EIS 838

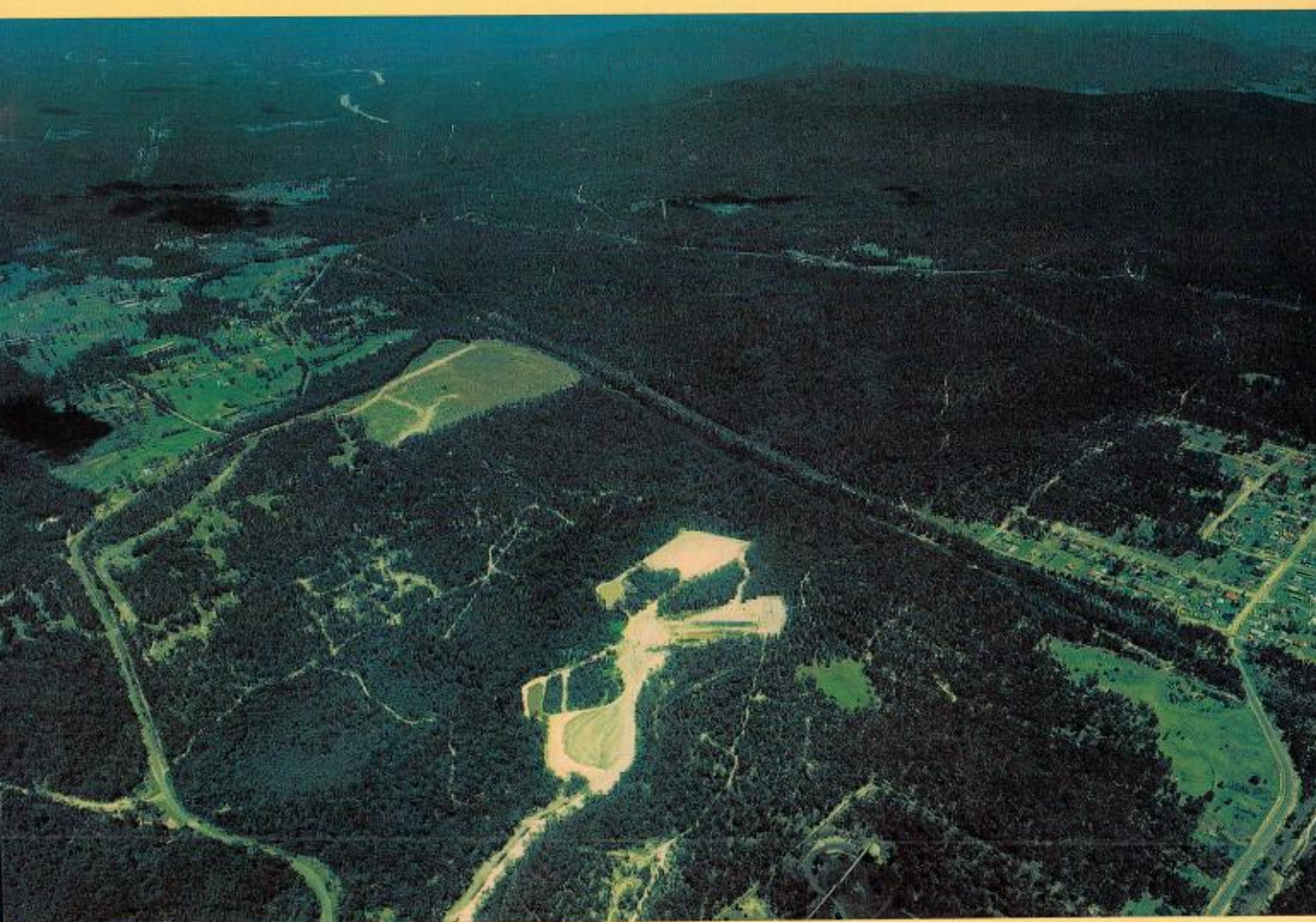
AB019539

Surface facilities for proposed Wakefield Colliery : environmental impact statement

FAI MINING GROUP

SURFACE FACILITIES FOR PROPOSED WAKEFIELD COLLIERY

Environmental Impact Statement



MITCHELL McCOTTER

SURFACE FACILITIES FOR PROPOSED WAKEFIELD COLLIERY

Environmental Impact Statement

Prepared by

Mitchell McCotter & Associates Pty Limited

Prepared for

FAI Mining Limited

November 1990

FORM 4

ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979

(SECTION 77(3) (d))

This Statement has been prepared by or on behalf of FAI MINING 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:

SURFACE FACILITIES FOR A PROPOSED UNDERGROUND COAL MINE TO BE KNOWN AS WAKEFIELD COLLIERY

The development application relates to the land described as follows:

No. Street WAKEFIELD ROAD

Locality/Suburb NORTHWEST OF WAKEFIELD NSW, IN THE PARISH OF TERALBA, COUNTY OF NORTHUMBERLAND

Property Real description VOL 3633 FOL 24 PORTIONS 52 & 132 PARISH OF TERALBA, LOT 4 DP 788115 PT. CT VOL 1750 FOL 56, FOL IDENTIFIER 7/755262 - LOT 7 DP 755262, FOL. IDENTIFIER 800/749388 - LOT 800 DP 749388.

(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 who prepared Environmental Impact Statement

TIMOTHY W MACOUN
BE MEngSc
66 SPIT ROAD, SPIT JUNCTION 2088

Certificate

I, TIMOTHY W MACOUN of MITCHELL McCOTTER & 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.

6TH NOVEMBER, 1990.

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SUMMARY

FAI Mining Limited (the company) plans to establish an underground coal mine in the Wakefield area, west of Lake Macquarie. This development will be known as Wakefield Colliery and is planned to commence coal production in 1992.

The colliery will operate for approximately 22 years and will be capable of producing up to 2.5 million tonnes of raw coal per annum. Coal will be transported from the colliery to Macquarie Coal Preparation Plant for treatment. Trucks will be used to transport coal on a private haul road, although the company is seeking approval to install an overland conveyor for this purpose at a later date, should the expenditure be justified.

The proposal also includes extending the raw coal stockpile and coal handling equipment at Macquarie Coal Preparation Plant. After passing through the preparation plant, coal from Wakefield will be railed to Newcastle for export.

The colliery will provide permanent employment for up to 260 people. Capital expenditure of approximately $100 million will be required to establish the colliery which will provide a stimulus to the region and the City of Lake Macquarie.

This environmental impact statement will be submitted to Lake Macquarie City Council as part of the formal development application seeking approval for the project. The company will seek subsequent approval from the Joint Coal Board to open the mine and from the Department of Minerals and Energy for coal extraction by longwall methods. Consideration of the consequences of longwall extraction, including surface subsidence, will be included in the application to the Department of Minerals of Energy.

THE COLLIERY SITE

The colliery's surface facilities will be established on a 9 hectare site in bushland to the north-west of Wakefield. This area is part of the upper catchment of Cockle Creek. Access to the site will be via a two kilometre access road from Wakefield Road.

PROJECT DESCRIPTION

The colliery will be developed over a twelve to eighteen month construction period. This will be followed by the development of underground access roads (headings) within the coal seam using continuous miners. A limited quantity of coal will be produced during this

period, expected to be one to two years in duration. Extraction of longwall panels will then commence, increasing coal production to planned levels. The colliery will operate on a 24 hour basis, six days a week with maintenance shifts on Sundays.

There are three components to the development proposal comprising the construction of:

- colliery surface facilities and access roads;
- coal transport facilities; and
- changes to Macquarie Coal Preparation Plant to handle the addition of 2.5 million tonnes per annum raw coal.

SURFACE FACILITIES

Colliery surface facilities will include structures and equipment providing access to the coal seam together with the coal handling plant, employee amenities, colliery services, workshops, administration offices, car parking and miscellaneous plant and equipment.

An 800 metre long inclined tunnel (drift) will be excavated to provide access to the coal seam. Personnel and mine equipment will be lowered to the coal seam by rail car. Mined coal will be transported to the surface by the drift conveyor. A vertical shaft will be established several hundred metres west of the main surface facilities site to provide ventilation and emergency egress for personnel.

The inclined drift conveyor will rise to a height of about 45 metres above ground to discharge into a 2,500 tonne coal storage bin. The bin will load directly into trucks or to an overland conveyor.

Emergency stockpiling capacity will be provided at the colliery for 15,000 tonnes of coal, to be used during abnormal operating conditions when the coal transport system is temporarily out of service. When this facility is in use, coal will be stockpiled by conveyor and reclaimed by front end loader.

Sewage effluent from colliery surface facilities will be treated in a sewage treatment plant. Output from the maturation pond will be pumped to the former Rhondda open cut mining site, just east of the colliery, where it will be disposed of by spray irrigation.

Rainfall runoff will be diverted around the colliery site as far as is practicable. Runoff from disturbed areas within the site will be directed to settlement dams before release to natural drainage.

Mine water removed from underground workings will be pumped to storage dams to be developed on the former Rhondda open cut mine. Water from these dams will be used for dust suppression or will be released to the natural drainage system.

A sealed roadway will be provided from Wakefield Road to the surface facilities site for use by employees and service vehicles. Part of this road will be common with the coal haul road. An unsealed maintenance road will continue from the surface facilities to the ventilation shaft.

COAL TRANSPORT

Coal will be transported from the colliery to Macquarie Coal Preparation Plant by trucks on a private haul road. The journey will be approximately seven kilometres in length, although only about two kilometres of haul road will need to be constructed for the Wakefield project. The remainder is either under construction for use by trucks from West Wallsend Colliery or will be constructed as part of the development of the nearby Westside Mine. The route of the haul road will proceed generally east from the colliery site, then north into the Westside Mine area.

Provision has also been made for an overland conveyor which may be constructed at a later date. The company has approval to construct a conveyor from West Wallsend Colliery to Macquarie Coal Preparation Plant. If the company decides to install an overland conveyor system, the extension of the conveyor to Wakefield Colliery would parallel Wakefield Road and the colliery access road.

MACQUARIE COAL PREPARATION PLANT

The raw coal stockpiling capacity at Macquarie Coal Preparation Plant will be increased from 40,000 to 80,000 tonnes. Stack out and reclaim capability will also be upgraded to handle the increased plant throughput necessitated by receipt of coal from Wakefield Colliery.

ENVIRONMENTAL ASSESSMENT

Under certain weather conditions some residents at Wakefield, Killingworth and nearby rural areas will be able to discern the sound of colliery plant and equipment. Noise levels at dwellings will comply with State Pollution Control Commission guidelines, except for one residence which is leased by FAI Mining Limited.

Should an overland conveyor be subsequently constructed, residential noise levels will increase slightly but will still be acceptable at all dwellings except for the house leased by the Company. FAI Mining Limited will retain the lease over this property for the duration of the mine.

Dust generation from the haul route will be controlled by providing a sealed section of road where the route is relatively close to the village of Wakefield. Unsealed sections of the haul road through Westside Mine will be regularly sprayed with water. Dust from the surface site will be controlled using fixed sprays fitted to the coal handling plant and stockpile areas. Based on dust measurements near West Wallsend Colliery, it is predicted that any alteration in current air quality at residences created by the Wakefield project will be minor.

Coal trucks will not travel on public roads. Wakefield Road will be used by mine personnel and service vehicles. At shift change times, the colliery could contribute up to 130 vehicles to public roads over a period of up to two hours. An incoming shift will arrive approximately one hour before the outgoing shift departs. Wakefield Road is being upgraded and will have the capacity to safely accept colliery traffic. The intersection of Wakefield Road with the colliery access road will be constructed to meet the requirements of Lake Macquarie City Council.

The colliery will not create significant alteration to visual perspectives in the area. The uppermost section of the coal bin and drift conveyor may be discernable through trees from some parts of Wakefield, but this would not be a major intrusion. Freeway travellers will observe the ventilation fan structure and upper sections of the coal handling plant but this is not regarded as incongruous in an area characterised by power stations, transmission lines and mining industry artifacts.

Pollution control devices will be installed at the colliery to ensure that the water quality in Cockle Creek is maintained. Mine water will not be released to Cockle Creek above the "wetland" area near Killingworth. This water will be used for dust suppression and any surplus will be treated at large storage dams where it can be released downstream of the

wetland after a long retention period. Surplus water may also be used as makeup water for Westside Mine.

A flora and fauna survey has been carried out over the area to be affected by the proposal. The most valuable vegetation community is that associated with the Cockle Creek flood plain. Disturbance to this area will be minimal. There are no rare or endangered species of flora or fauna which are directly threatened by this proposal.

The project incorporates proposals for the regular monitoring and auditing of the operation to ensure that environmental standards are complied with. Air quality, noise control and water pollution management will be subject to compliance with the State Pollution Control Commission requirements. Reports will be submitted to the Commission specifying the results of such monitoring. An Environmental Management and Rehabilitation Plan for the total development will be prepared and approved by Council before construction works commence.

The proposal will create employment for up to 260 people and will generate income for Australia from export sales of coal. Some $9 million per year will be spent to provide essential goods and services for the colliery, the majority of which will benefit local business. In excess of $20 million will be paid annually to Commonwealth, State and Local Government by way of taxes, fees and service charges.

ALTERNATIVES

Consideration was given to alternative pit top locations, alternative layouts for site facilities, coal transport alternatives and the consequences, for whatever reasons, of the project not proceeding. The proposal was considered to be superior to other development options. The option not to proceed would deny export earnings to Australia and nett benefits to the Lake Macquarie/Newcastle region.

CONCLUSION

Justification of the proposal rests on economic, social and environmental grounds. The proposal will bring positive economic benefits to the region and to Australia. Employment opportunities will be generated in an area where coal mining is an established industry with existing supporting services and facilities.

The environmental consequences of the project have been studied and a range of safeguards incorporated to control potential impacts. It is considered that Wakefield Colliery can be developed and operated in an acceptable manner to meet contemporary environmental standards.

1.0 INTRODUCTION

1.0 INTRODUCTION

1.1 THE PROPOSAL

FAI Mining Limited (the company) proposes to establish an underground coal mine in the Wakefield area, west of Lake Macquarie. The mine will be known as Wakefield Colliery and will supply coking and steaming coal to local and international markets.

The coal leases and freehold property to be occupied by surface facilities of the colliery are owned by FAI Mining Limited. The land is mostly forested, with gently rolling terrain in the foothills of the Sugarloaf Range.

Surface facilities for the mine will be located west of Wakefield Road near the F3 Freeway, which is presently under construction. Access will be from Wakefield Road. Figure 1.1 shows the location of the proposal. The colliery is planned to produce up to 2.5 million tonnes of raw coal per year from the West Borehole seam and will operate for up to 22 years.

It is proposed to transport raw coal to Macquarie Coal Preparation Plant initially by truck, using a private haul road. Treated coal will be taken by rail to an export coal loader. During a later stage of the project, a coal conveyor may be constructed to link the mine with the preparation plant.

The colliery will provide permanent employment for up to 260 people. Establishment of the colliery is estimated to cost $100 million.

1.2 THE COMPANY

FAI Mining Limited is the principal resources development division of FAI Insurances Limited. The company operates all of the former coal interests of Pacific Copper Limited and Barix Pty Limited. These interests include the former BHP Macquarie Collieries, Great Greta Colliery and the Mitchells Flat Project in the Hunter Valley, as well as Rhondda Collieries in Queensland.

In the Lake Macquarie district, FAI Mining Limited owns Lambton Colliery, Teralba Colliery, West Wallsend Colliery, the Macquarie Coal Preparation Plant and coal leases in the Lambton, West Wallsend and Westside colliery holdings, the latter which includes the Wakefield area as shown on Figure 1.1. The company has recently been granted a

development approval by Lake Macquarie City Council for Westside Mine, a small open cut mine to be developed just north of the current Wakefield proposal.

In New South Wales, FAI Mining Limited employs over 1000 people in mining and ancillary operations and produces more than three million tonnes of saleable coal each year.

1.3 BACKGROUND

Coal was discovered at Newcastle in 1791. Subsequent development of the Hunter Region was based on the mining operations in the Newcastle Coalfield. Mining has been undertaken on the western side of Lake Macquarie since 1857. The first shaft was sunk at Minmi and was followed by other coal mine developments such as West Wallsend, Young Wallsend, Mount Sugarloaf, Seaham No. 1 and No. 2, Killingworth (or West Wallsend Extended) and Rhondda collieries. These mines operated at different times between 1888 and 1978 and are now all closed.

Two well known operating mines in the area are now over 100 years old, Newstan Colliery and Stockton Borehole (now called Teralba) Colliery. Both these mines initially used pick and shovel methods to mine the coal. They now utilise fully mechanised longwall systems.

Another mine in the Wakefield area is West Wallsend Colliery (formally known as West Wallsend No.2 Colliery and now owned and operated by FAI Mining). This mine started operations in 1969 and now also uses longwall methods to extract coal from the Borehole seam.

The main seams mined on the western side of Lake Macquarie are the Great Northern and Fassifern seams in the upper part of the coal measures, and the Young Wallsend and Borehole seams at the bottom of the Newcastle Coal Measures. Operating collieries on the western side of the Lake and their production rates are shown in Table 1.1.

FAI Mining has recently been granted development approval by Lake Macquarie City Council to establish Westside Mine, a small open cut coal mine to extract the Great Northern and Fassifern seams east of Killingworth. This mine is expected to commence coal production early in 1991 and produce up to 600,000 tonnes of coal per year over a ten year life.

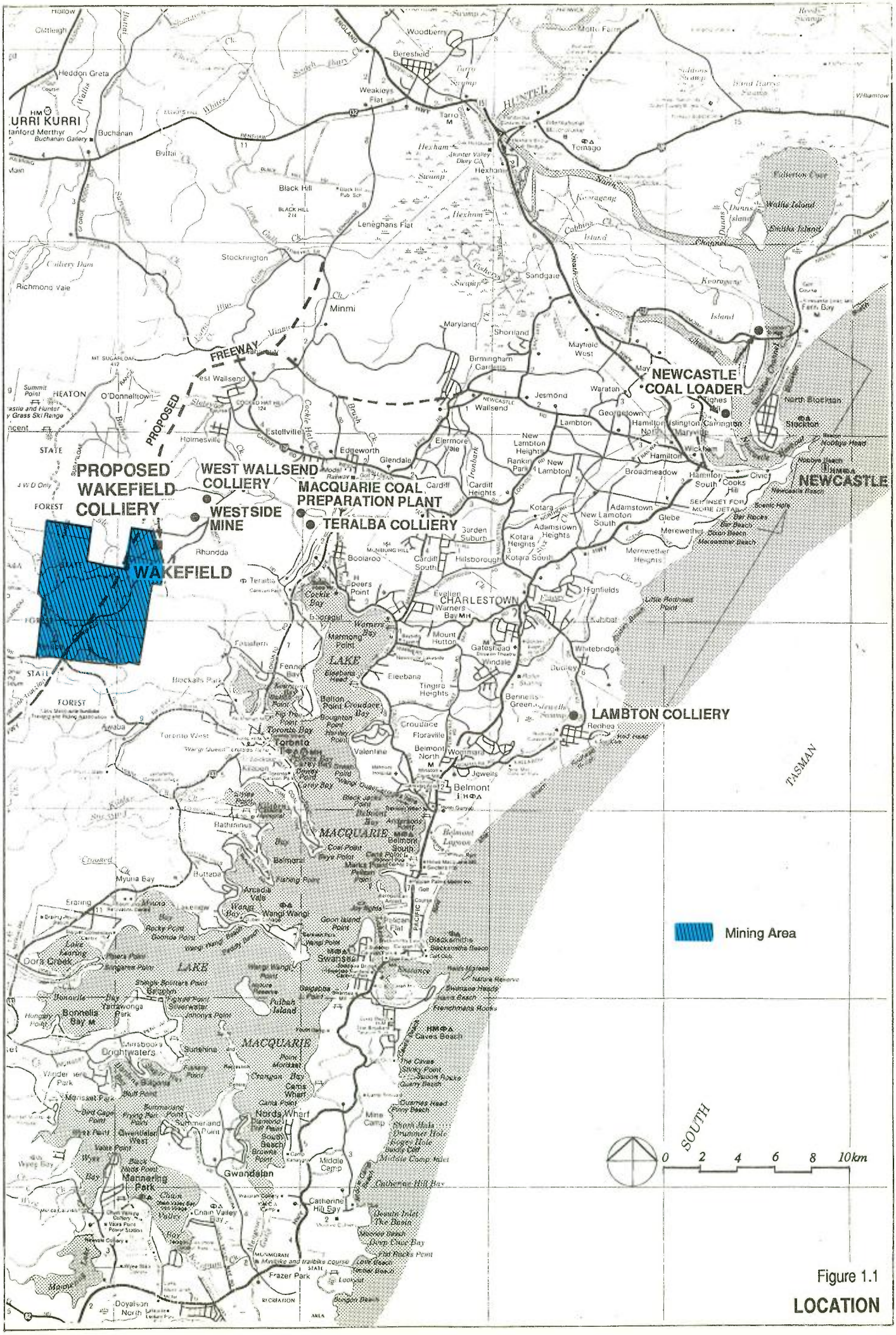


Figure 1.1

LOCATION

TABLE 1.1
COAL PRODUCTION
FROM COLLIERIES WEST OF LAKE MACQUARIE (1988 - 1989)

Colliery	Annual Raw Coal Production *tonnes*
Teralba	1,034,400
West Wallsend	762,000
Newstan	1,659,500
Awaba State	874,100
Myuna	1,405,000
Cooranbong	1,215,700
TOTAL	6,950,700

Source: NSW Coal Year Book 1988-89, Joint Coal Board

Mining operations in the Wakefield area commenced in 1976 when BHP's Northern Collieries gained development approval to construct surface facilities at Wakefield. Some site work was undertaken to construct a drift and tunnel for the mine. However, by December 1977, BHP had changed its plans and work ceased. During the 1980's BHP developed new plans to open a mine in the Wakefield area but no firm proposals were put forward.

Ownership of the coal leases passed to Bond Corporation in May, 1989 when BHP sold all its Newcastle coal mining interests. In January, 1990 Bond Corporation sold all of its coal interests, including title to the Wakefield coal leases, to the FAI Insurance Group. FAI Mining Limited is the operating company which owns and manages the coal mining interests of the group.

The mining area at Wakefield is shown on Figure 1.2. The mining area falls partly within the Killingworth - Wallsend Mine Subsidence District, proclaimed in 1971 and partly within the Westlake Mine Subsidence District, proclaimed in 1979. Proclamation of these districts allows the Mine Subsidence Board to control surface development so that future underground mining of coal is not unnecessarily restricted by inappropriate surface development. The location of the Sydney to Newcastle Freeway through the Wakefield area was determined in consultation with mining companies and the Mine Subsidence Board.

Since 1986, the extent and quality of coal reserves have been investigated in detail. The Sydney to Newcastle Freeway and nearby natural gas and petroleum products pipelines pass

through the mining area and are expected to be protected by subsidence restrictions. For this reason separate longwall extraction areas are proposed to the east and west of the freeway and pipelines corridor.

The mine plan provides for the eastern area to be mined first to produce both coking and energy coal followed by the western area which will primarily produce energy coal. Initial longwalls are planned for the north-eastern part of the lease, where the surface facilities will be located.

1.4 OBJECTIVES OF THE PROPOSAL

FAI Mining Limited is advancing the Wakefield Project because the company believes that the colliery is economically viable under future market conditions. The broad objectives are to:

- extract the maximum practicable amount of coal from within the lease area;
- operate the colliery as safely, efficiently and profitably as possible; and
- maintain acceptable environmental standards throughout the life of the project.

1.5 COMMUNITY CONSULTATION

The company has actively promoted discussion with the local community when planning the colliery. A community newsletter was prepared and distributed to residents in Wakefield during February, 1990. Copies were hand delivered to households. The newsletter introduced the proposal and invited residents to contact either the company or the consultant (Mitchell McCotter and Associates) should they seek further information or wish to make comments or express any views.

Matters of concern raised by residents were taken into account in conceptual design of the colliery and preparation of this environmental impact statement.

In addition, public and private authorities whose interests could be affected by the proposal were briefed on the project and their input sought. Responses from these bodies are

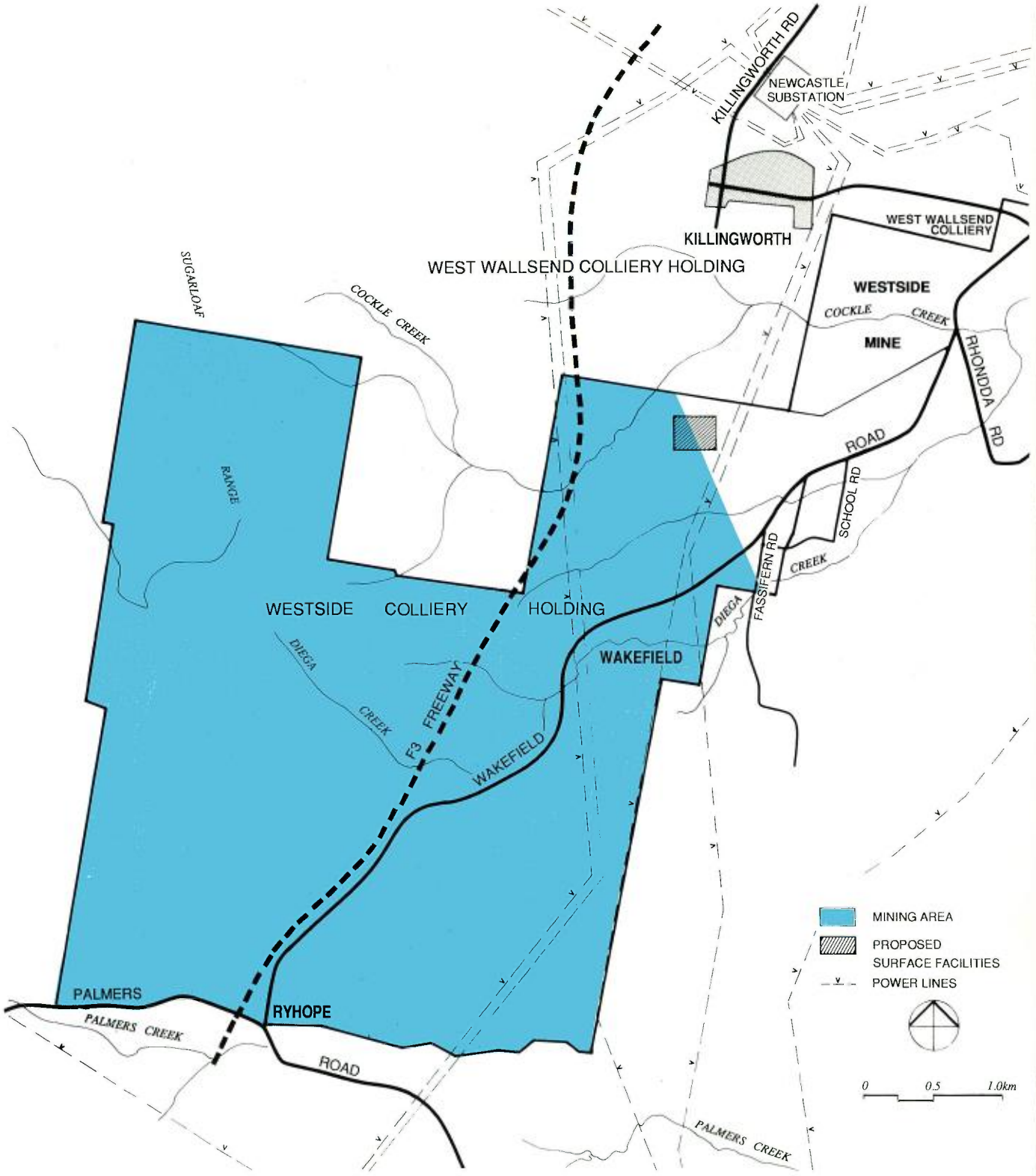


Figure 1.2

LEASE AREA

summarised in Appendix 7.4. Discussions were also held with officers of Lake Macquarie City Council.

