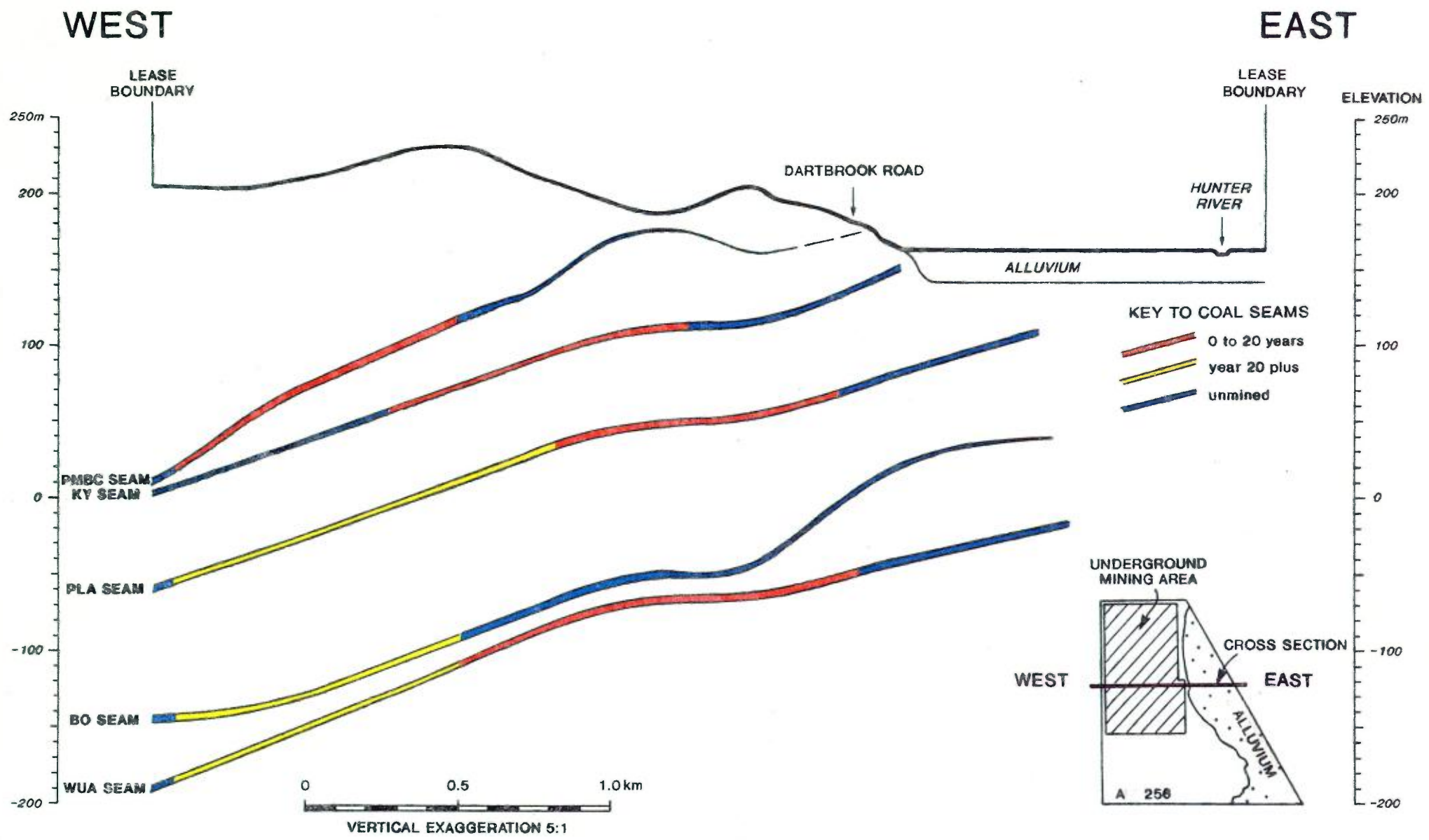
## Early Development Coal

It is intended that the development of Dartbrook Mine will follow the convention of constructing the surface facilities whilst the underground development is in progress. In this way the duration of the development period is kept to a minimum. Each of the surface development sites will be as small as possible, consistent with operational needs, consequently it will be necessary to remove coal brought from underground to avoid congestion at the sites. The option of separately stockpiling coal until the rail facilities are commissioned, would involve additional areas being disturbed and require temporary coal handling provisions from which additional environmental impacts could occur.

