COALPAC PTY. LIMITED
ACN 003 558 914

ENVIRONMENTAL ASSESSMENT

FOR PROPOSED EXTENSION OF INVINCIBLE OPEN CUT MINE AND REHABILITIATION ACTIVITIES.

CULLEN BULLEN N.S.W.

Prepared By
Craven, Elliston & Hayes (Lithgow) Pty. Limited
March 2006

COALPAC PTY LIMITED

Environmental Assessment for the Proposed Invincible Open Cut Mine and Rehabilitation Activities.

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March 2006

Report No. 3/1118

Submission of Environmental Assessment (EA)
Prepared under the Environmental Planning and Assessment Act 1979, Part 3A Major infrastructure and other projects, Sections 75D, 75E and 75F.

EA Prepared by:

Name: Noel F. Craven

Qualifications: Registered Surveyor; Certified Mine Surveyor under Coal Mines Regulation Act; Member of the Institution of Surveyors (Australia)

Address: Craven Elliston & Hayes (Lithgow) Pty Limited
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In Respect of:
The proposed open cut operation of the Invincible Coal Mine site and associated rehabilitation activities.

Project Application by: Coalpac Pty Limited
Invincible Colliery
Castlereagh Highway
Cullen Bullen

Land to be Developed: Mining Portions and Leases, ML 68, Part of MPL 80, Part of MPL 1346, Part of Consolidated Coal Lease No. 702 (CCL 702), freehold land owned by Coalpac Pty Limited, Lot 1 of FP 180294 and Lot 113 of DP 877190.

The land is partly subject of Consolidated Coal Lease No. 702

Maps attached as part of EA.

Environmental Assessment (EA) accompanies this form.

Certificate I, Noel Frederick Craven hereby certify that I have prepared the contents of this Statement and to the best of my knowledge:
It is in accordance with Environmental Assessment requirements as issued by the Director General under section 75F of the Environmental Planning and Assessment Act 1979 No. 203, and it is true in all material particulars and does not, by its presentation or omission of information materially mislead.

Signature
Name Noel F. Craven M.I.S. Aust.
Date

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EXECUTIVE SUMMARY

ES - 1 Project Overview

Coalpac Pty Limited (Coalpac) currently owns the Invincible Colliery. Invincible Colliery is located about 3km south east of the village of Cullen Bullen in the Western Coalfield of N.S.W. (EA Figure 1). The colliery is currently on a care and maintenance program, having ceased mining operations in 2001.

Coalpac is seeking approval to establish an open cut coal mine within Mining Lease 68 at Invincible Colliery, Castlereagh Highway, Cullen Bullen to supply a contract to Delta for the supply of coal to the Mt Piper Power Station. The company may also be awarded a contract to supply up to 120,000 tonnes of coal to Manildra Starch on the south coast of NSW. It is expected the approval for this Project will supply the coal to Delta Electricity and Manildra Starch for a period of 3 to 5 years, depending on awarding of tenders.

Coalpac has won a new contract for coal supplies to Delta commencing on 1st July 2005 and finishing on 30th June 2008 at a supply rate of 110,000 tonnes until 30th June 2006 and then 150,000 tpa for the subsequent two years.

The open cut will produce between 110,000 and 350,000 tpa of steaming coal which will be transported by an internal haul road to the crushing and screening area, within Portion MPL 80, for processing. The coal will then be transported by internal haul roads and onto the Castlereagh Highway to Mt Piper Power Station and other domestic markets.

The rate of production from the open cut project will depend on the tonnage of coal required by Manildra Starch and other domestic markets

The open cut mine will employ up to 12 people.

The open cut excavation will disturb 10ha of the site. The area to be disturbed will include areas affected by plant and topsoil storage and temporary overburden placement.

The open cut will be progressively rehabilitated.

With the exception of toilet facilities, portable office and a mobile crusher and screening plant it is anticipated that there will be no other infrastructure at the open cut.

Coal will be transported, after crushing and screening, direct to the power station or the south coast, eliminating significant stockpiling.

It is envisaged that most operations will occur between the hours of 0600 to 2000 hrs each day. Weekend work may occur as required.

The open cut operations will include areas previously partly mined by underground mining operations and safety and rehabilitation strategies will make provision for these workings.

A rehabilitation program will be developed to produce topographical landforms which will be consistent with surrounding landscape and existing landforms which will leave the restored land in a condition that will be suitable for grazing of stock and forestry which is consistent with its existing use.

ES - 2 Environmental Issues

(i) Product Transportation

The total output from Invincible Colliery, once the open cut is operating, will be up to a maximum of 350,000 tpa, dependent upon markets.

Consequently there will be an increase in the total average daily truck traffic along the Castlereagh Highway from Invincible Colliery. Under previous operations and consents Invincible Colliery was able to transport 2 million tonnes per year along the Castlereagh Highway to the Lidsdale Rail Siding, adjacent to Wallerawang Power Station. The movement of coal from the open cut to the crushing and screening area will be via internal haul road.

ii) Goods and Services Transportation

The transport of goods and services, including personnel, is currently effected via the Castlereagh Highway.

There will be a minor increase in traffic in respect of these items once the open cut is operating.

iii) Noise Impacts

A noise impact studies have been undertaken by Environmental Resources Management to supplement noise surveys conducted whilst the previous open cut was operating. The completed studies are attached as Appendix L.

The proposed open cut mining operations should not result in any significant adverse noise impacts due to the remoteness of the operations from habitation (Figure 14; page 81).

The haul road from the open cut site to the existing washery passes within 250 metres of "Renown Farm" residence, which is a property owned by Coalpac and rented to Ms. Wendy Day, on a week to week basis.

This residence will be protected from noise impacts by the high ground between it and

the proposed haul road.

It is intended to drill and blast overburden where hard rock is encountered.

Blasting operations will be confined to daylight hours, during weekdays. Blasting operations will not significantly affect the “Billabong” and “Hillview” residences located on the western side of the Castlereagh Highway located 2km from the opencut site. Farm residences along the back Cullen Road and the Wattle Mount area, 3 to 4 km west of the project site and the town of Cullen Bullen will not be affected due to the intervening high ground.

iv) Water Quality

Water used by the open cut operations will almost exclusively be for dust control on the site and along the haul road. This water will be supplied partly from run-off water contained within the open cut site and settlement basins. If necessary, during dry weather, it can be supplied from the existing mine water supply based on water pumped from underground workings and surface runoff stored in a dam north of the washery, which has a capacity of approximately 50 megalitres.

The surface water at the open cut site will be separated into clean and dirty water systems.

Dirty water will be contained on site held in existing sumps within the open cut workings and existing settling basins before being pumped into the nearby abandoned underground mine workings.

v) Flora

The proposed open cut site is immediately north of and adjacent to previous open cut mining operations completed in 2001. The previous site has been rehabilitated.

There has been some re-growth of trees, in particular *E. macrorhyncha* and *E. manniferra.*

The site is within Ben Bullen State Forest No. 434 and shows evidence of timber harvesting for mine props. Two plant communities were found to occur in this area, these being open forest of *Eucalyptus viminalis*, *E. macrorhyncha* and woodland of *E. rossi* and *E. macrorhyncha*.

The open cut operations will result in the clearing of some of the native flora, particularly vegetation from the open forest.

Disturbance of vegetation will be minimised by limiting plant and equipment operation to areas necessary for the mining operation. The rehabilitation program will be designed to re-establish units of local plant communities now present.

Extensive field expeditions for identification of flora, particularly for understorey and ground cover species, have been undertaken and recorded in Section 3 (3.9.2) of this document.

vi) Fauna

Three fauna habitats exist at the open cut site; open forest within the Ben Bullen State Forest, tussock and sedge communities and regenerating open cut areas.

Being of limited size, the proposed project is unlikely to affect threatened or protected fauna at state, regional or local levels.

Disturbed fauna will be able to take refuge in the very extensive forest area adjoining the site on the east during the period of operations.

Fauna studies have been completed and the results are recorded in Section 3(3.9.3) of this document.

The fauna surveys did not reveal the presence of any protected or vulnerable species as listed in Schedules 1 and 2 of the Threatened Species Conservation Act 1995.

A significant frog colony containing six separate species was located in a small wetland area contained in an abandoned open cut south of the proposed open cut area during the 1997 survey. As part of the rehabilitation program this wetland was retained and will not be affected by proposed operations.

Five species of Micro chiropteran bats have been identified at the project site and a disused mine entry into the abandoned Renown Colliery workings has been identified as a likely bat habitat. This area was incorporated in the rehabilitation plan and will be unaffected by this proposal.

vii) Aboriginal Archaeology and European Heritage

There are no land claims and/or sites registered with the Department of Conservation and Land Management and there are no claims pending under the NSW Aboriginal Land Rights Act, 1983. A Native Title claim has been lodged by the Wiradjuri Tribe over the forestry section of the site.

An aboriginal heritage assessment of the site has been completed by Ozark Environmental and Heritage Management P/L in addition to site inspections by representatives of the Bathurst Local Aboriginal Lands Council resulting in a very close scrutiny of the site. No Aboriginal Artifacts of Archaeological Sites were identified.

The resultant report which includes details of the Native Title Agreement for ML 68 is attached as Appendix D.

One non-indigenous heritage site was reported at the southern end of the area which

consists of traces of a hut and several introduced tree specimens. This site is not significant and being south of the proposed open cut, this area will not be disturbed.

viii) Air Quality

Specific measures will be incorporated into the mining and transport operations to control dust emissions during the life of the mine.

The monitoring of dust deposition and total suspended particulate matter at "Billabong" from 1997 through 2002 has shown that the rates of dust and particulate matter deposition were within EPA amenity criteria during operation of the previous open cut at Invincible (See Appendix H).

The proposed open cut operation will not affect the current air quality at either "Billabong" or "Hillview", however monitoring stations will be maintained at both residences to ensure compliance with EPA (Dec) assessment criteria (see Figure 14; page 81).

ix) Subsidence

The project does not include underground mining activities and no ground subsidence will result from mining operations.

x) Social and Economic Effects

Currently Invincible Colliery employs 2 people at the mine. This proposal will employ up to 12 people for a period of 3 years, and dependant upon further Project Applications, could result in employment for a longer period.

Proposed markets are for power station coal supplies to Delta Electricity and specialised steaming coal markets at Bomaderry, near Nowra.

Other social - economic impacts to the local community, Lithgow City Council and NSW are:

- Support of local power industry through the supply of coal to Delta Electricity at a competitive price.

- Recovery of a remnant coal resource which will not be viably mineable once the Invincible Colliery infrastructure is removed. Coal reserves in the vicinity of the Western Power Stations are limited and it is essential that all available reserves be mined; and

- Contribution by Coalpac to local State and National financial resources.

xi) Visual Impact

The topographical features surrounding the open cut site and its comparative remoteness from habitation results in minimal visual impact on local residents or persons travelling on the Castlereagh Highway.

The open cut workings will be visible from a short length of the Castlereagh Highway where it crosses the Great Dividing Range. The viewpoint is about 3km from the project site.

ES - 3 Conclusion

This EA has described and justified the proposed Project, identified the site, the proposed works, the proposed intensity of operations and the likely inter-relationship between proposed operations and any existing or approved operations at the mine or surrounding mines. It has demonstrated that the proposal is permissible with consent and assessed it against relevant environmental planning instruments (See Section 3.11.1.2).

Consultation has been undertaken with the relevant local and state authorities, service providers, community groups and in particular Department of Primary Industries, Forests NSW, adjoining landowners and occupiers.

This EA has identified the main environmental issues, assessed the likely environmental effects and made recommendations regarding mitigation measures.

There will be some impacts on the environment during operations and following the rehabilitation process. The impacts will be well within acceptable criteria and are mitigated by:

- The limited size of the operations.
- Remoteness from residential habitation; and
- An effective rehabilitation plan

Coal Reserves close to Western Power Stations are limited, and the continued operation of Invincible Colliery through this open cut project will make valuable coal reserves, within 3km of Mt. Piper Power Station, available for power generation.

SECTION 1

Introduction

1.1 Scope of Proposal

This Environmental Assessment (EA) has been prepared by Craven Elliston and Hayes (Lithgow) Pty Limited (CEH) to accompany a Project Application by Coalpac Pty Limited (Coalpac) to the Department of Planning (DOP).

The Project Application seeks Ministerial approval to develop an open cut coal mine on Portion ML 68 and construct associated haul roads on adjoining land at Invincible Colliery, Castlereagh Highway, Cullen Bullen (Figure 1; page 23)

The proponent is the owner and operator of the Invincible Colliery, which is located north of the township of Wallerawang on the Castlereagh Highway (Figure 12; page 64) The mine which has been in operation for over 100 years, is currently on a care and maintenance management program. The care and maintenance program commenced in 2001 due to lack of markets.

The lodgment of the Project Application for the open cut coal mine is based upon a contract for the supply of up to 150,000 tonnes per annum (tpa) of coal to the Mt Piper Power Station (Delta), a potential market with a south coast firm (Shoalhaven Starches) and other possible markets.

The open cut operation will use the existing mine infrastructure and a mobile crushing and screening plant. It adjoins the previous Invincible Open Cut which ceased operating in 2001 and has been rehabilitated. The existing haul road and other existing roads will be used to transport the coal from the proposed open cut mine to the current entrance to the Invincible Colliery and onto the Castlereagh Highway. Existing haul roads connect the open cut mine areas with the existing washery and mine top areas. There will need to be minor extensions to the existing roads to enable full access to the open cut sites, which will mean an extension of approximately 0.5 km of road. Part of Portion MPL80 will be required for mobile plant storage, run-of-mine coal crushing and screening, using a mobile crusher and screen and a temporary coal stockpile. Included in the open cut area will be sites for soil and overburden storages. Existing water management structures established for the previous Invincible Open cut operations will be used.

Coalpac has tendered for a three year contract to supply up to 150,000 tpa to Delta. It has tendered to supply up to 120,000 tpa into a domestic market, Shoalhaven Starches Pty Ltd at Bomaderry as special grade steaming coal. It is also investigating further domestic markets.

The Delta contract commences on 1st July 2005. During the first year Coalpac will supply 110,000 tonnes to Mt Piper Power Station. Additionally in the first year Coalpac may supply up to 60,000 tonnes to the domestic market (Shoalhaven

Starches) depending on a successful tender. In the second year and third year Coalpac will supply 150,000 tpa to Delta and potentially up to 120,000 tpa to the domestic market. Other markets may also eventuate bringing total coal production to 350,000 tpa.

This proposal, if approved, would enable Coalpac to mine coal from a combination of the Irondale and Lithgow seams.

To meet the time frame imposed by the Delta contract Coalpac intends to lodge a Project Application, accompanied by this EA with the Department of Planning (DOP) to satisfy the recent State Environmental Planning Policy (Major Projects 2005).

Therefore an Environmental Assessment is the appropriate form of planning documentation to accompany the Project Application.

A Project Consent granted to satisfy this application should provide for the total coal requirement for the Delta contract and the domestic market which could reach 350,000 tpa.

This EA will also be used as a basis for any application to the Department of Environment and Conservation for variations to Invincible's current licence and support applications to the Department of Primary industries - Minerals Division to undertake open cut coal mining.

1.2 Form of the EA

The EA document has been compiled as a single volume that comprises 7 sections preceded by an Executive Summary.

A second volume contains supporting information and reports.

The document was originally prepared for approval under Part 4 of the Environmental Planning and Assessment Act 1979 and addresses the statutory requirements of Clauses 71, 72 and 73(1) of the Environmental Planning & Assessment Regulation 2000, as advised by DOP (See Appendix B).

Whilst the documentation has been prepared to be consistent with the requirements for Part 4 approval it has been established that the proposal will be assessed under the recently gazetted Part 3A of the Act.

The contents of the EA will satisfy the requirements of the 3A process and no additional information will be required.

The document format is as follows:

Executive Summary followed by:

Section 1: This is an introduction to the project, scope of the proposal, the form of the EA; the objectives of the Project and activity; corporate details of the proponent company; the history of coal mining at Invincible; the coal resource, its occurrence and commercial parties involved in the production of the document and consultation with representatives from local and State Governments, the community and statutory authorities, surrounding landowners and occupiers.

Section 2: Provides details of the coal resources, explains the proposed mining operations and coal processing; transportation; waste and water management; and rehabilitation.

Section 3: Describes the existing environment and how it affects the planning of the project.

Section 4: Presents the environmental effects which will result from the project; the management procedures and safeguards proposed for the protection of the local environment; and monitoring proposals.

Section 5: Explains proposed measures to mitigate adverse effects of the Project on the environment.

Section 6: Describes the proposed environmental management system.

Section 7 Provides an evaluation of the impacts of the proposed Project.

APPENDICES

A second document contains Appendices which comprise correspondence and technical reports relating to the various matters dealt with in the document.

1.3 The Project Site

The project site is located to the north of the township of Wallerawang and south east of the town of Cullen Bullen (Figure 1; page 23,). The project site is shown in detail in Figure 3, Page 33.

Figure 9, Page 56, also shows the areas mined previously by underground and open cut methods.

1.4 The Proponent

Coalpac Pty Limited (ACN 003 558 914) is a private company which was incorporated at Sydney in June 1988. The company is a wholly owned subsidiary of Hyrock Pty Limited (ABN 72 000 561 311)

The company has successfully operated two coal mines, Invincible Colliery and Canyon Colliery (now closed) for the past 12 year period up until 2001, most of the coal produced being supplied to local power stations and NSW markets.

The directors of the company are:

*Noel F. Craven - Managing Director, Registered Surveyor and Certified Mine Surveyor with 50 years experience in open cut and underground coal mining operations.

*Jeanette M. Craven - Accountant with 40 years of experience in private business including 15 years in accounting activities relating to coal mines.

*David G. Barnsdall - (Chairman of Coalpac) Certified Accountant with 30 years experience in financial matters related to mining.

The principal shareholders in the company are Noel F. Craven, Jeanette M. Craven and David G Barnsdall all of whom are involved in the operations of the company.

1.5 The History of Coal Mining at Invincible Colliery

The following notes have been extracted from "Geology and Mineral Resources of the Western Coal Field" J.E. Carne 1908 (Memoirs of the Geological Survey of NSW); Lithgow District Historical Society Information Sheet; and from recollections by Noel F. Craven.

About 1873, at the time of the construction of the Mudgee Railway Line, Messrs Croaker, Campbell Mitchell, Bulkeley and others opened up collieries by tunnels in the Lithgow Seam outcropping on the slopes of Pipers Mount between Wallerawang and the Village of Lidsdale and to the west at Blackmans Flat.

The working thickness of the Lithgow Seam increased in the direction of Cullen Bullen, and this direction of seam improvement would have encouraged William Hart Jnr. to start a coal mine in 1880 at that locality.

Hart's mine was not successful, and was followed by the opening of Cullen Bullen Colliery in 1889 by the Cullen Bullen Colliery Company. This colliery was purchased and closed by Western Associated Collieries in 1900.

The Invincible Colliery started in 1901/03 in workings adjoining Cullen Bullen. A siding from the Mudgee Railway Line into Invincible Colliery was opened in 1909.

Following the vicissitudes of the 1929 depression, and the Second World War, Invincible Colliery was moved to a new site, "Rough Range", 4 kilometres south of Cullen Bullen.

Figure 1 Locality Plan

The mine was purchased by Austen and Butta Limited in 1972 and modernised with the object of supplying coal into the burgeoning NSW export market.

Following a collapse of this market in 1987 the mine was purchased by Coalpac and operated successfully until 2001, when it was put into a care and maintenance program.