During June 1990, officers of FAI Mining Limited and Mitchell McCotter and Associates attended a meeting of the Wakefield Progress Association to outline the proposal and answer questions.

1.6 DECISION-MAKING PROCEDURE

- **Surface Facilities** - Lake Macquarie City Council is the consent authority for construction of surface facilities. This includes all the above-ground facilities required for the mining and transport of coal and the sinking of access tunnels (drift and shaft) to the coal seam.

  Lake Macquarie City Council will place this EIS on public exhibition and accept written representations from organisations and members of the public. Council is required to take into account these representations when making its decision.

  Should development consent be forthcoming it will be conditional and will specify the basis under which the project may proceed. The company will then seek building approval from Council for the various buildings and structures to be erected on the property. At the same time, application will be made to the State Pollution Control Commission for approval to construct surface facilities.

- **Mining Approval** - for the company to proceed with underground coal mining, consent will be required from the Joint Coal Board under Order 27. This is required before commencing to excavate access tunnels from the surface to the coal seam, or to produce coal from the mine.

  Approval for coal extraction by longwall methods, which is the intended method for winning the bulk of the coal will be subsequently obtained from the Department of Minerals and Energy. In considering an application for longwall mining, the Department will take into account the environmental consequences of this method of extraction. Surface subsidence is one of the effects of extraction of coal by longwall methods which the Department will consider. Detailed mining plans will be

prepared by the company, and the Department will assess the mining proposal at the appropriate stage.

2.0 PROJECT DESCRIPTION

2.0 PROJECT DESCRIPTION

This environmental impact statement examines a proposal to develop and operate an underground coal mine at Wakefield. The developmental works comprise:

- **colliery surface facilities;**
- **coal transport facilities;** and
- upgrading and extension of stockpiling facilities at the **Macquarie Coal Preparation Plant** at Teralba.

Figure 2.1 shows the arrangement of these three components.

Colliery surface facilities will be constructed in the Wakefield area and include pit head infrastructure such as coal handling plant, employee amenities, workshops and an access road. A ventilation shaft with a fan and emergency egress facility will be located on a separate site, linked to the main surface facilities by an access road.

Coal transport will require construction of up to two kilometres of private haul road, to link surface facilities with another private haul road (presently under construction) leading from Westside Mine and West Wallsend Colliery to the Macquarie Coal Preparation Plant. Approval is also being sought for a future overland conveyor which may be constructed from Wakefield Colliery to the preparation plant.

Works at **Macquarie Coal Preparation Plant** are required to increase total storage capacity for raw coal and increase the stack out and reclaim capability.

2.1 SURFACE FACILITIES

2.1.1 Pit Top Site

Figure 2.2 shows the location of pit top surface facilities, access and haul roads, ventilation shaft, and the route of the future coal conveyor. The pit top area will be located north-west of Wakefield village on the opposite side of a ridge in the Cockle Creek valley system. Killingworth is located about two kilometres north of the site. This township is beyond

another ridge and into the next valley system. Two wood-pole transmission lines pass just east of the surface facilities site heading approximately north-south.

The site access road will remain on the northern side of the ridge to connect with Wakefield Road, generally following the route of an old haul road used in conjunction with the former Rhondda open cut mine. The route of this road will traverse an area of regenerating plant growth which was formerly Rhondda open cut mine. Mining operations on this land were completed in 1984.

At the present time the site is bushland and slopes gently to the north-west. There is no vehicular access, although transmission line maintenance trails lead to within a few hundred metres of the site.

The surface facilities and access road will be located entirely on property owned by FAI Mining Limited. This land is described as part of Portion 6 and Portions 7, 8, 52, and 132 Parish of Teralba, County of Northumberland.

2.1.2 Layout and Description of Pit Top

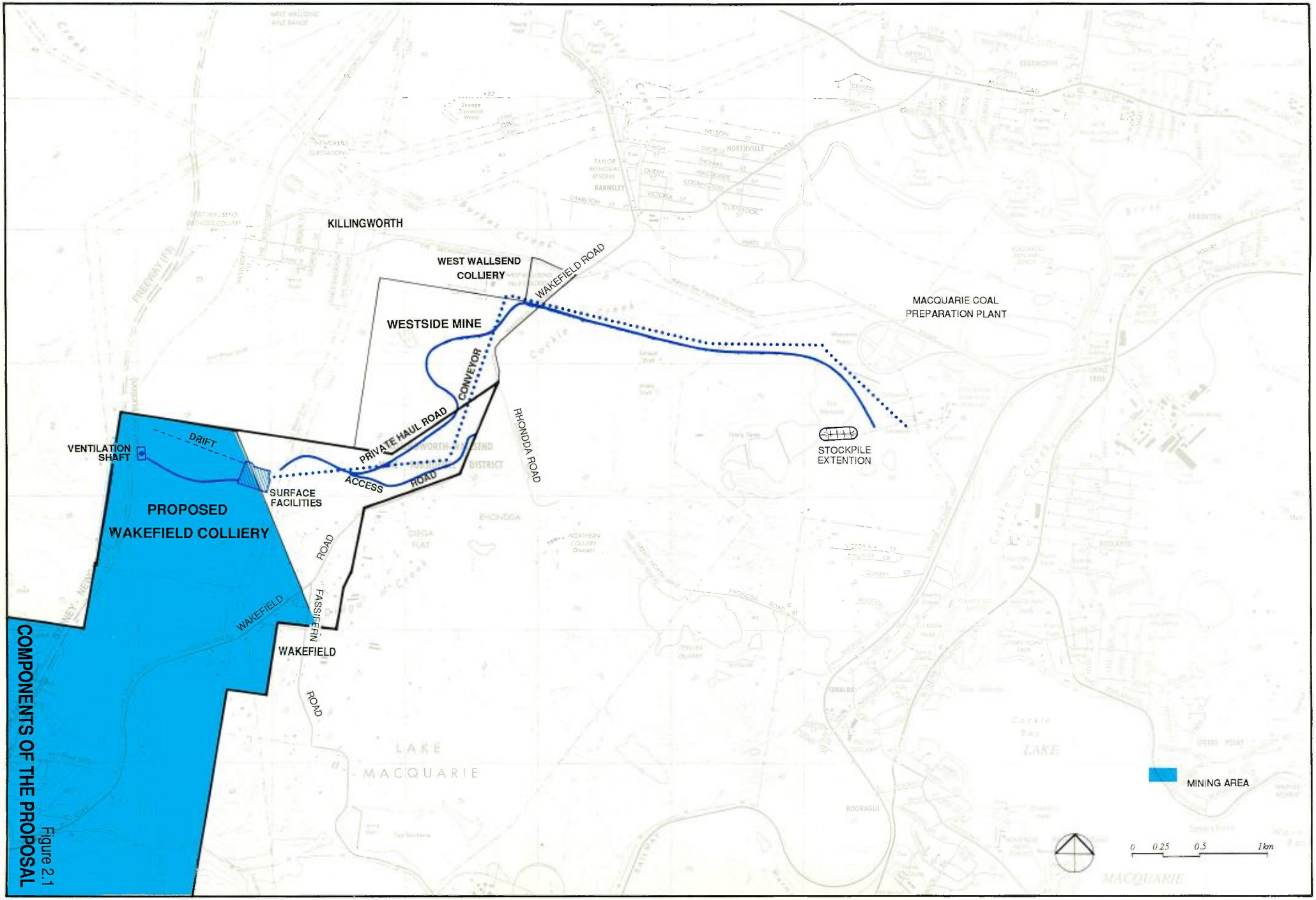
Pit top surface facilities will occupy approximately nine hectares. The proposed layout of this area is shown on Figure 2.3.

(i) Drift

An 800 metre long drift (inclined tunnel) will descend from the surface in a westerly direction to the West Borehole coal seam. The drift will have an rectangular cross section approximately seven metres wide by three metres high. The drift will incorporate a 3,800 tonne per hour coal conveyor and a haulage winder for transporting personnel, equipment and materials. The haulage winder will haul rail-mounted trolleys from the coal seam to the surface. Rail tracks will be laid at the surface to allow trolleys to be manoeuvred to the loading ramp, workshops and other destinations.

(ii) Coal Handling Plant

After emerging from underground, the drift conveyor will discharge into a 2500 tonne raw coal storage bin.



COMPONENTS OF THE PROPOSAL

Figure 2.1

Figure 2.2
LOCATION OF SURFACE FACILITIES

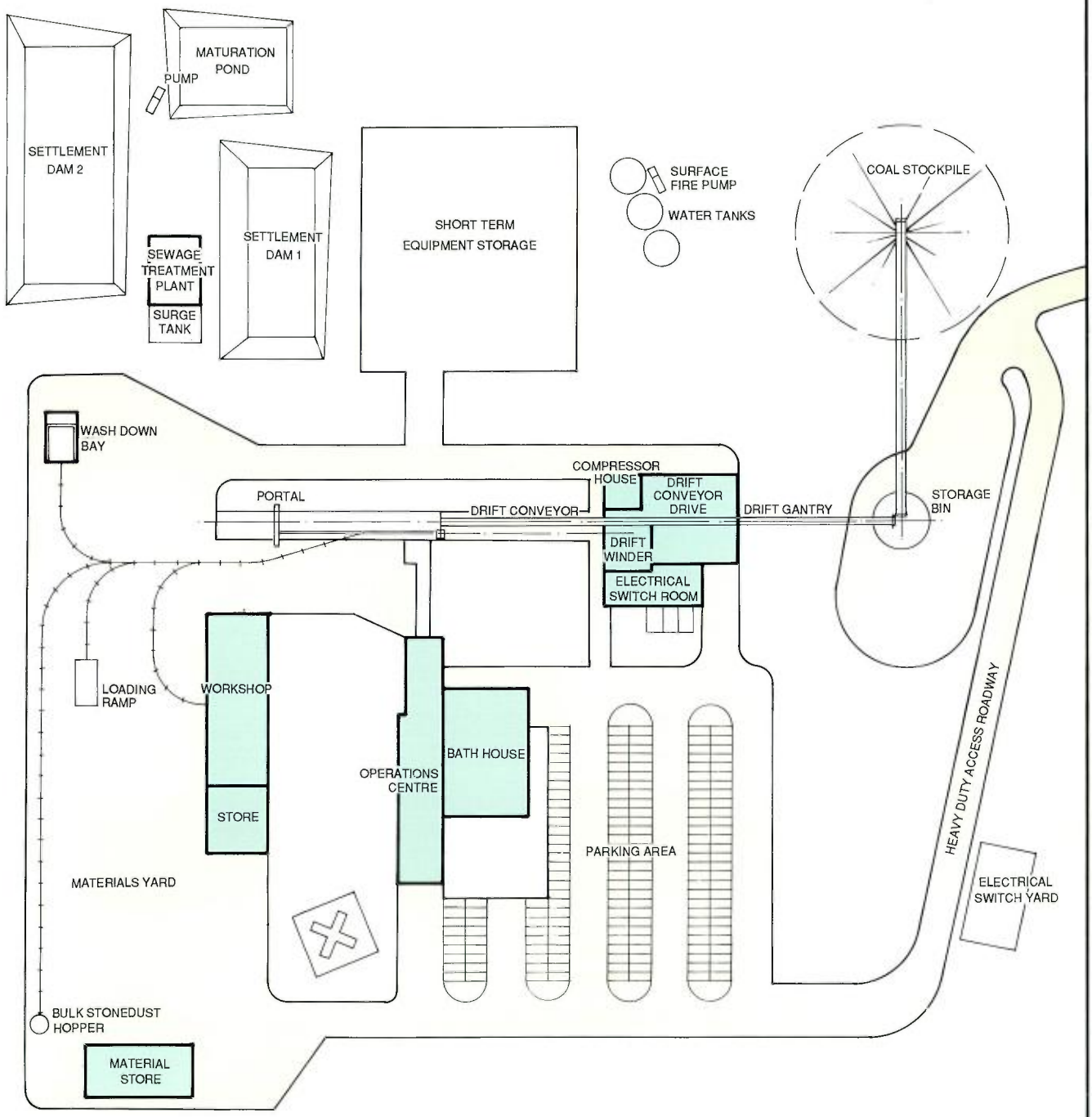


Figure 2.3
SURFACE FACILITIES LAYOUT

Coal will feed by gravity into trucks for haulage to the Macquarie Coal Preparation Plant. The bin design will also allow for the loading of a future overland conveyor.

Emergency stockpiling of coal will only take place under circumstances where it is not possible to load coal into trucks or onto the conveyor. It will be possible to discharge coal from the drift belt to an emergency stockpile area adjacent to the bin. Any stockpiled coal will be reclaimed by front-end-loader, which will load directly into coal trucks. The emergency stockpiling area will have a capacity of 15,000 tonnes of coal.

Above-ground sections of the drift conveyor will be fully covered, sheeted on both sides and have internal walkways on both sides of the conveyor. The emergency stack-out conveyor from the top of the storage bin is at right angles to the drift conveyor. The storage bin will be approximately 45 metres high, as shown in Figure 2.4.

(iii) Site Buildings

The bath house and operations centre will be the focal point for workforce activities. These buildings will be interconnected and linked by covered walkway to the drift entrance.

A workshop and adjoining store will be provided for equipment maintenance, sited within a sealed materials yard with a covered area for the storage of bulk materials.

A building will be constructed to house air compressors, the drift winder and the drift conveyor drive plant.

(iv) Miscellaneous

Other development in the pit top area will include roadways, car parking facilities, electricity and water supply infrastructure, storage areas and stormwater and drainage control equipment.

The surface facilities will be fenced, with gates provided across the access and coal haul roads. A separate gate will be installed near the intersection of the access road and Wakefield Road.

(v) Access and Haul Roads

A sealed road will be constructed from Wakefield Road to the surface facilities. Part of this road will also be used as a haul road up to where the haul route diverges into Westside Mine. Drainage systems and sediment traps will be provided along the road and batters will be stabilised to reduce the risk of erosion.

The road will have a marked centre line and appropriate sign posting. Wakefield Road will be upgraded at the intersection to provide a turning lane for each direction of travel to cater for colliery traffic entering or leaving the access road. Intersection work will meet the requirements of Lake Macquarie City Council.

2.1.3 Ventilation Shaft

A ventilation shaft is to be located on the western side of Cockle Creek near the Sydney-Newcastle freeway. The shaft site is shown on Figure 2.2.

The shaft site has been located to be above the lower end of the drift (at seam level). At the surface, one or two fans will be installed to draw air from the mine. The decision on the number of fans has yet to be made and will be determined by the degree of operational flexibility required.

A small elevator for personnel will also be incorporated in the shaft to be used in gaining access to the seam or escape from the mine in the event of an emergency. The shaft will be fully lined with concrete for stability reasons. Figure 2.5 shows a typical arrangement of the ventilation fan enclosure.

An unsealed access road will be constructed to link the ventilation shaft with the main pit top area. This road will deviate to the south to cross Cockle Creek at a point where the flood plain is relatively narrow. Suitable drainage and sediment control will be provided for this road with culverts for the Cockle Creek crossing.

Material excavated when constructing the ventilation shaft will be spread over the shaft site and used to improve the access road. This site will be separately fenced from the main surface facilities.

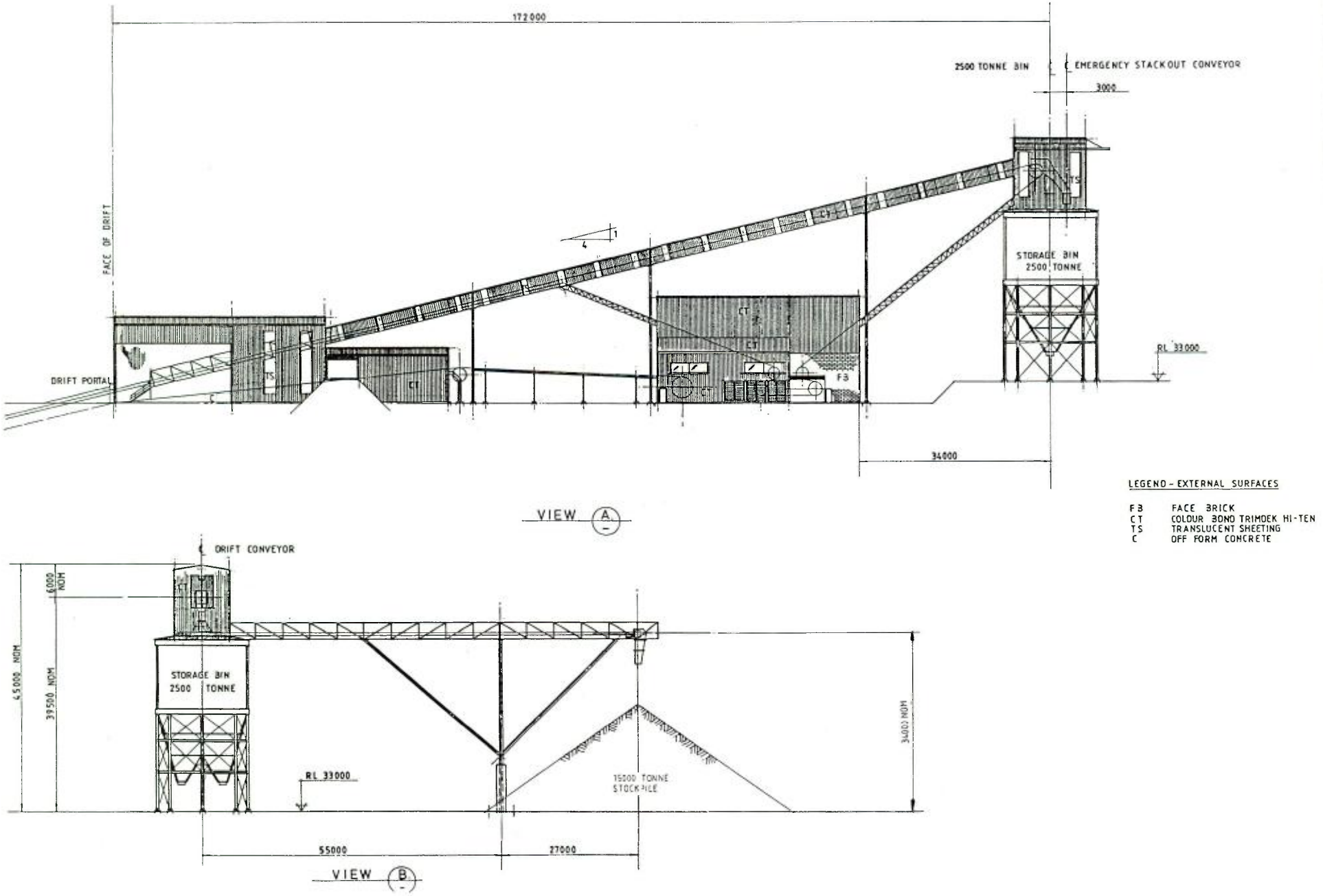
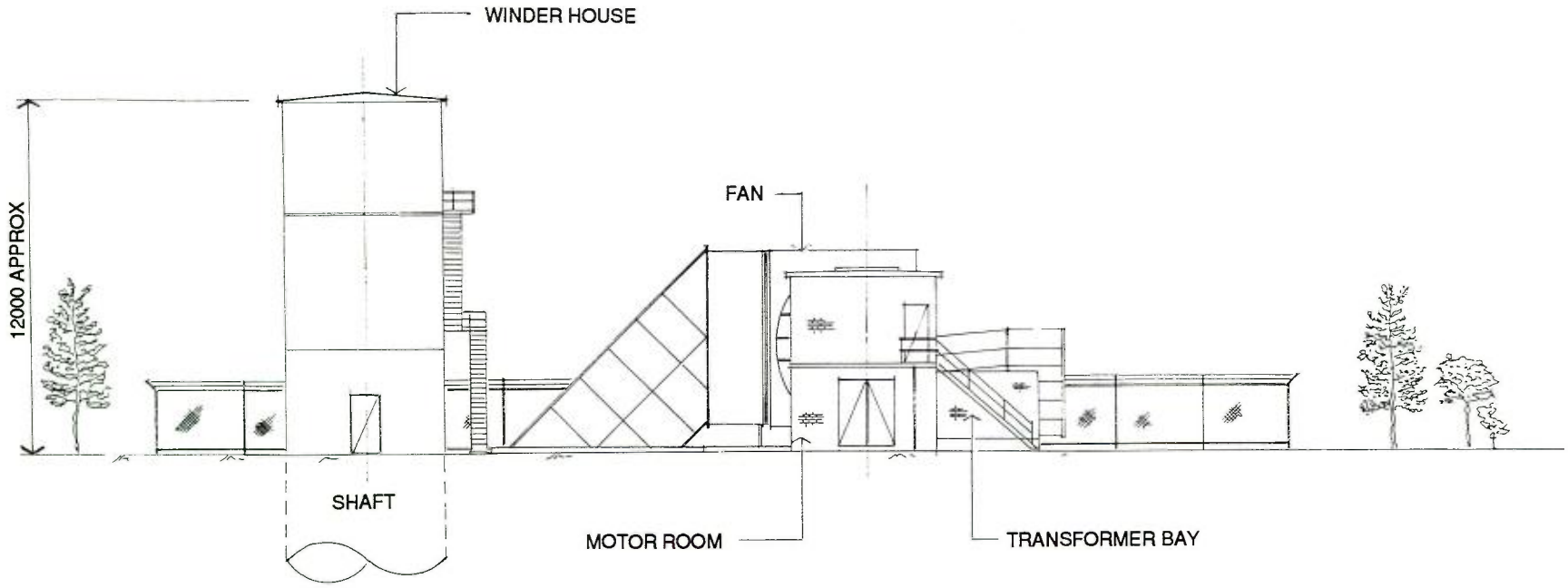
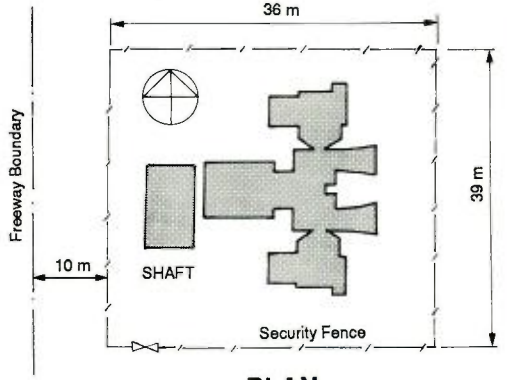


Figure 2.4

ELEVATION OF COAL HANDLING PLANT



NORTHERN ELEVATION



PLAN

Figure 2.5 TYPICAL ARRANGEMENT OF VENTILATION SHAFT SURFACE STRUCTURE

A second ventilation shaft may be required to the south-west of the pit top area at a later stage of mine development. Separate development approval would be sought when its need is confirmed and a site has been selected.

2.1.4 Construction

Construction of surface facilities will occur over a twelve to eighteen month period. Excavation of the drift tunnel is a substantial task and will continue throughout the construction period.

The initial construction activity will be vegetation clearing. Trees and shrubs will be removed from all working areas, but retained where practicable in areas to be landscaped around the car park and site buildings. Retention of natural vegetation on parts of the site will be determined with consideration for the practical needs of construction and mine operation and sound bushfire prevention practices.

Catch drains will be provided as part of clearing operations to direct surface runoff around the site. A sedimentation pond with feeder drains will also be constructed at this stage to collect runoff water from the cleared area.

Useful timber resulting from vegetation clearing will be sold or made available for uses such as milling, pit props, fence posts or firewood. The remainder will be disposed of on site by burning or a combination of burning and mulching. Mulched tree crowns will be of assistance in landscaping.

Additional clearing will be required for the power and water supply to the colliery as described in Section 2.6.

The drift will be excavated using a road-heading machine or by using drilling and blasting techniques. Excavated material will be used in forming the pit top area. Possible uses include levelling and preparing parts of the site for sealing or erection of structures, construction of the mine dam and sedimentation ponds and construction of the access and haul roads.

The drift tunnel from the surface to bedrock will be lined with concrete. Other sections of the drift will be lined as required for stability.

A hardstand area is proposed for the materials yard and connecting roadway leading to the drift portal.

2.2 COAL TRANSPORT

2.2.1 Haul Road from Colliery To Preparation Plant

Coal will be transported from the colliery to the Macquarie Coal Preparation Plant via a private haul road. The haul road will be located entirely on land owned by the company.

The haul route is shown on Figure 2.1. The distance to the coal preparation plant will be approximately seven kilometres. The first two kilometres of the haul road will be constructed for this project. The balance will be constructed to carry coal from Westside Mine and West Wallsend Colliery to the preparation plant. This latter section of road is currently under construction. An underpass is to be constructed to take the haul road beneath Wakefield Road.

The new section of haul road to be constructed for this project will have a sealed surface. Sealing this section of road is proposed for control of dust emissions.

Truck traffic will vary from 260 to 400 loads per day, depending on truck size.

2.2.2 Overland Conveyor Option

Approval is sought as part of this application for an overland conveyor that is to be installed at some future date, depending on the economies of conveyor transport. Development consent has been granted to FAI Mining Limited for the installation of a conveyor system from West Wallsend Colliery to Macquarie Coal Preparation Plant.

The company has received subsequent approval to construct the access road for this future conveyor as a haulage road for coal transport. This roadway is currently under construction and will be used by coal trucks from both West Wallsend Colliery and Westside Mine. A decision regarding construction of the conveyor will be made at a future date.

A conveyor link to Wakefield Colliery would be an extension of a conveyor from West Wallsend Colliery. The proposed route is shown on Figure 2.2.

The conveyor system would be designed for a capacity of 1,800 tonnes per hour on a 1,200 mm wide belt. Transfer stations will be required at the change of direction shown on Figure 2.2 and at the point of intersection with the West Wallsend conveyor. A light duty access road would be constructed beside the conveyor between Wakefield Colliery and West Wallsend Colliery for construction and maintenance purposes. This road would not be continuous over Cockle Creek. The conveyor would have a wind shield on one side for dust control and noise suppression. Figure 2.6 shows a typical cross section of the conveyor structure.

At transfer stations, the discharging conveyor would elevate to approximately five metres above ground. A 12 metre high take-up tower may be erected as part of this structure to suspend a belt-tensioning weight. Transfer chutes would be enclosed for dust control. Figure 2.6 also shows an elevation of a typical transfer station. Electricity supply for conveyor drives would be provided by a cable attached to the conveyor structure.

A ten metre wide cleared strip will be required for construction purposes. This will provide for a three metre access road beside two metre wide conveyor structure. Some regrowth will be allowed to occur in the corridor after construction although clearance will need to be allowed for inspection, maintenance and fire fighting purposes. Table drains will be constructed beside the access road with culverts beneath the roadway where necessary.