Underground development will progress simultaneously from both of the main sites so that the permanent coal transport system can be quickly established. It is estimated that underground development from the eastern site will result in 150,000 tonnes of coal being mined, all of which will have to be removed by road over a period of about one year.

Underground development from the western site will result in 220,000 tonnes of coal being mined which will also require to be road hauled away from the site.

Early Coal removed from the site by road will be taken to a nearby mine with load out facilities.



**MINING CROSS SECTION**

Fig. 5.4

## 7. LAND AFFECTED BY THE DEVELOPMENT

The Authorisation lies in essentially a rural area removed appreciably from urban development. The Authorisation lies within the Muswellbrook and Scone Shires and as such is covered by their Local Environmental Plans.

A background study of land titles, ownership, improvements and zonings within the area of the proposed development, has been carried out. The impact of these on the proposed development will need to be assessed, in particular Section 62 Consents (Coal Mining Act) to establish land that should be purchased.

Landowners however have not yet been approached but the joint venture partners intend to commence discussions with relevant landowners in the near future.

## 8. ENVIRONMENTAL ISSUES

An assessment has been made of environmental issues likely to arise as a result of the Dartbrook development. Potential impacts have been identified and investigated by consultants. Work on these is still in progress and the input of interested authorities will be of value to the satisfactory completion of the environmental impact statement.

### Landscape & Topography

Underground mining does not give rise to large scale disturbance of the landscape. In the case of the Dartbrook project, the disturbance is limited to those areas where surface facilities are located. These sites will be cleared and levelled before development proceeds. On completion of construction these sites will be landscaped.

There will be an impact in the longer term to the topography of the area adjacent to Brown's Mountain as a result of disposal of the coarse and fine rejects. The filling of both areas will commence following the construction of the wash plant and its subsequent utilisation in year 10. Filling will generally occur in stages resulting in the formation of new topography at these locations.

### Soils

There will be an impact on the soils at each of the surface development sites and where mining subsidence occurs. Soil erosion during development will be minimised by stabilising exposed areas and control of surface drainage. When the mine is in operation, close attention will be paid to possible subsidence effects on surface drainage, especially in areas where erosion is already present. Similarly measures will be employed at the eastern site and at the rejects disposal area.

### Hydrology and Water Resources

Underground mining will impact on the hydrology in the area where mining takes place. The strata within this area has low permeability and is not a significant water resource. From a rock mechanics viewpoint, a connection between the caved rocks in the mining area, and the Hunter River alluvials is not expected since there will be a zone of unaffected rock strata separating the two areas.

A part of the proposed underground development requires the construction of two parallel roadways in the WUA Seam at depths of between 85 and 120m. Up to 18m of the cover is alluvium. The design of the roadways and the provision of a non yielding pillar with a safety factor of 3:1 will ensure that there is no effect on the water resources of the alluvial plain. Hydrological testing has demonstrated that the intervening strata between the base of the alluvium and the level at which the roadways will be located has low permeability.

With the exception of Sandy Creek which crosses the northern part of the proposed mining area, stream flows in the mining area are minor, limited to surface drainage after heavy rain.

## Air Quality

The environmental investigation has studied the impact of the development on air quality. Background dust levels have been gathered over a number of years.

Meteorological data from several stations including Kayuga has been used to determine the regional wind patterns.

The impact of the western site development is expected to be minimal. An increase in airborne dust could occur intermittently at one residence close to the eastern site when easterly winds occur. All other residential properties are more than 1km from the site and are not expected to be affected.

## Noise

Specialist studies were commissioned to assess the expected noise levels associated with the project. Background noise levels were taken at Kayuga, Aberdeen, and in the general location of the eastern site over 24 hour periods in accordance with standard procedures. An assessment of noise impact has been made for both the construction period and the operational phase of the proposed development.

At Kayuga during the construction stage the noise impact will mainly be associated with equipment during site clearing and construction of buildings. Transport of men and materials to and from the site through Kayuga will also raise noise levels. During the operational phase, noise associated with traffic movement will be significantly higher than current background levels. Some consideration may need to be given to noise attenuation at the western site.

Noise levels generated from the construction and operational phases at the eastern site will effectively be screened from the nearest residence by the railway embankment. Background traffic noise levels from the New England Highway makes it unlikely that construction and operational noise will exceed the levels set by guidelines.

## Visual Impact

The coal stockpiles and coal handling plant within the rail loop site will be highly visible due to the contrast between the dark colour of the coal stockpiles and angular lines of the plant with the landscape of Browns Mountain and its surrounding area. From the nearby New England Highway and the Main Northern Railway Line the development will be spatially dominant although the silhouette of the plant will be moderated by the backdrop of Browns Mountain.