1.6 Title Details of Mining Leases and Tenements

The land subject of the Project Application is identified as follows:

- Portion ML 68, being Mining Lease 1434 (Act 1992)
- Part of Mining Purposes Lease No. 80 (Act 1973)
- Mining Purposes Lease 1346 (Act 1906)
- Part of Consolidated Coal Lease No 702 (CCL 702) (Act , 1973)
- Lot 1 of FP 180294 which is freehold land owned by Coalpac Pty Limited
- Lot 113 of DP 877 190 which is freehold land owned by Coalpac Pty Limited

CCL 702 excepts the surface and land and below to a depth of 15.24 metres in that part of ML 68 within Ben Bullen State Forest and the surface of the land and below to a depth of 13.72 metres in that part of Portion ML 68 within Portion 51.
The subject land is within the parish of Cullen Bullen, County of Roxburgh.

Portion ML 68 is the area proposed to be mined by open cut methods and is the site of part of the haul road from the open cut to the mobile crusher and screening plant.

Portion MPL 80 is the site of the mobile crushing and screening plant and part of the haul road from the plant to the Castlereagh Highway.

Portion MPL 48 and Lot 1, FP 180294 are the sites of roads from the mobile crushing and screening plant to the Castlereagh Highway.

1.7 The Coal Resource

Coal mining at Invincible Colliery has mainly been within the Lithgow Seam which is the thickest mineable seam in the colliery holding. The proposed Project will mine both the Lithgow seam and the Irondale seam. It will be noted that the Lithgow seam at Invincible Colliery includes the Lidsdale seam, both seams having converged at this location.

1.7.1 Nature of Occurrence

The Lithgow Seam is 3.5m to 4.2m thick (Figure 2; page 26) the coal being of bituminous rank, mainly dull, medium volatile with low to moderate ash content and low sulphur content (0.6%), and is suitable for steam raising purposes.

The lower section of the seam, below the bluestone band, is of high quality coal with

an ash content of 10% - 12%.

This section of the seam was worked exclusively up until 1950 as it contained no bands and met the specifications for locomotive coal.

In later years and up until 2001, the bottom 2.5m section has been worked, the increased recovery being washed for export and domestic markets after the installation of the coal washery in 1976.
The Lithgow seam gently dips to the north east at a rate of about 1:50, and for most part is under high cover, ranging from 50m - 150m.

Along its western margin the seam outcrops and in the vicinity of the proposed open cut site has low cover such that it has not been worked by underground methods. This has facilitated open cut mining, however in the proposed mining operational area the coal has been partly mined from the lower section of the seam.

The Irondale seam occurs approximately 17 to 20 metres above the Lithgow seam, is of varying thickness and quality and is generally only mineable for power station use.(Figure 2a; page 27)

1.7.2 Commercial Use

It is proposed to extract the high grade coal from the lower part of the seam by selective open cut mining methods for supply, unwashed, to the Shoalhaven Starch, on the South Coast of NSW, which Invincible formerly supplied from underground operations. The remainder of the seam and parts of the Irondale seam will be used to supply the 150,000 tpa to the Delta Power Station Contract commencement date of October 2005.

Table 1.1 presents an indicative analysis of the two grades of coal to be marketed.

Plate 1 – Invincible Pit Top Installations

Figure 2 Lithgow Seam Section

Figure 2a Irondale Seam Section

Table - 1.1 Indicative analysis of Lithgow Seam Coal to be produced from proposed open cut.

Parameter	Domestic Market Proximate Analysis	Power Station Contract Proximate Analysis
Inherent Moisture	2.5	2.0
Ash (%ADB)	16.5	21.0
Volatile Matter	32.0	30.0
Total Sulphur (%ADB)	0.65	0.6
Fixed Carbon (%ADB)	49.0	51.0
Phosphorus (%ADB)		0.007
Chlorine (%ADB)		0.02
Specific Energy (Mj/kg) (ADB)	27.8	26.3

Table - 1.2 Indicative analysis of Irondale Seam Coal to be produced from proposed open cut.

Parameter	Domestic Market Proximate Analysis	Power Station Contract Proximate Analysis
Inherent Moisture	2.5	2.0
Ash (%ADB)	16.5	21.0
Volatile Matter	32.0	30.0
Total Sulphur (%ADB)	0.65	0.6
Fixed Carbon (%MDB)	49.0	51.0
Phosphorus (%ADB)	-	0.007
Chlorine (%ADB)	-	0.02
Specific Energy (Mj/kg) (ADB)	27.8	26.3

1.8 Procedures Adopted For Preparation of EA

The writing of this statement and management of relevant investigations have been effected by Mr. Noel F. Craven, Registered Surveyor and Director of Craven Elliston and Hayes (Lithgow) Pty Limited (CEH) in association with Mr. Graeme Muir, (Ba.App.Sci Env.Tech. Environmental Technology) Environmental Manager, CEH.

Mr. Craven is also the Managing Director of Coalpac Pty Limited, the owner of Invincible Colliery.

Also contributing to the preparation of the document were:

*Mr. Peter Costa, the former Manager of Invincible Colliery.

*Mr. Keith Fletcher, Technical Manager CEH.

*Mr. Richard J. Peters, Bathurst Local Aboriginal Land Council.

*Mr. Dean Lavers (Ba.App.Sci.Env.Tech.) Terra Sciences Pty Ltd.

*Mr. Gordon Downey (B. Sc. (App.)) Atkins Acoustics and Associates Pty Ltd.

*Mr. Ron Leo, Proprietor of Big Rim Pty Ltd, Coal Mining Contractor.

*Mr. Paul Burcher (B. App. Sc.) AES Environmental Consultancy.

*Mr. Najah Ishac Manager, Acoustics, Environmental Resources Management Pty. Ltd.

*Jodie Benton and Phillip Cameron, OzArk Environmental and Heritage Assessment Pty. Ltd.

1.9 Consultation

Throughout the project planning and assessment process consultations were held with the Cullen Bullen community and representatives from Local and State Government authorities.

1.9.1 Statutory Authority Consultation

During the preparation of this document stakeholders and Statutory Authorities were consulted by mail and through a Project Information Meeting held at Invincible Colliery at the project site.

Copies of correspondence since received in response to these contacts are contained in Appendix B of this document. Matters raised have been addressed in the EA.

Comments received from Authorities following initial review of a draft document have been addressed to compile this final EA.

Table 1.3- Details of Attendees at Project Information Meeting.

Organisation	Contact	Address	Phone	Fax	Attendees
Lithgow Council	Andrew Muir Manager Env. Serv.	P O Box 19 Lithgow NSW 2790	(02) 63521077	(02) 63514259	Gary Wallace
Dept Infrastructure Planning & Natural Resources	Janne Grosse	Parramatta Office		(02) 9895 6270	
DIPNR - Orange	Lyndsey Usher	Orange	(02) 6841 7528		
DIPNR - Dubbo	Tim Baker	Dubbo	(02) 6841 7470		
DIPNR – Sydney	Mike Young	Sydney			NOTE: No DIPNR reps. were able to attend.
State Forests	Paul Wells Regional Manager	P O Box 865 Dubbo NSW 2830 Albury NSW 2640			Stephanie Hutchinson
Dept. Environment & Conservation	Darryl Clift Regional Operations Manager	P.O. Box 1388 Bathurst NSW 2795	(02) 63321838	(02) 63322387	Darryl Clift
Dept. Primary Industries – Mineral Resources Division	Chris Harvey Senior Env. Officer	P.O. Box 674 Wollongong NSW 2520			Greg Kininmonth
Dept. Primary Industries – Mineral Resources Division	Mr. Bill Barraclough – Senior Insp. Of Coal Mines	P.O. Box 674 Wollongong NSW 2520			No
Dept. Primary Industries – Mineral Resources Division	Mr. Eddie Morgan – District Inspector of Coal Mines	P.O. Box 69 Lithgow 2790			Mr. Eddie Morgan
Dept. Environment & Conservation – National Parks & Wildlife Division	Mr. Peter Myler – Macquarie Area Manager	Level 2, 203-209 Russell Street Bathurst NSW 2795 NSW 2065			No

1.9.2 Community Consultation

Following a discussion with Mr. Blackely of Portland Road, Cullen Bullen it was decided to place notices in the Cullen Bullen Hotel and the Cullen Bullen shop stating the intention of Coalpac to proceed with the Project Application for the proposed open cut and requesting that parties requiring further information contact Mr. Craven on telephone No. 6351 2281. A copy of the Notice is attached as Appendix B.

The nearest residences to the proposed open cut, at “Billabong” and “Hillview” (See Figure 14) were consulted with regards to the proposed extension of open cut operations at Invincible.

Mr. Graeme Muir of Craven Elliston & Hayes met with Mr. Burnie Munzer of “Billabong” and Mr. & Mrs. Gary Munzer of “Hillview” to discuss the proposed continuation of operations at Invincible and all aspects of the proposed operation.

Both residents were not opposed to the extension of the open cut if the proposed mining operations are consistent with those conducted from 1998 to 2001.

Mr. Graeme Muir also met with and discussed the proposed continuation of open cut operations with Mr. Michael Bulkeley the adjoining landowner.

Mr. Bulkeley had some concerns regarding intrusions of water onto his land from the existing rehabilitation areas at Invincible.

Coalpac is attending to these concerns and has consulted with and will likely engaged Mr. Bruce Hundy from the Department of Lands – Soil Services Division to effect repairs on Mr. Bulkeley’s land.

The water management system at the proposed open cut has been designed to divert any excess surface waters to the main colliery dam for utilisation in dust suppression (see Section 4.2.3).

This will ensure that the potential for waters leaving the open cut area is greatly reduced.

Coalpac will establish a Community Consultative Committee to oversee and monitor compliance with consent conditions.

1.9.3 Project Information Meeting

The Project Information Meeting was held on 25th May 2005 at Invincible Colliery.

The project information meeting provided an opportunity to discuss the proposed extension of open cut operations with the parties that were able to attend the meeting.

Discussions largely revolved around the extent and scale of operations of the proposed extension and future operational area's available to satisfy coal contracts.

In general most attendees could not see any major issues with extending the operation however most would need clarification as to the best approach to Project consent.

This issue was later resolved with implementation of SEPP (Major Projects) 2005, which established that DOP would be the controlling authority.

SECTION 2

Description of the Proposed Project

This section outlines the Company's proposal for the proposed open cut and rehabilitation of new open cut workings at Invincible Colliery. Environmental impacts are described and supporting information required for environmental assessment is given in subsequent sections and appendices.

2.1 Project Background and Objectives

Invincible Colliery has been on care and maintenance since 2001.

The Colliery is located about 3km south east of the village of Cullen Bullen in the Western Coalfield of NSW (Figure 1; page 23).

The mine has been operating for over a century and the mine leases have been substantially worked. Considerable reserves of unworked coal and partly worked coal areas remain but could be difficult to access or are affected by unknown mining conditions.

The colliery holding lies between the Castlereagh Highway and the Wolgan Road in an east-west direction, Wallerawang/Ivanhoe Collieries to the south and Baal Bone Colliery to the north.

Existing open cut reserves at Invincible Colliery are in excess of 2 million tonnes. Of these reserves approximately 720,000 tonnes can be viably worked from ML 68 at current prices. To work the remaining tonnages requires further mining leases from the surface to 15.24 m below to provide access to coal within CCL 702, which is the lease underlying the Invincible Colliery holding.

On 25 May 2005 Coalpac received advice from Delta Electricity that it proposes to award a contract to Coalpac for the supply of coal to Mt Piper Power Station.

In order to commence mining operations as soon as practicably possible, Coalpac has lodged a Project Application for consent by the Department of Planning (DOP) to mine an area within ML 68.

The tonnages permitted under this application will satisfy the current and intended contract tonnages for three years.

A further Project Application will be lodged in 2006 with DOP for applications for additional mining leases over remaining open cut coal reserves within the extent of CCL 702 which require the granting of mining leases before mining can commence.

The principal object of the Project is to maintain the viability of Invincible Colliery as a

supplier of low priced coal to local power stations and to other domestic markets.

It is proposed to produce a total of 350,000 tpa to supply the following markets:

Delta contract	150,000 tpa
Shoalhaven Starch	120,000 tpa
Other domestic markets where available	80,000 tpa
TOTAL	350,000 tpa

It is proposed to produce coal to supply the Delta Contract and the potential market of Shoalhaven Starch. Coalpac will try to identify further domestic markets.

The open cut excavation will disturb approximately 10 hectares, including the area for haul road extensions, coal crushing plant, topsoil storage and temporary overburden placement. (Figure 3; page 36;).

The proposed open cut will produce an estimated 720,000 tonnes of coal. This coal will be processed on site or transported by an internal road to the Invincible pit top for storage or further processing. The coal will be transported by road to the local power station and other domestic markets.

The rate of production from the open cut will be 500 - 1200 tonnes per day.

The open cut mine will employ up to 12 persons for its period of operation. This number may vary slightly as operational requirements dictate.

The ecological sustainability of this proposal will be based on the implementation of a comprehensive environmental management plan described in Section 6

The extensive areas of forest habitat adjoining the open cut site will provide significant habitat for species to retreat into whilst operations are underway.

A rehabilitation program will be developed to produce topographical landforms which will be consistent with surrounding landscape, and existing landforms, and will leave the restored land in a condition that will be suitable for grazing of stock and forestry, which is consistent with existing use.

2.2 The Coal Resource

2.2.1 History of Invincible Resource

Refer to 1.5 for historical information on Invincible Colliery.

2.2.2 Geology of Invincible Colliery Holding

The Invincible holding is located within the Western Coalfield of NSW and is geologically within the Sydney sedimentary basin.

The Western Coalfield extends from south of Lithgow to north of Ulan and is generally bounded by the outcrops of the Lithgow seam on the west with no defined boundary on the east where, the coal measures disappear under the Hawkesbury sandstone, which caps the Blue Mountains, and is largely contained within national parks.

The Sydney sedimentary basin consists of a series of gently dipping sedimentary beds of shale and sandstone of Permo-Carboniferous age capped by massive sandstones of Triassic Age. Directly beneath the Triassic sandstone these beds contain coal seams and form the Upper Coal Measures. The measures extend from the western boundary of the Western Coalfield in an easterly direction, dipping generally towards the coast, and extending out to sea. (Figure 4; Page 37).

The Lithgow seam is the main coal seam in the coalfield and most of the coal mines are located along its outcrop, which generally follows the Castlereagh Highway.

Early coal mines, established in the last decades of the 19th century, (following the construction of the Great Western Railway and the Mudgee Railway into the area) worked the area of the Lithgow coal seam adjacent to the outcrop, which proved to be the easiest to mine. The Invincible Colliery holding lies within this area.

The seam within the Invincible Colliery Holding is generally free of faults and poor roof conditions and is not excessively wet.

As the mines extended into the coal measures seam conditions worsened and in some locations in existing mines, including the eastern parts of Invincible Colliery Holding, have made underground mining operations difficult and costly.

The geological and seam conditions in Invincible Colliery are well understood as the mine workings within the Lithgow seam are quite extensive.
The proposed open cut site is of very limited extent when compared with the size of the colliery holding and consists of areas of coal having low overburden cover.

The mine workings extend into the proposed open cut area, but are not accessible and it has been found necessary to drill 23 percussion boreholes and 3 diamond boreholes (DDH 1, 2 and 3) to determine the thickness and quality of the seam and the nature and thickness of overburden. (Figure 5, Page 39).

The Irondale seam which is located about 17 metres above the Lithgow seam has been sampled and tested where it has been exposed by open cut mining. It contains workable tonnages of coal, which mined in conjunction with the Lithgow seam, is suitable for power station fuel.

Figure 3 Plan of Open Cut Mining Area and Lease Boundary

Figure 4 Coalfields of New South Wales

The cores from DDH 1, 2 and 3 and the proximate analysis of these cores indicate a similar seam thickness and seam quality to that worked underground which confirms the suitability of the resources for current and future markets.

An average Irondale seam thickness and indicative quality by ash content, as determined by the diamond boreholes, is shown on Figure 2a; Page 27.

2.2.3 Quantification of Coal Resources

The estimated steaming coal tonnage and overburden quantities within the proposed open cut area are shown in Table 2.1. The in-seam tonnage calculations are based on a coal density of 1.4t/m^3 and the average available seam thickness 4.0m, which includes coal from both Lithgow and Irondale seams.

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The area worked within Portion ML 68 is shown on Figure 3; page 36, and contains approximately 720,000 tonnes. This tonnage will supply the Delta contract of 410,000 tonnes over a period of 3 years commencing 1/7/05. The balance of the production during this period will supply domestic markets. The average overburden ratio will be 5:1.

Table 2.1 - Coal and Overburden Quantities in ML 68

Area	In Situ Coal(t)	In Situ Overburden Inc. "10ft" Band (m^3)	Estimated Period Worked
'A'	180,000	900,000	1/10/2005 – 30/6/2006 (subject to markets)
'B'	540,000	1,350,000	1/7/2006 – 30/6/2008 (subject to markets)
Combined "A" & "B"	720,000	2,250,000	1/10/2005 – 30/6/2008

2.3 Proposed Coal Mining Operations

2.3.1 Introduction

Section 2 (2.3) explains the preparation procedure before mining commences including the clearing of trees, soil removal and storage, overburden removal, coal extraction methods, method of mining, hours of operation, and life of project.

See Appendix E for proposed open cut operations program.

Staging of open cut operations are shown on Figure 6; Page 42.

Figure 5 Exploratory Boreholes

The existing drainage and settling basins will be incorporated into the new drainage and water control system and stockpile bases will be constructed prior to commencement of mining operations.

Coal mining will be undertaken in a systematic fashion and rehabilitation will be effected as the mine progresses.

Where contractors are employed the contract specification criteria will be in accordance with the EA, the Project consent and conditions attached to the Mining Lease.

Run of mine coal will be transported by haul trucks from the open cut mine to the crushing and screening area alongside the existing haul road (Figure 3; page 36,).

2.3.2 Type of Equipment to be Used

1 x 75 tonne excavator
1 x 10 cubic metre front end loader
1 x 6 cubic metre front end loader
1 x Grader
1 x 12,000 litre water cart
4 x 50 tonne rear dump trucks (off highway)
1 x 300 kW dozer
1 x 522 kW dozer
1 x 13 cubic metre Elevating Scraper
1 x Service/lube truck
1 x Toyota troop carrier
1 x Gundlach Crushing Plant and Stacker
1 x Twin Deck Screening Plant and Stacker
1 x Reedrill GD2CD

2.3.3 Clearing Vegetation

Clearing of vegetated areas on the open cut site will be done as the open cut progresses.

The woodland west of the open cut area and general topography provides a visual screen from viewpoints along the Castlereagh Highway. It is not intended to undertake a pre-Project planting program because of the remoteness of the site from public viewpoints.

Where practicable the commercially viable timber will be recovered prior to the clearing of the trees, which will be carried out by bulldozing.

Felled timber will be pushed to the edge of the existing rehabilitation areas, where recoverable tops and hollow bearing limbs can be removed for selective placement in areas around existing rehabilitation.

This will aid in the establishment of small mammal habitat within the existing rehabilitation areas as well as aiding in the dispersal of seed.

Excess or remaining bulky timber will then be buried upon backfilling of adjacent mining areas.

Once timber has been cleared from an area, all water falling on or entering the area will be controlled as part of the dirty water management system.

Appropriate sediment collection and drainage controls are established on the lower side of the site to control water discharges.

The Department of Lands, (formerly the Soil Conservation Service) will be consulted on the size and location of drains and the design of the water control system.

2.3.4 Soil Removal and Storage

The total open cut area to be excavated provides a moderate topsoil resource which can be expected to strip to an average depth of 0.15m.

Soils are shallow to moderately deep in the gullies. They are hard setting, have lower fertility and low to very low nutrient status, especially nearer the top of ridges and steeper areas.

The maximum amount of topsoil will be salvaged from the open cut site to effectively rehabilitate disturbed areas.