The base area of transfer stations will be concreted and appropriate drainage structures installed to divert runoff to prevent erosion. Runoff at transfer stations will be directed to a sump with a drive-in facility for removal of sediment.

2.2.3 Preparation Plant to Coal Loader

Coal is transported from Macquarie Coal Preparation Plant by rail. A rail loop and loading facility is installed at the plant for this purpose. Additional throughput at the preparation plant resulting from Wakefield Colliery can be accommodated with this loading facility.

The State Rail Authority has advised that the rail network from the coal preparation plant to the loaders can handle the additional coal resulting from development of Wakefield Colliery. Wakefield coal will be railed to the Newcastle coal loaders for export.

2.3 MACQUARIE COAL PREPARATION PLANT

Run of mine coal is treated at Macquarie Coal Preparation Plant to produce coking coal, energy coal and reject material. The plant has a capacity to treat 900 tonnes of raw coal per hour. At the present time the plant receives coal from Teralba and West Wallsend collieries. During 1989 the coal preparation plant treated 1.8 million tonnes of raw coal. Greater quantities have been treated in other years.

The output of Westside Mine, planned to be up to 600,000 tonnes per annum, will also be processed at the preparation plant when this mine commences operation early in 1991.

The existing raw coal stockpile capacity at the plant is 40,000 tonnes. To handle additional coal from Wakefield Colliery it is proposed to increase this storage capacity to 80,000 tonnes. This will necessitate upgrading the stackout and reclaim apparatus. It is intended to double the stackout rate to 2,000 tonnes per hour.

Increased stockpile capacity will be obtained by extending the length of the existing stockpile in a westerly direction. Rails and conveyors associated with the mobile stacker and reclaimer will be extended by 185 metres. The stackout rate will be increased by doubling the belt speed of the stacker and boom conveyors. Provision of a more powerful drive unit will increase the reclaim capability.

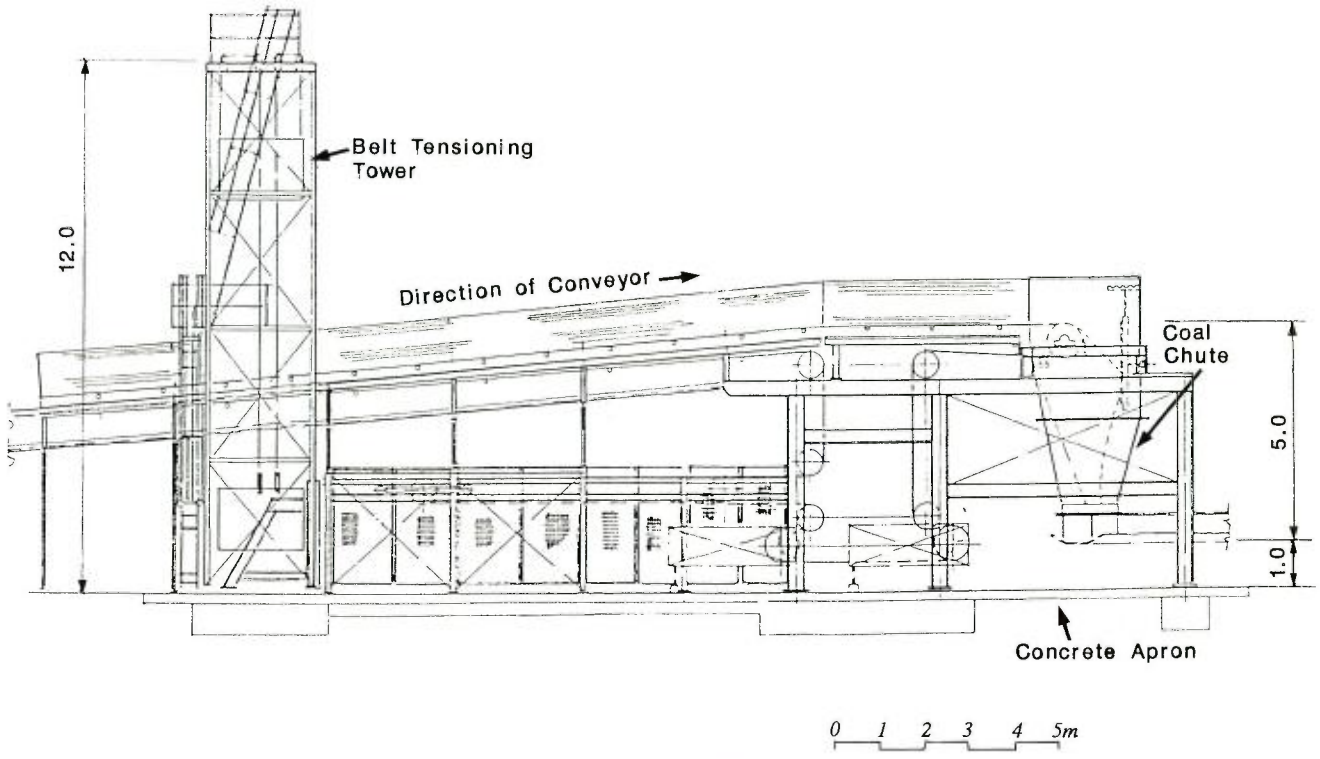
Figure 2.7 shows the layout of the preparation plant with the proposed stockpile extension added.

Rainfall runoff from the existing raw coal stockpile drains to the No. 1 and No. 2 catch dams to allow settlement of suspended material. This water is either used for dust suppression on haul roads, or released to natural drainage.

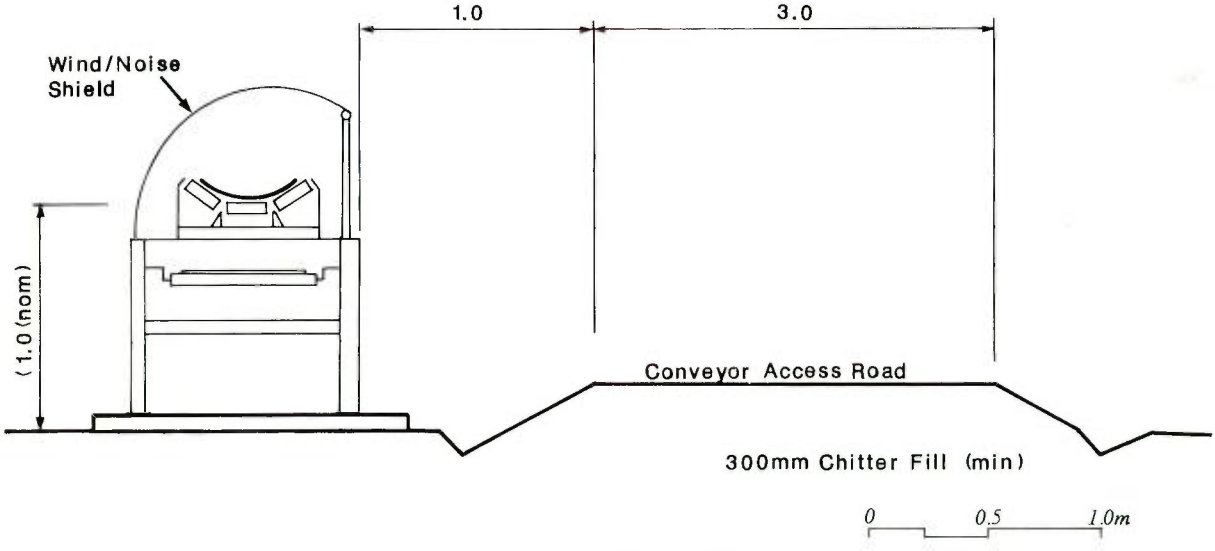
The proposed stockpile extension will be developed on adjoining land which will drain to the No. 1 catch dam. This dam has capacity to accept runoff from the extended stockpile.

Dust suppression on the existing stockpile is carried out by sprays fixed along the sides of the stockpile area. This system will be augmented to cover the extended stockpile.

The stockpile extension will occupy part of the existing emplacement area for coarse reject from the coal preparation plant. This will reduce the remaining capacity for coarse reject disposal by 35%. The additional plant throughput resulting from the processing of Wakefield



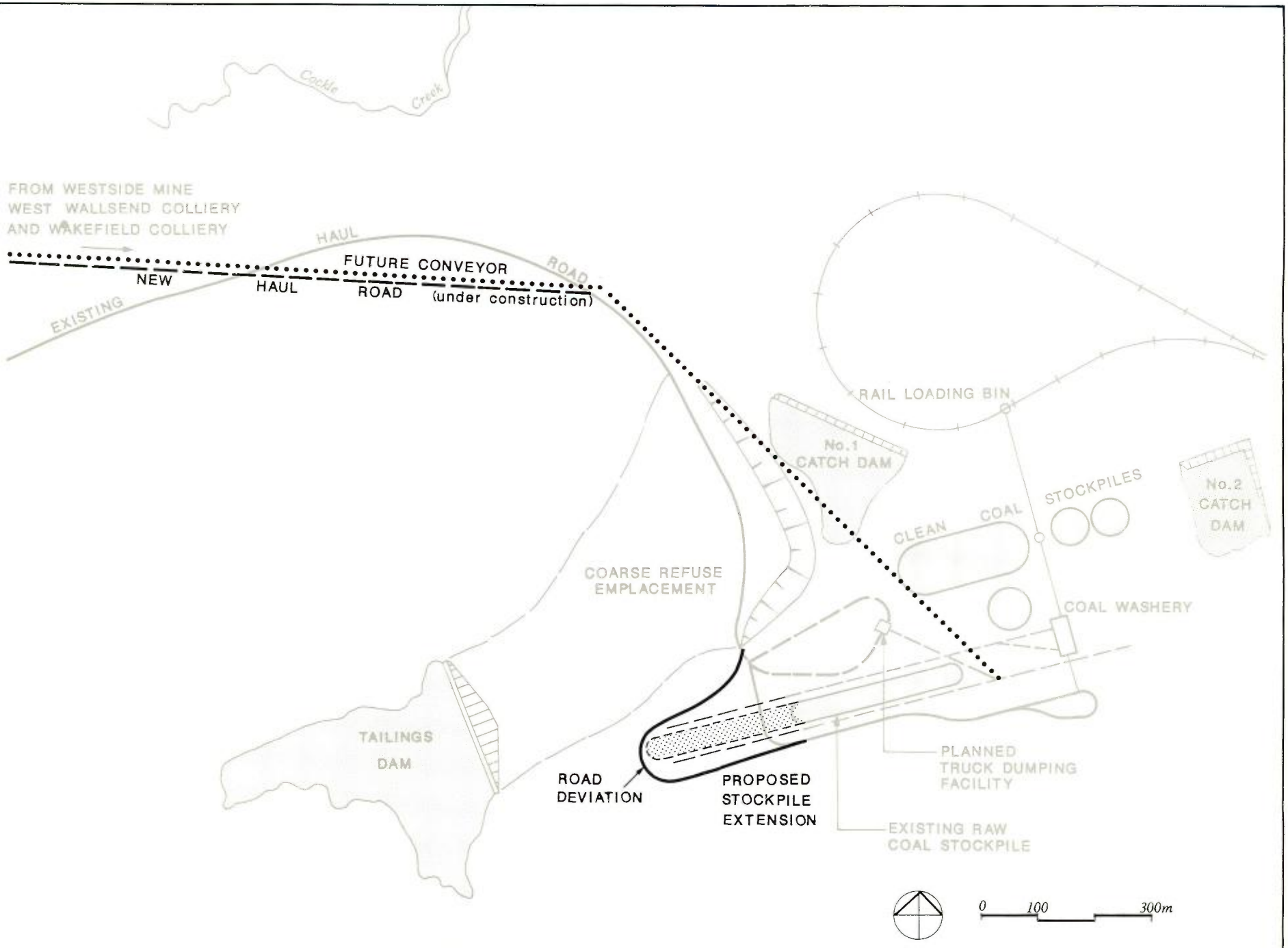
ELEVATION OF TYPICAL TRANSFER STATION



CROSS SECTION OF OVERLAND CONVEYOR

Figure 2.6

TYPICAL CONVEYOR DETAILS



MACQUARIE COAL PREPARATION PLANT

Figure 2.7

coal will also reduce the life of the reject emplacement area and will result in an increase in the filling rate of the tailings dam.

The company is aware that this reduction will advance the need to provide a suitable replacement area for refuse disposal and is currently investigating available options. There are approximately nine years of life in the existing facility before it will become necessary to provide additional facilities for disposal of tailings and coarse reject. A development application for this purpose will be submitted to Lake Macquarie City Council at the appropriate time.

2.4 WATER MANAGEMENT

2.4.1 Introduction

The colliery requires a water supply for the following purposes:

- bathhouse and office amenities;
- the operation of underground mining equipment;
- underground dust suppression and fire fighting;
- above ground dust suppression for stockpiles, coal handling plant and unsealed roads; and
- surface fire fighting.

A water management plan identifies the most appropriate source of water for colliery use, determines the means of distribution of the water, and provides for the collection, treatment, use and/or disposal of waste water and stormwater generated within the colliery or its surface facilities area.

Potable (or drinking quality) water is required for employee use and for underground mining equipment. Other water needs can be met from either potable or non-potable sources. These include dust suppression for unsealed sections of the haul road, dust suppression for stockpiles and conveyors, the washdown of vehicles, and fire fighting.

A summary of water demands is given in Table 2.1.

TABLE 2.1
YEARLY WATER DEMANDS

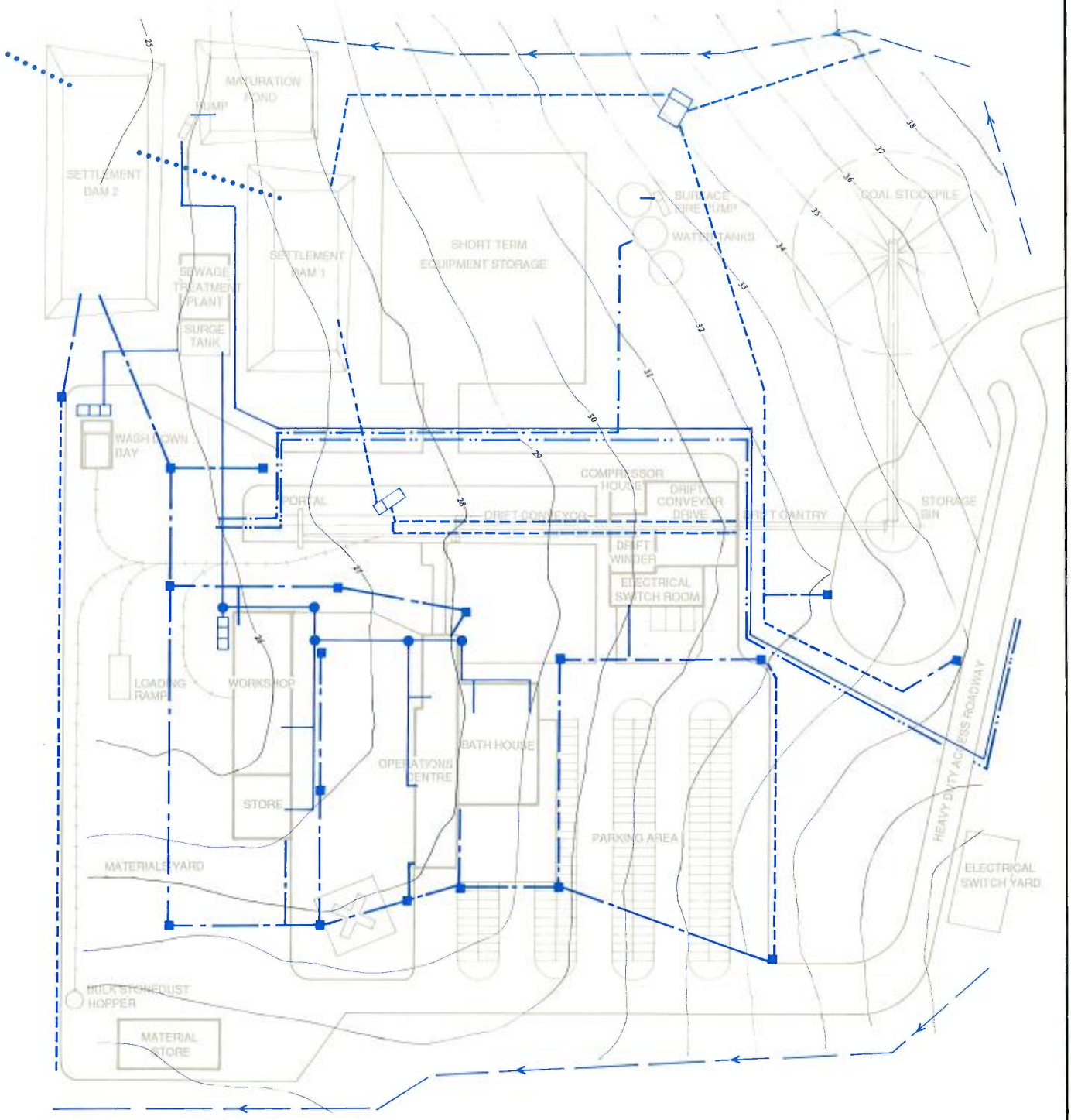
Demand	Requirement	Average Yearly Volume *megalitres*	Sub Total *megalitres*
Potable			
Employee	200 litres/employee/day	17	
Underground mining equipment		175	
Stockpile, conveyor dust suppression	(Active Surface Area) x (Evaporation) x 200%	4	
Vehicle washdown	0.5 megalitres/month	6	
Miscellaneous		1	203
Non-potable			
Haul road dust suppression	(Active Surface Area) x (Evaporation) x 150%	24	24

Potable water is available from the Hunter Water Board mains supply which is capable of delivering up to 260 megalitres per year. Non potable water could be obtained from the underground workings. This is estimated to be approximately 200 megalitres per year of which about 40 megalitres results from inflow to the colliery from groundwater within the coal seam.

It may be feasible to reuse mine water in underground mining equipment. This will need to be further evaluated when operations are underway.

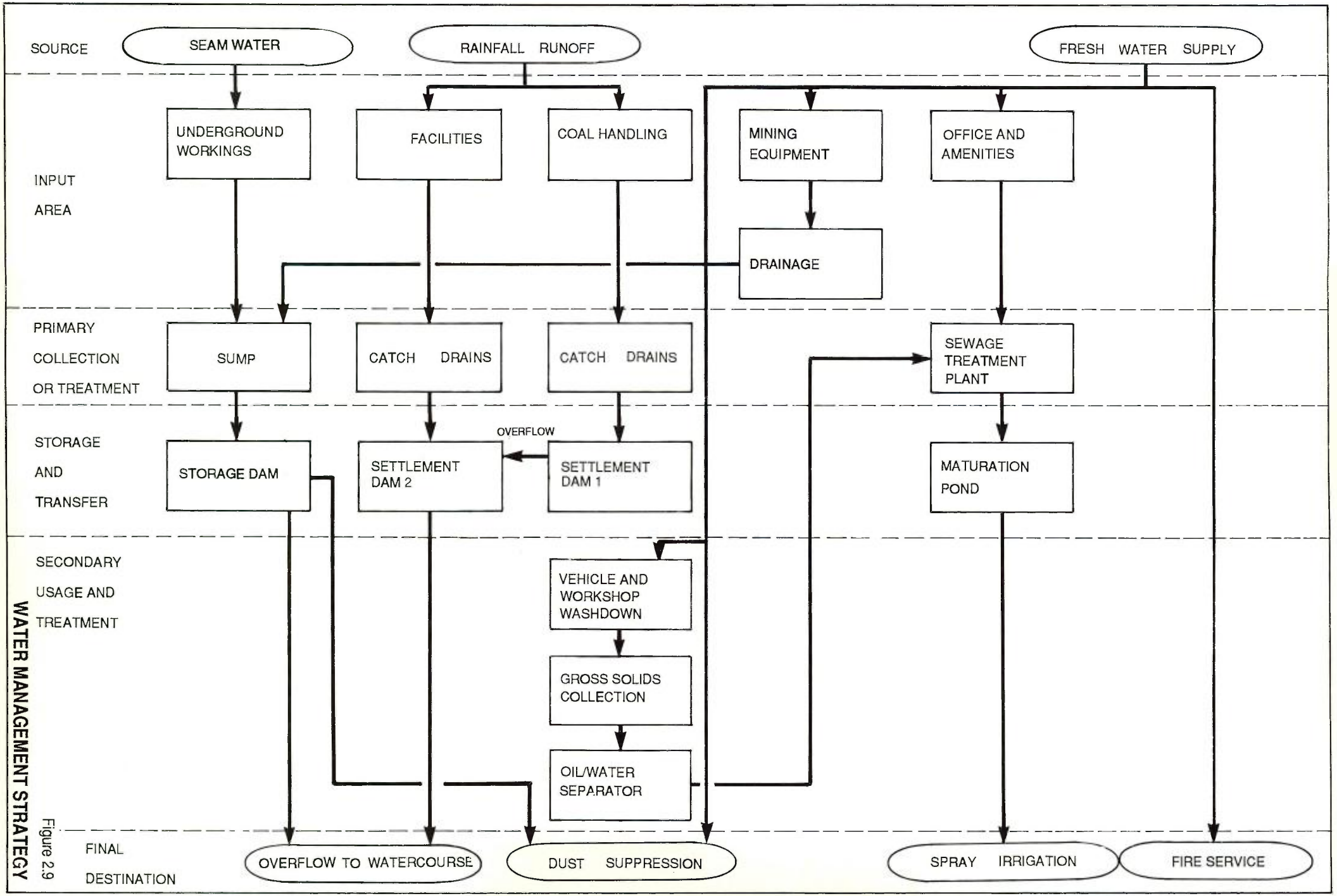
2.4.2 Pit Top Water Management Plan

There are three qualities of water to be collected, treated and disposed of or reused water derived from underground sources, rainfall runoff or stormwater, and domestic and process waste water sources. Wherever practicable, collected water will be reused to satisfy non potable demands. Figure 2.8 shows the general layout of water management controls and Figure 2.9 shows the water management strategy.



CLEAN WATER DIVERSION DRAIN
OVERFLOW
STORM WATER PIPEWORK
UNDERGROUND WATER SUPPLY
UNDERGROUND DEWATERING
DISH DRAIN
DRIVE IN SUMP
SEWER PIPEWORK
TRIPLE INTERCEPTOR
JUNCTION PIT
SURFACE INLET PIT
PRIMARY SEDIMENT TREATMENT

Figure 2.8
WATER MANAGEMENT CONTROLS



WATER MANAGEMENT STRATEGY

Figure 2.9

(i) Rainfall Runoff

Rainfall runoff will be treated to a standard acceptable for discharge into Cockle Creek. Three subcatchments have been defined. The level of potential contamination may vary between catchments and will be treated accordingly.

Coal handling areas (Catchment 1) including the stockpile, product bin and drift conveyor, will drain to sumps and then to Settlement Dam 1 with a one megalitre capacity. Also draining to Settlement Dam 1 will be a gravel paved area which will cater for the short term storage of equipment.

The paved area comprising the material store and yard, stonedust hopper, loading ramp, washdown bay and conveyor accessway (Catchment 2) will drain to Settlement Dam 2 with a two megalitre storage capacity. This dam will accept any overflow from Settlement Dam 1.

Runoff from grass and paved parking areas east of the drift conveyor (Catchment 3) as well as building roof areas will be relatively clean, however as a precaution this catchment will also drain to Settlement Dam 2.

Drainage from each of the more contaminated areas will pass through grit arresters and where necessary, oil interceptors, before discharging into the stormwater drainage network which feeds the settlement dams. The drainage system is shown in Figure 2.8

Settlement dams will have volumes sufficient to accept runoff from a once in 10 year, one hour duration storm, which is equivalent to a rainfall intensity of 48 millimetres/hour. To facilitate settlement, each dam will have a width to length ratio of approximately 1:2 and an average depth of 1.5 metres. Spillways will be incorporated and will be designed for a once in 100 year storm.

Water quality in Settlement Dam 2, would be suitable for release to natural drainage. These dams will be designed to drain over a one hour period to provide the necessary water quality for release to Cockle Creek and to drain sufficiently quickly to provide storage capacity for any follow up runoff.

(ii) Domestic and Process Wastewater

Domestic waste water from the office and bathhouse areas as well as tradewaste from workshop and washdown sites will be reticulated to a package sewage treatment plant.

Domestic wastes will drain to a holding tank and then be fed through the plant for primary and secondary treatment. The volume of domestic wastewater generated will be approximately 13 megalitres per year.

In addition, approximately seven megalitres per year of tradewaste will be collected and passed through grit and oil arresters to remove sediments and hydrocarbons. The overflow will then be directed to the treatment plant.

Effluent from the treatment plant will undergo further treatment in a one megalitre maturation pond which is equivalent to a 17 day detention period. Effluent will then be pumped to the former Rhondda open cut mining site east of the colliery and spray irrigated over a three hectare area. This equates to an effluent loading rate of about two millimetres per day and will assist in the rehabilitation of this area.

(iii) Mine Water

Mine water consists of drainage from underground operations as well as seepage from the coal seams. The estimated total quantity of mine water is about 200 megalitres per year or 16.5 megalitres per month.

The quality of the mine water can be predicted with reasonable confidence. Firstly it is predominantly made up of potable water used for underground water sprays and in mining equipment. Secondly, from operating experience at West Wallsend Colliery, coal seam inflows are expected to be relatively small, non saline and generally of an acceptable standard. The only potential water quality variations expected are a slightly elevated pH (between 8.0 and 8.6) and an increased turbidity.

Turbidity levels can generally be reduced to a discharge standard (< 30 mg/l) by a period of settlement. However, in certain circumstances the finely divided nature of the particles can necessitate flocculation to reduce turbidity. Mine water at West Wallsend Colliery has been treated in this manner.

Given these factors it is proposed that minewater be disposed of differently to site stormwater. This precaution is also warranted because of the wetland area on Cockle Creek immediately downstream of the surface facilities. It is considered that minewater, because of potential quality uncertainties, should be reused where possible within the mining operations and not released upstream of the wetland.

Mine water will be collected in a two-megalitre underground sump and then pumped directly to offsite storage dams to be constructed in the former Rhondda open cut mining area, east of the colliery.

Water from these dams could be used for dust suppression on the haul road at Westside Mine or at Macquarie Coal Preparation Plant. Surplus water would discharge to Cockle Creek.

The quality of mine water will be monitored to meet discharge quality standards that will be specified by the SPCC under the Clean Waters Act licence. Quality standards for the discharge will be in accordance with Class C specifications, as discussed in Section 3.0.

In the future, mine water may be reused in underground operations. The capacity of the storage in the Rhondda rehabilitation area will be determined on the basis of more definitive water quality data.

2.5 OPERATION AND WORKFORCE

The colliery will be able to produce coal 24 hours per day, Monday to Saturday. On Sundays the mine may be manned for maintenance purposes.

Development of underground roadways (tunnels) in the coal seam will commence approximately twelve months before the start of longwall operations. The roadways will be developed by continuous miners and will produce coal at an average rate of about 1,300 tonnes per day.