The emplacement of coarse washery rejects at a nearby site on the western side of Browns Mountain has the potential to severely impact on the visual quality of this area. Colour and textural contrasts will occur, however the staged development of the reject disposal area will minimise this effect by confining the activity at any one time to a small part of the reject disposal site.

Minimal visual impact is anticipated as a result of colour and form of the tailings dam, the water body fitting naturally into the surrounding landscape. The dam wall however will result in the introduction of an imposing lineal element into

the natural landscape. Overall, the visual impact of the tailings dam is minimal due to the remoteness of the area and the effective screening by existing topography and tree cover.

In addition to the visual impact of the surface facilities during daylight hours, night lighting of the rail loop and the western site facilities could result in the developments being conspicuous and eye catching at night. Lighting placement will be done with this in mind to minimise any effect.

### **Mine Subsidence**

When coal is mined from a coal seam by underground methods, the support provided to the overlying rocks is removed. Rocks such as sandstone and shale can span over small distances, and not collapse into an opening below. When the distance to span over mined out areas becomes too wide, the rocks (or roof strata) break and fall into the space underneath. If enough roof rocks are affected by the collapse of rock into a mined area then effects can be carried through to the surface. The movement of the surface is known as subsidence.

Initial estimates of the subsidence likely to occur are based on the guidelines established by the DME for the Southern and Newcastle Coalfields. The methods are completely empirical, based on real subsidence monitoring of single seam workings. Accurate predictions of subsidence can only be made by survey as mining proceeds. Subsidence surveys will form part of routine operations at the mine.

The development of subsided areas across the proposed mining area logically follows the mining sequence. The size and complexity of the proposed multiseam operation precludes accurate subsidence prediction over the total area therefore an empirical approach has been adopted to obtain an indication of likely subsidence.

The main mitigating feature of the area is its lack of surface development, and lack of complex topography and drainages. While slopes and drainages will undergo several periods of subsidence, regular inspection coupled with sound erosion control practices can mitigate surface impacts. This applies to the smaller drainages as well.

There will be subsidence impacts along Dartbrook Road, and nearby areas including 3 houses which may be affected by up to 2m of subsidence over the life of the mine. Repairs and maintenance to the road, houses and other structures such as drains, culverts and power lines will be necessary.

Farm dams will be affected to varying degrees. The most effective way of mitigating damage is to monitor the structure as undermining occurs and carry out remedial repairs. The timing of mining operations can provide the necessary control for this approach.

Sandy Creek will be affected by up to 2m of subsidence over 21 years. It will be irregular, and will result in localised ponding. The few houses situated close to Sandy Creek will not be affected.

No major impacts from subsidence have been identified at this stage. It should be possible to maximise coal extraction for the 21 year period without causing long term environmental harm. The surface impacts of subsidence to residents and land owners are capable of being controlled or repaired with current levels of technology.

#### Other Issues

A site survey was carried out and no aboriginal sites have been identified which require preservation.

A survey was also carried out which confirmed that no rare or endangered flora or fauna are known or are expected to occur on the site.

A number of designated heritage sites have been identified in the area. However none of them will be affected by the mine development.

**DARTBROOK PROJECT**  
**PROPOSED**  
**UNDERGROUND MINING LEASE**  
**RESOURCES AND RESERVES**  
**(Millions of Tonnes)**

SEAM	IN SITU RESOURCES	MINEABLE RESERVES	RE-			20 YEAR ROM
			COVERABLE RESERVES	SALEABLE RESERVES		
UPPER PIERCEFIELD	69.5	*				
MIDDLE PIERCEFIELD	50.9	24.0	15.2	11.9	15.2	
KAYUGA	30.6	14.9	8.8	6.8	8.8	
LOWER PIERCEFIELD	121.7	45.5	30.7	23.8	15.4	
VAUX	45.2	-	-	-	-	
BROONIE	46.7	21.9	10.5	7.9	-	
BAYSWATER	162.4	↑				
UPPER WYNN	117.8	42.9	29.7	29.7	16.7	
EDINGLASSIE	40.0	↑				
<b>TOTALS</b>	<b>O/C</b>	69.5				
	<b>U/G</b>	575.3	149.2	94.9	80.1	56.1
		<u>644.8</u>				

\* UNQUANTIFIED OPEN CUT POTENTIAL

↑ UNQUANTIFIED UNDERGROUND POTENTIAL (EXCL. FROM TOTAL)