Advice already provided by the Department of Lands and the Department of Natural Resources regarding the most effective methods of recovery and placing of topsoil will continue to be adopted for the new rehabilitation areas.

Where practicable the upper section of the topsoil profile will be removed and stored to provide a seed bank for spreading over the rehabilitated surfaces.

The lower topsoil/subsoil layer will be removed and stored selectively.

The material will be stacked to minimise surface erosion by water run-off and, if necessary, seeded to reduce erosion loss and maintain biological viability.

Topsoil from the initial mine excavation will be stored in a stockpile (not greater than 2 metres in height). Machinery will be utilised to minimise the compaction of topsoil in the stockpile.

As the mining operation progresses into the next mining area, topsoil will be removed and placed on a stockpile ready for spreading on an area which has been recontoured to the approved final landform.

Figure 6 Open Cut Proposed Mine Sequences.

The slopes of recontoured surfaces will be in accordance with those stipulated in the approved final landform. On steeper slopes, contour drains will be built across slopes to minimise erosion of the topsoil from re-contoured surfaces. Small sedimentation dams will also be constructed where necessary.

2.3.5 Overburden Removal

The average depth of overburden over the whole of the open cut site will be approximately 20m with a maximum depth of 25m along the northern and eastern limits of the open cut.

Overburden will be stripped in accordance with the sequence shown on Figure 6; Page 42 . Overburden from the No.1 excavation area will be will be utilised in the construction of haul roads and water management structures, which will be required to access the proposed mining areas, and excess will be stockpiled.

Any overburden from Block 1, not used for haul road construction or water management structures will be placed into the existing void, known as Cornock's Entry, which is now redundant.

The excavation will accept approximately 236, 200 cubic metres of material.

Overburden from successive excavation areas will be placed in the previously worked area.

Where practicable, overburden will be pushed into final rehabilitation position.

Where hard overburden material is encountered blasting will be necessary. The areas to be blasted will be cleared of loose material before drilling, and blasting will only be undertaken on weekdays during daylight hours.

Blasted material will be pushed by bulldozer or loaded into rear dump trucks and handled as with other overburden.

2.3.6 Extraction of Coal

Following exposure of the interface of the overburden and coal seam, the seam surface will be graded to remove diluted coal and any remaining overburden material.

The seam will be ripped and loaded into haul trucks for transport to the mobile coal crushing and screening installation.

The coal will be mined selectively to service the two markets available and thicker bands of partings will be removed to improve coal quality (Figures 2 and 2a; Page 26,27).

Waste containing coal will be dumped in areas to be rehabilitated at a minimum depth

of 2m below the finished surface.

2.3.7 Method of Mining

The method of mining is described in Appendix E.

2.3.8 Hours of Operation and Life of Project

Invincible Colliery has previously operated underground up to 24 hours each day, 7 days each week. The open cut will generally operate on a 12 hour per day basis, though there may be a necessity to operate longer hours. The open cut may operate 7 days per week.

During construction and during operations, hours of operation may be between 07:00 to 22:00 hrs, with normal hours being between 07:00 to 17:00 hrs. Some mining work may occur during weekends, though this will not be regular.

Maintenance may be undertaken at any time of the day and/or any day of the year depending upon breakdown/servicing of plant and machinery.

Transport of coal to the mobile crusher will be, wherever practicable, during daylight hours, but there may be occasions for transporting during hours of darkness.

The life of the open cut coal project will depend on the availability of future coal contracts.

The coal reserves within ML 68, the site of this Project proposal, are sufficient to satisfy the Delta contract and the Shoalhaven Starch contract over a period of 3 years. Extensions of these contracts and the supply of additional contracts will be subject to the granting of coal leases over remaining open cut coal areas.

At a production rate of up to 350,000 tpa, the total life of the open cut operation will be 7 years, subject to granting of adjoining leases

2.4 Surface Facilities

2.4.1 Existing Surface Infrastructure and Proposed Open Cut Infrastructure

Invincible Colliery is equipped as an operating coal mine with a pit top infrastructure capable of crushing, washing and handling 1Mtpa and facilities for 260 employees. This infrastructure was set up to service the output from a long wall underground coal mining operation which was abandoned in 1988.

The pit top infrastructure will service the proposed open cut operations in conjunction with surface infrastructure to be established at the open cut. Existing infrastructure to be used will be:

- Fuel storage system which conforms to Australian Standards.
- Machine wash-down area which discharges wash-down water into a dedicated dam.

Surface infrastructure at the open cut mine site will be comprised of:

- Site office, First Aid Room and training room.
- Crib Room.
- Small Change Room incorporating showers/toilets which will conform with CMRA Regulations.
- Maintenance area which will consist of a one bay shed (7m x 12m x 6m) with 4 doors for storage of spares and tooling required for the maintenance and servicing of plant.
- A mobile crushing and screening plant will be installed on a dedicated site on the existing washery refuse emplacement area located immediately south of the proposed open cut area.

Because of the capacity of existing mine infrastructure, and the minimal additional infrastructure to be installed at the open cut site, there will be no constraints which will effect constructional and/or operational requirements.

2.4.1.1 Water

Potable water is currently supplied to the colliery by a captive 50mm diameter pipeline connection to the Fish River Dam Water Supply main pipeline about 3km west of the pit top. This supply will be available to the open cut site for drinking purposes and will be stored in a container.

Non-potable water is available from the approximately 50 megalitre capacity dam north of the washery which is constantly replenished by catchment runoff and mine water pumped from the underground workings. This water is available from a stand pipe at the pit top and will be used for dust control on the site and along the haul road when water from the open cut sumps and retention basins is not available.

An estimated 70,000 litres of water (average) will be used each day for dust suppression (wet conditions/days excluded).

There are no water pipelines requiring protection or re-location.

2.4.1.2 Electricity

Invincible Colliery is serviced by a 66kV power line, the voltage being reduced at a pit top substation to 11kV. The installation of a mobile crusher and screening plant will be located at the proposed site and will require an 11KV underground cable to be installed between the pit top sub-station and the site. The cable will be buried to a minimum depth of 500mm below ground. Total electrical energy requirement at the

open cut mine site will be 200 kW.
There are no existing power lines requiring re-location or protection.

2.4.1.3 Communications

Telephone, Internet and fax facilities are currently available at Invincible Colliery pit top.

Communications for the open cut operation will be based on mobile phones, UHF radios and existing facilities at the Invincible Colliery offices.

2.4.1.4 Sewage

A septic tank treats the sewage from the office/ablutions facilities at the Invincible Colliery pit top.

This installation was originally intended to service 260 employees and will easily cope with any use by open cut employees working in the pit top area.

Stored effluent from the portable toilet/showers at the open cut will be emptied on a regular basis by contractors.

2.4.1.5 Fuel/Oil Storage

On-site mobile equipment will be refueled by means of a 10,000 litre tank attached to a fuel/service vehicle, replenished at the existing fuel storage tank located at the pit top. The refueling will be effected within a designated area.

Mobile equipment will be lubricated by a lubricating unit installed on the fuel/service vehicle which will also be equipped with a holding tank to collect waste lubricants. The waste oil and grease from equipment maintenance will be stored in a Waste Oil Holding Tank and removed from the site by a Licenced Waste Oil Recovery Contractor.

Recovery of waste lubricants will be effected within a designated area constructed to control and retain any spillage.

2.4.1.6 Explosives Storage

In the event of blasting activities being undertaken:

- Bulk explosives will be brought on site on an "as needed" basis.
- Bulk explosives will be delivered by an explosives supplier in a licensed registered vehicle.
- The vehicle used to transport blasting accessories around the mine site shall

conform to the requirements of the Dangerous Goods Act and AS 2188.

- No explosives will be stored on site.

2.5 Coal Handling and Processing

2.5.1 Overview

It is proposed that coal selectively mined at the open cut will be sold as an unwashed product. It will be crushed with a mobile crusher at the washery refuse emplacement area south of the open cut and delivered directly by road trucks to the power stations and Shoalhaven Starch via a haul road and the public road.

If stockpiling of coal is necessary the existing stockpile sites at the washery will be used. These sites have a capacity of 100,000 tonnes.

2.5.2 Raw Coal Handling

Raw coal will be mined and loaded by excavator or front end loader at the open cut face and transported by 50 tonne capacity rear dump trucks to the mobile crusher raw coal stockpile which has a capacity of 30,000 tonnes or the receival hopper at the washery.
Where the coal is mined selectively the method of extraction and handling will be as follows:

- The Irondale Seam will be selectively mined as it is exposed during the overburden removal.

- In areas where there are no disused underground workings, the Lithgow coal seam will be selectively mined as one of two products - high ash or low ash. The high ash coal will be crushed to 50mm, while the low ash will be crushed and screened for a 40 x 10 mm product. Low ash coal outside this range will then be mixed into the high ash coal.

- In areas where extraction of coal occurs adjacent to underground workings (Figure 7; page 50), the Lithgow seam will be mined in four discrete layers or plies. The top two (2) layers will be crushed for a 50mm product. The third (3rd) layer will then be mined to expose the old underground workings. This step is considered necessary to minimise the amount of man introduced material that may damage the crusher. After cleaning out the old roadways, the fourth (4th) layer of coal will be mined. The third and fourth (3rd & 4th) layers will be crushed and screened for a 40 x 10 mm low ash product, with coal outside the range being blended into the high ash product (Figure 2; page 26).

2.5.3 Coal Processing

It is not intended to wash the open cut coal product. Processing will be confined to crushing and blending for power station supply and crushing and screening selectively

mined coal for domestic markets.

Washing may be necessary to meet the quality requirements of domestic markets from time to time. If this occurs, disposal of waste including coarse and fine rejects will be effected at the existing washery refuse emplacement site.

Plate 2 - Invincible Coal Processing Plant and part of Stockpiling Area

2.5.4 Product Coal Handling

There will be two product stockpiles which will receive coal from the mobile crushing and screening plant via an elevating belt conveyor to a rotating stacker. Both the low ash and high ash coal stockpiles will have a capacity of 12,000 tonnes. Coal will be loaded from these stockpiles by front end loaders into highway trucks for dispatch to the markets.
The coal stockpile and the product coal stockpile will have a maximum capacity of 54,000 tonnes. Product coal processed at the washery will be handled through the existing system of conveyor belts and bins for loading into highway trucks.

2.5.5 Spontaneous Combustion

Experience in the stockpiling of coal at Invincible Colliery indicates that stored coal is not susceptible to spontaneous combustion. Stockpiles are regularly inspected for signs of heating.

The size and transitory nature of the stockpile, at the crusher site and washery stockpile area, will minimise any likelihood of spontaneous combustion.

2.6 Coal Transportation

2.6.1 Coal Transportation within the Colliery Holding

Raw coal will be transported from the open cut face to the mobile crusher by rear dump trucks along the constructed and existing haul roads constructed from coal refuse. If the existing washery is used for processing the coal will be transported directly from the open cut face to the washery by rear dump trucks along the internal haul roads.

The haul roads will be watered to minimise dust. The newly constructed haul roads will be removed and the site rehabilitated at the end of the project.

The roads from the open cut site to the pit top are located as shown on Figure 8; Page 51.

Plate 3 - View of Refuse Emplacement looking north along Existing Haul Road

Figure 7 Proposed Open Cut Showing Adjoining Underground Workings

Figure 8 Invincible Open Cut Site Plan

The total length of the existing haul road is 1.5km. There will be a requirement to construct approximately 0.5km of new haul road to extend the existing haul road into the open cut areas.

Drains from the road will discharge into the existing settling basins (Figure 9; Page 56).

Plate 4 - View of Site, North End of Existing Haul Road

Plate 4a – View of Site Looking East from North End of Existing Haul Road

2.6.2 Coal Transportation to Markets

Under the current Delta Electricity coal contract Coalpac will transport 150,000 tpa from Invincible Colliery to Mt. Piper Power Station by truck via the Castlereagh Highway, a distance of 3km.

Coalpac also proposes to supply up to 120,000 tpa to Shoalhaven Starch at Bomaderry by road and a further 60,000 tpa to other markets if available.

The RTA has indicated that it will not require any change to existing public road transport arrangements. (See letter, Appendix B)

Plate 5 – Mt. Piper Power Station Coal Stockpile

2.7 Waste Management

2.7.1 Types of Waste

Waste from the proposed Project can be separated into general wastes and mining wastes. General wastes are not directly connected with the open cut mining operations or the rehabilitation procedures and wastes from mining operations.

2.7.2 Management of General Wastes

General wastes will comprise:

- Paper and food wastes originating from the office and amenities, and cartons and containers from maintenance operations which will be stored in suitably located garbage bins. The garbage bins will be collected on a regular basis and the contents disposed of with other pit garbage by a contractor.

- Sewage will be disposed through the existing pit top septic tanks and the portable toilet will be emptied by a contractor.

- Oils and grease.

- Maintenance stations for mobile plant will be within the open cut area or at the existing pit top workshop. Waste oil and grease originating from these locations will be removed from the site by a Licenced Contractor.

2.7.3 Management of Wastes from Mining Operations

The open cut mining operations will result in waste overburden material consisting of shales and mudstones, which tend to weather when exposed and harder sandstones and conglomerates.

These materials will be stored in stockpiles as explained in the proposed mining operations Section 2 (2.3.5) and then backfilled into the open cut excavation to provide filling material for the rehabilitation process.

Harder materials will be buried, as far as practicable, beneath the softer shales and mudstones to provide smoother surfaces when covered by subsoil and topsoil.

Carbonaceous material will be covered by at least 2 metres of non-carbonaceous material.

2.8 Water Management

The water demand for the project will be potable water for drinking and ablutions and process water for dust suppression.

2.8.1 Water Requirements

The potable water requirement will be approximately 0.25Ml/annum.

The process water supply will be approximately 25Ml/annum.

Part of this water will be used at the washing plant if it is required to operate.

2.8.2 Water Supply

Potable water will be supplied from the colliery water system sourced from the Fish River Water Supply and process water from the 50Ml colliery storage dam as outlined in Section 2.4.1.1.

2.8.3 Drainage and Water Pollution Controls

The open cut operation has been designed with a fully contained water management system which is shown on Figure 9; Page 56.

Due to the intrusive nature of the open cut operation any run-off water from “upstream” of the site will, upon entering active mining areas, be deemed dirty water and be handled accordingly.

Dirty water from active mining areas will be collected and contained within internal sumps and either used for dust suppression or pumped into the abandoned Colliery

workings in times of excess water flows.

Waters discharged to old underground workings, where the seam dips away from the disused mine entries, provides an extensive water storage which is comprised of both the Old Invincible and the Invincible underground workings. (See Figure 10; page 57). Existing rehabilitation surfaces will drain to a settling basin capable of containing run-off from a 1 in 10 year 72 hour storm event.

Overflow will drain into a second settling basin constructed with a spillway where it will be allowed to settle before being pumped to the main colliery dam at the pit top area or into underground workings during major storm events and periods of excess flow.

Water will only discharge over the spillway into the natural drainage system during prolonged heavy run-off periods. Water discharge will comply with EPA requirements that suspended solids may not exceed 50mg/l.

2.8.4 Sewage Treatment

The existing septic tanks at the colliery pit top provide sewage treatment for the toilet and ablution facilities at that location and stored effluent from the toilet/showers at the open cut will be emptied on a regular basis by contractors.

2.9 Rehabilitation

2.9.1 Introduction

The following sub-sections explain the company's objectives for rehabilitation of the disturbed areas, and the methods and procedures to be adopted to achieve the most successful rehabilitation result.

The progress and results of the rehabilitation activities will be included in the company's Annual Environmental Management Report submitted annually to the Department of Mineral Resources, in respect of Invincible Colliery.

2.9.2 Objectives

The objectives of the Rehabilitation Plan are as follows:-

- To minimise the impacts on the environment during the construction phase and during the mining of the open cut. This will be effected by shaping and planting the final surfaces as the works progress and protecting both final and temporary disturbed surfaces from erosion.

- To optimise topsoil and subsoil materials in the rehabilitation process.

Figure 9 Open Cut Proposed Water Management Plan.

Figure 10 Plan of Colliery Holding Showing Extensive Underground Workings

- To maintain the stability of earthworks and the drainage system at the site during wet weather so as to minimise erosion and the resulting sediment laden water.

- To rehabilitate the final landform after mining operations cease so that it will be stable and consistent with surrounding landforms and capable of alternative final land uses.

- To attain zero net vegetation loss by planting open areas within the lease to offset the total area cleared as a result of the proposed Project.

2.9.3 Rehabilitation Landform

A preliminary rehabilitation strategy has been developed which incorporates both temporary and permanent programs to provide surface stability during operations and after the establishment of the final landforms.

The objectives of the rehabilitation strategies are:

- To produce a stable land form consistent with the original land form and future use. (In 2.9.2)
- To minimise the environmental impacts of the proposed Project and rehabilitating affected areas as soon as is practicable.
- To make best use of available topsoil resources.
- To ensure that the drainage system will operate during heavy run-off.

2.9.3.1 Temporary Erosion Control System

Prior to clearing of vegetation, stripping of soil and construction activities, temporary erosion and sedimentation control structures will be installed.

Areas requiring sedimentation controls will be identified during the construction and mining operations.

Silt fences will be erected downstream of exposed areas consisting of filter fabric which will have a silt retention efficiency of at least 75% and will allow sufficient flow to prevent surcharging during minor storm events.

Straw bales will also be used for temporary sedimentation control of low volume run-off drains.

2.9.3.2 Revegetation Methodology

The overall revegetation methodologies are described below:-

- Following the establishment and final landform preparation the site will be "contour furrowed", where necessary, prior to cultivation, and sowing operations to assist moisture penetration and retention and also reduce down slope run-off.(Figures 11 and 11A; pages 61 and 62).
- Larger rocks will be removed from the surface and buried.
- Heavy clay material will be treated with gypsum to break down clods. Acid soil will be treated using agriculture lime.

Acid sulphate soils are not known to occur at Invincible Colliery in soils derived from the coal measures.

- An appropriate fertiliser will be spread prior to cultivation. This is necessary to produce a seed bed with furrows to reduce run-off and open up the surface.

- Where possible sowing will be undertaken following rainfall when the soil is damp and in weather conditions likely to produce further rainfall.

- On steep slopes and batters straw mulch material will be applied to final surfaces to accelerate revegetation. Fertiliser and seed will be applied at the same time as the mulch.

- On reasonably shallow slopes surface seed will be broadcasted on to the cultivated surface.

- Surface restoration and revegetation will be undertaken after consultation with the Department of Lands – Soil Services Division, and will commence within the first growing season. An appropriate grass seed mix will be obtained from the Soil Services Contractor.

- The area disturbed by the open cut workings will be progressively rehabilitated.

- Woodland areas within the Ben Bullen State Forest will be revegetated with locally occurring tree species by, where possible, gathering seeds and windrowing tree crowns "in seed" obtained from tree clearing.

- Seed collected from E cannonii and E Viminalis will be the main components of any supplemental planing.

- Clearing of trees will be kept to a minimum and only in advance of the open cut.

2.9.4 Final Land Use

The purpose of the rehabilitation plan is to create a landform which will be stable and not affected by environmental degradation.

The remainder of this site is the adjoining Ben Bullen State Forest and it will be appropriate to return the landform to an open forest community.

As these uses are consistent with strategic planning objectives for the area and are the same as current use, the final land use strategies are well defined.

The rehabilitation strategy, whilst directed towards this final use, also includes the following features:-

- Incorporation of contour banks and similar structures into the final landform, following consultation with the Department of Lands.

- Maintaining and incorporating the well established woodland of mature native vegetation which is located west of the existing open cut excavations, as shown on Figure 3; page 36. This woodland includes tree species *Eucalyptus viminalis*. and E Cannonii

Effective rehabilitation will require an ongoing maintenance program for drainage controls, temporary fences to exclude native and domestic animals and undertaking re-seeding and re-topsoiling if necessary.