Longwall mining will produce coal at the rate of approximately 9,000 tonnes per day. Peak annual production is estimated to be 2.5 million tonnes of raw coal, made up of 2.0 million tonnes from the longwall panel and 0.5 million tonnes from continuous miners.

The workforce could vary depending on the number of shifts to be worked and target production levels. It is anticipated that three shifts will be worked and the staffing will be as follows:

TABLE 2.2
WORKFORCE NUMBERS

Shift	Typical Minimum Staffing	Typical Maximum Staffing
Day Shift	77	113
Afternoon Shift	61	79
Night Shift	57	68
Total	195	260

It is expected that shift times would overlap so that traffic from staff arriving and departing at each shift change would be separated by about one hour.

2.6 SERVICES

The mine will require the supply of electrical energy, potable water supplies, and communication systems.

Electricity will be supplied by a 33 kilovolt wood pole transmission line between Awaba Substation and the surface facilities at Wakefield Colliery. Part of an existing transmission line could be utilised. A substation will be provided at the colliery surface facilities area with the capacity to supply 11.5 megawatts.

Shortland Electricity will have the responsibility for deciding the route to be taken by the transmission line and arranging for its construction. Before making a decision in this regard, Shortland Electricity will undertake an appropriate level of environmental assessment for the work.

Potable water will be supplied from Hunter Water Board mains at Barnsley. The colliery will have a monthly water requirement of 17 megalitres. Three storage tanks each with a 100 kilolitre capacity will be located in the pit top area, as shown on Figure 2.3. Two tanks will

be for fire-fighting purposes and the third will be for underground use. The main water pipeline will be located on the company's property along its Wakefield Road frontage between The Broadway and the colliery's access road. A strip of land up to five metres wide will be cleared, about ten metres inside the boundary.

Telephone connections to the colliery will be made by Telecom Australia.

2.7 DEVELOPMENT PROGRAMME

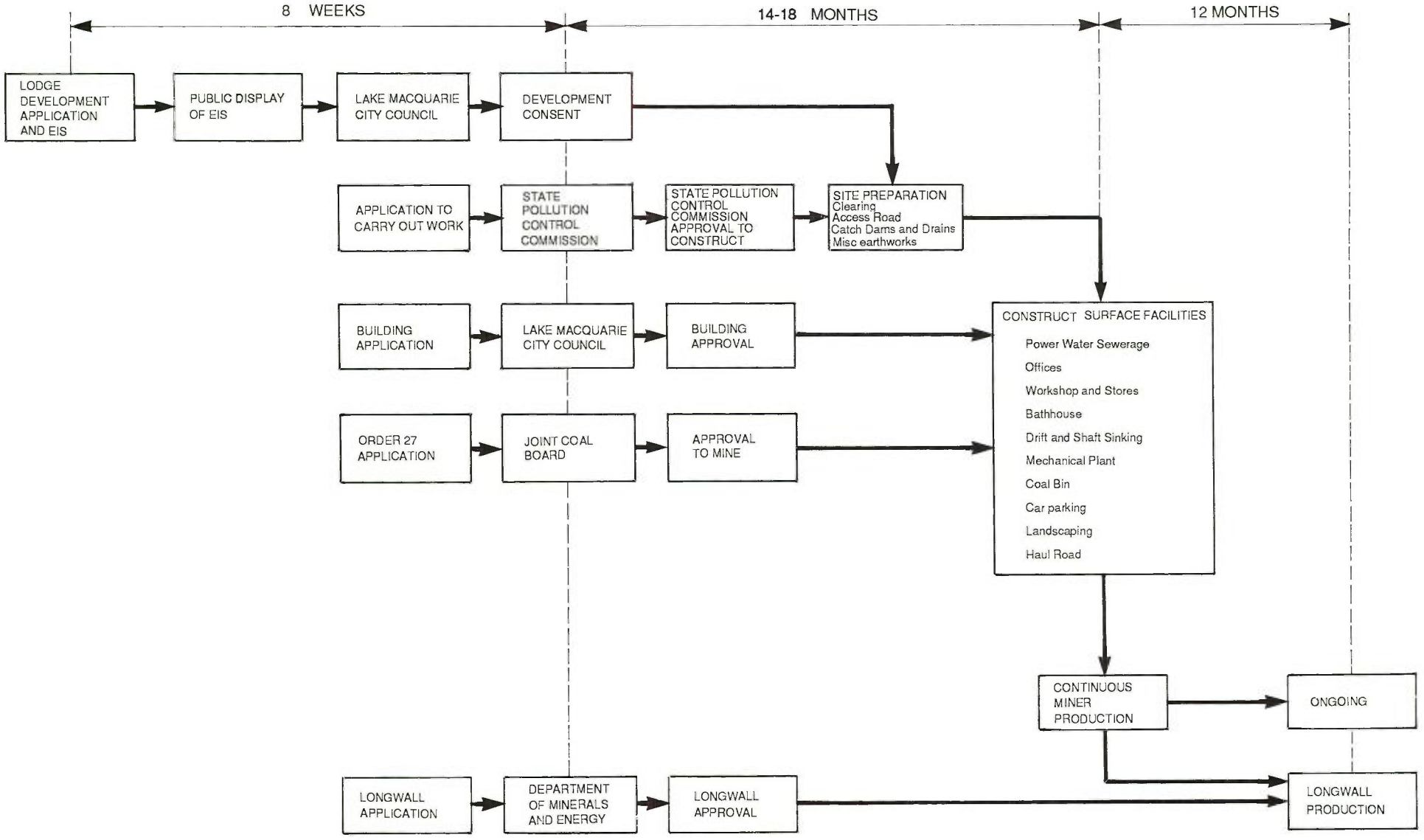
The proposed programme for development of surface facilities and commencement of underground mining is shown in Figure 2.10.

It is estimated that coal production would commence approximately 14 months after receipt of development approval from Lake Macquarie City Council. Longwall production would commence 12 months later.

After granting of development consent, further applications for approval will be required to be lodged with:

- State Pollution Control Commission;
- Department of Minerals and Energy;
- Lake Macquarie City Council; and
- Joint Coal Board.

Approval from each of these organisations will be required in order to develop the colliery.



MINE APPROVAL AND DEVELOPMENT FLOW CHART

Figure 2.10

3.0 ENVIRONMENTAL ASSESSMENT

3.0 ENVIRONMENTAL ASSESSMENT

3.1 SETTING AND CLIMATE

3.1.1 Setting

The colliery site is located to the west of Lake Macquarie in foothills of the Sugarloaf Range. Mine surface facilities will be sited in an area of disturbed bushland bounded to the west by the Sydney - Newcastle freeway construction and to the east by a regenerating area which was formerly an open cut coal mine. Land use of the district is characterised by activities such as forestry, agriculture and coal mining.

Surface facilities will be established in the Cockle Creek catchment, below a ridge which divides the catchments of Cockle and Diega Creeks. These creeks join downstream and eventually drain to Lake Macquarie.

Soils are generally of a duplex form derived from sediments of the Permian Newcastle Coal Measures. Vegetation is open forest or woodland on ridges and *melaleuca* dominated swamp forests along flood plains.

Slopes in the area range from flat to gentle and are generally less than eight percent. Flatter slopes occur on the Cockle Creek flood plain. Gentle slopes in the south and east of the site have north and west aspects respectively (See Figure 2.2). These slopes descend from a ridge running east west which reaches a height of 78 metres approximately, 240 metres east of the site. The proposed access road and coal haul road will be located below the crest on the northern side of this ridge.

The surface facilities site is dissected by a broad gully that drains into Cockle Creek. Cockle Creek also separates the surface facilities site from the proposed ventilation shaft.

3.1.2 Climate

Weather patterns in central eastern NSW are characterised by hot summers and cool to mild winters with the distribution of rainfall showing a late summer/autumn dominance.

Rainfall data is available from Nobby's Signal Station, located some 20 kilometres to the east of the site and from Macquarie Coal Preparation Plant, some five kilometres from the site.

Table 3.1 shows mean monthly and yearly rainfall and number of raindays from both stations and also standard deviation for the preparation plant data. These figures are based on five years of data from Macquarie Coal Preparation Plant and over 100 years from Nobbys signal station.

TABLE 3.1
RAINFALL DATA

	Nobby's Signal Station			Macquarie Coal Preparation Plant			
Month	Mean Rainfall *(mm)*	Mean Rain Days *(No. of Days)*	Evaporation *(mm)*	Rainfall		Rain Days	
				Mean *(mm)*	Stand. Dev.	Mean No.	Stand. Dev.
JAN	93	11	190	111	56.7	9	2.6
FEB	104	11	189	95	62.7	12	3.7
MAR	121	12	140	108	85	11	3.5
APR	116	12	120	196	159	13	6.1
MAY	114	12	80	85	58	12	2.4
JUN	116	12	75	63	20	9	2.6
JUL	98	11	80	77	46	8	2.0
AUG	77	10	105	75	63	12	5
SEP	76	10	125	54	44	7	2.1
OCT	76	11	160	85	72	11	5.5
NOV	68	10	170	146	59	11	2.1
DEC	83	10	140	71	53	10	6.3
TOTAL	1142	132	1665	1171	234	123	12.6

The low variation in number of raindays per month shows that in summer more rainfall is received on approximately the same number of raindays indicating a greater rainfall intensity during those months. This is caused by the higher frequency of thunderstorms during summer.

Pan evaporation data indicate a possible deficit of soil moisture during the summer months and a surplus during the winter months. This is a common pattern in Eastern Australia which results in spring being the most active growing season for plants when stored soil moisture is high and temperatures are increasing.

Wind speed and wind direction data for each hour of 1988 were obtained for the purposes of modelling air quality impacts from the proposed Westside Mine (Holmes, 1990), immediately north of the Wakefield site. The anemometer location was approximately five kilometres east of the Wakefield site.

The prevailing wind for the area is from the south to south east quadrant with other important directions being east-northeast, northeast and west-northwest. The dominant wind directions by season are:

- summer: south through to north east;
- autumn: south through to south east;
- winter: west to west-northwest and south; and
- spring: south-southeast through to north-east.

Figure 3.1 shows wind roses for all four seasons of 1988 and the average for 1988.

Rainfall and evaporation data are relevant for analysis of the behaviour of the drainage and water pollution control system. Wind data is necessary for an analysis of noise projection and dust dispersion.

3.2 NOISE

3.2.1 Residents in Proximity

Plant and equipment at the colliery may be audible to a varying extent from immediate surroundings. The coal transport system using trucks or possibly a conveyor may also be audible beyond the site. The significance of colliery generated noise is a function of its level of intrusion at residences.

Residences potentially affected by noise are located in the villages of Wakefield and Killingworth and on nearby rural land. The topography of the area provides noise screening for the majority of residences in Wakefield and Killingworth. The ridge immediately south of the surface facilities will reduce sound transmission towards Wakefield. To the north, another ridge will provide screening for Killingworth, although saddles in the ridge will lessen this benefit for some residences at the southern end of the urban area.

A single rural residence is located to the west of the site on the western side of the Sydney to Newcastle freeway. This residence is approximately 400 metres from the ventilation fan and 1,200 metres from other surface facilities.

A noise assessment study has been separately prepared (Tonin, 1990). The findings are summarised in sections 3.2.2 to 3.2.5.

3.2.2 Existing Noise Levels

The site of the surface facilities and the coal haulage route are of a rural nature, being mostly remnant bushland. Background noise is correspondingly low, arising mainly from distant traffic, insects, animals and weather.

Existing noise levels at Wakefield residences were monitored continuously over a five day period during April, 1990 at locations shown on Figure 3.2. Measurements indicated that background noise at Wakefield varied during the day. Noise is primarily caused by traffic on Wakefield Road with daytime levels being greater than at night. Background noise, referred to as the L_{90} level, is the noise level which is exceeded for 90% of the time.

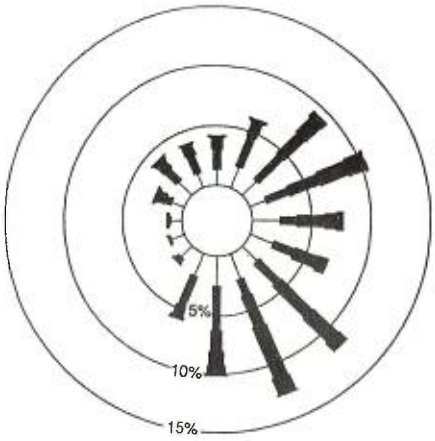
During the night, background noise falls to an average level of about 30 dB(A) which is typical for a rural area. This figure is less than the background noise level of 35 dB(A) recommended by the State Pollution Control Commission (SPCC) as an acceptable night time limit for residences in a rural area.

During the day, background noise was found to be generally 40 dB(A). This figure is also below the acceptable daytime limit of 45 dB(A) recommended by the SPCC for a rural area.

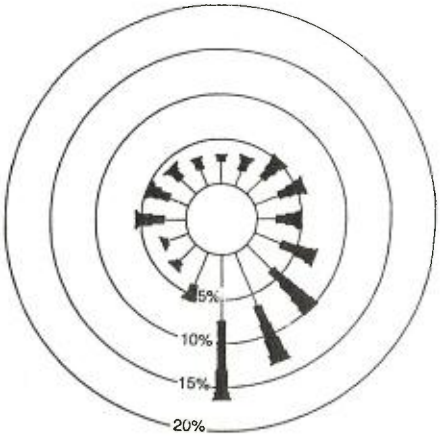
Similar measurements were recorded at Killingworth as part of the investigations for nearby Westside Mine. Background noise at Killingworth was shown to be slightly higher than for Wakefield with a lowest level of 35dB(A). The relevant monitoring location in Killingworth is indicated in Figure 3.2.

3.2.3 Noise Criteria

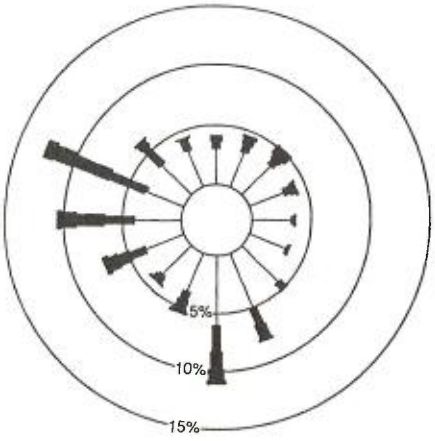
Wakefield Colliery will generate noise from plant and equipment and from transportation of coal by trucks. There are differing criteria for assessing noise from these sources. Because it is planned to operate the colliery on a 24 hour-per-day basis, daytime and night-time noise from the mine will be essentially the same. An exception would be operation of the front end loader, which will be used only in unusual circumstances for reclaiming stockpiled coal. This item of plant would operate during the hours of 7 am to 5 pm.



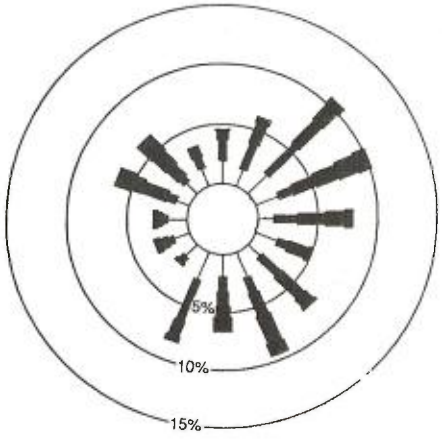
SUMMER



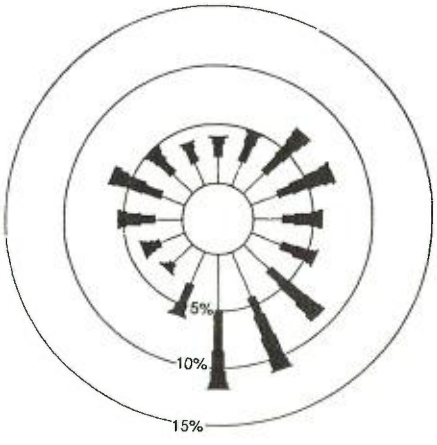
AUTUMN



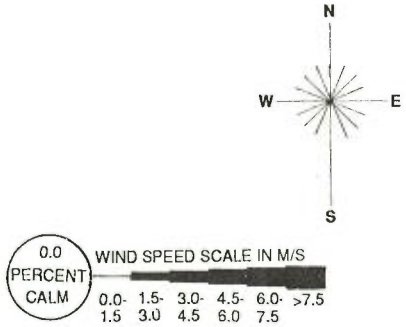
WINTER



SPRING



ANNUAL



Note: Recorded during 1988 approximately 5km east of the Wakefield Site

Figure 3.1

WIND ROSES

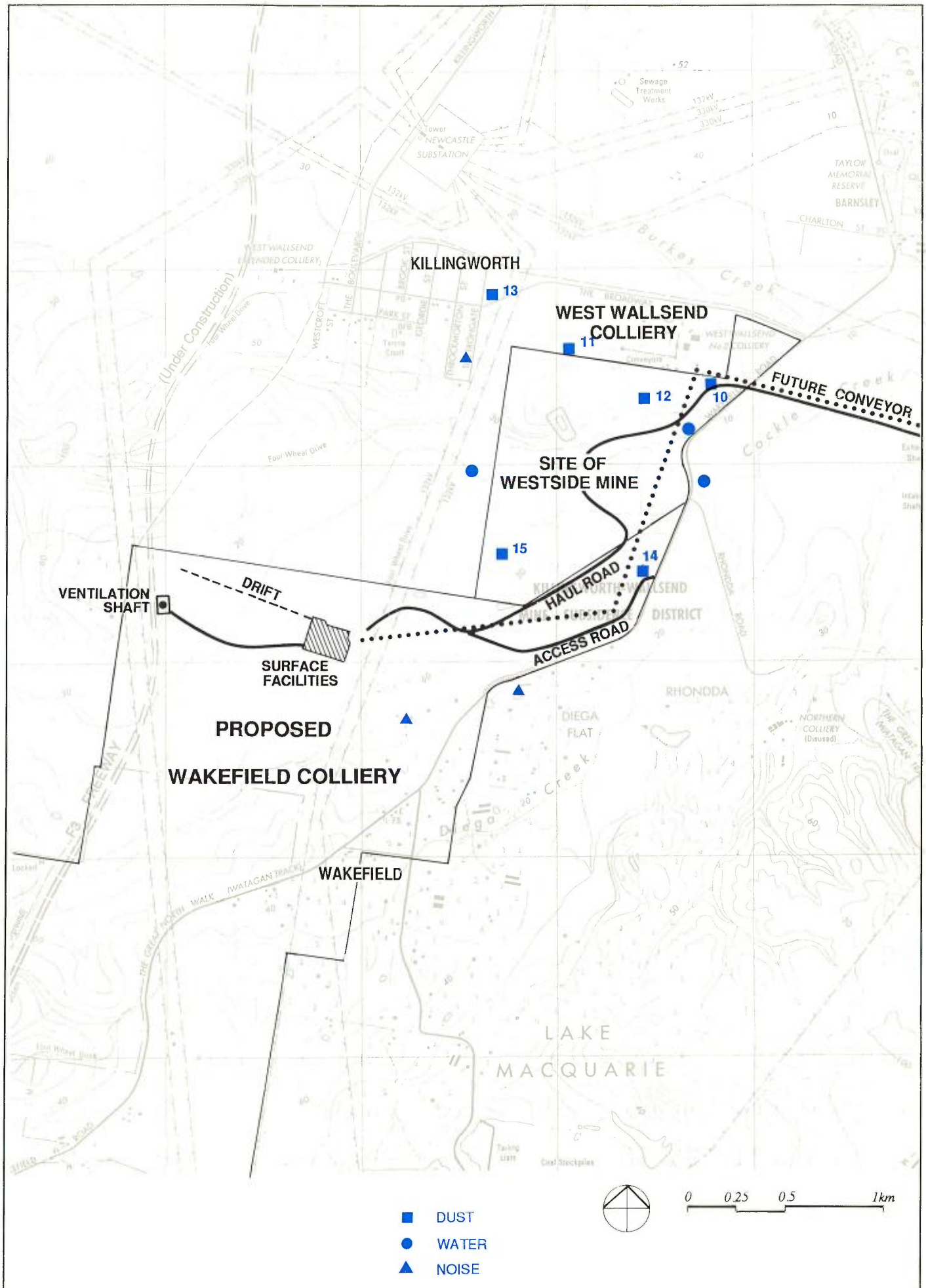


Figure 3.2

MONITORING LOCATIONS

Criteria for acceptable noise levels are more stringent during the night, defined as the period between 10:00 pm and 7:00 am, because of the potential for sleep disturbance.

The impact of plant and equipment noise is normally assessed by comparing the existing background noise levels with the noise predicted to be generated by the new source or combination of sources. The State Pollution Control Commission recommends that the L_{10} noise level from the proposed source should not exceed the existing L_{90} level by more than 5 dB. The L_{10} level is that exceeded only 10% of the time.

Since it is proposed to operate most mine equipment continuously, the noise criterion should be set by reference to the night-time background noise level. According to the guidelines an L_{10} noise level of 35 dB(A) from continuously operating colliery plant should not be exceeded at any residences. During the daytime period when the front-end loader may be operating, noise criterion from plant operations including the front-end loader is 40 dB(A).

An exception to these criteria is the rural residence to the west of the proposed ventilation fan. The background noise level at this residence is predicted to rise to approximately 36 dB(A) once the Wakefield to Minmi section of the Sydney-Newcastle freeway is opened. Under these circumstances, L_{90} background noise levels from colliery operations should not exceed 5dB below the predicted background level, or 31 dB(A). On this basis an L_{10} noise criterion of 36 dB(A) is appropriate for this residence. During the day, L_{10} noise levels from the colliery should not exceed 45 dB(A).

Noise criteria for construction work are based on the period of construction. Because the construction period will extend beyond six months, the noise criterion for this phase of the project is set at 5 dB above background. Hence a criterion of 45 dB(A) would be set for construction work carried out in approved daylight hours.

For transportation noise, which is of intermittent intensity, the L_{eq} noise descriptor is the appropriate measure. L_{eq} is the average noise level which is equivalent to a constantly varying source. For night-time traffic on the proposed haul road a criterion of 35 dB(A) has been adopted for L_{eq} which is 5 dB(A) above the background level, as for plant and equipment noise. This criterion is stricter than the State Pollution Control Commission guideline which specifies that noise at the nearest residence from a new road in a rural area should not exceed an L_{eq} of 50 dB(A). The reason a stricter criterion has been adopted is that a private haul road should be considered an integral part of the colliery and not as a separate traffic noise source as would be the case for a public road.

A second criterion is used for truck noise at night to take account of isolated noisy events which can cause sleep disturbance but which may result in only a small increase in L_{eq}. This criterion requires that the maximum noise, L_{max}, should not exceed the L_{90} background level by more than 15 dB. Hence maximum truck noise measured at any residence should not exceed 45 dB(A).

3.2.4 Noise Levels from Plant and Equipment

Noise levels are predicted by taking into account the noise contribution from all colliery operations. Major items of plant equipment are listed in Table 3.2. A sound power level is also shown for each item. This is the sound level actually emitted at the source and is obtained from measurements, calculations or manufacturers' data. Equipment noise levels reduce as the measuring point is moved further away from the source. Other factors such as topography, weather and intervening objects can also influence noise transmission.

TABLE 3.2
SURFACE PLANT AND EQUIPMENT

Item	Sound Power Level *dB(A)*
Drift winder	98
Drift conveyor drive	106
Upcast shaft second egress winder	80
Compressor	103
Conveyors	82 per metre
Drive unit for pit top conveyors	84
Drive unit for overland conveyor	87
Surface bin	107
Front end loader	110
Transfer tower	100
Ventilation fan	119
Coal truck	111

The sound power level for coal trucks is an average of levels from empty and laden trucks. As can be seen from the table, the ventilation fan is the most significant noise source. The front-end loader will be used only occasionally, during abnormal operating conditions and its use will be restricted to the daytime period only. Nevertheless, to ensure a worst case situation is assessed, the front end loader is considered to be in operation continuously during the daytime period.

3.2.5 Predicted Noise Levels

Noise levels at surrounding residences have been calculated for neutral wind and temperature conditions. Calculations take account of the effect of proposed safeguards introduced to control noise.

The ventilation fan (or fans), for example, will be orientated to reduce noise impacts by discharging away from the nearest residence. A silencer, designed to appropriate specifications, will be fitted to the discharge side of the fan.

The overland coal conveyor will be fitted with a wind shield which will provide a reduction of at least 4 dB in noise on the shielded side. This shield will be placed on the northern and western side of the conveyor to reduce noise transmission in the direction of Killingworth.

Most residences in Wakefield are shielded from conveyor noise by the ridge top immediately south of the conveyor route. The embankment for the new freeway construction will cause a minor reduction in potential noise levels from the colliery to the west of the freeway.

Plant and Equipment

Predicted noise levels from colliery plant and equipment at residences surrounding the site are included in Table 3.3. The locations of residences A to E referred to in the table are shown on Figures 3.3 and 3.4.

TABLE 3.3
CALCULATED NOISE LEVELS AT RESIDENCES FROM COLLIERY OPERATIONS

Residence	Noise Level *dB(A)*				Noise Level Criteria *dB(A)*	
	with conveyor		without conveyor			
	Day	Night	Day	Night	Day	Night
A	51	51	21	19	40	35
B	36	36	19	18	40	35
C	37	35	36	34	45	36
D	36	35	31	30	40	35
E	36	35	35	33	40	35

In the absence of the overland conveyor, noise levels from plant and equipment will be below relevant criteria at all residences. Introduction of the conveyor however, will result in criteria

being exceeded at two of the five residences. Under these circumstances the night-time noise criterion will be exceeded by 16 dB at Residence A, which is unacceptable. Noise at this location is dominated by the conveyor and the transfer tower at the intersection of two conveyor belts. This residence is currently leased by FAI Mining Limited and the Company intends to retain the lease for the duration of the mine or purchase the property. In the absence of the conveyor, noise from mine plant and equipment at this residence would be less than existing background levels.

Noise levels from mine plant and equipment will be acceptable at all other residences. The exceedance of 1 dB above night-time criterion level at residence B, when the conveyor is operating is not considered significant.

Figures 3.3 and 3.4 show contours of predicted L_{10} levels around the mine when plant and equipment are operating with and without the overland conveyor.

Transportation

The haul road has been sited to minimise the effect of truck noise. The proposed route will create some interference with operations at the nearby Westside Mine, more so than an alternative route considered further to the west. The company is prepared to accept the imposition on Westside Mine in the interests of noise control.

Again the ridgeline immediately to the south of the road provides screening for most dwellings in Wakefield. Noise transmission to Killingworth is attenuated by distance and topography.

Calculated noise levels from trucks at residences closest to the haul road are given in Table 3.4. These levels have been calculated for a theoretical maximum of 600 trucks per day. The average number of trucks will be either 400 or 260, depending on truck size. The location of residences is as shown on Figures 3.3 and 3.4.