Potential infestation of weeds will be monitored and an appropriate weed eradication program will be set up if necessary, in consultation with NSW Department of Primary Industries and the Noxious Weed Inspector.

2.10 Project Employment

During the construction stage and operations there will be a workforce of up to 12 people. This number will vary according to operational requirements of the mine.

Employees will be retained under contract by Big Rim Pty Limited.

The majority of the workforce is likely to reside in the Greater Lithgow area where there is housing accommodation

Figure 11 Proposed Rehabilitation Landform.

Figure 11a Rehabilitation X-Sections

SECTION 3

Existing Environment

This section describes the existing environment at the Project Site.

3.1 Topography

3.1.1 Regional Topography

Invincible Colliery is located on the western fall of the Blue Mountains which extends towards the eastern coast of NSW and consists of an elevated plateau deeply intersected by rugged cliff lined valleys.

Whilst these valleys are on the eastern side of the Main Dividing Range and drain easterly, the colliery and Project Site are just to the west of the Dividing Range and drain westerly into the Turon River Catchment.

The landforms west of the Blue Mountains are characterised by undulating to rugged terrain gradually flattening towards the western interior of the state.

Elevations in the region range from just under 1200m on the Newnes Plateau and at Yetholme to 700m in the Capertee and Wolgan Valleys (Figure 12; page 64).

3.1.2 Colliery Holding Topography

The Invincible Colliery Holding straddles the Great Dividing Range and for most part embraces the high Blue Mountains plateau terrain with the western boundary running roughly parallel to, and west of, the outcrop of the Lithgow seam, which maintains a fairly constant elevation of about 900m, with the Irondale seam some 15 - 20 metres above.

The project area lies just within the outcrop of the seam and is characterised by flat to undulating land adjacent to the outcrop rising to steeper land to the east (Figure 12; page 64).

Steeply rising ground to the north, east and south of the project area and the undulating land to the west will attenuate noise and vibration impacts on the only two houses located 2 kms from the proposed open cut and the town of Cullen Bullen 3.0km to the North West.

South of the proposed open cut site the Lithgow seam has been worked along the outcrop by open cut and underground mining which has resulted in disturbance of the original ground surface. This area includes the washery reject emplacement area which is the proposed site for the crushing and screening plant.

Figure 12 Regional Topography and Drainage.

Plate 6 – Project Site looking north

3.2 Drainage

3.2.1 Regional Drainage

The Project Site is located on the western side of the Main Dividing Range and is within the Burrendong Catchment Area. It is not within the Sydney drinking water catchment.

The Burrendong Dam is located at Wellington, approximately 100km northwest of Invincible Colliery.

Advice received from the Department of Lands (formerly Department of Land and Water Conservation), revealed that there are two towns directly downstream of the site, namely Sofala and Hill End. Neither draw surface or ground water for potable supplies.

The use of water by "riparian" users, downstream of the site, is unknown.

Regional drainage follows the flow of western waters in a northerly direction along the Turon River, then westerly into the Macquarie River and eventually into the Darling River which is the main natural drainage line in western NSW.

3.2.2 Local Drainage

Drainage from the Project Site is shown in Figure 12; page 64 and Figure 9; Page 56.

The flow of run-off water is in westerly direction through grazing land, along natural watercourses to Dulhuntys Creek which flows north to join the Turon River. Surface water flows from the Project Site are intermittent and occur only in wet weather.

3.2.3 Flooding

The Project Site is traversed by two watercourses with gradients in the range of 2% - 4% and does not flood.

The redirection of run-off flows around the site will limit the open cut water catchment to the area of disturbed ground. During periods of heavy rainfall, short - term flooding of the open cut workings could occur.

Floodwaters will be contained within the open cut excavation until the water quality clears and can be discharged into the dirty water system and pumped into abandoned mine workings.

3.3 Geology

3.3.1 Regional Geology

Invincible Colliery Holding is located on the western edge of the Sydney Basin which generally follows the Castlereagh Highway between Lithgow and Ilford.

The Western Coalfield occupies an area comprised of the deeply eroded plateau which characterises the Blue Mountains and the western margin of this plateau where coal seams within the underlying Illawarra coal measures outcrop.

Most of the coal mining activities in the Western Coalfield occur along these outcrops.

The general stratigraphic sequence of rocks within the Western Coalfield is described below in descending order.

Uppermost Unit - Narrabeen Group
Age - Triassic
Lithology - Sandstone and shale

This sequence forms the prominent cliffs in the Blue Mountains area and underlies the City of Sydney.

Lower Unit - Illawarra Coal Measures
Age - Permian
Lithology Shale, sandstone, conglomerate and coal.

This sequence lies conformably beneath the Narrabeen Group and forms the talus slopes falling away from the sandstone cliffs of the Blue Mountains.

The bottom section of this sequence includes the Berry formation of the Permian Shoalhaven Group, unconformably overlying the basement rocks of Devonian age

comprised of slate, quartzite, limestone and granite.

These are five named coal seams in the Illawarra coal measures which in descending order are:

- The Katoomba Seam
- The Middle River Seam
- The Irondale Seam
- The Lidsdale Seam
- The Lithgow Seam

The Katoomba, Irondale, Lidsdale and Lithgow Seams are the seams currently worked in the Western Coalfield.

North of Blackmans Flat the Lidsdale and Lithgow Seams converge and consequently are merged as one seam, the Lithgow Seam, in the Project Area.

The Irondale seam is also present in the Project Area but is of inferior quality compared with the Lithgow seam. Bands of coal within the Irondale seam can be worked to produce power station coal when blended with the Lithgow seam coal.

The Western Coalfield strata dips towards the northeast at a rate of about 1:50.

Faults, dykes and other seam discontinuities are comparatively rare in the mined areas of the Western Coalfield and both the Katoomba and Lithgow seams are characterised by good working heights and seam conditions.

3.3.2 Local Geology

The Lithgow and Irondale seams outcrop within the Project Site.

The thickness and general quality of the seams is shown in Figure 2 and 2a; Page 26 and 27. This has been determined from boreholes, underground workings and previous open cut mining.

Seam overburden consists of sandstone conglomerate and shales which are considerably weathered, particular in areas of low cover.

The overburden thickness varies from 20 to 25m and can be expected to be removed by hydraulic excavator and front end loader following blasting with soft load.

3.3.3 Resource Estimates

A resource estimate will be supplied to the Department of Primary Industries - Minerals.

3.4 Land Capability and Soils

3.4.1 Soil Types

For the purposes of identifying the soil types within the project area a booklet and accompanying map, Soil Landscapes of the Wallerawang 1:100 000 map sheet published by the Department of Land and Water Conservation, was used as it classifies areas of the region into landscapes whose soils are similar in character and nature.

The map is based on the Central Mapping Authority 1:100 000 topographic map sheet.

The area in which the open cut is proposed contains three different soil landscapes as identified on the map; colluvial landscape (Hassans Walls), erosional landscape (Cullen Bullen) and disturbed landscape.

Colluvial Landscape (Hassans Walls - hw).

This soil landscape is composed of cliffs derived from the Narrabeen Group sandstones which are prone to weathering by undercutting and rock falls or create severe rock fall hazards. These cliff formations have steep colluvial talus side slopes which have developed over the Illawarra Coal Measures and the Shoalhaven group. Slopes within this landscape are characteristically >40%, in elevations between 280 - 1 000 metres with local relief being greater than 100 metres.

The soils within this landscape tend to be shallow Lithosols/Siliceous Sands on cliff ledges, moderately deep Lithosols/Siliceous Sands on the tops of talus slopes, yellow and brown moderately deep Podzolic soils on the mid-slopes of the talus slopes and shallow to deep Sand/Lithosols on the lower slopes and valley floors.

The vegetation within this landscape is characterised by uncleared open woodland and some open forests. Erosion within this landscape is characterised by severe sheet erosion and rock falls. Mass movement along with localised mine subsidence areas can occur, a feature of the Illawarra Coal Measures.

Erosional Landscape (Cullen Bullen - cb).

This landscape comprises rolling low hills and rises on the Illawarra Coal measures and the Berry Formation. Slopes range between 10 and 25% between elevations 550 - 1050 m with local relief being <50m. Small low <5m scarps are indicative of localised rock outcrops on the upper slopes of the hills which may be strewn with cobbles and gravels.
Soils within this landscape range from shallow to moderately deep Yellow Podzolic

soils and Yellow Earths on the crests, Yellow Podzolic Soils, Soloths, and Yellow Leached Earths of moderate depth on the upper and mid-slopes, and the lower slopes and in narrow drainage lines have moderately deep to deep yellow Solodic Soils and Yellow Podzolic Soils. The scarps are usually shallow Yellow Earths and Lithosols.

The vegetation of this landscape is characterised by large cleared areas used for grazing and some areas have been planted out to radiata pine plantations. In areas where native timber remains it tends to be open woodland with grassy understoreys.

Erosion within this landscape includes minor sheet erosion and moderate gully erosion in drainage lines in areas where the ground has been disturbed by clearing activities. In specific areas on steeper slopes severe sheet and rill erosion has occurred.

The topsoils are hard setting and the landscape is described as having a high water erosion hazard and high run-on.

Disturbed Landscape (xx)

This landscape unit applies to specific areas of land and it can be found to exist within other landscape units. This unit was created to identify areas of land which have been extensively disturbed by previous or existing land users, generally associated with mining or industrial activities.

Existing land uses include coal mining, power generation, coal stockpiles, sand mining, gravel pits, rubbish tips, sewage treatment sites and landfill areas.

The soils within these areas have frequently been completely destroyed to a depth of 1m or deeper.

The original vegetation within these areas has generally been completely destroyed or removed however some areas are regenerating naturally. Infestation by exotic weed species is common within these areas.

Topography within this unit varies and covers the full range of slopes from steep sided quarries and open cuts to relatively flat and level landfill areas.
The erosion hazard within this unit is also varied, with level landfill areas being generally topsoiled and stabilised, so erosion problems are few; to sheet and rill erosion on bare topsoil batters; to some mass movement on highwalls and steep quarry banks.

In addition to these classifications or groupings, soils from the site were taken and sent to the Department of Lands (formerly the Department of Land and Water Conservation) Scone Research Service Centre for testing to determine the soil characteristics and capabilities of the site.

Six soil samples were taken from four sites within the study area. The four sites chosen were representative of the soils within the areas and include one sample each

from the disused open cut area and one from the alluvial creek lines. Both of these had indistinguishable subsoil layers, and two samples, one topsoil and one subsoil, from the hill slope in the cleared area and the hill slope in the timbered area.

The following comments were made by the soil testing authority:

- The samples tested were found to be generally acidic sandy/loamy materials with low fertility levels.

- The sample from the disused open cut area was found to be a medium clay material.

- In general all of the samples were found to be lacking in nitrogen, phosphorus and potassium and the application of a fertiliser was suggested to increase the levels of these nutrients.

- Five of the six samples tested were found to become slightly dispersed after cultivation or disturbance and may be prone to surface crusting/loss of structure.

- All of the samples were found to be stable in their current states.

- The soil tests showed that the following additions would have to be made to improve the soils of the site; nitrogen, phosphorus and potassium fertiliser; application of lime or dolomite to correct the acidity, sodicity and dispersibility as well as calcium and magnesium deficiencies.

3.4.2 Soil Reserves

Of the soil samples taken for testing, one, from the abandoned open cut area, did not have distinguishable soil layers, one other sample, from the gully to the east, did not have distinguishable subsoil layers. It appeared that the whole of the soil to a depth of at least 0.5m was of the same quality.

The other two samples had topsoil layers of approximately 5 to 10 centimetres.

It has been estimated that there would be approximately 15000-20000m^3 of topsoil on the site. This will be stripped and used later in the rehabilitation of mined areas.

3.4.3 Replacement of Soils

As mentioned in Sections 2(2.9) the soil stripping program and the rehabilitation program are progressive.

This method allows the rehabilitation process to be completed within the life of the pit and it also means that the need for topsoil stockpiles will be minimised.

The method of spreading the topsoil will minimise the amount of compaction and the possibility of erosion and sedimentation of waterways either existing or created. Any movement of tracked vehicles on rehabilitated slopes, or slopes under construction, will be up and down the slope, as opposed to across the slope, to minimise the effects of rill erosion.

3.4.4 Land Capability

The publication Soil Landscapes of the Wallerawang 1:100 000 Sheet used in section 3.4.1 to obtain soil type classifications classifies the capability of the soils or units in terms of urban capability and rural capability.

For the Hassans Walls landscape unit the urban capabilities are labeled as having severe limitations for urban development.

The rural capabilities for this unit are considered to have severe limitations for cultivation and grazing however the lower slopes and drainage flats are capable of sustaining light grazing.

The second of the landscape units, Cullen Bullen, is identified as having low to moderate limitations for urban development, a low level of limitations for grazing and moderate limitations for cultivation.

For disturbed landscapes, it identifies the following capabilities.

The urban capabilities of this landscape unit are identified as being severely limited and recommends that geotechnical engineering advice should be sought prior to approval for urban development.

In terms of the agricultural capability of this land it describes it has having severe limitations for cultivation and grazing however localised grassed and stabilised areas have moderate limitations for grazing.

Another form of classifying land in terms of its capabilities has been developed from an American system by the Department of Land and Water Conservation (now Department of Natural Resources).

This system based on assessing the biophysical characteristics of the land, along with the current technology that is available for land managers to identify the potential of the land for such uses as crop production, pasture improvement and grazing as well as other uses such as forestry, urban, mining and quarrying.

The following table, taken from Hannan (1984), describes the system and the classes of land that have been developed.

Table 3.1 - Land Capability Classes

Land Classification	Soil Conservation Practice	Interpretations and Implications
I	No special soil conservation works or practices	Land suitable for a wide variety of uses. Where soils are fertile, this is land with the highest potential for agriculture and may be cultivated for vegetable and fruit production, cereal and other grain crops, energy crops, fodder and forage crops and sugar cane in specific areas. Includes "prime agricultural land".
II	Soil conservation practices such as strip cropping, conservation tillage and adequate crop rotation.	Usually gently sloping land suitable for a wide variety of agricultural uses. Has a high potential for production of crops on fertile soils similar to Class I but increasing limitations to production due to site conditions. Includes "prime agricultural land".
III	Structural soil conservation works such as graded banks, waterways and diversion banks, together with soil conservation practices such as conservation tillage and adequate crop rotation.	Sloping land suitable for cropping on a rotational basis. Generally used for the production of the same type of crops as listed for Class I, although productivity will vary depending upon soil fertility. Individual yields may be the same as for Classes I and II but increasing restrictions due to the erosion hazard will reduce the total yield over time. Soil erosion problems are often severe. Generally fair to good agricultural land.
IV	Soil conservation practices such as pasture improvement, stock control, application of fertiliser and minimum cultivation for the establishment or re-establishment of permanent pasture.	Land not suitable for cultivation on a regular basis owing to limitations of slope gradient, soil erosion, shallowness or rockiness, climate or a combination of these factors. Comprises the better classes of grazing land of the State and can be cultivated for an occasional crop, particularly a fodder crop, or for pasture renewal. Not suited to the range of agricultural uses listed for Classes I to III. If used for "hobby farms", adequate provision should be made for water supply, effluent disposal and selection of safe building sites and access roads.
V	Structural soil conservation works such as absorption banks, diversion banks and contour ripping, together with the practices as in Class IV.	Land not suitable for cultivation on a regular basis owing to considerable limitations of slope gradient, soil erosion, shallowness or rockiness, climate or a combination of these factors. Soil erosion problems are often severe. Production is generally lower than for grazing lands in Class IV. Can be cultivated for an occasional crop, particularly a fodder crop or for pasture renewal. Not suited to the range of agricultural uses listed for Classes I to III. If used for "hobby farms", adequate provision should be made for water supply, effluent disposal and selection of safe building sites and access roads.
VI	Soil conservation practices including limitation of stock, broadcasting of seed and fertiliser, prevention of fire and destruction of vermin. May include some isolated structural works.	Productivity will vary due to soil depth and soil fertility. Comprises the less productive grazing lands. If used for "hobby farms", adequate provision should be made for water supply, effluent disposal and selection of safe building sites and access roads.
VII	Land best suited for green timber. Generally stock should be excluded.	Generally comprises areas of steep slopes with shallow soils. Clearing of timber from these sites is not recommended. Where clearing has occurred, the area should be allowed to revert to timber.
VIII	Cliffs, lakes or swamps.	Land unusable for agricultural or pastoral uses. Recommended uses are those compatible with the preservation of the natural vegetation, namely, water supply catchments, wildlife refuges, national and state

		parks and scenic areas.
U	Urban areas.	
M	Mining and Quarrying areas.	

Under this land classification system the land within the proposed open cut area would be classified as; Class M lands in those areas of disused open cut to the south of the site, some Class V and some Class VI in the existing cleared grazing land and the forestry land to the north and east of the proposed area.

3.5 Meteorology

3.5.1 Sources of Meteorological Data

The following summaries of meteorological data for the Project Site have been derived principally from the following sources:

- Bureau of Meteorology stations at Lithgow and at the site of the Wallerawang Power Station, approximately 20km southeast and 10km south-east of the Project Site respectively.

- Pan evaporation data from Bathurst Agricultural Research Station.

- Pacific Power remote weather station at Cullen Bullen (decommissioned).

Data from Lithgow comprises; rainfall; temperature; relative humidity; temperature inversions; and snowfalls.

Rainfall data from the site of the Wallerawang Power Station is also presented. Continuous wind data was sourced from the former Pacific Power Meteorological Station at Cullen Bullen. Pan evaporation data was supplied from the Agricultural Research Station at Bathurst, the nearest available source of evaporation data.

With the exception of wind data, all meteorological data is presented in Table 3.2.

3.5.2 Regional Climate Characteristics

The Cullen Bullen area lies within the cool-temperature climatic zone and is characterised by mild summers and cold winters. Rainfall is seasonally distributed with higher falls during the warmer months than the cooler months. On a more localised scale, the climatic region is largely influenced by factors such as topography, altitude, aspect and exposure. In general, diurnal temperature range, fog and snow incidence increase with increasing altitude.

3.5.3 Temperature

Table 3.2 presents the mean daily maximum and minimum temperatures recorded at

Lithgow. January is the warmest month (average maximum 26^0C and average minimum 12^0C) and July the coldest month (average maximum 10^0C and average minimum approximately 1^0C).

Frosts are common within the region with most occurrences between May and September. Mean frost days range from zero in January and February to 15 in July.

3.5.4 Rainfall

Mean monthly and annual rainfalls for each of Lithgow and Wallerawang Power Station are presented in Table 3.2 and demonstrate the variability in rainfall experienced throughout the local area. Most rain falls in summer while least falls in winter. Conversely, the mean monthly number of rain days is marginally greater in winter and spring than summer and autumn.

Summer rainfall is generally associated with convective thunderstorms, and hence rainfall in summer is generally of a greater intensity than that in winter. Winter rainfall is of lower intensity as it is generally related to frontal systems approaching from the west and south-west. Some of the rainfall recorded in the winter months falls as snow.

3.5.5 Wind

Figures 13 and 13a; Pages 76 and 77 displays the seasonal wind roses at Cullen Bullen. The strongest and also most frequent winds are from the south-west, particularly during daytime.

Winds from the north-eastern quadrant are generally weaker. The strength of winds, at night, is reduced and the distribution is more uniform.

Being located in a narrow valley with elevated lands to the north, west and east, the Project Site is essentially shielded from winds.

3.5.6 Evaporation

Table 3.2 lists the average monthly pan evaporation for the 31 year period at the Bathurst Agricultural Research Station which is located approximately 50km south-west of the Project Site. Rainfall exceeds evaporation only in the winter months.

3.5.7 Humidity

The relative humidity at Lithgow is typical of a cool temperature climate; 9.00am relative humidities range from approximately 60 per cent in summer to approximately 80 per cent in early winter; 3.00pm relative humidities range from approximately 50 per cent in late spring and summer to 65 per cent in winter.

3.5.8 Temperature Inversions

Radiation inversions, the main type of temperature inversion likely to cause noise enhancement, tend to occur on frosty mornings and on days when fogs occur. Table 3.2 lists the mean and maximum recorded frost and fog frequency at Lithgow. During winter, temperature inversions would occur on at least one third of mornings.

Figure 13 Seasonal Wind Roses (9am)

Figure 13a Seasonal wind Roses (3pm)

3.5.9 Snowfalls

Light snowfalls occur at altitudes of around 1,000m in the Blue Mountains area, most frequently in July/August.

Snowfalls in the area of the Project Site occur on average three times per year.

3.6 Water Occurrence

3.6.1 Surface Water

The Project Area is within the catchment of the Turon River.

There are no permanent water flows or creeks within the project area and apart from rainfall run-off the only surface water in the vicinity is contained in the Invincible Colliery pit top dam which provides water for the coal washery.

3.6.2 Groundwater

Recently discontinued (current) existing underground mine workings in the Lithgow Seam "make water" which is pumped into the pit top dam or, through a vertical borehole, into the upper Cox's River Catchment at the eastern extremity of the mine workings.

Water discharged from the mine complies with the standards required by EPA licences from a licenced discharge point.

The regional dip of the Lithgow seam is towards the northeast which results in the seam water accumulating in the mine faces away from the entries.

It is not anticipated that there will be any groundwater seepage into the open cut workings as the seam is drained by underground workings east of, and lower than, the seam within the Project Area.

Table 3.2 – Meteorological Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
TEMPERATURE - °C - Lithgow (93 years of records)													
Mean Daily Maximum	26	25	22	18	14	11	10	12	15	19	22	25	18
Mean Daily Minimum	12	12	10	7	4	2	1	1	3	6	8	10	6
RAINFALL - MM - Lithgow (116 years of records)													
Mean	93	85	85	63	64	68	67	64	59	68	70	77	858
Median	83	66	66	50	44	53	51	49	53	59	66	67	853

Rain days	11	10	11	9	10	12	12	11	10	10	10	10	126
Table 3.2 continued													
REALTIVE HUMIDITY - % - Lithgow (40 years of records)													
9:00am	65	71	73	76	81	82	78	73	65	60	60	61	70
3:00pm	52	57	56	57	62	65	60	54	51	50	50	47	55
EVAPORATION - MM - Bathurst Agricultural Research Centre (31 years of records)													
Mean	211	162	140	84	50	33	34	56	78	124	156		1351
Highest	285	210	186	123	150	42	43	80	117	1701 69	258	297	1961
Lowest	145	109	105	54	34	30	28	40	66	77	117	164	969
FOG FREQUENCY - Lithgow (40 years of records)													
Average No./Month	1	1	1	1	2	2	2	2	1	1	0	0	-
FROST FREQUENCY -													
Average No./Month	0	0	0	2	6	9	14	11	7	2	0	0	53
SNOW DAYS - Lithgow (40 years of records)													
Average No./Month	0	0	0	0	0	1	1	1	1	0	0	0	
Maximum	0	0	0	0	1	2	3	3	4	1	1	0	

3.7 Air Quality

3.7.1 Existing Sources of Air Pollution

The Project Area is located approximately 1.5km north of the coal handling area at the Invincible Colliery pit top.

When the underground mine is operating low levels of air contamination are generated for the following reasons.

- Coal is delivered from the underground workings to the washery by conveyor belt.
- The coal and refuse is wetted by the washery process and not dusty when subsequently handled.
- Coal is delivered to load-out bins by conveyor and truck loading for dispatch is effected through bins.
- One front end loader and one truck handles the moist coal refuse from the washery.

The main source of dust is from the 1000 tonne raw coal stockpile, with a minor

contribution from the 5000 tonne washed coal stockpile and the coal refuse stockpile. The mine is not currently operating, so air contamination is very low.

There is practically no agricultural activity adjoining the project site and the main source of air pollutants are seed and pollen in season.

Other minor sources of pollution are road traffic, residential smoke and the products of combustion from Mt. Piper Power Station located about 3km to the south.

3.7.2 Existing Dust Levels

The existing dust levels were monitored in 1997 for the previous open cut operations. Dust gauges were placed at the Project Area as shown in Figure 14; Page 81.

Monitoring commenced on 7 November 1997 and continued weekly for a period of 4 weeks and monthly thereafter. The results are shown in Table 3.3 in g/m^2/month.

Table 3.3 - Results of Dust Monitoring

Date	DG1	DG2	DG3	DG4	DG5	DG6
7/11	3.3	1.4	6.9	1.5	-	-
14/11	20.1	1.3	0.1	16.2	1.1	0.5
21/11	1.3	1.0	0.7	2.5	0.4	1.7
28/11	0.0	1.4	1.7	0.9	1.4	1.6
24/12	1.4	1.2	1.0	0.7	2.0	1.8
25/01	0.6	0.7	0.3	1.7	0.4	0.3

Note that the high readings for gauges 1 and 4 on the 14/11 are due to glass funnel breakages.

These results are still relevant to the proposed open cut operation.

Figure 14 Location of Environmental Monitoring Stations and Nearest Residences

3.8 Existing Noise Levels

3.8.1 Introduction

The existing acoustic environment has been described using information gathered from long term unattended monitoring, short term attended monitoring and from operational monitoring from when the open cut was operating on the site in 1999.

Previous information was gathered and analysed under the Environmental Noise Control Manual, which has been superseded by the Industrial Noise Policy.

Environmental Resources Management was engaged to provide an assessment of proposed noise impacts consistent with the requirements of the EPA's Industrial Noise Policy which replaced the EPA's Environmental Noise Control Manual.

Background noise levels were re-measured at both residences in December 2005 for the purpose of reviewing the modelling undertaken by ERM

The contents of the following sections are compiled from information taken from the report prepared by ERM, which is attached in its complete form as Appendix L.

3.8.2 Monitoring Noise Levels

ERM states:

"From our observations, the dominant noise sources at local existing residential areas are related to road traffic. No industrial noise was audible at the surrounding residences."

The existing acoustic environment was measured by means of short-term attended noise monitoring, long term unattended noise monitoring data (available from measurements conducted as part of an earlier analysis by ERM) and from unattended noise measurement completed subsequent to initial investigations.

Table 3.4 lists the residences for which the noise impacts from the colliery have been assessed.

Table 3.4 – Details of Surrounding Residences

ID	Location	1Approximate position with respect to the site	2Approximate position with respect to Castlereagh Highway
Location 1	Billabong Residence	1300m West	420m West
Location 2	Hillview Residence	1200m South West	550m South West
Location 3	Old Company Cottages	1500m North West	130m West
1. Shortest distance from the limits of operation in the direction mentioned 2. Shortest distance from the road in the direction mentioned			

3.8.3 Results

3.8.3.1 Long Term Unattended Noise Monitoring

The long term unattended noise monitoring was conducted at the Billabong and Hillview Residences (Location 1 and 2 respectively). These locations were chosen to represent the residences that would be most affected by the proposed operations. The details of the measurement locations are presented in Table 3.4 above.

Table 3.5 below presents a summary of the measured background noise levels (ABL) measured at the "Billabong" and "Hillview" homesteads.

Operational Monitoring

Additional background monitoring was conducted at the Billabong residence while operations were occurring at the site. However, it was noted that the noise from the site was not audible at the residence. In addition, a second logger placed at the site boundary confirmed that site noise did not impact background levels at the residence.

Short Term Attended Noise Monitoring

In order to identify the current noise climate in the area, attended noise measurements were undertaken at the Billabong and Hillview residences on August 30, 2005. These measurements were then compared with the levels obtained through previous long term and operational monitoring, to obtain a clearer understanding of the existing noise environment.

Following review of the initial Environmental Assessment, it was decided to review the background noise levels at both Billabong and Hillview Residences in December 2005.

The following information has been taken from the noise report prepared by ERM to support this application.

"Ambient Noise Monitoring

The EA noise assessment conservatively adopted the DEC's minimum RBL value for noise assessment purposes. The EA data is limited to 3 days and was recorded during a weekend, which is typically quieter than weekdays, in 1999. This is not considered representative of normal weekday conditions. Hence, long term noise monitoring was undertaken in accordance with the INP and results are summarised in *Table 1* (See Table 3.5 Below) Location numbers are as per the EA noise assessment. Although part of the monitoring period extended into the holiday season, it is considered that data collected is typical of the area. This is supported by the transport activity that was observed during this period. Furthermore, the daily charts demonstrate a trend in morning and afternoon noise patterns consistent with expected road traffic activity. Notwithstanding, data collected is likely to provide a

low representation of existing background noise levels, resulting in a conservative noise assessment".

Table 3.5 – Long Term Monitoring Results

Location	Rating Background Level			Ambient (L_{eq}) Noise Level		
	Day dB(A)	Evening dB(A)	Night dB(A)	Day dB(A)	Evening dB(A)	Night dB(A)
1. Billabong Residence (west of site)	35	31	30[2]	45	42	44
2. Hillview Residence (south west of site)	36	30[2]	30[2]	50	45	43

Notes: 1. Data affected by rain and wind speed > 5 m/s excluded.

2. It should be noted that the EPA's minimum 30dB(A) RBL was adopted here.

3.9 Ecological Considerations

3.9.1 Introduction

A key component of any investigation towards obtaining approval for any proposal is the assessment of the existing environment, both in terms of the flora and fauna.

To this end flora and fauna surveys were carried out in 1997 and in 2005 on the proposed site to determine what exists and the possible impacts the proposal will have on that flora and fauna.

Information from the 1997 survey reports and the 2005 surveys and inspections have been used to prepare this EA. The 1997 flora and fauna surveys are attached as Appendices I and J, and the 2005 report is attached as Appendix K.

3.9.2 Survey of Flora

The aims of the flora survey undertaken in 1997 in respect of the previous open cut operations were to:

- Identify the species and plant communities found to exist on this site.
- Identify and describe any rare or threatened plant species and assess the conservation significance of any that are found to exist.
- Ascertain the extent of any impact the proposal may have on the species and communities identified within the study area and what affect these impacts are likely to have on the communities identified.
- Finally to recommend any measures which may assist in mitigating the affect of identified impacts on any of the identified species or communities.

The field work, carried out to identify species and communities present, was carried out in several daily visits between October and early November of 1997 by Mr. Graeme Muir of Craven Elliston and Hayes further field inspections were carried out by Mr. Paul Burcher from AES Environmental Consultancy in June 2005

The survey was carried out over the six week period in 1997 in order to maximise the time period in which plant species might be flowering to aid in the accurate identification of species in the field, reducing the need for the removal of plant specimens from the site. The survey in June 2005 was carried out in order to determine whether there was any significant variation from 1997.

The field survey method consisted of extensive foot traverses and quadrant surveys throughout the study area. Work was concentrated largely on the area of Ben Bullen State Forest as this area showed the greatest species diversity and thus would
be the area which would be the subject of the greatest impact.

The traverses covered the full range of altitudes and aspects, identifiable soil types and/or geological changes and identifiable fauna habitats within the study area. The purpose of the foot traverses was primarily to identify or locate the different plant species that occurred within the area.

Particular attention was paid to identifying or locating any rare or threatened plant species, and noting the extent of any disturbance to the natural vegetation, particularly the presence of weed or introduced plant species.

The quadrant surveys were then randomly positioned in each of the identified different areas. At each site records were made of the height, composition, density, floristics and cover of the dominant plant stratum, the understorey layer and the groundcover.

While every effort was made to identify species in the field, some species were not able to be identified. These were tagged and collected for later identification using selected texts at the office. Some difficult specimens were identified by using the Royal Botanic Gardens public reference collection in Sydney.

The Flora Survey carried out by Paul Burcher (B. App. Sci) of AES Environmental Consultancy states:

The previous flora survey was found to be thorough and not require any further work apart from checking for plant species and ecological communities that have been listed since the time of the report and are known to occur within ten kilometres of the site. This involved targeted searches of the site for the shrubs Wollemi Mint-brush (Prostanthera cryptandroides) and Clandella Geebung (Persoonia marginata) and checking whether any of the vegetation communities present conform to White Box-Yellow Box – Blakely's Red Gum Woodland (TSC Act) or Grassy White Box Woodlands (EPBC Act), these communities having been listed since 1998.

3.9.2.1 Results of Flora Survey

From the field investigations that were carried out five distinct vegetation units have been identified.

1. Open forest with dominant tree species *Eucalyptus viminalis* (Ribbon Gum) and *E. macrorhyncha* (Red Stringybark).

2. Woodland with dominant tree species of *Eucalyptus rossii* (Inland Scribbly Gum) and *E. macrorhyncha*.

3. Cleared land used for grazing which, in the past, has been sown with improved pasture species such as oats.

4. Swampy area of low lying ground within the northern-most disused open cut.

5. A vegetation unit that has been classed as regeneration by the investigator. This unit has mixed tree species of *Eucalyptus macrorhyncha*, *E. mannifera* (Brittle Gum) and *E. viminalis.*

The majority of the timbered or forested area would be classified as open forest situated predominantly on the valley floors in areas of alluvial soils to the north and east of the study area. This vegetation unit contained dominant tree species of Ribbon Gum and Red Stringybark. Figure 2 of Appendix I, show the location of the vegetation units as identified during field excursions.

The area marked as vegetation type 1(a) was open forest of the same classification as vegetation type 1.

The dominant tree species were more Red Stringybark and less Ribbon Gum whereas the other areas marked as vegetation type 1 are equally dominated by Red Stringybark and Ribbon Gum.

The ridge to the east of the study area that dissects the open forest is classed as a woodland with dominant tree species of Inland Scribbly Gums and Red Stringybark.

Both of these vegetation units had an understorey of medium to low density containing small trees and shrubs of the following species; *Acacia dealbata* (Silver Wattle), *A. buxifolia* (Box Leaf Wattle), *A.longifolia* (Sydney Golden Wattle), *Persoonia levis* (Broad Leaf Geebung) and *P. linearis* (Narrow Leaf Geebung), Eucalypt regeneration was also common in these areas contributing to the density of the understorey.

The ground cover within both of these units varied between the range of 40% to 100%.

Common groundcover species, consistent with both the woodland and open forest communities include patches of *Pteridium esculentum* (Bracken Fern), *Viola betonicifolia* (Native or Mountain violet), individuals of *Acaena novae-zelandiae* and various members of the Asteraceae family.

Common grasses that are consistent with both of these vegetation units are Chionochloa species, Danthonia species, Poa species and Agrostis species. In specific areas species of Lomandra, Dianella, Stylidium and Gonocarpus can be found. Common to the open forest were areas of spear grass or Stipa species.

Individuals of the following were found to occur in each of these vegetation units. *Eucalyptus bridgesiana* (Apple Box), Brittle Gum and *Callitris endlicheri* (Black Cypress Pine).

The open forest, and to a lesser extent the woodland, showed signs of infestation by Blackberry, Briar Rose and Mistletoe primarily on Eucalypts.

The cleared land is bounded by the State Forest on two sides, by the regenerated vegetation area to the south and by open country to the west.

The swampy area or vegetation unit is located within a disused open cut. This area remains wet for the majority of the year, sustaining a healthy frog population. The main plant species identified to be present were one variety of Typhaceae, most probably *T. domingensis* although floral structures were not available to confirm the identification of these plants to species level.

These Typhae species congregated from the centre of the pond to the extremities, or within one to 2m of the edge, where *Juncus australis* was found growing quite prolifically. This swampy area, frog population and surrounding area was not affected by the previous open cut operations. The area affected by the previous open cut operations is shown on Figure 6.

The vegetation unit marked as regeneration is a disused open cut which now contains the wetland area, and an area created by similar activities further to the south, at the end of the proposed haul road. This area has now been rehabilitated

The vegetation that has self-seeded on these spoil dumps is dominantly juvenile to mature Eucalyptus trees of the species Brittle Gum, Inland Scribbly Gum and Ribbon Gum.

These trees may be stunted in growth, rather than being juvenile specimens, as a result of the quality of the growing medium in which they have seeded.

The area surrounding the wetland has no understorey species but has extensive growth of *Cassinia arcuata* (Biddy Bush or Chinese Scrub).

The regeneration unit marked to the south of the study area is dominated by the

same tree layer but the understorey of Biddy Bush does not occur. The tree layer is more dense and Blackberry predominates as a groundcover species in this area.

The climber *Glycine clandestina* (Twining Glycine) is prevalent in the trees of this regeneration unit and *Hardenbergia violaceae* (False Sarsparilla or Native Lilac) is also present in this area.

The pasture grasses from the areas adjoining these regeneration units are beginning to encroach beyond the treeline and individuals of Pattersons Curse also appear in the verges of these areas.

The results of the flora survey conducted by AES Environmental Consultancy confirmed the results of the original survey were accurate and still current.

One exception being that during the most recent survey some of the stringybarks found on the site, were found to be Capertee Stringybark (Eucalyptus Cannonii), estimated to be less than 10% of the stringybarks present.

As a result of this finding a new eight point test has been conducted on the impact of the proposed open cut on this species.

3.9.2.2 Conservation of Flora

Literature searches of the National Parks and Wildlife Services data base, the Atlas of NSW Wildlife, for the Wallerawang and Bathurst 1:100 000 topographic map sheets, and Benson and Keith (1990), were used in order obtain a listing of the flora that has been previously identified in the area and particularly the rare or threatened species that have been found.

In addition to this an attempt was made to obtain any information from State Forest's Interim Forest Assessment report for Ben Bullen State Forest, which was not able to be accessed.

The search of the National Parks and Wildlife Services records revealed that there are plants that are listed as rare, threatened, endangered or extinct under Schedules 1 and 2 of the Threatened Species Conservation Act (T.S.C Act 1995), within the region.

The search also revealed that none of the species listed have been located within the study area.

As plant species as listed in the T.S.C Act 1995, have been found to exist within the study area there is a need to carry out any "eight point tests" for the species *Eucalyptus cannonii* based on the impact of the proposed open cut on the species.

Plate 7 - View North into the State Forest.

The complete test can be found in Appendix 2 of this EA (Section 4 in the flora survey). The conclusion of the eight point test is as follows.

The proposed development would remove a small proportion of Capertee Stringybark habitat. Upon cessation of mining, this will be rehabilitated and Capertee Stringybark included in the planting schedule. The species appears to be adequately conserved in regional conservation reserves. Given these factors, it is considered unlikely that the proposed development would have significant effect on the species, or its habitats.

In addition to finding Capertee Stringybark on site the newest survey established that two flora species, Wollemi Mintbrush and Clandulla Geebung, had been added to the threatened species list since the original survey was completed.

Wollemi Mintbrush is associated or found in vegetation communities not found on the proposed site nor was it identified to exist on site and hence was not considered further.

Clandulla Geebung however is known to exist within vegetation communities consistent with those found on the site. No specimens of the species were found during the most recent survey and it was not considered further.

The open forest (vegetation type 1) has conservation significance in that these areas are "potential koala habitat" as defined by State Environmental Planning Policy - 44, Koala Habitat Protection. This means that it warrants consideration in finalising aspects of the proposal, in particular the species to be used in rehabilitating the site. This was taken into account in the previous rehabilitation activity.

Since the completion of the original surveys the Environment Protection and

Biodiversity Conservation Act also came into force.

Capertee Stringybark is listed as a vulnerable species under this Act which prompted an assessment under the guidelines of the Act to determine whether the proposed operation has, will have or is likely to have a significant impact on the species.