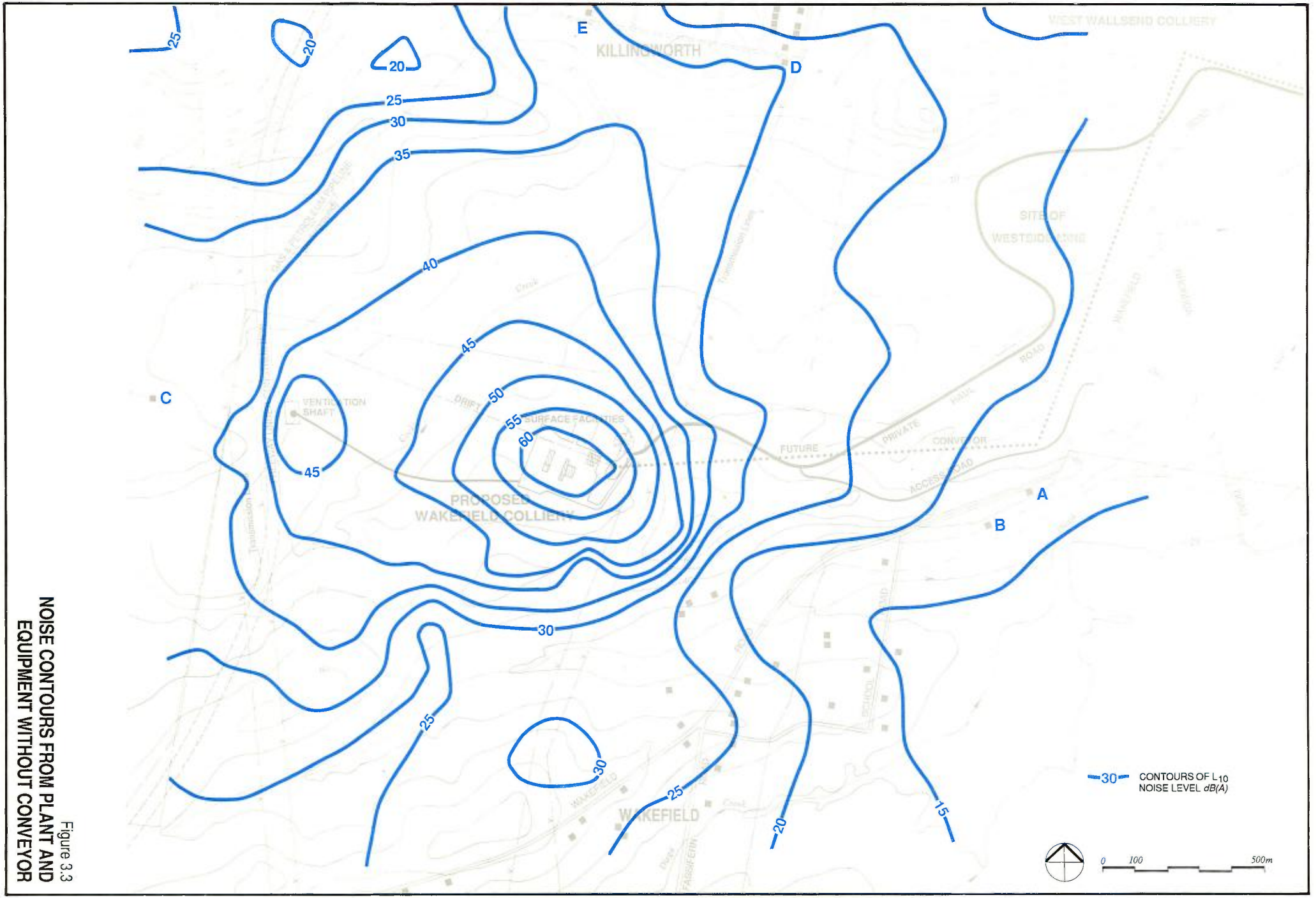


Figure 3.3

NOISE CONTOURS FROM PLANT AND EQUIPMENT WITHOUT CONVEYOR

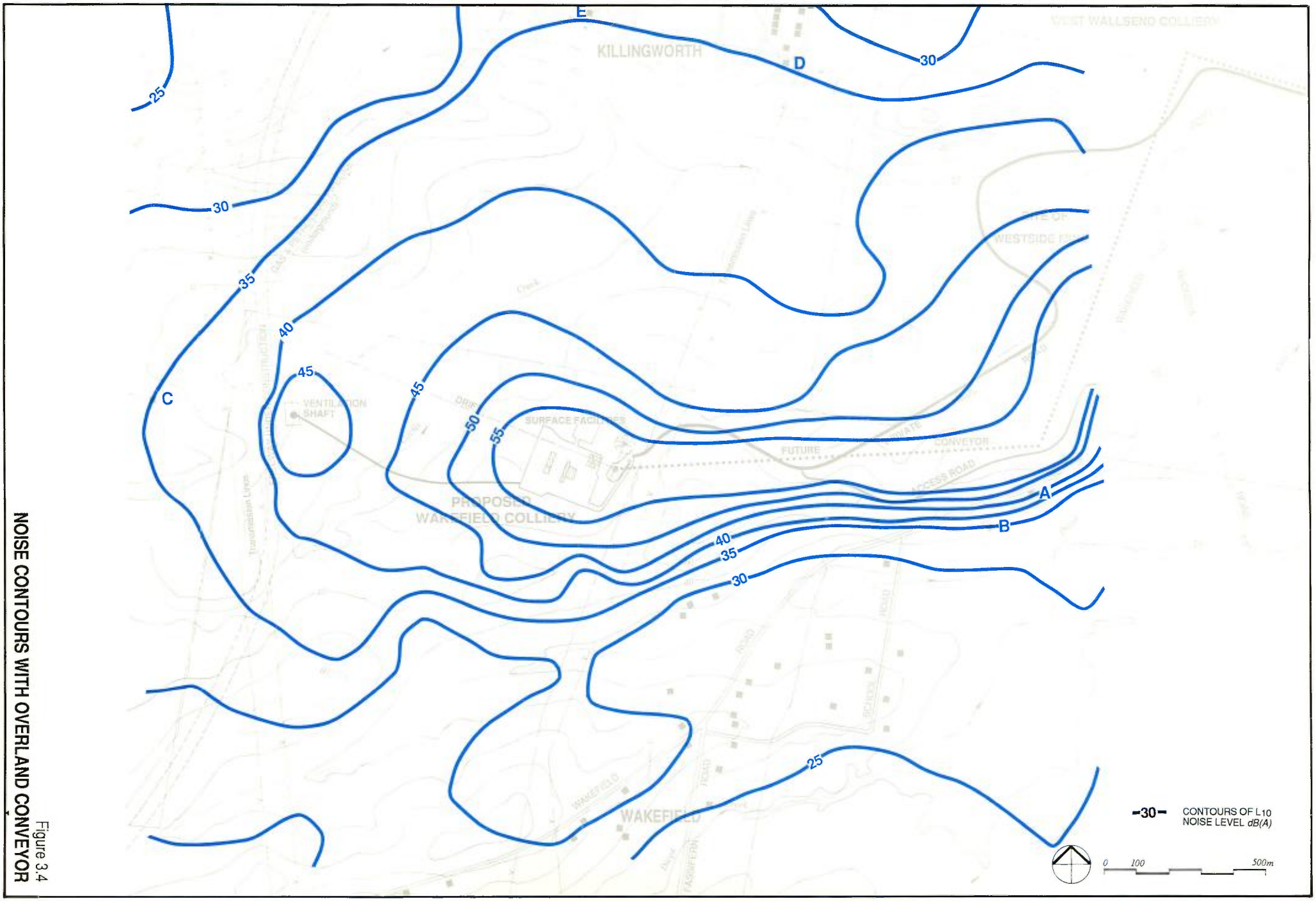


Figure 3.4

NOISE CONTOURS WITH OVERLAND CONVEYOR

TABLE 3.4
NOISE LEVELS FROM TRUCKS

Residence	Predicted Noise Level *dB(A)*		Acceptability Criterion *dB(A)*	
	L_{eq}	L_{max}	L_{eq}	L_{max}
A	39	48	35	45
B	32	42	35	45
D	35	44	35	45

Noise levels will meet criteria for all dwellings except Residence A. As previously discussed this residence is currently leased by the company, which intends to retain control over its occupancy for the duration of the project.

Construction Noise

Construction work will take place during daylight hours Monday to Saturday. This work will involve road and building construction, installation of plant and equipment, excavation of the drift tunnel and ventilation shaft and other site works. The L_{10} noise criterion of 45 dB(A) for this work will not be exceeded at any residence.

3.2.6 Assessment of Impact

Noise levels from the colliery received at nearby residences will be within acceptable limits for all but one residence which is leased by FAI Mining Limited. As recommended by the State Pollution Control Commission, noise levels have been predicted for neutral climatic conditions.

At any particular time the actual noise level may be higher or lower than the predicted level depending upon prevailing weather conditions.

Safeguards have been incorporated into the design of the colliery to limit noise emission. All roadways and the overland conveyor have been routed to remain on the opposite side of the ridge from Wakefield so that there is no direct line-of-sight path for noise transmission. The ventiliation fan will be oriented away from the nearest residence to limit noise transmission.

3.3 TRAFFIC

3.3.1 Existing Roads and Traffic

The regional road network is shown on Figure 3.5.

Access to the mine will be from Wakefield Road. Employee and service vehicles, but not coal trucks, will contribute to traffic volumes on Wakefield Road. The majority of traffic currently using Wakefield Road falls within the following categories:

- private vehicles moving to and from Killingworth;
- coal trucks travelling to and from West Wallsend Colliery;
- private and commercial vehicles associated with Wakefield and other small settlements in the area; and
- through traffic travelling towards the Sydney to Newcastle freeway, which presently ends at Freemans Drive.

The most recent traffic counts for Wakefield Road were carried out in 1986. At that time an average daily traffic volume of approximately 2,000 vehicles was measured near the intersection with The Broadway.

A significant increase in traffic would have occurred since 1986. This would be a result of traffic using Wakefield Road as a route from the Freemans Drive freeway exit to the western suburbs of Newcastle. When the next section of freeway to Palmers Road opens in late 1990 or early 1991, the traffic volume is expected to increase even further as Wakefield Road becomes attractive to through traffic accessing the New England and Pacific highways. However, in late 1993 or early 1994, when the subsequent section of freeway to George Booth Drive opens, there will be a decrease in traffic on Wakefield Road as it would no longer be preferred by through traffic.

In anticipation of these likely changes to traffic on Wakefield Road the Roads and Traffic Authority has undertaken a program of upgrading over the past two to three years. The road has been straightened, bridges replaced and a roundabout installed at Barnsley. Its current standard is that of a two lane arterial road along its entire length and is considered capable of

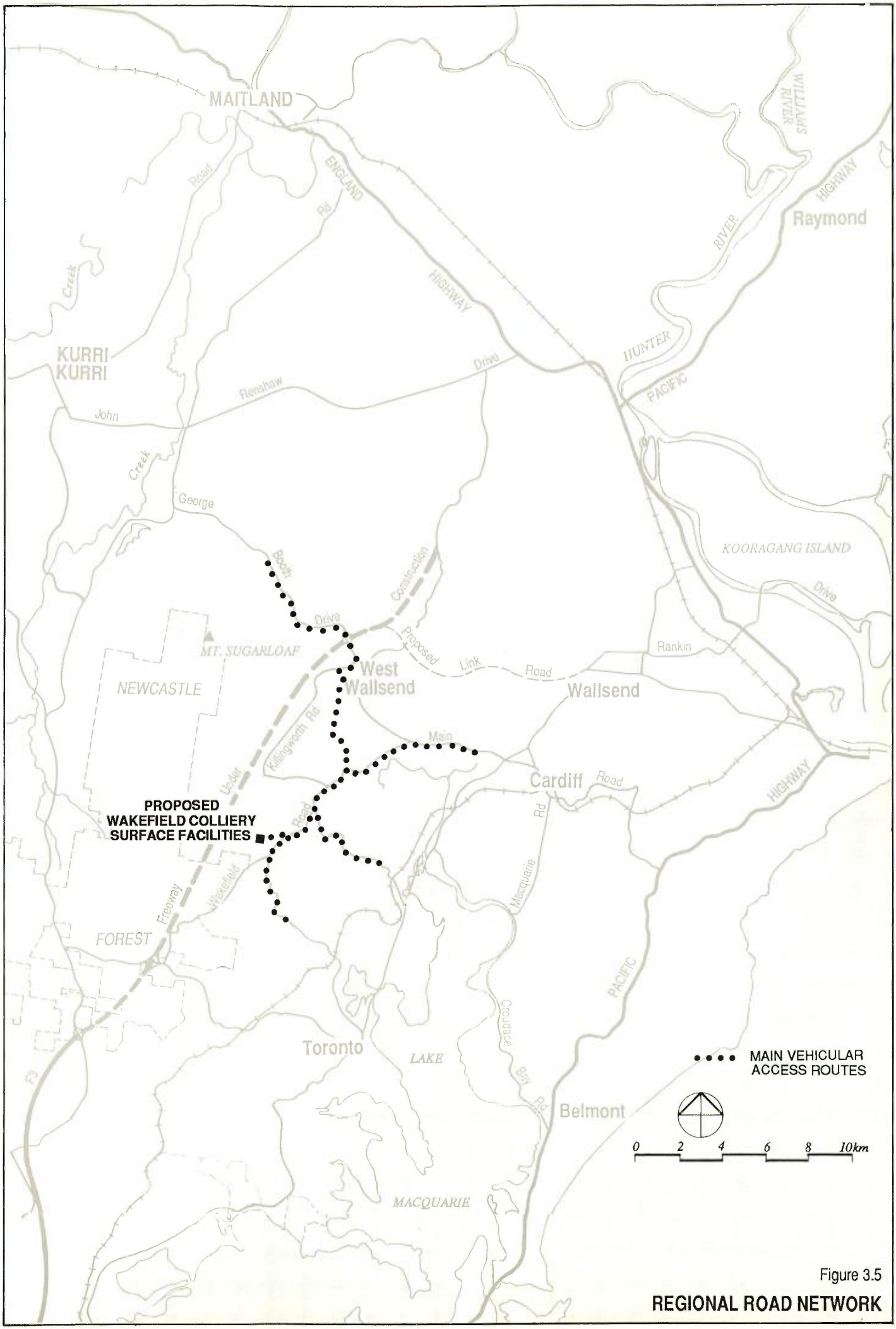


Figure 3.5

REGIONAL ROAD NETWORK

adequately carrying an annual average daily traffic volume of up to 12,000 vehicles. (RTA, pers. comm).

It is normal practice to examine accident statistics when assessing the likely effect of increased traffic volumes. However recent upgrading of Wakefield Road, its changed geometry and imminent changes in traffic volume prevent meaningful conclusions being drawn from past accident history.

Since 1988 coal trucks from West Wallsend Colliery have travelled via The Broadway, Wakefield Road and Rhondda Road and then by a section of private road to Macquarie Coal Preparation Plant. Completion of the new haul road later this year will avoid the use of public roads for the haulage of coal from West Wallsend Colliery.

Beyond Wakefield Road, employee and service vehicles from the colliery would use arterial roads such as George Booth Drive, Palmers Road, and Toronto Road. Some traffic may use Leneghans Drive. Closer to the site local roads which could receive some traffic are Northville Road, Appletree Road, Rhondda Road and Fassifern Road. Average Annual Daily Traffic volumes (AADT) on main roads in 1986 and 1988 are provided in Table 3.5.

TABLE 3.5
TRAFFIC VOLUMES BEYOND WAKEFIELD ROAD

Road	AADT	
	1986	1988
1. George Booth Drive (MR223) 2. Palmers Road (MR220) 3. Toronto Road (MR217)	7734 7623 13142	7531 8976 15310
1. at Edgeworth west of Barnsley Rd 2. at Toronto west of MR217 3. at Toronto west of Carey Street		

Source: RTA, 1988

3.3.2 Traffic Generation

The mine will employ up to 260 workers and operate six days per week. This will cause a potential increase of up to 500 in the average annual daily traffic volume along Wakefield Road by 1993/94 when the colliery is fully operational. This figure would be reduced by the

split in mine traffic heading north or south on Wakefield Road and by employees sharing a vehicle for commuting purposes.

At changes of shift there will be an overlap in arrival and departure times of approximately one hour. Total hourly traffic volumes at shift change times will increase by approximately 130 vehicles.

During construction of the surface facilities, a workforce of approximately 50 would be employed at the site from morning to late afternoon. A variety of service vehicles will arrive during the day. Construction would contribute up to 150 vehicles to daily volumes, split mainly between morning and evening commuting periods.

Examination of employee statistics at the company's West Wallsend Colliery shows that approximately 43% of employees live in areas which would suggest they would approach that colliery from the north. The remainder of the workforce would approach from the south and east. Approximate numbers using Rhondda Road from the east are difficult to estimate as there may be some aversion to driving on an unsealed road. If Rhondda Road were to be sealed it is likely that a minimum of 22% of employees would travel that way, while up to 35% could travel through Wakefield.

It is reasonable to assume that the employee catchment and distribution for Wakefield Colliery would be similar to that for West Wallsend and hence similar travel patterns would be predicted.

Movements of service vehicles would occur particularly during the construction phase. This traffic would tend to be spread throughout the day and should not significantly add to hourly volumes.

3.3.3 Assessment of Impact

Recent upgrading of Wakefield Road has improved its level of service for current traffic volumes. The anticipated increase in traffic volume on Wakefield Road resulting from the freeway extension to Palmers Road may reduce the level of service. The extent of future traffic increase has not been estimated by the Roads and Traffic Authority.

To fully assess the likely effect of Wakefield Colliery on traffic conditions it would be necessary to know predicted traffic levels for Wakefield Road after the colliery is fully operational and has reached its full employment levels. This is unlikely before 1994 at which

time Wakefield Road will not be subjected to traffic influences from the F3 Freeway. Accordingly, given that the capacity of the road is approximately 12,000 vehicles per day, it is unlikely that the increase of up to 500 daily vehicle movements will significantly reduce the level of service.

Up to 130 vehicles may leave or enter the colliery at shift changes. The intersection of the access road with Wakefield Road will provide a storage lane for both right and left turning vehicles. The length of the right turning lane will be critical and will be determined in consultation with the Roads and Traffic Authority and Lake Macquarie City Council.

Some uncertainty exists as to traffic levels on Wakefield Road for the next three to four years. It is unlikely that colliery traffic will significantly affect the level of service after provision of an adequate intersection. When further sections of the freeway to George Booth Drive open in 1993/94 the through traffic pressure on Wakefield Road will be significantly reduced.

Rhondda Road is the only unsealed road in the area which is likely to receive an increase in traffic numbers as a result of employee movements to and from the colliery.

3.4 VISUAL CHARACTERISTICS

The mine surface facilities are located within an area zoned 7(a) Environmental Protection (scenic). Preserving the appearance of bushland and the semi-developed character of the area is important to maintain the objectives of this zoning. The site is currently unable to be viewed from public land other than from the Sugarloaf Range to the west and Cardiff Heights to the east.

The most visible item in the pit top area will be the drift conveyor and 2,500 tonne coal bin. The drift conveyor rises on an inclined gantry to a height of approximately 45 metres to discharge into the coal bin.

The surface structure erected over the vent shaft will stand approximately 13 metres above ground and have sufficient bulk to be noticeable amongst its bushland surroundings.

The visibility of surface facilities was investigated by considering topographical profiles from potential viewing locations. Locations examined were residences and public facilities at Wakefield, Killingworth, Wakefield Road and the F3 Freeway west of the site. The following discussion explains the extent of visibility of the surface facilities from each

location. Figure 3.6 highlights ridgelines which block views of the site and areas from which the colliery may be seen.

3.4.1 Wakefield

Any view of the surface facilities from the majority of residences in Wakefield would be obstructed by the ridgeline immediately south of the site.

From Wakefield Hall and nearby residences, glimpses of the elevated conveyor and coal bin may be obtained through the trees. However, at a distance of 850 to 1150 metres this structure would not significantly impose upon landscape views from these locations.

3.4.2 Killingworth

Southerly views from Killingworth are largely obstructed by high ground immediately south of town. There is some potential for mine structures and part of the haul road to be viewed from the saddle at the southern end of The Trongate although it is unlikely this view could be obtained from any residences.

3.4.3 Wakefield Road

There is a section of Wakefield Road south of the proposed mine from which the upper parts of the conveyor and coal bin might be seen. Glimpses would be similar to those from residences in this area referred to in Section 3.4.1. Wakefield Road is not part of a recognised scenic drive and any views of mine structures would be partially obscured and of short duration for motorists. Since the area is known to have a coal mining character, glimpses of coal mine structures should not conflict with the expectations of users of Wakefield Road.

The section of Wakefield Road east and north-east of the surface facilities would be unlikely to provide significant views of mine structures due to the presence of trees along the road.

3.4.4 F3 Freeway

Views of the ventilation fan structure and elevated coal conveyor would be obtained from a section of freeway approximately one kilometre in length as shown in Figure 3.6. For part of this length, mine surface facilities would be partly obscured by trees. Where the freeway crosses creek lines west of the site it will be elevated above tree level and a less obstructed

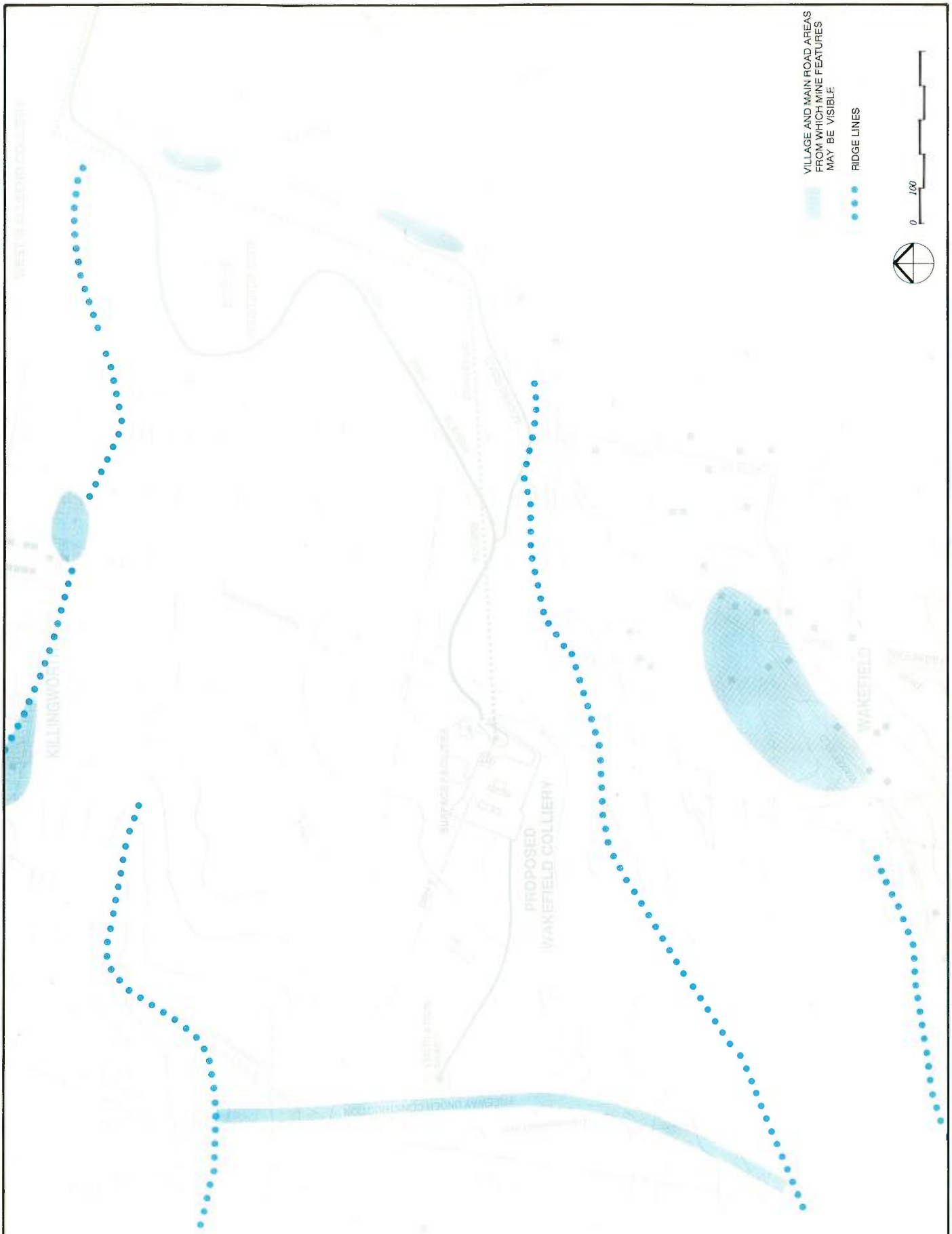


Figure 3.6
VISUAL CHARACTERISTICS

view of the mine will be possible. This view would primarily be observed by southbound travellers.

The freeway is not intended as a scenic drive, nor is its presence intended to influence or inhibit development proposals on adjoining land. Freeway users would be travelling through an area where power stations and major electricity transmission lines are visible from the freeway. The presence of coal mining infrastructure would be within the general character of the area in which context the proposed Wakefield surface facilities would be viewed.

3.4.5 Safeguards and Impact Assessment

Apart from the coal handling plant, no other surface structures will protrude above the height of surrounding trees. From most viewpoints there will be little or no alteration to the impression of continuous tree cover. The mine site would be most clearly discernible from a short section of the future F3 freeway, particularly for south-bound travellers. To reduce visual prominence, the coal handling plant and mine buildings will be painted with colours found in the surrounding landscape such as shades of green and brown.

The colliery will be discernible from vantage points on the Sugarloaf Range to the west but will not create a discordant element in the vista of rural, residential and industrial land uses. It is unlikely the colliery would be noticeable from Lake Macquarie or vantage points to the east. Due to the relatively small site of disturbance and limited viewing opportunities, the mine would not produce a major impact on visual quality and would be consistent with other types of development able to be approved under the 7(a) zoning.

3.5 AIR QUALITY

Activities associated with the colliery do not have the potential for significant emissions of either gaseous material or dust particulates to the atmosphere. Dust can be generated as a result of traffic or wind blowing over disturbed ground, and from coal handling and stockpiles of coal. Gaseous emission can emanate from vehicle exhausts and from the discharge of the ventilation shaft. The following section analyses the potential for such emissions.

3.5.1 Existing Dust Levels and Air Quality Standards

Existing dust levels in the Wakefield area are available from the results of dust deposition monitoring carried out for a trial open cut operation immediately south of West Wallsend Colliery. Monitoring was commenced in March, 1986 using a network of standard dust deposition gauges at locations shown on Figure 3.2. Excavation of the trial "box cut" for Westside Mine continued for five months from May to October, 1986. Dust quantities collected during this period showed the extent of influence of the trial open cut. Some gauges have been monitored through to the present day. Until the recent commencement of freeway construction, the only activities in the area with potential to generate continuing dust have been West Wallsend Colliery, and traffic on local roads. Average monthly dust levels recorded to date are shown in Table 3.6. These figures represent total insoluble solids, which includes coal dust as well as dust from the ground surface.

TABLE 3.6
AVERAGE MONTHLY DUST DEPOSITION DATA
Insoluble solids g/m^2/month

Gauge No	10	11	12	13	14	15
Distance from West Wallsend Colliery *(m)*	350	300	350	800	1150	1200
1986	1.1	0.8	2.0	1.4	0.5	0.5
1987	1.1	0.6	0.7	1.3	0.6	0.5
1988	-	1.2	-	-	-	-
1989	1.4	1.0	-	1.2	-	-

Dust deposition figures in the vicinity of West Wallsend Colliery are indicated in results from gauges 10, 11, 12 and 13. Gauges 10 and 11 are the most exposed to the colliery and indicate average dust levels of the order of one gram per square metre per month.