The assessment concluded that the proposed open cut is unlikely to have significant impact on the Capertee Stringybark and referral to Environment Australia is not required.

3.9.3 Survey of Fauna

The fauna survey of the proposed site was carried out during the second last week of October 1997 by Mr. Dean Lavers of Terra Sciences in conjunction with Mr. Graeme Muir of Craven Elliston and Hayes. A further survey in June 2005 has been undertaken to determine any changes in the study areas since the 1997 study.

The main aim of the 1997 study was to determine the level of impact on threatened native fauna species and their habitats as a result of the proposal. To achieve this, the field survey and subsequent assessment aimed to:

- Identify fauna species within the subject site.
- Assess the capability of the subject site to support threatened fauna species as identified in Schedule 1 and 2 of the Threatened Species Conservation Act, 1995.
- Determine the regional significance of threatened fauna species and impact of the proposal.
- Detail ameliorative measures to minimise potential impacts the proposal may have on threatened fauna.
- Determine whether the development is likely to have a significant effect upon threatened species, their populations or ecological communities.

The most recent survey by AES Environmental Consultancy, carried out in June/July 2005, states:

In conjunction with results from other surveys carried out locally, it is considered that the previous fauna survey was adequate. Notes were made of all fauna species detected during the field inspection. Particular attention was paid to the identification of Treecreepers (Elimacteris spp) and grass finches (sub-family Estrildinae) as threatened species in these taxa have been listed since 1998 and are known to occur locally.

3.9.3.1 Results of Fauna Survey

The site surveyed in 1997 was found to consist of four general habitat types or zones.

1. Agricultural pasture land.

2. Previously cleared and regenerating open cut areas.

3. Tussock and sedge community defined by gullies and depressions.

4. Tall standing eucalypt dominated forests.

Habitat types 3 and 4 will be impacted on by the current proposal.

All of the species of fauna identified as a result of the survey are commonly occurring species in this region and are listed in Appendix J. (Appendix A of the Fauna Report).

D. Lavers, Terra Sciences makes the following points:

- The presence of feral predators such as cats and foxes was observed during the study. Super-predators such as these are able to thrive in areas like the site due to the abundance of easily available prey and their ability to remain unaffected by any human disturbances.

- Large populations of rabbits thrived under the protection of Blackberry stands and with the good foraging resources of the nearby pasture. Pig scats and digging were observed on the boundary of the agricultural lands and nearby one of the dams.

- The presence of high introduced populations is likely to out-compete other species for habitat resources.

- Six species of frogs were identified during the survey. All of these species were recorded from dam sites or the open cut area containing water. All species recorded were regarded common to the region. The most active site for frogs was the larger depression towards the north of the old open cut. This site contained a good sedge community along with a shallow pool area. Located within a sheltered hollow, this water holding depression provided at least all six recorded species of frogs with adequate habitat.

- Two species of snakes that frequent the area were identified. These include the Red-bellied Black Snake and the Copperhead. A third snake species was observed but not properly identified. The characteristics of this snake make it likely that the species was a Common Brown Snake.

- Lizards, skinks and monitor species were less common over the site with only three sightings of smaller skink species made within the elevated forest community. All species of skinks are common to the region. Particular searches were made for gecko and monitor species, however no sightings or traces were identified.

- The threatened species*, Eulamprus leuraensis*, which has been recorded within the region, was not identified as occurring on the site. It is considered that more favourable habitat exists within the Central Blue Mountains.

- Thirty eight species of birds were identified. All are considered common within the region. A good proportion of these species are common to areas with contrasting forest and agricultural communities. It is considered that without the contrasting habitat features of these two areas, bird population numbers would be significantly lower.

- Seven species of terrestrial and arboreal mammals were observed during the survey. All species being common to the region. The site provided many species with higher adaptability to agricultural disturbances with good resources.

- Kangaroo and wallaby numbers were very high over these areas. Evidence of heavy traffic from macropods into and out of the agricultural lands was observed with damage to fence lines bordering onto the forest area. Wombats were observed grazing on the pasture with runs extending from adjacent forest areas. One series of wombat runs is located on the western intercept of the forest and the agricultural land.

- The tussock areas on the site are typically made up of a dense ground cover of grasses and sedge species (with exception of the pasture areas). Trapping successes within the larger gully area to the east of the site indicated that a population of Brown Antechinus (*Antechinus stuartii*) exists here.

- Evidence on clearer ground or in ant mounds that echidnas are present in numbers was observed throughout the forest areas.

- Tree limbs and smooth tree bases were investigated for the marking scratches of possums or koalas. Scats and scratches from the Brush-tailed Possum were recorded within a tall standing Eucalypt community north of the site. Large hollows within larger eucalypts were potential habitat to possum species.

- Five species of Micro chiropteran bats were positively identified over the subject site. It is expected that several more species (including threatened species) cover the area during foraging or nocturnal flights. Up to 14 species of bat have been identified as occurring in the local region. Previous research

indicates that bat diversity is consistent with available tree hollows with bat numbers concentrated into forested areas.

Of the species originally identified on the site the Brown Treecreeper has since been listed under the Threatened Species Act.

The AES survey states:

The only treecreeper observed during the field inspection by AES was the Red-browed
Treecreeper (Climacteris erythropy). It goes on further to state that literature on the two species indicates that the forest habitat at the site is more typical of that used by the Red-browed Treecreeper than that of the Brown Treecreeper.

It is suggested then that the original identification of the Brown Treecreeper may have been a mistakenly identified Red-browed Treecreeper.

Assuming however, that the original identification was accurate an eight point test was carried out (See Section 4 of Appendix K).

The recent fauna surveys and inspections of the study area undertaken for this EA has shown that outside the limits of the open cut area worked subsequent to the 1997 fauna survey there has been no significant change. Those areas impacted by the previous open cut operations are subject to ongoing rehabilitation efforts which will be further advanced by the placement of hollow bearing timber, additional plantings and habitat establishment.

Plate 8 - Open Cut Wetland Frog Habitat

3.9.3.2 Conservation of Fauna

Protected fauna as listed under the Threatened Species Conservation Act, 1995, (T.S.C Act, 1995) may be classed as threatened, vulnerable, endangered or

presumed extinct.

The database, maintained by the NSW National Parks and Wildlife Service, was searched in order to determine whether or not any of the species considered to be threatened, vulnerable, endangered or presumed extinct were identified to exist within the site.

The following species were listed on the database.

Table 3.6 - Threatened Species Database Records

Threatened Fauna Recorded for Wallerawang Map Sheet 8931 NPWS Atlas of NSW Wildlife	
Common Name	Scientific Name
-	Eulamprus leuraensis (E1)
Square Tailed Kite	Lophoictinia isura (V)
Glossy Black Cockatoo	Calyptorhyncus lathami (V)
Turquoise Parrot	Neophema pulchella (V)
Powerful Owl	Ninox strenua (V)
Regent Honeyeater	Xanthomyza phrygia (E1)
Painted Honeyeater	Grantiella picta (V)
Koala	Phascolarctos cinereus (V)
V = Vulnerable Species listed under the T.S.C Act, 1995 E1 = Endangered Species Listed under the T.S.C Act, 1995 E4 = Presumed Extinct Species listed under the T.S.C Act, 1995	

A regional search was also carried out which revealed the following species had been found within the region.

Table 3.7 - Threatened Species Based on Range Data

THREATENED SPECIES BASED ON RANGE DATA	
Painted Burrowing Frog (E1)	Magpie Goose (V)
Elamprus learaensis (E1)	Freckled Duck (V)
Broad-headed Snake (E1)	Blue-billed Duck (V)
Spotted-tailed Quoll (V)	Square-tailed Kite (V)
Eastern Quoll (E1)	Grey Falcon (V)
Brush-tailed Phascogale (V)	Brolga (V)
Koala (v)	Bush Thick-knee (E1)
Yellow-bellied Glider (V)	Mongolian Plover (V)
Squirrel Glider (V)	Painted Snipe (V)
Rufous Bettong (V)	Black-tailed Godwit (V)
Black-striped Wallaby (E1)	Glossy Black-cockatoo (V)
Brush-tailed Rock-wallaby (V)	Swift Parrot (V)
Yellow-bellied Sheathtail-bat(V)	Turquoise Parrot (V)
Large Pied Bat (V)	Powerful Owl (V)
Great Pipistrelle (V)	Masked Owl (V)
Little Bent-wing Bat (V)	Pink Robin (V)
Common Bent-wing Bat (V)	Regent Honeyeater (E1)
Large-footed Mouse-eared Bat (V)	Painted Honeyeater (V)

Australasian Bittern (V)	Bathurst Copper Butterfly (E1)
Black-necked Stock (V)	
V = Vulnerable Species listed under the T.S.C Act, 1995 E1 = Endangered Species listed under the T.S.C Act, 1995 E4 = Presumed Extinct Species listed under T.S.C Act, 1995	

None of the species listed in either of the tables above were found or recorded to be on the site during the original fauna survey.

Eight part tests for significance were carried out on 14 of the species listed, based on an assessment of their likelihood of occurrence. These eight part tests can be found in Appendix J (Appendix C of the Fauna Report).

These fourteen species were; the Squirrel Glider, the Yellow-bellied Sheathtail Bat, the Little Bent-wing Bat, the Common Bent-wing Bat, the Large Pied Bat, the Great Pipistrelle, the Square-tailed Kite, the Bush Thick-knee, the Glossy Black Cockatoo, the Turqoise Parrot, the Masked Owl, the Powerful Owl, the Painted Honeyeater and the Regent Honeyeater .

The results of each of these eight part tests were the same; In relation to these species there is not likely to be a significant effect on threatened species, population or ecological communities, or their habitat.

Since the original fauna survey carried out in 1998, besides the Brown Treecreeper, the Greater Broad-nosed Bat, the Diamond Firetail and Gang-gang Cockatoo have been listed as vulnerable under the TSC Act.

Of these three, suitable habitat occurs on the proposed site and eight part tests have been completed for each species to determine whether the proposal is likely to have a significant effect on each of the species.

The eight part tests for each of these species are attached to the Flora & Fauna Assessment and the outcome of each test concluded that the proposed development will not have a significant effect on the species or its habitat.

The survey by AES also re-assessed the site as potential koala habitat as outlined in SEPP 44 – koala habitat protection.

The assessment concluded that the land is not core koala habitat and there is no evidence of a resident population and therefore there is no need to prepare a Koala Management Plan to accompany the proposal.

In addition to listings under the TSC Act the EPBC Act has come into force since the original survey and the large-eared Pied Bat is listed as a vulnerable species under this Act.

An assessment of the potential for the proposed open cut and whether it has, will have, or is likely to have a significant impact was carried out.

The assessment concluded that the proposed action is unlikely to have a significant impact on the large-eared Pied Bat and referral to Environment Australia is not required.

3.10 Archaeological Survey

3.10.1 Field Survey Methods

The proposed open cut site and the haul road route were extensively examined by field inspection in 1997 which consisted of foot traverses over the proposed areas and their surrounding and adjoining areas.

The same areas were inspected by representatives of the local Aboriginal Land Council in order to determine whether or not any sites or artifacts of significance could be found within the project area.

A current survey of the area subject to this EA was carried out by Mr. Richard Peters from the Bathurst Aboriginal Land Council in June 2005. The area was comprehensively covered by the 1997 survey and re-examined again in 2005. No sites or artifacts of significance were discovered during the previous open cut operations.

A subsequent Heritage Assessment survey was carried out by OzArk Environmental and Heritage Assessment Pty. Ltd. (OzArk) in February 2006 to support this application under Part 3A of the Act.

A copy of the OzArk report is attached as appendix D which details survey results and details of Native Title agreements with regards ML68.

3.10.2 Survey Results

There were no indigenous heritage sites or artifacts located within the direct or indirect impact areas. See the response from the Bathurst Local Aboriginal Land Council attached in Appendix D

Four sites of non-indigenous heritage were located during the search of the area. These sites consisted of the remains of an old building, not standing, largely overgrown with non-indigenous plant species, the remains of two old open cut mining sites, and the partly sealed adit and air shaft of some old underground workings.

The building site is located well away from any area of proposed disturbance and will not be disturbed in any way. Of the two open cut sites one is now an ecologically significant habitat for frogs and the other is largely overgrown with blackberry bushes. As mentioned the adit and air shaft have been sealed, are remote from the site and should not be disturbed. The sites are located in Figure 3; page 36 and Figure 9; Page 56.

The report compiled by Ozark concluded the following;

“It is recommended that:

1) No sites were recorded within the Invincible Open Cut Extension Project study area and consequently there are no constraints to the proposed development on the grounds of cultural heritage.

2) Should any ‘Aboriginal objects’ or other Indigenous sites be identified elsewhere within the study area during the course of the mining or rehabilitation activities, work in that area should immediately cease and a DEC Archaeologist and the Bathurst LALC be contacted to discuss how to proceed;”

The full OzArk report is attached in Appendix D of the supporting documentation.

3.10.3 Indigenous Significance Assessment

As no indigenous sites of significance were discovered (during the site inspections) an assessment of the value to the local aboriginal community and the scientific and educational value of the site has not been prepared.

3.10.4 Non-Indigenous Heritage Assessment

The site’s evidence of use by Europeans, the remains of a building and the remains of past mining activities are of relevance in that they provide an insight into the history of mining in the Cullen Bullen area. The scale and extent of disturbance of mining sites is such that there would be little value (cultural, scientific or educational) in altering the proposal to allow for the preservation of the old mining areas.

The building remains to the south east of the site, which was more than likely associated with the mining activities within the area, will not be disturbed by any activities proposed, to so the cultural, educational or scientific value of the site will not be disturbed or compromised in any way.

3.10.5 Conclusions

The conclusions of both the inspections by representatives of the Bathurst Local Aboriginal Lands Council and the Heritage Assessment carried out by OzArk, conclude that there are no constraints to the proposed development based on cultural heritage.

In terms of European heritage none of the four industrially related sites that may be considered significant will be disturbed under this proposal.

On these grounds there is no archaeological reason why the proposed development should not proceed.

The company is aware that under the National Parks and Wildlife Act of 1974 (as amended), it is illegal to damage, deface or destroy an aboriginal relic without the written permission of the Director. Therefore should any relics or artifacts be discovered in the course of operations, the company is obliged to contact the National Parks and Wildlife Service and work in the area will cease until the site can be inspected by representatives of the Department and the Local Aboriginal Land Council. Work will not continue in the area until any approvals and permits required are obtained.

3.11 Land Ownership and Planning Zones

3.11.1 Planning Instruments

3.11.1.1 Local Environmental Plan (LEP)

Under the Greater Lithgow City Council Local Environment Plan 1994 the freehold land within the subject area is zoned Rural (General) 1(a) and the Forestry Land is zoned Rural (Forestry) 1 (f).

The open cut development is consistent with objective (a) (iv) of zone Rural (General) 1 (a) and is permissible for both zones with development consent.

3.11.1.2 State Environmental Planning Policies (SEPP)

Advice from DOP identified the need to address the following State Environmental Planning Policies (SEPP);

SEPP 11 – Traffic Generating Developments
SEPP 33 – Hazardous and Offensive Development
SEPP 44 – Koala Habitat Protection
SEPP 55 – Remediation of Land
SEPP – (Major Projects) 2005

<u>SEPP 11 – Traffic Generating Developments</u>

SEPP 11 applies to the proposed open cut operation as it qualifies under section M of schedule 1.

The RTA has been notified of the proposed operation and they have provided a written response with regards to their requirements. See Appendix B coal transportation requirements are discussed in section 2.6

<u>SEPP 33 – Hazardous and Offensive Development</u>

The proposed open cut operation will not require, create or facilitate the use or storage of materials that could be considered hazardous or offensive.

The relative remoteness of the site from human habitation means that the likelihood of disturbance by the operations will not cause or pose significant risk in relation to human health, life or property or to the biophysical environment.

The proposed mitigation measures and operational controls will ensure that the site is remediated to consent authority requirements following cessation of operations.

On this basis SEPP 33 would not apply.

SEPP No. 44 - Koala Habitat Protection.

The proposed site of the open cut falls within the bounds of the City of Greater Lithgow, which is listed in Schedule 1 of the SEPP, and therefore the proposal must include an assessment of the contents of SEPP 44.

After assessing the contents of the SEPP it was discovered that one species that is listed in Schedule 2 of the SEPP occurs on-site and it is proposed to clear an area of this vegetation.

The species *Eucalyptus viminalis* is listed as a feed tree species and it constitutes greater than 15% of the dominant tree species in the upper strata and therefore some of the land to be cleared is classified as potential koala habitat and Clause 7 of SEPP - 44 applies.

Clause 7 of SEPP - 44 defines the procedures that a council must follow in determining whether or not an area is potential koala habitat and the steps to follow to ensure that the area concerned is not core koala habitat. It also allows the council to grant consent to a proposal should it determine that the area concerned is not potential koala habitat.

Clauses 8 and 9 of the SEPP relate to the granting of consent on areas that the council determines to be core koala habitat and the respective preparation of a plan of management for the area.

The tree species *Eucalyptus viminalis*, a feed tree species as defined in Schedule 2 of SEPP 44, is adequately conserved within the Ben Bullen State Forest further to the north and east of the subject area. The proposed area concerned does not constitute core koala habitat as defined in the SEPP 44 (i.e. the area does not support a resident population of koalas indicated by the presence of breeding females).

The fauna survey and data search of the National Parks and Wildlife Service Wildata database confirms the finding that the impact of the proposal on the vegetation supportive of koala habitat, while significant, should not be considered sufficient to prevent the proposal from proceeding.

SEPP 55 – Remediation of Land

The proposed operations at Invincible Colliery will not create any areas that could be described as contaminated land as described under Part 7A of the EPA Act and therefore this planning policy would not apply to this proposal.

State Environmental Planning Policy (Major Projects)

Clause 5(1)(a) of the SEPP defines developments for the purpose of mining coal as being developments to which the SEPP applies.

The application of this planning policy identifies the proposed development as being State Significant Development for which the Minister is the consent authority.

3.11.2 Land Ownership

The Project Area is within Mining Portion ML 68 and part of Ben Bullen State Forest No. 434.

That part of the area within the Ben Bullen State Forest below 15.24m from the surface of the land is within the Invincible Colliery Holding (Consolidated Coal Lease No. 702). That part of Portion 51 below 13.72m from the surface of the land is within Invincible Colliery Holding.

3.11.3 Existing Development Consents

That part of the land to the depths referred to above are subject of ML No. 68 Orange.

Invincible Colliery has operated since 1900 and underground mining operations are covered by existing use.

Development consents apply to surface development since 1975 at Invincible Colliery (Appendix F).

3.11.4 Land Use

The Project Area and adjoining lands are used as follows:

1. Crown land to the north-west, north and east is part of Ben Bullen State Forest.

   Current Use: State Forest and Nature Conservation.

2. Private Portions 50 and 51, and land adjoining on the west owned by Mr. M. Bulkeley and Coalpac Pty Ltd.

Current Use: Improved pasture and medium level grazing. Affected by grazing, open cut and underground mining operations.

3. Land to the south of Portion 50.

   Current Use: Invincible Colliery Pit Top; coal washing, handling and storage; offices, bathrooms and workshops.

The proposed open cut operations will not significantly affect adjoining land holdings as dust and water emissions will be controlled.

3.11.5 Urban Occupation and Residences

There are three existing residences in the vicinity of the Project Area as shown on Figure 14; Page 81.

- "Renown Farm" is owned by Coalpac and is rented to Ms Wendy Day on a weekly basis.

- The second residence “Billabong”, is located on the western side of the Castlereagh Highway and is owned by Mr. Bernie Muenzer.

- The third residence “Hillview” is owned by Mr Greg Muenzer and is also on the western side of the Castlereagh Highway.

Plate 9 - View of "Renown Farm" looking west from haul road.

SECTION 4

Environmental Impacts and Monitoring

4.1 Air Quality

4.1.1 Introduction

The mining activities include the removal and stockpiling of overburden and coal, the handling and transport of coal, use of roads, and exposure of surface created by stripping and back filling to wind erosion. These activities will affect air quality and involve monitoring and management procedures to prevent adverse effects on the surrounding area.

4.1.2 Air Quality Objectives

Dust generation within the mining site will be kept to a level consistent with the safe operation of the mining equipment and employee safety as prescribed by the Coal Mines Regulation Act, 1982. This restriction will prevent adverse impacts on areas immediately surrounding the site in respect of vegetation and wildlife.

In the surrounding rural area, which has no residential occupation with the exception of three dwellings. Two dwellings are 2 km from the site and one owned by Coalpac and rented on a weekly basis is 1 km from the site. Dust-generating activities are not expected to exceed EPA air quality objectives shown on Table 4.2.

Whilst operational Coalpac maintained a network of dust depositional gauges surrounding its open cut operations.

The results for the period October 1998 to July 2002 have been used to calculate long term averages (LTA).

Table 4.1 – Recorded Dust Deposition Results

GAUGE NUMBER	BACKGROUND LTA (g/m^2/month)	OPERATING LTA (g/m^2/month)
1	0.75	0.48
2	1.94	1.26
3	0.45	0.79
5	1.04	0.70
6	0.87	1.27

As can be seen from the operational results in comparison to the accepted air quality objectives in table 4.2 the levels of dust deposition whilst operational did not exceed measured background levels.

Table 4.2 EPA Goals for Dust Deposition

Dust Deposition (Insoluble Solid)	
Existing Dust Fallout Level (g/m^2/month)	Maximum Acceptable Increase over fallout levels Rural/Semi Rural Areas (g/m^2/month)
2	2
3	2
4	1

Total mean annual concentration of suspended particulate must be less than $90ug/m^3$.

The current measured levels of dust deposition have been measured in the local area and an average dust deposition objective of $3.0g/m^2$/month has been adopted.

4.1.3 Potential Air Contaminants

Emissions resulting from the proposed mining activities will be dust and exhaust fumes from mobile equipment.

Dust emissions will arise from the stripping and pushing of overburden, winning of coal, vehicular movements on unsealed roads, crushing operations and wind erosion from the exposed surfaces of coal and overburden stockpiles, stripped areas and backfilled areas prior to rehabilitation.

4.1.4 Air Quality Control

The methods of controlling and minimising the generation of air pollutants on the mining site will include the following:

- Restricting the area of disturbance to practicable limits.
- Avoiding stripping and mining activities where practicable during dry and windy weather.
- Applying appropriate amounts of water to haul roads within the open cut and to the haul road from the open cut to the Invincible Colliery pit top and to the crushing and coal storage area at intervals necessary to prevent dust generation.
- Stabilising the haul from the proposed crusher to the pit top.
- Controlling exhaust emissions from vehicles by programmed equipment maintenance to comply with EPA requirements.

- Directing vehicle exhaust discharges away from the grounds surface.
- Equipping rock drills with a dust collection device (cyclone) and/or water injection.
- Equipping the mobile crusher, crusher feeder and screens (if installed) with water sprays.
- Where overburden is encountered and blasting becomes necessary drilling and blasting will be undertaken in accordance with methods used in the open cut operations from 1998 – 2001. Details of these methods and associated management methods adopted to control blasting impacts and resulting outcomes are shown in Appendix G.
- Rehabilitating disturbed surfaces as quickly as practicable.
- Maintaining the practice of covering coal trucks delivering coal on public roads.

4.1.5 Assessment of Impacts

The measures to be taken to control air quality, as outlined above, are consistent with those normally undertaken by open cut mining operations at other locations in the region and those previously adopted by Invincible operations.

Through strict implementation the EPA requirements shown in Table 4.2 will be met.

The proposed operation is small by industry standards and environmental impacts will be correspondingly small.

Dust emissions will occur at a consistent rate during the hours of operation of the open cut mining process unless suppressed by wet weather conditions.

The mining site is well protected from south-easterly winds by the adjoining terrain and dust borne by south-westerly and westerly winds will be directed away from farm land, the three closest residences and the town of Cullen Bullen.
There will be no adverse effects on vegetation and wildlife in the State Forest area at the levels of air pollution generated by the operations.

This prediction is based on studies which have shown that very high levels of dust are required to cause noticeable effects on plants and wildlife (SPCC, 1983)

4.1.6 Monitoring

Dust gauges have been established in the area surrounding the mining site to measure existing dust fall-out levels.

These gauges will be maintained for ongoing monitoring during the life of the open cut operations to keep within EPA goals (Figure 14; Page 81).

4.2 Hydrology and Water Quality

4.2.1 Introduction

The project site is located on the western fall of the Great Dividing Range and surface water flowing from an adjoining catchment area of 314 hectares passes through the area which will be disturbed by open cut mining.

The nature of the soils and drainage within the area dictate that the amount of surface run-off in the area is minimal.

Applying experience gained whilst operating the previous open cut, the need to divert surface run-off around operation areas is unnecessary.

Topsoil or top dig material will be bunded on the outside of operational areas which will provide sufficient temporary bunding for surface flows outside active areas.

Water which falls or accumulates within working areas will be removed for use in dust suppression.

Water which accumulates within the Lithgow seam workings naturally drains to the north-east away from working areas into old underground workings.

This method of water control was employed in the open cut operations from 1998-2001.

If necessary water can be pumped from the underground workings at the licenced discharge point which Coalpac maintains on the eastern fall of the Dividing Range on the Cox's River at Long Swamp.

If water from the disturbed areas cannot be pumped into the main colliery dam or utilised in dust suppression it can be pumped into the extensive network of underground workings.

From experiences at Invincible from both open cut and underground operations the quality of waters which discharge from the underground workings is good in all regards with near neutral ph's and low sediment loads. (based on experiences from pumping waters from the mines licenced discharge point on the eastern side of the range).

If for any reason surface waters cannot be disposed of in one of the ways listed above it will be contained and treated so as to satisfy Environment Protection Authority pollution control criteria before it is discharged from the site. This situation

did not arise in the previous operations.

The project site is not subject to significant flooding and the operations will not contribute to increased liability to flooding.

4.2.2 Sources of Water Pollution

Rainwater run-off will flow from open cut mined areas, coal, overburden and soil stockpiles and haul roads. This water will become contaminated with suspended solids of sand, clay, coal and organic particles and will be designated "dirty".

Water from the existing catchment which is not disturbed will be designated "clean".

Water management will be directed to separating the clean and dirty run-off. Water discharged from the open cut site will be within the pH range of 6.5 to 8.5, suspended solids will not exceed 50mg/l and grease and oil will not exceed 10mg/l.

4.2.3 Drainage and Water Management

Figure 9; Page 56 is a plan showing the layout of the water management of the Project Site.

The following is an explanation of the method of managing the water run-off from the disturbed ground catchment and the adjoining undisturbed, existing catchment as shown in Figure 6; Page 42 and Figure 9; Page 56.

Once mining commences any water which accumulates within disturbed areas will be treated as dirty water and will be utilised for dust suppression, will percolate to old workings, or will be transferred via a network of pipes and pumps to the main colliery dam to the southwest.

Any surface waters which accumulate west of the haul road, constructed to gain access to the mining areas, will flow to the water or sediment control dams and will not leave the site before satisfying EPA criteria. To maintain a surcharge capacity in these dams this water will also be transferred to the main dam.

Waters which accumulate to the east of the haul road, from the gully to the east, will be treated as dirty water which, if not used in dust suppression, will be transferred to the main dam or will be allowed to settle and percolate into ground water..

Run-off from the haul road connecting the proposed site to the crushing and screening area will be captured by existing drains and settling basins.

By maintaining low water levels in the dam and settling basins, through using the water for dust suppression and/or pumping into disused underground mine workings, a buffer storage will be maintained capable of retaining the dirty water run-off.

The following calculations are based on Australian Rainfall and Run-off (Institution of Engineers, Australia).

The combined capacity of the settling basins will be approximately 3000m^3.

The dirty water catchment in the initial stages will be 7ha.

The following parameters were adopted to calculate the discharge from the dirty water catchment of 7ha.

- Flood frequency, 5 years.
- Time of concentration 10 minutes.
- Rainfall intensity 78mm/hour.

Using the formula Q = 0.00278.C.I.A. (AR & R)

where Q = peak flow rate (m^3/s)
C = 0.5 (Adopted run-off co-efficient)
I = 78 (Rainfall intensity - mm/hr)
A = 7 (Area of catchment - ha)

The discharge is 0.76m^3/sec
or 2736m^3/hr.

The settling basins would have the capacity to hold all of the run-off water if the rain lasted for an hour at the rate of 78mm/hr.

Adopting a flood frequency of 100 years, and a storm event of 30 minutes at an intensity of 75mm/hr. The following peak flow rate was calculated (using the formula as shown above).

Peak flow rate of 2.87m^3/sec or 10,332m^3/hr.

The results of this calculation indicate that the settling basins, as shown on Figure 11; page 61, would have the capacity to hold all of the run-off water in the event of a storm lasting three hours at a rate of 75mm/hr.

4.2.3.1 Diversion Drains

Diversion drains will be installed progressively along the up-slope edge of the open cut to minimise the flow through the disturbed area and divert the clean water into the drainage system to the west of the open cut site.

4.2.3.2 Containment of Dirty Water Within Open Cut

The sequence of the open cut operations will ensure that dirty water will be contained within the open cut and will flow down dip to the north eastern corner of the excavation which will act as a sump.

4.2.3.3 Settling Basins

There are five main settling basins which are interlinked and adequately control surface water run-off around the open cut mining site.

The western slopes are serviced by a settling basin which captures surface water flows.

The overflow from this basin is connected via bunds and a secondary basin to the main existing settling basin at the western limit of operations.

The haul road north of the proposed crusher site drains to two settling basins. Both of these basins can be serviced by pumps to pump either to the main colliery dam or into a water truck for use in dust suppression. If additional water storage capacity is needed, water from these sumps can be pumped directly into underground workings via the old Renown adit.

Surface waters from the proposed crusher site and the haul road south of the proposed crusher site are serviced by the existing settling basins and drainage network.

Overflows from this network flow to the main washery dam which provides water for the operation of the washery and Pit Top area.

The overflow from this main washery dam is an existing licenced discharge point maintained by Coalpac.

4.2.3.4 Disposal of Water Into Underground Workings

Water from the sump areas within the open cut and the settling basins will be used for dust suppressions and controlled by pumping it into the main colliery dam.

This will eliminate the discharge of water from the downstream settling basin into the natural drainage system west of the open cut area, which will only occur during periods of heavy rainfall.

The close proximity of old underground workings to the open cut provides an excess storage capacity for surface waters which cannot be pumped to the main colliery dam during a major storm event.

4.2.3.5 Progressive Rehabilitation

The rehabilitation of disturbed surfaces will be undertaken progressively to minimise erosion. This will be done as soon as possible, consistent with constraints imposed by mining operations.

Appropriate contour banks will be installed and final surfaces planted in consultation with the Department of Lands Soil Services Division, nominally graded to 0.5% at 5 metre height intervals.

4.2.3.6 Fuel Handling and Storage

Refuelling of mobile plant will be effected within a designated area at the open cut area and any contaminated ground material resulting from fuel spillage will be removed to a special location and stored so to permit the breakdown of the fuel.

4.2.4 Environmental Effects

4.2.4.1 Surface Water

Through the fundamental principle of the water management plan, which separates the clean and dirty water systems, the provision of appropriate pollution control facilities to treat contained dirty water and the transfer of water into the main colliery dam, any discharges from the open cut site will be kept to a minimum and will comply with water quality criteria referred to in Section 4 (4.2.2).

This principle was successfully applied to the previously worked open cut areas during the period 1998 -2001.

4.2.4.2 Ground Water

The strata at the project site dips in an easterly direction towards existing underground mine workings.

Underground mining operations have shown that the mine workings do not contain significant accumulations of ground water and therefore have limited effect on the local water table.

The proposed open cut workings will be small in extent compared with the existing mine workings, comparatively shallow and close to the coal outcrop and there will be no up-dip reservoirs of recharge waters.

Therefore there will be no significant effect on the local or regional water table or on ground water quality.

No potential contaminants will be stored or used on the site except for fuel and lubricants. These substances will not cause contamination of groundwater as they will be handled and stored as described in Section 4 (4.2.3.6). Absorption material

will be kept at sites where lubricants are used to control any spills which might occur.

4.2.5 Monitoring

Although water is not expected to be discharged from the site there will be one discharge point from the settling basins shown on Figure 9; Page 56. Any discharge from this point will only be made when water quality meets EPA standards.

During discharge conditions samples will be taken and analysed for total dissolved solids, turbidity and pH. Similar analyses will be undertaken on a monthly basis for all water storages on site. Some analysis will be effected on samples taken from surrounding watercourses, when in flow, to determine background water quality.

Records will be kept of rainfall at the Project Site and of any activities which may have an impact on water quality.

4.3 Noise

The information in the following assessment has been compiled from attended and unattended noise monitoring carried out in 2005 by ERM combined with the operational noise survey carried out by ERM in 1998. Complete copies of the reports are attached as Appendix L of this EA.

The data obtained from the above surveys was applied to modelling software by Mr. Najah Ishacs of ERM in compliance with the NSW Industrial Noise Policy.

4.3.1 Assessment Criteria

In order to assess the possible effects of a development on an acoustical environment it must be established that the proposed work will generate noise within specified limits as specified by the Environment Protection Authorities.

The following information on noise assessment criteria is taken from the noise assessment report attached as Appendix L.

"Summary of Noise Criteria

Residences potentially affected by the operations at Invincible Colliery should not be exposed to:

- Operational noise from the colliery in excess of 35dB(A)$L_{eq,15min}$ when measured over any 15 minute period (day and night) within a residential property boundary and 30 metres from the dwelling (where the boundary is greater than 30 metres from the dwelling);

- Operational noise from all industrial sites should not exceed 50dB(A) $L_{eq,day}$, 45dB(A)$L_{eq,evening}$ and 40dB(A)$L_{eq,night}$;

- instantaneous noises from night time quarrying operations (if eventuated) in excess of 45 dB(A) $L_{1,1min}$ when measured external to any residential bedroom window;

- if night mining eventuated, internal noise levels within residential sleeping areas at night of 25dB(A)Leq as per AS2107;

- day time and night time traffic noise levels at one metre from a dwelling should not exceed 60 dB(A)$L_{eq,1hour}$ and 55 dB(A)$L_{eq,1hour}$ respectively, when measured over the worst case hour of traffic;

- internal noise levels from traffic should not exceed 35-40dB(A)Leq within sleeping areas;

- for sleep disturbance maximum noise level from vehicles on public roads (eg, truck, pass-by) during night times house (10pm to 7am) in excess of 50 to 55 dB(A)L_{max} when measured internally (or approximated conservatively as 60 to 65 dB(A)L_{max} externally;

- air-blast over-pressure noise of 115dB(Lin) for 95% of blasts in any 12 month period, and in no case should exceed 120dB(Lin);

- blast ground vibration of 5mm/s peak particle velocity; and

- blasting should be restricted to 7am to 6pm Monday to Friday, with one blast per day if perceptible at residences.

ERM maintains that the criteria above are conservative, and anticipates that these criteria would be agreed to by the DEC."

Following a review of the background noise monitoring completed in December 2005 ERM derived the following project specific criteria.

"Based on the above monitoring data, the derived project specific criteria (limited by intrusiveness) is summarised in *Table 4.3*.

Table 4.3 *PROJECT SPECIFIC NOISE CRITERIA*

Location		Criterion, $L_{eq,15minute}$ dB(A)		
		Day	**Evening**	**Night**
1	Billabong	40	36	35
2	Hillview	41	35	35
Notes: 1. Criteria are based on the Existing Background Noise levels.				

"

4.3.2 Noise Generation from Machinery

It is proposed that work will be undertaken between the hours of 7am and 10pm, over two working shifts. The working sequence will involve the initial stripping and removal of topsoil and top dig material by bulldozer and loader to prepare a drill bench followed by the drilling and firing of the material. Loaders and excavators will then be used to load the haul trucks. Bulldozers will be used to push fired material for the loaders and excavators to load the trucks. Coal seams will be ripped by bulldozers and loaded into haul trucks for transport to the crusher site. Highway trucks will then transport the crushed coal to Mt. Piper Power Station.

Table 4.4 lists the typical equipment that will be required to undertake the outlined operations.

Table 4.5 displays the Sound power levels of the equipment to be use dat the proposed operation.

Table 4.4 Typical Equipment proposed to be on site

Equipment Type	Model/Specifications	Number of units proposed on site
	Stage 1	
Front End Loader	CAT 992, 10 cubic metre	1
Dozer	CAT D11, 522 kW	1
Elevating Scraper	CAT 623F, 13 cubic metre	1
Highway Dump Trucks	CAT 773B, 50 tonne off highway trucks	3
	Stage 2	
Front End Loader	CAT 992, 10 cubic metre	1

Equipment Type	Model/Specifications	Number of units proposed on site
Front End Loader	CAT 988, 6 cubic metre	1
Grader	CAT 14G	1
Highway Dump Trucks	CAT 773B, 50 tonne off highway trucks	3
Dozer	CAT D11, 522 kW	1
Crushing Plant	Gundlach Crushing Plant (manufactured in-house)	1
Water Cart	CAT	1
Drill	Reedrill GD2CD	1

Table 4.5 Equipment Leq Sound Power Level Spectral Data, dB

ITEM	31.5	63.0	125.0	250.0	500.0	1000.0	2000.0	4000.0	8000.0	16000.0	LINEAR	A-WEIGHT
Excavator (CAT 375ME)	109	106	110	106	101	106	99	93	89	5	115	108
Front End Loader (CAT 992D)	98	99	108	109	106	107	102	96	92	80	114	110
Grader (CAT 14G)	103	105	106	103	103	102	97	91	83	5	112	106
Dump Truck (CAT 773B)	93	93	100	100	97	95	95	89	84	5	105	101
D11 Dozer	115	111	110	112	106	106	102	97	88	5	119	110
D10 Dozer	115	111	110	112	106	106	102	97	88	5	119	110
Elevating Scraper	114	113	114	106	107	105	104	96	87	5	119	110
Service Truck	99	109	103	98	96	99	97	92	85	5	111	103
Crushing Plant	105	106	107	105	109	111	110	103	97	5	117	115
Screening Plant	112	116	110	105	105	105	102	99	92	5	119	109
Water Cart	99	109	103	98	96	99	97	92	85	5	111	103

4.3.3 Blasting Assessment

The following blasting assessment has been prepared by ERM from information supplied by Craven Elliston & Hayes and Roche Blasting Services who carried out blasting operations at Invincible's previous open cut.

ERM states:

"The closest location is Billabong (Location 1) at a distance of approximately 1650m.

These distances were then used to calculate potential noise overpressure and ground vibration in accordance with Blastronics published data."

Table 4.6 lists these results.

Table 4.6 Noise Overpressure and Ground Vibration Predictions

LOCATION	DISTANCE (METRES)	MAXIMUM INSTANTANEOUS CHARGE (MIC), KG	95% OVERPRESSURE, DB	95% GROUND VIBRATION, PPV
Location 1 (Billabong)	1645	242	115	1.9
	1645	897	120	5.0
Location 2 (Hillview)	1770	300	115	2.0
	1770	1037	120	5.0
Location 3 (Cottages)	1968	413	115	2.2
	1968	1282	119	5.0

The results indicate that noise overpressure and ground vibration goals (refer to Section 3.3) will be achieved if a maximum instantaneous charge (MIC) of 242kg or less is used and the MIC should in no case exceed 897 kg (for the 120dB limit). The MIC needed to achieve the lower limit of 115dB goal for all other locations is in excess of 300kg.