The box cut excavation was carried out near gauge 12, as shown on Figure 3.2, which accounts for the higher average monthly level of dust recorded by that gauge in 1986. Gauges 10 and 13 would be affected by traffic generated dust from Wakefield Road and the Broadway respectively.

Gauges 14 and 15 are furthest from West Wallsend Colliery. Gauge 14 is approximately 350 metres west of Rhondda Road which is unsealed and is now part of the haul route for trucks carrying coal from West Wallsend Colliery to Macquarie Coal Preparation Plant. Gauge 15 is not near any road and is over one kilometre from West Wallsend Colliery. Deposition

rates at this gauge are likely to be least affected by the Colliery and representative of dust deposition levels at Wakefield, which commences some 500 metres south of the gauging site.

Present background dust deposition levels at Wakefield are therefore likely to average about 0.5 g/m^2/month. The average dust deposition readings recorded in Table 3.6 would be considered to be average for a rural area. The highest deposition rate recorded in a year when the boxcut excavation did not influence results is 1.4 g/m^2/month.

Research carried out for the State Pollution Control Commission (Mitchell 1988), has recommended that where existing average levels of background dust deposition are up to 2 g/m^2/month, average dust deposition levels could increase by up to a further 2 g/m^2/month before it could be considered that a degradation in the amenity of the area had occurred.

The figures in Table 3.6 suggest there is a modest increase in dust deposition in the immediate vicinity of West Wallsend Colliery. An increase of the order of 0.5 g/m^2/month over natural background levels can be inferred at distances of the order of 300 to 400 m.

3.5.2 Dust Sources and Air Quality Safeguards

Dust generation could occur due to construction activities and from coal stockpiles, coal loading and coal transport. Of these, coal loading and transport to the coal preparation plant have the greatest potential to generate dust.

Run of mine coal will be conveyed to a 2,500 tonne loading bin from which it will be loaded directly onto trucks or possibly to an overland conveyor at a later date. An emergency stockpiling area will be provided nearby. Coal will be reclaimed from the stockpile by front-end loader. Fixed water sprays will be available to maintain the coal in a damp condition.

Coal transport to Macquarie Coal Preparation Plant will be by trucks over a private haul road. The first section of haul road will be sealed to limit dust generation in the vicinity of Wakefield residences. Unsealed sections of haul road (associated with Westside Mine) will be watered continuously when trucks are running during dry weather.

An overland conveyor may be constructed at a later date to replace the coal haul road. It would have a wind barrier above and along one side to prevent wind lift from the belt. All transfer stations would be equipped with water sprays.

3.5.3 Assessment of Impact

The range of proposed dust control measures conform to SPCC (1983) recommendations and will contain dust emissions within acceptable levels. Truck movements will increase dust levels in the immediate proximity of the haul road. The closest residence however, is over 400 metres from this road and the road will have a sealed surface where it passes near Wakefield. Figures in Table 3.6 indicate that at a distance of 400 metres from the mine, increases in dust deposition levels would not be likely to compromise public amenity. It is unlikely that an increase of the order of 0.5 gm/m^2/month would be noticeable by residents and it would be necessary to use measurement gauges to detect such a small increase.

Water sprays will control dust emissions from the stockpile and coal handling facility.

Additional dust gauges will be installed to monitor dust deposition in the area. The effectiveness of control measures will be monitored by the company and all systems will be reviewed for compliance as required by the SPCC.

3.6 HYDROLOGY AND WATER QUALITY

3.6.1 Hydrology

The proposed surface works lie entirely in the catchment of Cockle Creek, a tributary of Lake Macquarie. In this area the creek is an intermittent watercourse flowing in a north-easterly direction through a broad valley. The catchment of the watercourse upstream of the colliery measures some 6.5 square kilometres as shown on Figure 3.7. Immediately downstream of the colliery, Cockle Creek flows into an area which has been identified by the Shortland Wetlands Centre as one of fifteen remaining wetland systems in the Lake catchment.

The surface facilities area and ventilation shaft are located some two to three metres above the bed of Cockle Creek and would not be affected by flooding of Cockle Creek. The creek valley has a broad flood plain with flood levels not expected to be more than 1 metre above the bed of the creek.

The proposed surface facilities and ventilation fan will be linked by an access road which will cross the creek valley. Culvert creek crossings will be designed to pass creek flow and be overtopped during major floods.

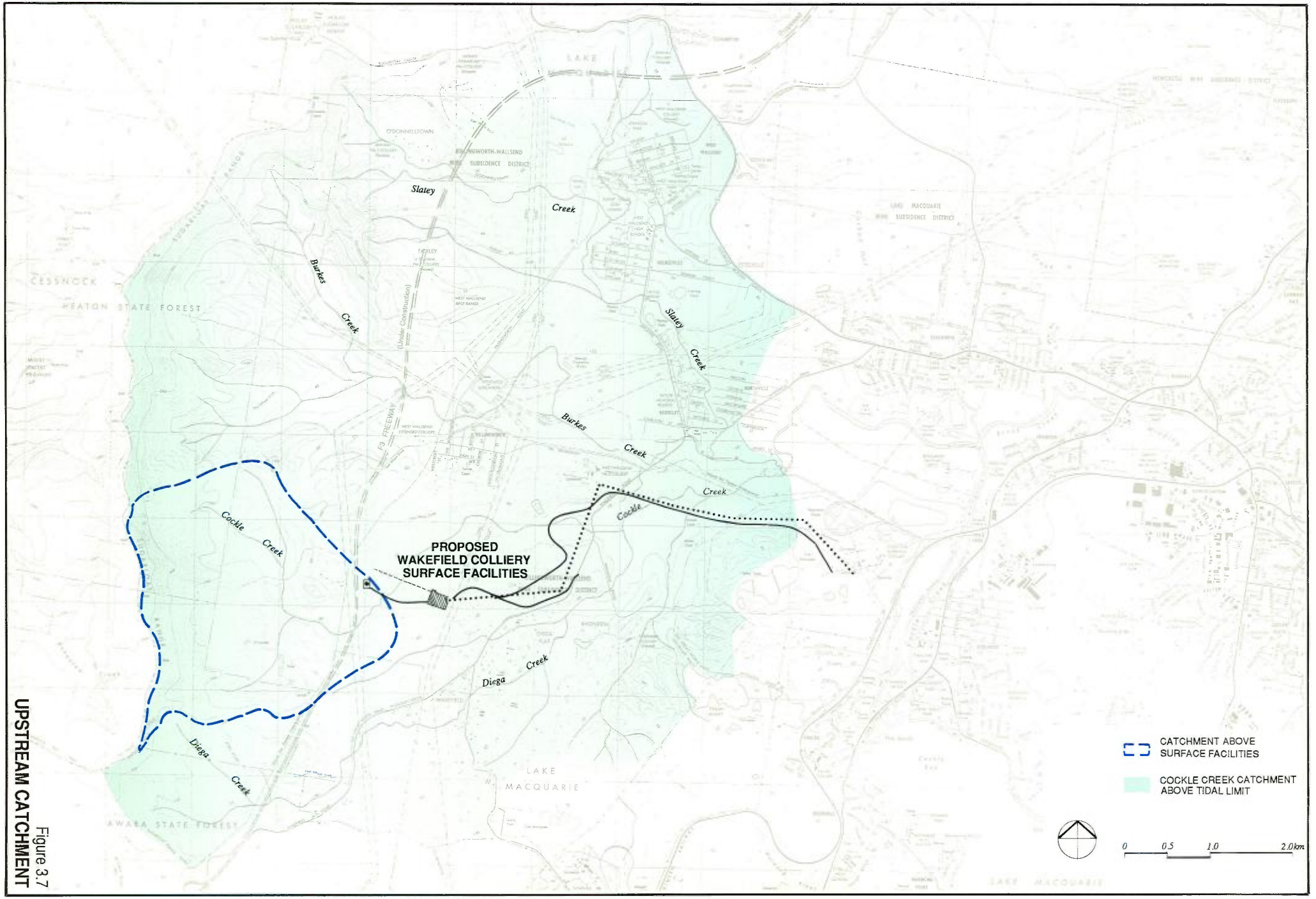


Figure 3.7
UPSTREAM CATCHMENT

Downstream of the Wakefield site, Cockle Creek flows between the two mining areas of the proposed Westside Mine. The coal haul road from Wakefield will cross the creek within the Westside Mine area.

The crossing will be constructed as part of the Westside development as it is necessary for access to the southern mining area.

Further downstream, but still within the Westside Mine area, the proposed overland conveyor would cross the creek. This crossing will be in the vicinity of Tobins Bridge where Cockle Creek passes under Wakefield Road. The conveyor would be supported on a gantry structure and not interfere with creek flows. Beyond Wakefield Road, Cockle Creek drains east through timbered land to a tidal limit near Northville. The creek enters Lake Macquarie after a further 6 km of estuary.

3.6.2 Surface Water Quality

Monitoring of surface water quality in upper Cockle Creek commenced in 1987. Monthly results are available for three measuring locations in the vicinity of the proposed Westside Mine (shown on Figure 3.2). The closest sampling location to the Wakefield Colliery site is a point just south of Killingworth. This sampling point is about 1.5 km downstream from the Wakefield site and is near the downstream end of an identified wetland area on the creek.

Monthly samples from the creek at the Killingworth sampling point were collected and analysed over an eighteen month period from May 1987 to November 1988. Creek water was found to be of good quality for a bushland stream throughout the sampling period. Conductivity averaged 20 millisiemens per metre (mS/m) with a maximum recording of 27 mS/m. The pH ranged from 5.9 to 7.4 with an average of 6.7.

Total suspended solids were quite low, averaging 37 milligrams per litre and ranging from 6 to 90 mg/l during the measuring period.

In dry weather there is little, if any, flow in this part of Cockle Creek. During storm flows, the creek is naturally more turbid which is shown by the variation in total suspended solids.

At the present time substantial earthworks are taking place in the Cockle Creek catchment upstream of the Wakefield site as part of the construction of the Sydney to Newcastle freeway. It is likely that water quality in the creek has been affected to some extent by these

construction works. Accordingly it was not considered appropriate to measure baseline water quality during this period.

3.6.3 Groundwater

During construction of the drift tunnel and ventilation shaft, it is likely that surface groundwater will be encountered. Inflows of groundwater associated with the surface water table will be prevented by the concrete lining of the drift and shaft.

Water inflows to the mine workings are derived from the coal seams which can act as aquifers. The inflow rate depends on the permeability of the seams. Experience at both West Wallsend and Teralba collieries suggests that the volume of seam water will be relatively small.

It is proposed that minewater will be pumped from the underground workings directly to storage dams at the former Rhondda open cut mine, where it will be used for dust suppression. Surplus water would enter Cockle Creek downstream of the wetland area.

Based on analyses from West Wallsend and Teralba collieries, mine water at Wakefield is predicted to have a level of suspended solids of 75 to 80 mg/litre and a range of pH from 8 to 8.6.

3.6.4 Safeguards and Impact Assessment

Surface runoff from the surface facilities area which could contain suspended material will be directed to ponds to allow settlement of most non-soluble solids. In some areas initial treatment will be achieved by passing surface flows through grit arrester pits.

Sedimentation ponds will be designed to accommodate flows from a once in ten year, one hour duration storm. Spillway structures will be designed to handle a once in 100 year storm event.

Trade and domestic waste will be separately collected, treated and disposed of by spray irrigation. (See Section 2.4 for details).

Minewater will be used for dust suppression. It is expected to be of a quality suited to discharge after settlement, but it is proposed that excess minewater will not be discharged at the pit head but downstream of the wetland area on Cockle Creek.

3.7 COAL TRANSPORT

Coal will be transported by truck, conveyor and rail. Impacts from coal transport will be primarily associated with movement of trucks on the private haul road. Noise and dust associated with coal haulage have been discussed in Section 3.2 and 3.5 respectively.

Safeguards incorporated into colliery design will ensure that water released to Cockle Creek will meet State Pollution Control Commission requirements under The Clean Waters Act.

The coal haul route will share the route of the access road across the existing rehabilitation area. At the southern boundary of the proposed Westside Mine, the haul road will turn north and connect with the Westside haul road. Only a short length of road constructed specifically for Wakefield Colliery will pass through bushland. Hence, there is little potential for this road to disturb wildlife movement in the area.

The future overland conveyor from Wakefield Colliery will require clearing vegetation from a ten metre wide strip along the conveyor route. The loss of vegetation would be relatively minor in an area already partly cleared and disturbed by access for previous mining activity. Being elevated above ground, the conveyor would not prevent fauna from migrating across the corridor, although the cleared vegetation and conveyor access track may discourage animal movement.

At the crossing of Cockle Creek the conveyor would be elevated. There would be no impedance to the flow of water in the creek during flood events. Drainage controls will be included in earthworks to minimise sedimentation.

Transport from Macquarie Coal Preparation Plant to the Newcastle coal loader will be by rail. The railway route proceeds from the preparation plant through stations at Cockle Creek, Cardiff, Kotara, Adamstown and Broadmeadow. The State Rail Authority has advised that it will be able to fully service the transport requirements from the preparation plant. The Authority believes that rail transport of Wakefield coal can be accommodated with no adverse environmental impacts and that rail has consolidated its position as the most environmentally acceptable transport mode.

3.8 EMPLOYMENT EFFECTS

Lake Macquarie City is located within the Lower Hunter Region of New South Wales. This region comprises Cessnock, Lake Macquarie, Newcastle, Maitland and Port Stephens local government areas. It forms the area from which the mine workforce will predominantly be drawn. Workers recruited from beyond this area would be likely to relocate their place of residence to take up employment.

3.8.1 Regional Population

The Lower Hunter Region had a population of 416,100 at the 1986 census. Table 3.7 shows low, medium and high population projections for the Region through to the year 2011.

TABLE 3.7
LOWER HUNTER POPULATION PROJECTIONS

	1986	1991	1996	2001	2006	2011
Low Level	416,100	432,500	444,800	454,000	461,200	467,300
Medium Level	416,100	434,700	452,300	467,300	480,500	492,500
High Level	416,100	437,000	462,700	486,100	507,300	527,300

Source: DoP 1989

Most of the region's population (70%) resides in the Newcastle and Lake Macquarie local government areas. Their populations at the 1986 census were 132,900 and 158,300 respectively.

3.8.2 Regional Employment Characteristics

Table 3.8 shows industry employment structure within the Hunter Region, including the Upper Hunter. The table also presents an "index of concentration" for each industry which is the ratio of percentage employed in the region to the percentage employed in Australia as a whole.

TABLE 3.8
HUNTER REGION: INDUSTRY EMPLOYMENT STRUCTURE

Industry	1971		1986		Change	Index of Concentration*
	No	%	No	%	1971-86	1986
Agriculture, etc	9,886	6.0	8,710	-4.5	-1,176	0.80
Mining	7,490	4.5	11,885	6.1	4,395	4.36
Manufacturing	46,089	28.0	31,797	-16.4	-14,292	1.09
Electricity, etc	4,199	2.6	6,633	3.4	2,434	1.79
Construction	12,136	7.4	12,834	6.6	698	1.00
Commerce	28,905	17.5	34,595	17.9	5,690	0.95
Transport	8,886	5.4	10,864	5.6	1,978	1.06
Communication	2,414	1.5	3,016	1.6	602	0.76
Finance	7,874	4.8	14,620	7.5	6,746	0.74
Public Admin, Etc	7,134	4.3	9,714	5.0	2,580	0.83
Community Services	16,669	10.1	32,144	16.6	15,475	0.95
Accommodation, etc	8,325	5.1	11,264	5.8	2,939	0.95
Other	4,793	2.9	5,639	2.9	846	0.81
Total Employed	164,800	100.0	193,715	100.0	28,915	
Unemployed	2,892		27,976		25,084	
Total Labour Force	167,692		221,691		53,999	

* Ratio of percentage employed in that industry in Hunter Region to the percentage employed in that industry Australia wide.

Source: DoP, 1989

It is apparent that the proportion of the Hunter workforce employed in the mining industry is significantly higher than the average for Australia. Trends in the number of employees engaged in various industries between 1971 and 1986 include a major decline in manufacturing, a small decline in agriculture and sizeable increases in finance, community services and mining. There was, and continues to be, an obvious shift in the employment base away from manufacturing to other industries. Growth of employment in other industries however, has not matched the decline in employment in manufacturing or natural increase of

the labour force. As a result unemployment rose substantially within the Hunter Region from 1971 to 1986.

The 1986 census revealed 12.8% unemployment in Lower Hunter district. At the same time unemployment in the Sydney Statistical District was 8.6%. Unemployment has fallen over the past few years and figures for November 1989 are 5.2% for the State, 4.2% for Sydney and 8.6% for the Lower Hunter. It is possible that in the last 12 months an increase may have occurred.

3.8.3 Anticipated Employee Catchment

Place of residence statistics for employees at West Wallsend Colliery are shown in Table 3.9.

TABLE 3.9
PLACE OF RESIDENCE, WEST WALLSEND COLLIERY EMPLOYEES

Locality	Number of Employees
Lake Macquarie (west)	100
Lake Macquarie (Southwest)	4
Lake Macquarie (Northeast)	58
Lake Macquarie (Southeast)	5
Central Newcastle	22
North Western Newcastle	28
Maitland	17
Cessnock	58
Total	292

These figures demonstrate that the catchment for new employees would be wider than the Lake Macquarie area and that employees are prepared to commute considerable distances to a place of employment. Of course some employees living in the Lake Macquarie area will have relocated to the area after gaining employment at the colliery. However given the recent period of rationalisation in the coal industry, particularly in the Lower Hunter, it is very likely that the unemployment statistics include a significant number of people previously employed in the industry. This 'pool' is considered to be more than adequate to supply Wakefield Colliery's employment needs.

The operational workforce will be up to 260 employees. The workforce will include a range of skills and requirements for varying levels of experience. Experienced personnel could be transferred from other FAI Mining Group collieries. However it is likely that the colliery workforce will be drawn from within the Lower Hunter and from the numbers of unemployed persons who have the necessary skills and experience required by the company. Very little immigration is expected. There is unlikely to be any noticeable changes to the local community structure nor would the colliery increase demands for facilities, services or accommodation.

3.9 ECONOMIC EFFECTS

Local firms will benefit through provision of equipment, materials and services to the colliery. Retail outlets throughout the region would also benefit from employee income expenditure on food, accommodation and consumer goods. For production of 2.5 million tonnes per annum (raw coal) it is anticipated the following annual expenditure will be required.

.	Services from local companies	$ 400,000
.	Overhauls of mine equipment undertaken by local engineering firms	$1,400,000
.	Pit consumables sourced from local firms or firms with local offices	$4,500,000
.	Transport of coal by truck transport firms or owner-drivers	$2,600,000
	Total	$8,900,000

In addition there will be annual charges paid directly to government bodies for a range of different services:

		$ per Year
.	Council Rates	11,000
.	Licences & Fees	6,000
.	State Land Tax	5,000
.	Water Rates	120,000
.	Electricity	1,800,000
.	Coal Royalties	3,400,000
.	Coal Excise Duty	500,000
.	Rail Charges - MCPP to Port	6,300,000
.	Port Charges	10,000,000
.	Maritime Services Board	1,000,000
.	PAYE Tax Payments	4,500,000
.	Payroll Tax	800,000
	Total	28,442,000

Company tax would also be paid to the Commonwealth Government on profits generated by the colliery. In addition, the revenue generated by the colliery due to export sales would represent a direct contribution of the same value to the national economy in terms of national exports and foreign exchange.

3.10 SOILS

3.10.1 Soil Types

The mine site is part of an area surveyed by the Soil Conservation Service as part of an investigation for the Sydney - Newcastle freeway (GHD 1986). The surface facilities will be located mostly on a soil unit termed non-calcic brown soils and described as hard pedal brown duplex soil. The site of the ventilation shaft contains a yellow podsolic soil unit described as a hard pedal mottled yellow duplex soil.

Both soils are of moderate to low fertility and are particularly prone to erosion when disturbed. All structures will be located on these two soil types.

A different soil type occurs on the Cockle Creek flood plain between the pit top facilities site and the ventilation shaft site. GHD (1986) describes this material as an alluvial earthy sand,

suggesting an essentially sandy soil with a small fraction of fines and/or organic matter. A more detailed soil survey was conducted on the lease of the proposed Westside Mine (Chapman & Dyson 1987). In this report, Cockle Creek alluvium was examined about two kilometres downstream from the Wakefield Site and described as a mottled heavy pedal duplex soil. This suggests a very clayey soil with a minor sand component.

Other studies in the area generally provide support for, or show acceptance of, the heavy duplex classification (BHP 1988, Mills 1990, Dallas 1990). Soil distribution is shown in Figure 3.8.

Flood plain soils will be affected by the access road to be constructed between the ventilation shaft and the pit top site. The heavy duplex soil is poorly drained, dispersible and unstable.

3.10.2 Safeguards and Impact Assessment

Soil disturbance will occur during construction of surface facilities and roads. Although slopes are gentle there is a moderate to high erosion hazard. Controls will be implemented to reduce the potential for sediment to be carried by stormwater to Cockle Creek.

As part of initial earthworks on the pit top site, settlement ponds will be constructed (see Section 2.4). Runoff from the site facilities area will drain to these ponds which will be designed to ensure efficient settlement of suspended material. Ponds will be designed to accept runoff from a once in 10 year, one hour duration storm, which will cater for over 90% of rainfall events. Catch drains will divert upslope runoff around the site.

For road construction, catch drains will be installed upslope of the road. They will remain in place and be regularly maintained after roads are completed.

Rehabilitation of disturbed areas will be affected immediately following completion of construction activities in that area. For larger areas this will involve seeding with grasses and applying fertilizer to promote a vigorous protective cover. For smaller areas laying of turf may be adopted. Where a significant area of subsoil is exposed, additional topsoil may need to be imported to ensure adequate grass cover is achieved. Topsoil from site areas will be stripped and stockpiled ahead of site earthworks.

Most major developments comprising significant earthworks are generally the subject of a detailed plan, prepared prior to works commencing, specifying soil erosion controls considered necessary at the particular site. Lake Macquarie City Council has indicated that

an Environmental Management and Rehabilitation Plan will be required as a condition of any development approval. This plan would address procedures for clearing of vegetation, earthworks and erosion control measures, and the requirement for the rehabilitation and landscaping of the site.

There will inevitably be some loss of soil material from disturbed areas during the construction phase. Proposed measures will ensure that minimal soil material will move offsite and that there is a low risk of significant increased sediment input to Cockle Creek. The Company's commitment to stabilising all land surfaces following construction also ensures that any erosion risk will be temporary.

3.11 FLORA AND FAUNA

A survey and assessment of the flora and fauna of the proposed surface facilities site has been carried out (Mills 1990). This report addresses vegetation communities, fauna and habitats, features of conservation significance and an assessment of possible impacts from the proposed colliery.

3.11.1 Flora

Vegetation in the vicinity of the study area has been previously described by McRae and Conacher (1980), Benson (1986) and Bartrim and Bartrim (1986).

Mills compiled a list of 149 plant species in the study area consisting of 130 natives and 19 introduced species. Introduced species were found to occur mainly along roadsides and at other disturbed locations. A full species list was prepared.

Five vegetation communities were also identified and are summarised in Table 3.10. They are classified using the terminology of Specht (1981) and the dominant tree species. The distribution of vegetation community types is shown in Figure 3.9.

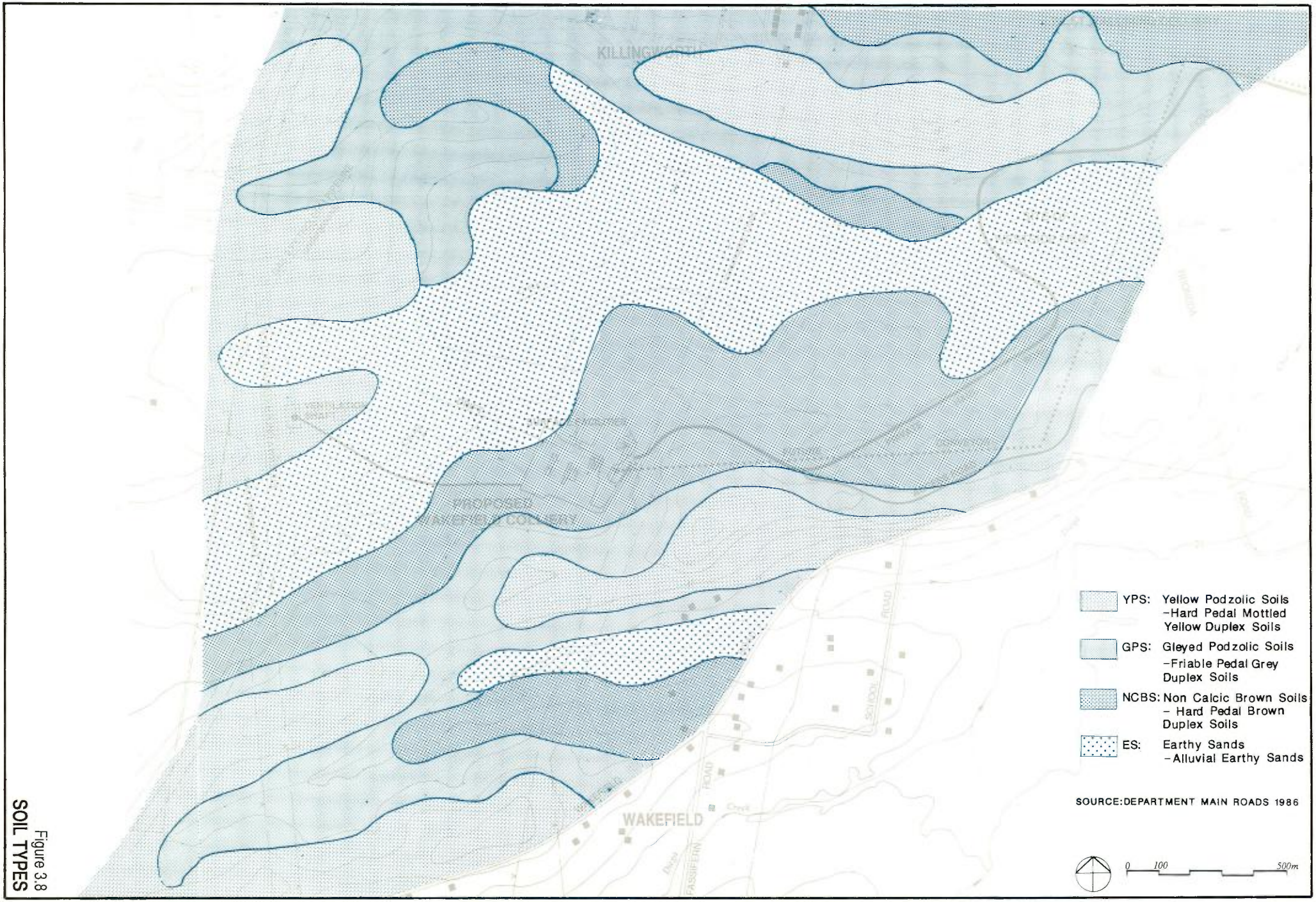


Figure 3.8
SOIL TYPES

CABBAGE GUM/SWAMP MAHOGANY OPEN FOREST
ROUGH BARKED APPLE WITH PAPERBARK SCRUB UNDERSTOREY
RED BLOODWOOD/SMOOTH-BARKED APPLE/ WHITE MAHOGANY WOODLAND
SYDNEY PEPPERMINT STRINGYBARK FOREST
CLEARED LAND
EUCALYPT ANGOPHORA COMMUNITY
PAPERBARK SCRUB
SMOOTH-BARKED APPLE/RED BLOODWOOD/ STRINGYBARK WOODLAND
SMOOTH-BARKED APPLE / RED MAHOGANY PAPERBARK WOODLAND
SPOTTED GUM/IRONBARK OPEN FOREST/ WOODLAND
BASTARD MAHOGANY SMOOTH-BARKED APPLE RED BLOODWOOD COMMUNITY

0 100 500m

Figure 3.9
VEGETATION COMMUNITIES

TABLE 3.10
VEGETATION COMMUNITIES

Community	Dominant Species	Occurrence
1. Smooth-barked Apple/ Red Bloodwood/Stringybark Woodland	*Angophora costata* *Eucalyptus gummifera* *Eucalyptus eugenioides* *Eucalyptus umbra* *Eucalyptus fibrosa*	Occurs over much of the study area, mainly in the vicinity of the proposed facilities.
2. Smooth-barked Apple/ Red Mahogany/Paperbark Woodland	*Angophora costata* *Eucalyptus resinifera* *Melaleuca* spp.	Occurs on moister sites on level topography in the western part of the area.
3. Cabbage Gum/Swamp Mahogany Open Forest	*Eucalyptus amplifolia* *Eucalyptus robusta* *Melaleuca* spp.	Occurs on the alluvial flats near Cockle Creek in the western part of the study area.
4. Red Bloodwood/Smooth-barked Apple/White Mahogany Woodland	*Eucalyptus gummifera* *Angophora costata* *Eucalyptus umbra* *Eucalyptus haemastoma*	Occurs at the eastern end of the study area on soils which are sandier than those in the west.
5. Spotted Gum/Ironbark Open Forest/Woodland	*Eucalyptus maculata* *Eucalyptus fibrosa*	Occurs on a small part of the study area, at the extreme western end.

The Wetlands Centre, Shortland has undertaken a broad-scale study of remaining wetland areas in the Lake Macquarie catchment. A small wetland has been described in the upper Cockle Creek valley near Killingworth. This area is downstream of the proposed Wakefield surface facilities and extends along the valley to approximately the boundary of Westside Mine.

3.11.2 Fauna

Fauna species and fauna habitats were surveyed in the field and assessed using information provided by other relevant studies. Lists of fauna species recorded in or near the study area or expected to occur in the study area were also compiled (Mills, 1990).

The list of birds contains 41 species which were recorded in or near the study area although many more could be expected to occur.

Few mammals or evidence of their existence (scats, tracks, diggings) were identified in the field survey. The list of those species recorded and expected to occur contains 18 species of which five are introduced. Nine species of herpetofauna are listed for the area.

Three main faunal habitats were identified and are summarised as follows:

- a woodland/open forest with grassy understorey (Vegetation Community 1.);
- an open forest or woodland in swampland with a dense understorey and wetland flora, (Vegetation Communities 3, 4 and 5); and
- a woodland/open forest with a shrub and/or heath understorey (Vegetation Community 3.);

Fauna observed in the study area reflect these different habitat types. The first two habitats are generally undisturbed except for the absence of larger trees due to logging. The third habitat, found in the eastern end of the study area, has been greatly disturbed by clearing, road construction, recent bushfires as well as continual disturbance from rubbish dumping.

3.11.3 Features Of Conservation Significance

Australian plant species which are rare or threatened are listed in Briggs and Leigh (1988). This publication is used to assess the conservation significance of plant species in New South Wales. No species on this list were located during the field study.

Bartrim and Bartrim (1986) studied the area north of the Wakefield site and noted the presence of the rare plant species *Tetratheca juncea.* This species has been rated 3VCi by Briggs and Leigh (1988), meaning that it is vulnerable and although it is known from a conservation reserve, it is inadequately conserved. This species may occur within the

heathland understorey in Community 5 at the eastern end of the present study area, although it was not located. This area is quite disturbed having been burnt in 1986.

Benson (1986) listed several plant species of particular conservation significance to the south of the present study area. None of these species were located by Mills.

Vegetation communities which may be of regional or local significance have been noted in the studies by McRae and Conacher (1980) and Pressey *et al.* (1981). The community in the study area identified by these authors is the Melaleuca Swamp Community which occurs on alluvial soils along streams. This community occupies the area identified as a wetland by the Wetlands Centre, Shortland.

In relation to the value of the Melaleuca Swamp Community as fauna habitat, Pressey *et al.* (1981) commented that "these swamps play an important role in the total ecosystem as the major feeding and/or breeding habitat for several mammal, bird and frog species; as a likely refuge for fauna during drought and fire; and possibly as a corridor for the movement or migration of fauna." McRae and Conacher (1981) also identified the Melaleuca Swamp Community along Cockle Creek as being of botanical significance noting that it is "the last remaining example of this community, which is generally not well reserved." Benson (1986) however, shows extensive examples of this community to the west and south-west of Lake Macquarie and west of Tuggerah Lakes.

Fauna of particular conservation importance in New South Wales are listed on Schedule 12 of the National Parks and Wildlife Act 1974 (New South Wales 1974), as amended. The species from Schedule 12 which are known or strongly suspected to occur in the study area are listed in Table 3.11.

3.11.4 Safeguards and Impact Assessment

The proposal to develop a colliery on the site involves clearing several hectares of open forest/woodland vegetation. Most of the vegetation is generally common in the district, although the swamp community is identified as being significant. Only a small section of swamp community is affected by the surface facilities and the access road to the ventilation shaft. This is not considered to be a major disturbance. However it will be important to preserve the drainage patterns so that areas of swamp vegetation are not deprived of moisture.

TABLE 3.11

SPECIES LISTED ON SCHEDULE 12 OF THE NATIONAL PARKS AND WILDLIFE ACT, KNOWN OR EXPECTED TO OCCUR IN THE STUDY AREA AT WAKEFIELD

Part 1:	**Fauna of Special Concern**	
Morelia spilota	Diamond Python	This species may occur in the moister vegetation along the streams in the area.
Ardeola ibis	Cattle Egret	This species was recorded on cleared land adjacent to the study area.
Egretta alba	Great Egret	This species may occur from time to time in wetland areas in or near the study area.
Haliaeetus leucogaster	White-bellied Sea-Eagle	This species was recorded flying overhead in the study area.
Hirundapus caudacutus	White-throated Needletail	This species probably occurs in the study areas from time to time; aerial only.
Apus pacificus	Fork-tailed Swift	This species may occur in the study area from time to time; aerial only.
Rhipidura rufifrons	Rufous Fantail	This species was recorded near the study area by Pressey *et al.* (1981) and by Bartrim and Bartrim (1986).
Cinclosoma punctatum	Spotted Quail-thrush	This species was recorded near the study area by Bartrim and Bartrim (1986).
Part 2:	**Vulnerable and Rare Fauna**	
Falco peregrinus	Peregrine Falcon	This species may occur in the study area from time to time.
Callocephalon fimbriatum	Gang-gang Cockatoo	This species was recorded in the area by Pressey *et al.*(1981).
Part 3:	**Threatened Fauna**	
nil		
Part 4:	**Fauna in Imminent Danger of Extinction**	
nil		

The impact of the proposed development on the fauna of the area is likely to be negligible because of the relatively small area of natural vegetation to be disturbed. Much of the area has been previously disturbed, hence its value as a fauna habitat is already diminished.

Several fauna species listed on Schedule 12 of the National Parks and Wildlife Act are likely to occur in the study area from time to time. These species do not rely upon the habitats in the study area exclusively. The area of natural habitat to be affected by the proposal is small and does not represent a rare habitat type. However, the vegetation community associated with Cockle Creek has been identified as an important fauna habitat area.

One plant species listed as being rare or threatened, *Tetratheca juncea*, occurs in the vicinity of the present study area (Bartrim and Bartrim 1986). This species was not found during this study. No other species listed as being of particular conservation significance by Benson were found despite active searching.

Safeguards adopted to protect important features of flora and fauna on or near the study area and to mitigate against potential adverse impacts of the proposed development include:

- minimising natural vegetation removal particularly where trees have landscape values;

- minimising vegetation and natural drainage disturbance in the vicinity of Cockle Creek. The vegetation associated with the creek is important due to its faunal habitat and botanical value; and

- rehabilitation and revegetation of the land surface in disturbed areas to take place following construction.

3.12 ARCHAEOLOGY AND HERITAGE

A comprehensive archaeological survey was undertaken (Dallas 1990). The chairman and other members of the Koompahtoo Local Aboriginal Land Council inspected the site during the course of the study.

Recorded information on Aboriginal sites in the study area and region was also researched including a search of the NSW National Parks and Wildlife Service Register. No records of sites occurring within the study area were identified though it was found that there are several recorded sites within the local region. It was predicted that the types of site most likely to be found were occupation sites and scarred trees.

No Aboriginal sites or relics were found during the survey and it was concluded that probably none are located within areas affected by the proposed surface facilities, access routes or conveyor routes. The Land Council also confirmed that the survey was satisfactorily performed and that it had no further interest in the areas affected by the proposal. However the National Parks and Wildlife Service Cultural Resource Coordinator will be notified if any recognisable Aboriginal relic is uncovered during construction.

There are a number of nearby historical items associated with the coal industry including as Rhondda Colliery (closed 1983) and the formations of several abandoned narrow gauge railways used to transport coal in the vicinity. However, there are no historical items within the study area. Futhermore, no item listed in the registers of the Heritage Council or the Australian Heritage Commission exists in the vicinity of the proposed colliery.

3.13 LAND USE AND ZONING

3.13.1 Existing Land Use and Ownership

The site of the proposed surface facilities is bushland which has, for the most part, been little disturbed other than by selective logging and for various corridors for utilities. A wood pole transmission line runs along the eastern boundary of the pit top facilities and the former Rhondda open cut mine is located further to the east. The mining area has been reshaped and is in the process of revegetation. To the north and east, the bushland has been disturbed by clearing, road construction, bushfires and illegal rubbish dumping. The proposed Westside open cut mine is located to the north east with the proposed haul road, access road and conveyor route pass through this land. Additional land uses include the rural residential community of Wakefield, roadways including the F3 Freeway (scheduled for completion in this area late 1993) and Wakefield Road, four electricity transmission lines, and the gas and liquid petroleum pipelines.

The predominant landuse in terms of area of land affected are forestry (Awaba and Heaton State Forests), and agriculture to the east of Wakefield Road.

The nearest residences to the pit top site are at Wakefield. The closest is located approximately 500 metres to the south east whilst most of the village is within one kilometre in the same direction. These features are shown on Figure 3.10, Land Use.

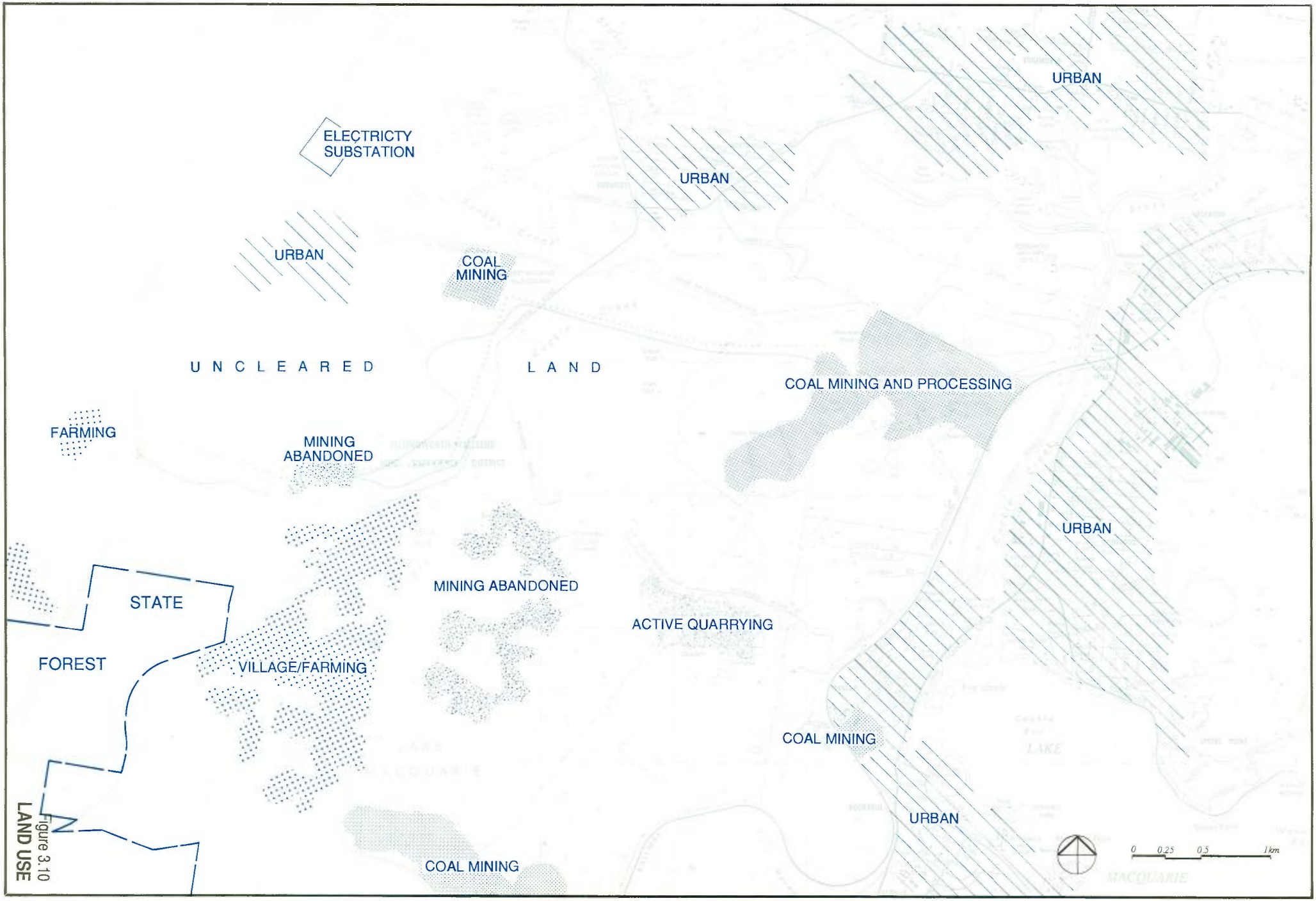


Figure 3.10
LAND USE

The area of land owned by FAI Mining at Wakefield is shown on Figure 3.11. This includes all of the land to be occupied by colliery development. Land to the north of the site is owned by another mining company. To the south there are smaller parcels of land associated with Wakefield village. A small farming area exists west of the F2 Freeway bordering an extensive area of state forest which extends west and south west from the site.

3.13.2 Zoning

Land development within the area is subject to the provisions of the Lake Macquarie Local Environmental Plan (LEP) and the Hunter Regional Environmental Plan (REP).

(i) Lake Macquarie Local Environmental Plan (LEP)

The land to the north, south and east of the site is zoned Rural 1(a), 1(b) and 1(d) under the LEP. The site for all the surface facilities are located within an area of land zoned 7(a) Environmental Protection (Scenic). Zoning is shown in Figure 3.11.

The Environmental Protection (Scenic) zone is designed to retain the scenic and environmental qualities of the slopes and foothills of the Watagan and Sugarloaf Ranges which do not fall within State Forests (Lake Macquarie City Council, 1977).

(ii) Hunter Regional Environmental Plan (REP)

Under the terms of the Hunter REP, a consent authority is required to consider a number of matters before granting consent to a development application for coal development. These matters broadly fall into the categories of use of prime crop or pasture land, transport of coal, rehabilitation, post mining use, water quality effects, noise, dust, odour, vibration, soil erosion and water pollution.

The objectives of the Plan in relation to mineral resources and extractive materials are to

- manage the coal resources (and other mineral resources and extractive materials) of the region in a co-ordinated manner so as to ensure that adverse impacts on the environment and the population likely to be affected are minimised;

- ensure that development proposals for land containing coal and other mineral resources and extractive materials are assessed in relation to the potential problems of rendering those resources unavailable; and

. ensure that the transportation of coal has minimal adverse impact on the community.

These matters for consideration by the consent authority have been addressed in this environmental impact statement. The proposal is consistent with the objectives of the REP.

3.13.3 Assessment

The proposed colliery will not prevent continuation of any existing landuse on surrounding properties. The surface facilities are located over 400 metres from the nearest residence which together with the interviewing ridge provides a more than adequate buffer zone around the site.

Because the proposed development will not substantially alter the appearance of the slopes of the Sugarloaf Range from accessible public viewing points, it is considered to be consistent with the objectives of the 7(a) zoning of the land. The colliery is permissible development under Clause 22 of the Lake Macquarie Local Environment Plan.

3.14 BUSHFIRE RISK

The naturally vegetated areas around Wakefield experience a frequent fire regime resulting from easy public access. Vandals, stolen cars being dumped and burnt and rubbish burning are common causes of bushfires in the area. According to Council's Fire Officer, a bushfire occurs in the district almost every year.

Proposed pit top facilities would be surrounded on three sides by relatively undisturbed bushland. At present, access to the pit top area is more restricted than areas adjacent Wakefield Road. The transmission line clearing east of the site serves as a fire break between these two areas.

An assessment of bushfire hazard for the site was undertaken according to Circular 74 (Department of Environment and Planning, 1984) and Luke (1982). The methodology involves determining the possible fire hazard under extreme conditions by overlay mapping of slope and vegetation.

The fire hazard of the site is predominantly moderate though small patches of high hazard occur where slopes are greatest. The reason for the wide distribution of moderate hazard is

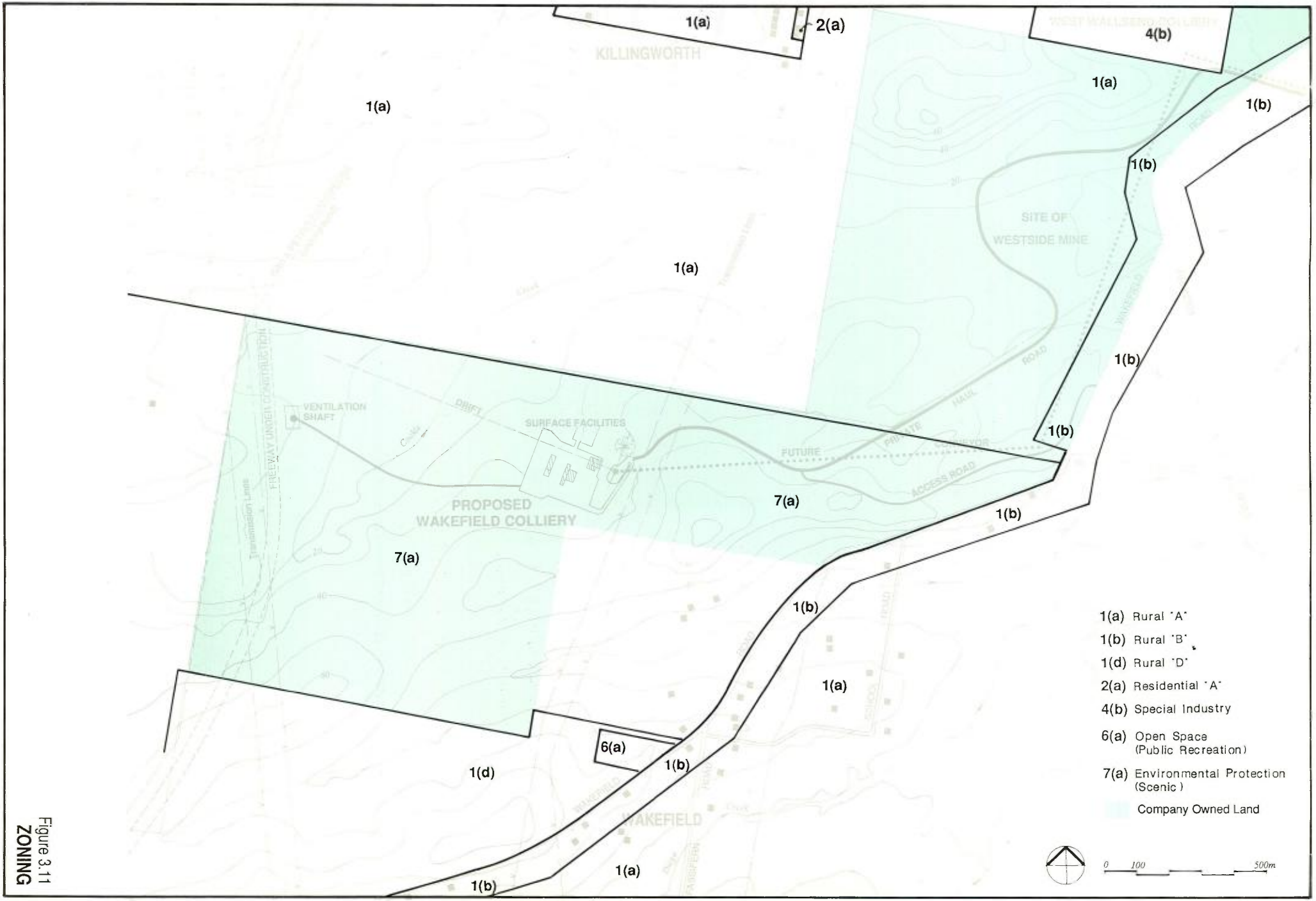


Figure 3.11
ZONING

that where potentially hazardous dry schlerophyll forest occurs, slopes are almost flat. Where slopes are greater, the more benign open woodland vegetation occurs.

A bushfire protection plan will be formulated to safeguard surface facilities from bushfire and to eliminate any opportunity for increased bushfire risk posed by the colliery's presence. Despite the general lack of high fire hazard conditions on the site, the high fire frequency in the district presents a risk to buildings adjoining undisturbed bushland. Fire radiation zones appropriate for high fire hazard areas suggested by Luke (1982) will therefore be adopted. All buildings on the outer edge of the site will be surrounded by at least a 20 metre fuel free zone (inner fire protection zone free from flammable vegetation) and a minimum fifteen metre fuel reduction zone (outer fire radiation zone). The outer zone will be divided into five compartments to be control burned on a rotational five yearly cycle. A fire trail will be constructed around the site within the outer fire protection zone to provide access for fire fighting and hazard reduction burning. This system would safeguard the surface structures from local bushfires and also safeguard against the spread of any fire which might occur on the site.

3.15 ACCESS AND SECURITY

The access road from Wakefield Road to the pit top will be fitted with security gates both at Wakefield Road and at the entrance to the surface facilities. The site will be fenced to prevent unauthorised access.

A fire trail along the southern ridge will be connected with the main access road and a security gate installed so that access may be gained only by mine staff and local fire brigades.

These safeguards will result in restricted access to the area by unauthorised persons which, together with an increased security presence, will decrease the incidence of arson and vandal-caused bushfires. Access for fire fighters along the ridge top adjacent to the mine will be improved.

3.16 CUMULATIVE IMPACT

Wakefield Colliery will contribute to the level of industrial development in the area west of Lake Macquarie. In this area are located the Sydney-Newcastle freeway extension, the proposed Westside Mine, West Wallsend Colliery, Teralba Colliery, Newstan Colliery, Teralba Quarry, the Macquarie Coal Preparation Plant, Newcastle Electricity substation and

various high voltage transmission lines. The combined or cumulative effects of these developments are manifold. The most relevant cumulative effects to assess are those affecting adjacent sites.

There is potential for interaction in respect of noise, dust, transport and water quality with the Westside Mine and with the freeway. The major areas of potential cumulative impact in the local region are discussed below in more detail.

(i) Noise

Noise generated from operations at Wakefield Colliery may be noticeable at residences in Killingworth, Wakefield and at an isolated rural residence west of the surface facilities site. Noise from Westside Mine will also be noticeable at some of these locations.

Westside Mine will operate only during the hours of 7:00 am to 10:00 pm when daytime noise criteria apply. Wakefield Colliery is proposed to operate 24 hours per day and accordingly has been designed to meet night-time noise criteria. At times when Westside Mine is operating in sections of the open cut which are close to residences in Killingworth or Wakefield, the noise level from Wakefield Colliery received at those residences will be considerably lower and will not add to total daytime noise.

The private haul road leading from West Wallsend Colliery to Macquarie Coal Preparation plant will carry coal trucks from three coal mines. The combined effect of trucks from the three mining operations will increase noise levels in the vicinity of this route. However, no residences are located in close proximity to the haul road. The closest residences are in Killingworth, about 1.5 kilometres from the common part of the haul road.

(ii) Dust

Levels of dust deposition in the area will be affected by both Westside Mine and the Wakefield proposal. Dust generated from freeway construction activities will be likely to have reduced before Wakefield Colliery commences coal production.

The residence in Wakefield which is nearest to the proposed Westside Mine is predicted to receive an increase of dust deposition of less than one gram per square metre per month from that mine. This could occur during the final years of Westside when excavation is taking place in the south western corner of that lease.

Dust deposition at gauges surrounding West Wallsend Colliery suggest that there will be very little dust contribution from Wakefield Colliery to residences in Wakefield. However, deposition levels will continue to be monitored over the life of both projects, to ensure the actual levels meet acceptability criteria.

(iii) Traffic

There are no foreshadowed developments in the area which could significantly increase traffic on Wakefield Road to the point that a cumulative impact with the current proposal would occur. Indeed, completion of the Sydney to Newcastle freeway is expected to reduce current traffic levels on Wakefield Road which will reduce the interaction of colliery traffic with other Wakefield Road traffic.

(iv) Water Quality

The Sydney-Newcastle freeway, Wakefield Colliery and Westside Mine are all located within the catchment of Cockle Creek. However these developments occupy a relatively small proportion of the area which is predominantly vegetated and undisturbed. Other existing development is limited to transmission line access tracks, forestry logging roads, fire trails and some small cleared farming areas.

Wakefield Colliery will disturb a much smaller area than Westside Mine or the Sydney-Newcastle freeway. Once operations begin, there is very limited potential for sediment to be generated. Landscaping around the surface facilities and ventilation fan sites will prevent erosion. The emergency coal stockpile area and truck loading area will drain to settlement dams. All roads and work areas associated with the colliery will be properly drained and runoff will be directed to settlement dams for settling prior to release.

The major developments either proposed or under construction in the upper Cockle Creek catchment described above will, if properly controlled, not unduly affect water quality in Cockle Creek. Wakefield Colliery is the least likely of the three to have any effect on water quality.

3.17 MONITORING

FAI Mining Limited will monitor a range of environmental factors during the life of the colliery. Should monitoring results show any unacceptable impacts have developed, the Company will take steps to rectify the matter.

Records of measurements will be maintained by the Company and made available on request to interested parties to assist with any research which may be conducted by others in the Wakefield area. Reports will be prepared and submitted to the relevant authorities to formally notify the results of the monitoring programme.

Factors to be monitored will include:

- noise levels at residences;
- dust deposition;
- traffic;
- water quality in Cockle Creek;
- minewater quality;
- performance of sedimentation controls; and
- progress of landscaping and rehabilitation.

3.18 ENERGY STATEMENT

An energy statement is a specified requirement for environmental impact statements for designated development. Although this document specifically examines establishment of surface facilities, the energy statement has been prepared to consider the energy consequences of underground mining at Wakefield Colliery, which is more meaningful in terms of energy consumption.

Extraction of coal by underground mining will result in a net energy gain. That is, the energy of coal produced by the colliery will exceed the energy consumed in extraction.

Over the life of the colliery, it is anticipated that 6.4 million tonnes of coking coal and 26.5 million tonnes of energy coal will be produced. The specific energy for 16.5% ash content product coal is about 27 MJ/kg. The total energy of product coal is estimated to be 890,000 terajoules (one terajoule is 10^{12}joules).

The energy requirements to operate the colliery, transport and process the coal are 3600 TJ of electrical energy and equivalent 100 TJ of petroleum products, giving a total energy input of 3700 terajoules. In addition there will be additional energy impacts for transporting the coal to overseas markets and those associated with its use at the endpoint. However, the energy

input required to extract and process coal represents only 0.4% of the energy output of the mine.

In-situ reserves within the area of the lease to be worked are estimated at 70 million tonnes. Recoverable reserves within the same area are estimated to be 44 million tonnes. After passing through Macquarie Coal Preparation Plant, marketable product coal is expected to be 33 million tonnes.

Table 3.12 summarises energy recovery from the mine. The efficiency of energy recovery is 56% based on in-situ reserves and 85% of recoverable reserves.

TABLE 3.12
ENERGY RECOVERY FROM MINE

	In-Situ Reserves	Recoverable Reserves	Product Coal
Tonnage (Mt)	70	44	33
Specific Energy (MJ/kg)	23	24	27
Total Energy (Terajoules)	1,610,000	1,056,000	890,000

4.0 PROJECT ALTERNATIVES

4.0 PROJECT ALTERNATIVES

The project has undergone an extensive planning phase during which a number of alternative pit top sites, layouts and transport options have been examined. Alternatives considered are discussed below and reasons for their rejection are indicated. The consequences of not proceeding with the project are also discussed.

4.1 ALTERNATIVE OF NOT PROCEEDING

The proposal examined by this document is the establishment of surface facilities for underground mining of coal. If surface facilities are not constructed the coal reserves cannot be won. Markets would obtain coal from elsewhere, possibly overseas sources in which case Australia would forego export earnings. State and Federal governments would lose direct revenue payments while local industry and business would not receive the indirect benefits of supplying goods and services to the mine.

FAI Mining Limited would forego considerable financial returns. If the coal cannot be extracted then a major asset owned by the Company would be sterilised.

Non-financial consequences of the project would also not occur. Environmental effects of the development described in this document would not take place. In addition, the presence of coal reserves in the ground would continue to restrict development within the mining area due to the Mine Subsidence Board's provision for future mining. The opportunity for the coal resource to be accessed while there is only limited surface development, as at present, could be lost.

4.2 ALTERNATIVE PIT TOP LOCATIONS

Alternative locations for the pit top facilities site are constrained by two major factors:

- the drift tunnel should reach the coal seam at a point below the F3 freeway. This allows main headings to follow the freeway route for efficient extraction of the coal resource without subsidence affecting the freeway; and

- the location of the drift tunnel should avoid sterilisation of mineable coal resources. The drift tunnel needs to be 800 metres long and the surface location should be sited in a valley to minimise local environmental effects.

A discussion of the sites considered follows:

i. Southern Site

This site is located next to the freeway, approximately three kilometres south of the proposed location for surface facilities. Coal transport from this location would be more expensive with greater environmental impacts. Surface transport options would involve either coal haulage on public roads or using an excessively long conveyor through private properties, neither of which is favourable for environmental reasons. The southern site was considered not to be economically viable and to be more detrimental to the environment. This site was therefore rejected.

ii. West Wallsend Site

An area of land adjacent to and west of the existing West Wallsend Colliery could be developed for Wakefield. A benefit of this site is the ability to concentrate facilities in what would be a single large colliery site. Surface transport of coal to Macquarie Coal Preparation Plant would also be simplified.

The site was not considered viable because the particularly long underground transport routes are not practical for efficient operation. In addition the site would have adverse environmental effects on the residents of Killingworth and would introduce industrial complications for the Company arising from locating two mines on one site.

iii. Central Site

BHP gained development approval to construct surface facilities for Wakefield Colliery at this site in 1976. This location, approximately two kilometres south of the chosen site, was rejected because a drift tunnel would sterilise high quality coal reserves and coal transport from this location would be more expensive with greater environmental impact on the community of Wakefield.

iv. Northern Site

Within this option there were two potential sites, one being the proposed site on land (then) owned by RW Miller and Company Pty Ltd and the other being on BHP land immediately to the north. The current site was selected for the following reasons:

- negotiations regarding purchase of the land from R. W. Miller and Company Pty Ltd were easily incorporated into negotiations already in train to acquire coal lease rights;

- surface coal mining has already taken place on some of the R. W. Miller land reducing the degree of disturbance to uncleared land;

- all Wakefield facilities could be sited within the area of the Wakefield Coal leases; and

- the R.W. Miller land shares a common boundary with the proposed Westside Mine enabling easier provision of private haul road and conveyor routes.

FAI Mining Limited has acquired the site from RW Miller and Company Pty Ltd.

4.3 LAYOUT OF SITE FACILITIES

The site layout has been largely determined by the location of the drift tunnel. The portal for this tunnel is the main access for men and equipment and the point of exit for coal. Therefore it is most efficient to locate parking, amenities and administration blocks and coal loading facilities at this point.

Alternatives for the location of the ventilation shaft were examined in detail. There is an access and maintenance advantage in this shaft being located near other site facilities. However, initial mine development is simplified if the shaft is located as close as possible to the pit bottom. In addition, long term mine ventilation is more effective and noise impacts less if the shaft is located as planned. The site near the freeway was chosen as this is the most effective flood-free location. The access road crossing Cockle Creek is not regarded as having a major impact.

4.4 TRANSPORT ALTERNATIVES

The main objective of transport planning was to avoid coal haulage on public roads. Options included truck haulage by private haul road or the use of a conveyor to Macquarie Coal Preparation Plant.

In the early years of operation, coal production levels would not support the cost of constructing a conveyor. As production increases however, a conveyor could become feasible and there would be subsequent efficiency savings in transport.

The haul road would be constructed to link with the proposed Westside Mine haul road. The length of additional road required to link with Westside is less than two kilometres.

The proposed conveyor route was chosen after first considering two other alternative routes. The first would have run along the western boundary of the Westside lease and would have necessitated a transfer point in the north west corner of that area. This route was rejected due to the proximity of the transfer point to Killingworth and therefore likely unacceptable noise impacts. The second route passed through the Westside lease to the east of the proposed southern pit. However, this would have caused unacceptable restriction to the Westside mining operations. The chosen route runs approximately parallel with Wakefield Road and has been located to avoid noise impacts on Wakefield residents. Part of the conveyor and the southern transfer point may be visible from Wakefield Road.

5.0 JUSTIFICATION AND CONCLUSION

5.0 JUSTIFICATION AND CONCLUSION

Justification for the project rests on economic, social and environmental grounds. Wakefield Colliery will extract a marketable coal resource using modern mining techniques which will recover coal as efficiently as practicable.

The sale of Wakefield coal on international markets will contribute to Australia's export earnings and help to lessen our balance of trade deficit. The national economy will benefit from the investment required to establish the colliery and from operations which will result in payments to people, businesses and government organisations.

Employment will be provided for up to 260 people on the Wakefield site with the expectation of further employment in industries servicing the colliery. Wakefield is close to large population centres which can provide accommodation and community service infrastructure for the colliery's workforce. Because coal mining is an established industry in the area, a new colliery can readily be assimilated within the existing social and industrial character of the Lake Macquarie district.

Wakefield Colliery can be developed without adversely affecting either local communities or the natural environment as a result of the environmental safeguards incorporated into the design and operation of the project. The surface facilities, roads and a possible future conveyor route have been sited on the opposite side of a ridge from Wakefield village, the nearest residential area.

Predicted noise levels at the closest residences are within acceptable night-time criteria, for the life of the mine. Dust generation will be minimised, being controlled by providing a sealed haul road near residences, avoiding the open stockpiling of coal at the site during normal operations and using water sprays where necessary.

There will be no major traffic impacts. Coal will be transported on a private haul road. Employees and mine service vehicles will access the colliery from Wakefield Road via a new intersection with turning lanes in each direction. Volumes of increased traffic are well within the capacity of the existing road system.

The natural environment will be protected by minimising vegetation clearing to that necessary for the development to proceed with reasonable bushfire protection. Mine water will not be released upstream of a nearby wetland area but will be used for dust suppression

or held in storage as possible make-up water for the nearby Westside Mine. Any surplus water will be released to Cockle Creek near Tobins Bridge.

Several hectares of partly disturbed bushland will be cleared to allow the colliery to proceed. Vegetation to be disturbed is well represented in the area and clearing the site will not endanger any plant or animal species.

FAI Mining will monitor the environmental performance of the colliery and undertake any action which may be necessary to ensure that environmental objectives are met.

Having regard to the safeguards included is the proposal, it is considered the environmental consequences of developing and operating Wakefield Colliery will be controlled to within acceptable contemporary standards.

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6.0 REFERENCES

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7.0 APPENDICES

7.1 DIRECTORS REQUIREMENTS

New South Wales Government

Department of Planning

File

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

Telephone: (02) 266 7111 Ext.7235
Fax No: (02) 266 7599
Contact: V Thomson

Our reference: 81/811

Your reference:

General Manager Operations
Pacific Copper Limited
PO Box 841
NEWCASTLE 2300 262

Dear Sir,

Wakefield Underground Mine Project
Proposed Pit Top Facilities

Thank you for your letter of 15 November, 1989 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 it appears that the subject land is zoned 7(a) Environmental Protection (Scenic) under the Lake Macquarie LEP 1984, the proposal seems to be prohibited. Should you wish to proceed further with the proposal, you should pursue the matter with the Lake Macquarie City Council with respect to the zoning. To enable preliminary studies to begin, specifications are issued at this time.

3. 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 Lake Macquarie City Council. The EIS shall be prepared in accordance with clause 34 of the Regulation and shall bear a certificate required by clause 26(1)(b) of the Regulation (see Attachment No. 1).

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

- impacts of shift change traffic on the area;
- sediment control measures to minimise runoff to Lake Macquarie;
- examination of alternatives for the siting of ventilation shafts;

- visual impact assessment of overland conveyor and coal storage bin;

- noise impact assessment of pit top operations and overland conveyor/truck haulage.

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

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

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

Yours faithfully,

B Adams 19/12/89

Barbara Adams
Manager, Assessments Branch
As Delegate for the Director.

DEPARTMENT OF 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 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 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 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 opertions 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.
- 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 of 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 opertions.
- 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.

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 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.

7.2 COMMUNITY NEWSLETTER

FAI MINING LIMITED

AN INTRODUCTION TO THE PROPOSED WAKEFIELD COLLIERY

information newsletter *February 1990*

prepared by:
Mitchell McCotter & Associates Pty Ltd
planning and environment consultants

INTRODUCTION

Environmental investigations are about to commence in relation to a proposed underground coal mine in the Wakefield area. Surface facilities for the mine will be located on undeveloped land west of Wakefield, near the present F3 freeway construction.

The mine will be known as Wakefield Colliery and will supply coking and steaming coal to local and international markets. Coal from the mine will pass through Macquarie Coal Preparation Plant prior to sale.

Although in the early stage of planning, the Company feels it is appropriate to seek input from residents and organisations.

This newsletter provides information about the proposal for residents and other interested people. It also provides a contact name and telephone number should you seek any further information or wish to have an input into planning for the project.

THE COMPANY

FAI Mining Limited now operates all the former coal interests of Pacific Copper Limited. In January 1990, FAI Mining Limited acquired the New South Wales and Queensland coal assets of Pacific Copper Ltd. In the Lake Macquarie area these assets include:

- Lambton Colliery;
- Teralba Colliery;
- West Wallsend Colliery;
- the Macquarie Coal Preparation Plant; and
- various coal leases in the Wakefield area.

FAI Mining proposes to develop the leases by establishing the Westside Mine, near Killingworth and the currently proposed Wakefield Colliery to the south.

In New South Wales, FAI Mining employs over 1000 people in mining and ancillary operations and produces more than three million tonnes of saleable coal each year.

THE COAL RESOURCE

The coal to be mined is in the West Borehole seam in the Westside Colliery Holding. The seam ranges in thickness from 3.2 to 6.0 metres with a depth ranging from 80m in the west to 200m in the east.

Recoverable reserves in the area are estimated to total more than 43 million tonnes.

MINE PLANNING

It is proposed to use longwall extraction supported by two continuous miner units. Planned coal production is in the order of 2.5 million tonnes per year. Permanent employment for up to 280 people could be provided.

The longwall system will be designed to extract up to 4.5 metres of seam thickness. This is the maximum thickness that is economically feasible to mine using proven technology.

Main development headings are planned to be established below the F3 freeway which will divide the lease into eastern and western longwall areas.

Underground transport is to be based on rubber tyred vehicles. An underground conveyor with a capacity of approximately 3,000 tonnes per hour is required to move coal from the longwall face to the surface.

SURFACE FACILITIES

Surface development will be confined to a small area to minimise environmental effects of the project and to simplify site management. Surface facilities will include a bathhouse and an office building as well as coal transport and storage facilities. Dams and a sewage treatment plant are also essential.

The proposed site adjoins a former open cut mine to the north of Wakefield village.

A drift (inclined tunnel), 700 metres in length is planned to provide access to the coal seam from the surface. A vertical shaft will be located close to the drift for ventilation purposes.

A drift conveyor powered from a surface drive house will deliver coal directly into a storage bin.

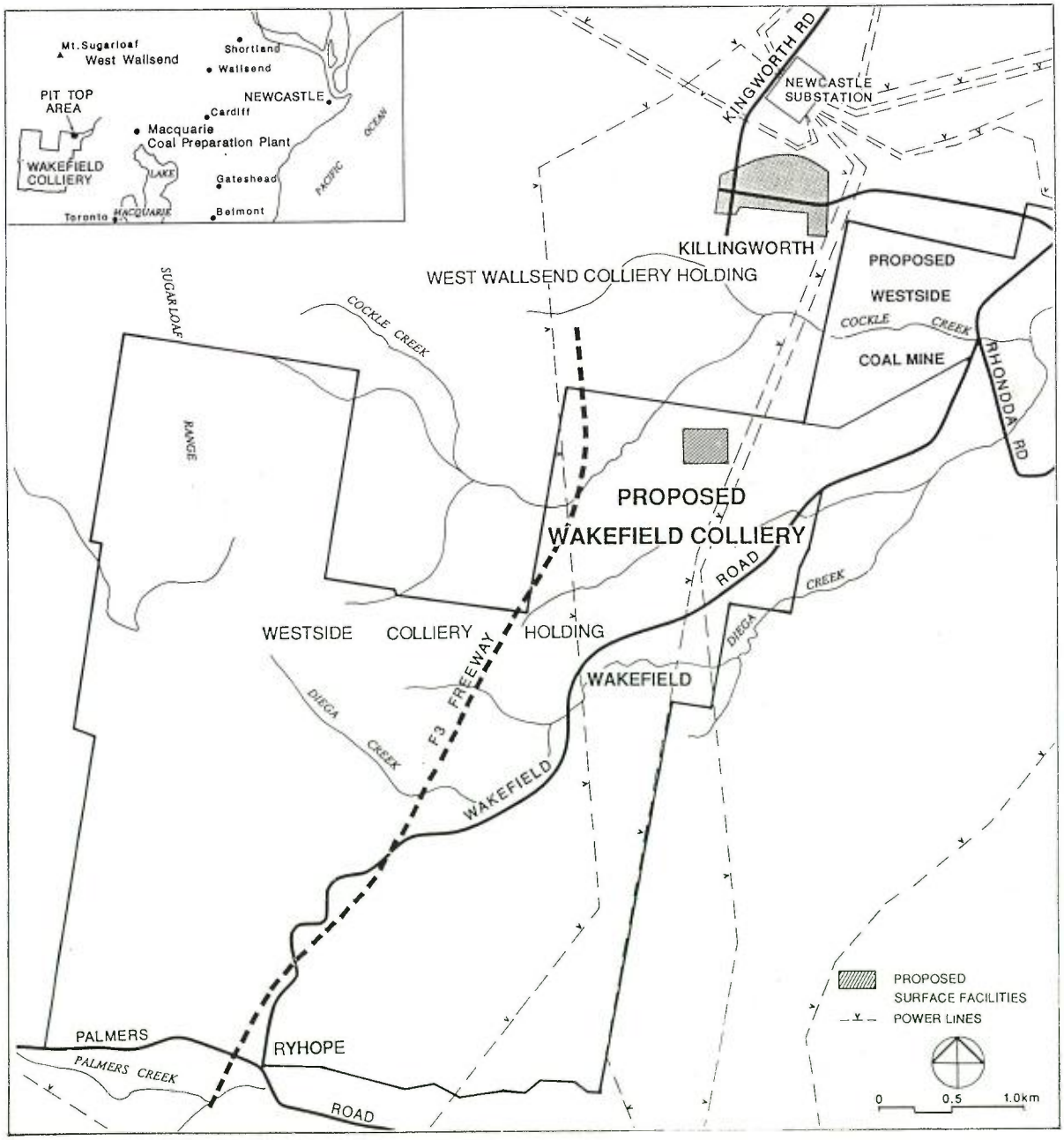
TRANSPORT

Coal would be transported from Wakefield Colliery to the Macquarie Coal Preparation Plant. Upon commencement of operations, trucks would transport coal entirely on a private haul road. An overland conveyor system would later be built to replace road transport. An area will be set aside adjacent to the mine storage bin to stockpile coal in the event of delays in the transport system.

Wakefield coal will be processed at the Macquarie Coal Preparation Plant. This is a modern facility that currently prepares coal from the Company's Teralba and West Wallsend collieries. Clean coal is transported by rail from this plant to the port and the same method will be used for the coal from Wakefield.

APPROVAL PROCEDURES

An environmental impact statement (EIS) will accompany the application for approval to develop the mine. An independent firm specialising in environmental assessment, Mitchell



McCotter and Associates, has been commissioned to prepare the EIS.

The EIS will be lodged with Lake Macquarie City Council with a formal development application. The Company is seeking approval to establish the mine on the desired site. Additional approvals will be sought for the use of longwall mining methods.

ENVIRONMENTAL ASSESSMENT

The consultants will be studying a wide range of matters in preparing the EIS. Field surveys will be undertaken and will include studies of soils, geology, plants and animals, history and archaeology of the area, noise levels and water quality.

This information will enable the company to fully understand the effects of its plans. Methods for reducing or eliminating potential impacts will be examined and where practicable, included in the project to minimise any changes to the environment.

ENVIRONMENTAL ISSUES

Environmental studies have commenced and contact has been made with a number of Government departments. The plan to transport coal initially by private haul road and later by conveyor means that coal transport is not a major issue. Important questions to be answered in the EIS are: how visible will the surface facilities be; will the mine be noisy; and how much traffic will employees add to local roads?

Other issues to be detailed in the EIS include: where will the mine get its water, how can stormwater runoff be best managed; where is the best road access to the site; and what safeguards are appropriate to minimise air pollution? The consultants will consider how the mine can be developed to co-exist harmoniously with residents and others using the area. Throughout these studies, the Company will be keen to receive suggestions or comments from the community.

The EIS will also discuss the benefit of the Company's mines to the local economy. As a significant employer in the region, the Company's long term prosperity has a strong influence upon the prosperity of the workforce, those who service the area and the community as a whole.

The issue of mine subsidence will be examined in detail in a separate application for the use of longwall methods at the mine.

TIMING

Environmental investigations are proceeding in conjunction with the design of surface facilities. In this manner, environmental issues can be considered at an early stage and solutions worked into the design strategy.

It is anticipated that the EIS will be ready for public display in May, 1990. Subject to approval being granted it is planned to commence site work in October 1990.

YOUR SAY

Before Council makes any decision on the project it is required to take into account written comments from any interested person or organisation. The time when the EIS can be examined and comments lodged will be advertised in local papers. You will be invited to make any comments on the project at that time.

However, the Company wishes to have any concerns of local residents taken into account in preparing the EIS. If you would like to make any input to the studies or give any opinions that might help us in the preparation of the EIS, please write to or telephone:

Terry Perram
Mitchell McCotter & Associates P/L
P.O. Box 580
SPIT JUNCTION NSW 2088
Phone: (02) 960-2355

or

Jonathan Romcke
FAI Mining Limited
PO Box 841
NEWCASTLE NSW 2300
Phone: (049) 29-6477

7.3 AUTHORITIES CONSULTED

Caltex Oil (Australia) Pty Limited
Department of Arts, Sport, the Environment, Tourism and Territories
Department of Minerals and Energy
Department of Planning
Electricity Commission of New South Wales
Forestry Commission of New South Wales
Hunter Water Board
Joint Coal Board
Lake Macquarie City Council
Mine Subsidence Board
National Parks and Wildlife Service
Pipeline Authority
Roads and Traffic Authority
Shortland County Council
State Pollution Control Commission
State Rail Authority
The Cabinet Office
The Natural Gas Company

7.4 RESPONSE FROM AUTHORITIES CONSULTED

Caltex oil (Australia) Pty Limited.

Caltex is the operator of the high pressure liquid petroleum products pipeline which traverses the lease area. Possible subsidence affecting the pipeline is of major concern to Caltex. Caltex is concerned that a satisfactory mining plan be developed which will not result in excessive ground subsidence to the detriment of the pipelines.

This is a matter for consideration at the time of preparing mining plans for submission to the Department of Minerals and Energy. The proposed siting and development of surface facilities examined in this environmental impact statement will not affect existing pipelines in the area.

Department of Arts, Sports, the Environment, Tourism and Territories

The Department offered no specific comment but advised that it would comment on the completed EIS when placed on public exhibition.

Department of Minerals and Energy

The Department expressed support for the project and would not be offering further comment until detailed documentation is available.

Department of Planning

The Department's requirements are set out in full in Appendix 7.1.

Electricity Commission of New South Wales

The Commission pointed out that two steel tower transmission lines run close to the eastern boundary of the colliery and that the potential for subsidence to affect the lines should be assessed.

Forestry Commission of NSW

The Commission advised that none of the proposed structures would be located in State Forest and there would be no effect on State Forest other than subsidence following mining.

Hunter Water Board

The Board has no objection to the proposed mine and advised that a water main would be required from Barnsley to the mine and that there are no sewerage facilities available.

Joint Coal Board

The Board expressed general support for the proposal and did not anticipate becoming more involved until Joint Coal Board approvals are sought.

Lake Macquarie City Council

Officers of Council were consulted several times during preparation of the EIS and matters raised have been addressed in this document.

Mine Subsidence Board

The Board advised that the proposed mining is located within two mine subsidence districts and that the Board's approval is required to subdivide land or erect surface structures within proclaimed Mine Subsidence Districts.

The Board also advised that in respect of land within the lease to the east of the F3 Freeway there could be no additional improvements and that all future applications for surface development must be referred to a meeting of the Board.

The Board is generally in agreement with the proposal.

National Parks and Wildlife Service

The Service advised that it had reviewed the archaeological report and that no further archaeological investigation is required within the areas affected by the proposed pit top, ventilation shaft, or access and conveyor routes. However the Service also advised that any

areas to be affected by subsidence due to underground mining will need to be surveyed prior to the commencement of mining.

The Service believed there should be a flora and fauna study of the area and that other likely impacts on the Cockle Creek catchment and surrounding bushland should be addressed.

Roads and Traffic Authority

The Authority requested that the EIS consider compatibility issues of the proposed mining operation with the Freeway. Issues flagged were visual impact, effects of blasting, atmospheric dust and changes to drainage patterns.

The proposed transport method was endorsed by the Authority but it also warned that if the proposed conveyor and haul road did not proceed then use of public roads may occur. This would incur a levy payable to the Authority of 3c/tonne/kilometre. It was advised that the EIS should clearly demonstrate the expected timing of road construction and mine opening.

State Pollution Control Commission

The Commission advised on matters which the EIS should address with respect to air, water and noise pollution. To address air pollution it was advised that the EIS include projected dust deposition rates, combined impact with existing and proposed developments, an assessment of short term impacts, details of dust control measures and details of a monitoring programme.

To address water pollution it was advised that the EIS should include details of control measures, details of the site drainage system, details of settling ponds and details of a monitoring programme.

To address noise pollution it was advised that the EIS include an assessment of the existing acoustic environment, a modelled prediction of future noise levels, details of noise control measures and details of a monitoring programme.

It was additionally advised that disturbed areas must be revegetated to a high standard prior to commencement of coal production.

The development will require approval under legislation and the Company will be required to hold an appropriate licence.

State Rail Authority of New South Wales

The Authority expressed support for the proposal to rail haul all Wakefield Coal from the Macquarie Coal Preparation plant. The Authority advised it would be able to meet the task of hauling increased volumes and that there should be no additional environmental impact. The Authority wished to be advised when coal would begin to be hauled by conveyor to the preparation plant. The Authority also wishes to discuss potential transport of coal to any power stations.

The Cabinet Office

No comment was offered on the basis that other relevant arms of New South Wales Government administration had been consulted.

The Natural Gas Company

The Gas Company met with FAI Mining representatives to discuss the project. The lease area is traversed by the natural gas and petroleum liquids pipelines which are proposed to be undermined. These pipelines form the main arteries of fuel, energy and feedstock supplies to the Newcastle area. Pipeline failure resulting from mine subsidence is of major concern. The company requested further consultation to resolve this issue.

This is a matter for consideration at the time of preparing mining plans for submission to the Department of Minerals and Energy. The proposed siting and development of surface facilities examined in this environmental impact statement will not affect existing pipelines in the area.

7.5 STUDY TEAM

This environmental impact statement was prepared by Mitchell McCotter and Associates for FAI Mining Limited. Liaison with FAI Mining was through Mr Jonathon Romcke, Mining Engineer Projects.

The following Mitchell McCotter personnel worked on the project:

Timothy Macoun	Project Director
Terry Perram	Project Manager
Luke Palfreeman	Civil Engineer
Stephen Lacey	Environmental Scientist
Michelle Fernandes	Planner
Martine Walker	Planner
Pamela Walker	Planner
Karen Fletcher	Word Processing
Gina Taylor	Word Processing
Michelle Wigney	Word Processing
Laura Kelly	Word Processing

Consultants to Mitchell McCotter:

Renzo Tonin and Associates
Kevin Mills and Associates
Mary Dallas

FAI MINING LIMITED

EIS
838

Environmental impact statement on surface facilities for proposed Wakefield colliery

Borrower's name	Date	Ex

RAECO

RAECO

EIS 838


FAI MINING LIMITED
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