In addition to the published data from Blastronics, site specific data was also available from Roche Blasting services regarding blasts at Invincible Colliery, as listed in Table 4.7.

Table 4.7 Site Specific Blast Data provided by Roche Blasting Services

Location	**Distance (metres)**	**Maximum Instantaneous Charge (MIC), kg**	**95% Overpressure, dB**	**95% Ground Vibration, PPV**
-	500m from blast site	260	114.1	3.2
Billabong	Approximately 1700m from the blast site	450	110.2	1.28

"These results indicate that higher MIC values were used for blasts, while still complying with the criteria specified in Section 3.3 at the residence. However, the data set is limited to only two cases, and has therefore not been used for any calculations.

Hence, proper design and consideration must be given to blasting within the area."

4.3.4 Environmental Effects

The predicted noise emissions from the site have been computed by applying all of the monitoring data and established assessment criteria to computerised noise modelling software approved by the Department of Environment and Conservation (DEC).

The noise model takes into account attenuation factors such as ground coverage, distance, atmospheric and meteorological effects, topography and barriers and multiple noise sources.

The position of various equipment for modelling purposes was determined so as to represent a worst case scenario, whereby the potential for noise impacts on the surrounding residences would be the greatest. Equipment was situated within the new limits of extraction as advised by the proponent, such that minimum noise attenuation was offered by the topography and distance between the site and the receivers.

Operations at Invincible Colliery will not extend outside of the operating hours of 7a.m. to 10p.m. Thus, night time operation and sleep disturbance scenarios have not been included as part of the assessment.

Following the review of the initial EA document the noise modelling was reviewed in conjunction with the revision of the background noise levels.

ERM state the following with regards to the revised results;

"The operational activity previously modelled in the EA noise assessment have been revised. This updated mine planning approach was undertaken to minimise noise emissions through a two stage approach. These two stages are proposed mining areas closest to the nearest residences and hence represent a worst case snap-shot. The selected mine plans display the working areas within approximately 1 month and 4 months of working within that specific area of the mine. Other changes from the EA assessment that are of acoustic significance include:

- A Bund. An earth bund will be constructed adjacent to the crushing plant extending at least 1m above the top of the equipment. This will run north south and shield residences to the west and south west. A conservative reduction of 5dB was applied to the crusher and loader noise level for this bund; and

- Deeper pit operations. A more realistic pit configuration was used to simulate proposed activities. This resulted in a pit depth of 5m below the surface, hence providing significant shielding."

The equipment list for the modelling scenarios are shown in Table 4.2 page 107.

A worst case 15 minute scenario was considered for modelling purposes. The scenario assumed simultaneous operation of all plant and equipment, at locations that, in ERM's opinion, represents a worst case scenario for surrounding residences. "

Road Traffic Noise

The potential for noise impacts associated with the expected increase in truck traffic on Castlereagh Highway from the previous operations was investigated. The number of vehicles associated with site operation on the highway was advised by CEH.

It is predicted that there will be a maximum of 10 truck movements in a given hour. Using previously measured noise levels of highway trucks and semi trailers, the noise impact on the residences was calculated and listed in Table 4.8 for the proposed 10 truck movements alone.

Table 4.8 Predicted Road Traffic Noise Impact

RECEIVER	PREDICTED NOISE IMPACT $L_{EQ,1HOUR}$	CRITERIA $L_{EQ,1HOUR}$
Billabong	33	60
Hillview	30	60

As can be seen in Table 4.8, the predicted noise impact due to the increased road traffic on Castlereagh Highway is well within the outlined criteria and will not adversely impact the noise environment at the residences. However, traffic noise needs to be assessed cumulatively with existing traffic noise, which is not quantified. If the existing traffic noise levels are below the nominated criterion, then total noise (existing plus proposed trucks) will also be within the criterion. This is because the predicted truck traffic noise is too low to contribute to noise levels above 43dB(A) (or 10dB above predicted). Similarly, if existing traffic noise is above the nominated criterion, adding the calculated truck traffic noise will not increase existing traffic noise, and therefore complies with the EPA's existing +2dB' rule.

4.3.4.1 Domestic and Native Fauna

From research carried out on the effects of noise on animals involving the use of sonic booms, it has been established that there is little effect on animals as a result of blasts or sonic booms in the range of 125 dB to 135 dB and that animals are generally more affected by air blast than ground vibration created as a result of blasting.

The effects of booms at these levels on feedlot cattle, lactating dairy cattle, sheep and horses were slight with few abnormal changes in behaviour and the levels were found to be well within the range of activity variation experienced by these animals.

(Source of information; clipping from US Bureau of Mines document "Structures Response and Damage Produced by Airblast from Surface Mining", Report of Investigations 8485, 1980.)

Given the effects of noise levels as discussed, the noise generated by the proposed operations is unlikely to have a significant effect on animal behaviour.

As the area will be fenced on the western side, to prevent domestic animals straying into the working areas, and that the animals will be outside a range of 150 to 200 metres of any working areas then it is proposed that the effects of noise on domestic animals will be minimal.

There appears to be little information available on the effects of noise and mining operations on native fauna. However taking into account the shy nature of most native animals it is expected that the noise generated by operations in the open cut will deter native animals from venturing into the working areas, preferring to withdraw into the extensive bush within Ben Bullen State Forest.

4.3.5 Noise Modelling Conclusion

The results of the revised noise modelling investigations carried out by ERM state the following conclusions.

“Noise Modelling Results

“The results of noise modelling are summarised in *Table 4.9*. As per the EA assessment, the same weather conditions were modelled using the ENM software.

It is ERM’s understanding that the operations at Invincible Colliery will not extend outside of the operating hours of 7am to 10pm. Typically, operations will occur between 7am and 6pm, which is the EPA defined daytime hours. Thus, night time operation and sleep disturbance scenarios have not been included as part of this assessment. Furthermore, if evening operations eventuated, the calm weather predictions above would be considered representative as evening wind conditions are not a feature of the area as defined by the INP.

Discussion

The results indicate compliance with the INP goals at the nearest residences of Billabong and Hillview during calm weather conditions. During adverse weather conditions, exceedances of the INP targets are predicted. The previous consent conditions are predicted to be generally met even under adverse winds.

A comparison between the EA results and those above show a 6 to 8 dB reduction in noise levels under calm weather conditions. Similarly, a 3 to 4 dB noise reduction is achieved under adverse winds. Such reductions are considered significant and are a result of the proponent’s concerted effort to reduce noise as much as practicable. It is considered that all reasonable and feasible noise mitigation has

been applied in accordance with the intent of the INP and only residue noise levels remain above the target INP levels (during adverse winds only). Further, the INP acknowledges that for existing operations, such as this, noise mitigation is limited and alternate noise targets (not the project specific) should be adopted. This coupled with the understanding that agreements (verbal) between the affected residences and the proponent exits, suggests that noise impact is unlikely."

Table 4.9 Predicted Operational Noise at Residences

	Receiver	Predicted Noise Level, $L_{eq,15minute}$ dB(A)		INP Criteria Leq,15 minute dB(A)	Previous Consent Limits, L_{10},15 minute dB(A)
		Day (Calm)	Day (Adverse Weather)		
	Stage 1				
1	Billabong	34	44	40	45
2	Hillview	31	43	41	45
	Stage 2				
1	Billabong	35	45	40	45
2	Hillview	32	46	41	45

4.3.6 Noise Mitigation Measures.

If required noise from operations at the proposed open cut will be mitigated by the installation of residential grade mufflers on the CAT 992 loaders and 773 B off highway haul trucks.

Bunding on the western end of the crusher site can be constructed which will provide noise attenuation should noise exceedances occur as a result of crushing, screening or loading operations.

The advance of the open cut both further north and east as well as moving below natural surface levels will provide noise attenuation in the form of bunding created by cutting into the existing rehabilitation areas to the immediate west of each working area.

4.3.7 Monitoring'

A noise management plan will be adopted, which will involve noise monitoring during mine development to confirm noise levels and assess the practicability of additional

noise controls.

Noise audits may be undertaken to ensure that noise levels criteria are satisfied. A complaint protocol that facilitates investigation of noise related complaints will be incorporated in the noise management plan.

4.4 Visual Impacts

The visual impact of the Project will depend on two principal factors.

Firstly, the degree of visibility of the change in the landscape due to the mining activity on the site and secondly; the visibility of the site from external viewing time (in moving vehicles) and the location of the viewpoint and its distance from the site.

Visual impacts will be minimal because of the location of the Project Site, is visually shielded by the topography from all directions.

Plate 10 - View of Project Site looking Southwest

4.4.1 Open Cut Activities

Apart from a very short viewing time for vehicles travelling the Castlereagh Highway, where it crosses the Main Dividing Range, the project site is not visible from this road.

The view from the Dividing Range is broken by the foliage of trees adjacent to the road.

4.4.2 Lighting

In accordance with the Coal Mines Regulation Act Regulations, (as amended), machinery used between sunset on one day and sunrise on the following day, must

have adequate lighting. Since some of the mining operations occur adjacent to and immediately over old underground workings, extra mobile lighting will be necessary for mining to proceed in an efficient and safe manner.

Lighting will not be visible from the residences and the section of the Castlereagh Highway west of the site.

The visual impact of the clearing of vegetation, exposure of highwalls and ground disturbance will be minimised through progressive rehabilitation as mining operations proceed.

These impacts, although low due to the small extent of the open cut workings, will continue during the programmed life of the project.

Following rehabilitation, these impacts will reduce as the revegetation becomes established.

Table 5.0 Visual Impact Assessment

Development	Viewpoint	Distance (km)	Impact
Open Cut Mining	Castlereagh Highway at Dividing Range	3.0	Low to nil
"	Back Cullen Road	2.5	Nil
"	Cullen Road and	5.5	Nil
"	Cullen Bullen Township	2.0	Nil

The coal stockpiles at the crushing and screening plant will be contained within the existing refuse emplacement area, adjacent to the refuse stockpiles, and will not result in any change in the existing visual impacts.

Soil and overburden stockpiles will be formed as low in height as is practicable.

Fencing will be low and within the cleared freehold land to control stock, plant and equipment. Existing fencing is located on the western side of the site making it less visible.

The haul road running south from the open cut area will be minimally visible from the viewpoints where it enters the previous open cut area but otherwise screened by existing vegetation.

Existing vegetation will screen temporary buildings and plant.

4.5 Soil Management

4.5.1 Introduction

Soil resources within the project site require careful management so that they are not wasted or lost through wind or water erosion and are available for rehabilitation of the disturbed areas.

Management measures to maximise the soil resource will include:

- Progressive stripping and removal of soil.
- Consultation with the Department of Lands (Soil Conservation Service) to determine the quality of the soil and suitability for rehabilitation.
- Separately stockpiling different qualities of topsoil and subsoil as it is exposed during recovery.
- Adopting stockpiling techniques to minimise the potential for erosion and loss of soil viability.
- Topsoil final landform surfaces progressively.

Preliminary soil tests have been undertaken by the Department of Lands (previously the Department of Land and Water Conservation) and results are given in Section 3 (3.4.1).

4.5.2 Erosion and Sedimentation Controls

Permanent measures such as containment of "clean" water from above the disturbed areas and containment of runoff from disturbed areas by the sediment basins and temporary measures including contour banks, drains and silt-stop fences are discussed in Section 2 (2.9) and Section 4 (4.2).

Soil erosion will be controlled through these measures and the program of progressive rehabilitation.

4.5.3 Stripping and Storing Method

As discussed in Section 2(2.3.4) soil will be stripped progressively and selectively stored, where necessary, prior to spreading on rehabilitated surfaces.

Control of erosion will be effected by alignment of stockpiles with the contour of the storage site and diversion of runoff water from above the stockpile with drains and embankments.

Seeding will be undertaken in consultation with the Department of Lands (Soil Conservation Service).

4.5.4 Environmental Effects

The methods outlined above for the removal and stockpiling of soil and the control of erosion and sedimentation will ensure that environmental effects are acceptable within the Project Site and do not affect adjoining areas.

4.6 Ecology

4.6.1 Introduction

The flora and fauna surveys have established that the overall impact of the proposed open cut on the flora and fauna of the region will not be significant as all of the vegetation communities, fauna species and habitat are adequately preserved within the adjoining Ben Bullen State Forest and other conservation areas within the region.

The implementation of the rehabilitation measures discussed in Section 4 (4.6.2.3) will minimise the future effects of the impacts.

4.6.2 Flora

4.6.2.1 Threatened Plant Species

The search of the National Parks and Wildlife Services records revealed that, there are plants that are listed as rare, threatened, endangered or extinct under Schedules 1 and 2 of the Threatened Species Conservation Act (T.S.C Act 1995) identified within the region.

The recent survey of the site by Paul Burcher of AES Environmental Consultancy revealed the presence of a population of Eucalyptus cannonii, or Capertee Stringybark, not previously identified.

On this basis an eight-point test has been carried out on the species E.cannonii based on the impacts of the proposed open cut on the species.

The result of this eight point test revealed that no populations of *E. cannonii* will be placed at risk of extinction nor will the extent of habitat destruction be extensive enough to significantly impact on the future of the species in a regional context.

The recent survey also considered the status of vegetation communities that are listed as Endangered Ecological Communities under the Threatened Species Conservation Act and the Environment Protection and Biodiversity Conservation Act.

None of the vegetation communities found on the site conformed to communities listed under either Act.

4.6.2.2 Likely Impacts of Proposed Project.

The proposed open cut will require the removal of vegetation in the area contained within the Mining Portion ML68. The total timbered area to be cleared will be approximately 10 hectares.

The woodland vegetation unit in the east of the project area will be subject to some disturbance. Some interference may also be caused by the construction of erosion and sediment control measures such as contour drains or the erection of fencing.

The impact of the proposal on this woodland will be mitigated by the rehabilitation processes.

Open forest of the type found in the gullies to the north and east of the proposed project site is well represented in the adjoining areas of Ben Bullen State Forest.

The population of Capertee Stringybark found within the main gully running east of the site will provide a seed resource to be utilised in the rehabilitation process, which will help in the preservation of the species and mitigate the negative impacts the proposed open cut will have on this population.

Seed will be collected from these trees for later use in the rehabilitation process.

The open forest (vegetation type 1) does have conservation significance as potential koala habitat, as defined by State Environmental Planning Policy - 44, koala habitat Protection. See Section 3 (3.11.1.2) for discussion on this matter.

The species *E. viminalis* is adequately conserved further to the north and east and thus the impact of the proposal on the vegetation, in a regional context, and related to the area as koala habitat, while significant, should not be considered sufficient to prevent this proposal from proceeding.

The areas labeled regeneration have been disturbed by the previous open cut operation, and will not be disturbed by operation. The rehabilitation of these areas offsets the impact that the current proposal will have on this vegetation unit.

4.6.2.3 Mitigation Measures

The rehabilitation plan will include works as follows:

To ensure zero nett vegetation loss, the 10 hectares of the mining lease not utilised to the west of the site (adjacent to the haul road and existing rehabilitation areas), will be planted with species consistent with those existing on the project site and the adjoining forest area which will allow for the maintenance of the diversity of the flora in the study area.

Particular attention should be paid to providing sufficient quantities of the tree

species *Eucalyptus viminalis and E.cannonnii*, in the rehabilitated landform, so that the possible koala habitat and species diversity are restored to the area upon completion of the project.

The rehabilitation plan will be designed to re-establish the plant communities that formerly existed on the site, i.e. use plants to include understorey and groundcover species wherever possible to maintain the balance within the rehabilitated community.

Careful attention will be paid to rehabilitated areas in the early stages of rehabilitation to ensure that weeds and introduced plants such as Blackberry and Pattersons Curse do not take over. Regeneration sites are susceptible to infestations of this nature, in their early stages of development, particularly where these plants are established within the site.

The rehabilitation plan proposes to use tree tops and limbs, gathered during clearing, along with the careful stripping of topsoil, for use in the rehabilitation process. This creates a seed pool to be used in rehabilitating the site, thus maintaining species diversity.

The topsoil will be spread with a minimum of disturbance and the tree tops and limbs will be strategically placed in order to gain maximum effect.

4.6.3 Fauna

4.6.3.1 Impact on Fauna Habitat

As the level of habitat removal is dependant on the extent of workings carried out, the possible extent of habitat disturbance will be limited to 10 hectares.

Species diversity in the area is moderate. A number of species exist due to the extensive areas of neighbouring forest. The more common species use the fringe relationship between forest and cleared agricultural land.

The proposed open cut would result in the loss of an area of forested country. Low lying habitats within the forested area will be more subject to mining disturbances than more elevated areas as the increases in stripping ratio will limit open cut workings in the more elevated forest areas.

Habitat within the Ben Bullen State Forest, is moderate to good quality. Habitat quality was generally found to improve away from areas neighbouring cleared land. The maximum area of forest fauna habitat to be impacted by the proposal is less than 10 hectares. The disturbance of this habitat is unlikely to have a significant effect on any threatened fauna species because forest habitat of similar and better quality will be available immediately adjacent to the proposed disturbed areas.

The proposal will not affect any corridors of refuge islands as neither have been

found to exist within the Project Site.

4.6.3.2 Impact on Threatened Fauna

No unique or important fauna habitat was found to exist within the areas of Ben Bullen State Forest proposed to be disturbed by the open cut.

Ameliorative measures as recommended by both Lavers (1997) and Burcher (2005) (See Sections 4.6.3.4 and 4.6.4) will be implemented during and after operations to ensure that impacts on threatened fauna will be minimised.

The proposal is not likely to have a significant effect on any threatened species, populations, ecological communities or habitats, and consequently, Species Impact Statements are not required.

4.6.3.3 Protected Fauna

The wildlife database, maintained by the NSW National Parks and Wildlife Service, was searched in order to determine whether any of the species considered to be threatened, vulnerable, endangered or presumed extinct have been identified within the site.

None of the species identified were found on the site during the fauna survey.

Impacts on habitat within the tall eucalypt forests will occur on the slopes and lower gully floors.

Main habitat components within this community are larger hollow bearing trees and ground logs. Both of these habitat types are more common as the distance into the forest areas increases.
The results of the survey indicate that the more common or robust fauna species make the greatest use of this habitat zone. Rarer species make greater use of areas less disturbed by agricultural or past mining practices.

No threatened species were identified as using the site for habitat and no indicators of the presence of any threatened species were observed.

The outcome of the fauna survey is that no threatened species will be affected by the proposed development.

4.6.3.4 Protection of Fauna

Mr Dean Lavers in preparing the fauna report from the field investigations recommends the following amelioration measures be undertaken to minimise any potential impact.

- Implementation of appropriate soil conservation practices.

- Use of cleared vegetation material to assist in providing mulch and seed sources for stabilisation and regeneration areas.
- Maintenance trails, which may need to be formed within the forest above the open cut site, would be kept to a minimum.

- Fresh water dams or ponding areas adjacent to the open cut site will be protected from contaminants or disturbance. This will ensure that watering sites for native fauna will remain intact and unpolluted.

- Wherever possible rehabilitation of previously mined areas will take place progressively.

- Upmost care should be taken when removing or disturbing known habitat such as. significant bird hollows and wombat burrows.

4.6.4 Ecological Conclusions and Recommendations (2005 Survey)

A flora and fauna assessment has been undertaken of the proposed extension to Invincible Open Cut Mine at Cullen Bullen New South Wales. It has found that the proposal would result in the loss of approximately ten hectares of open forest and woodland, which would be rehabilitated upon cessation of mining.

These open forest and woodland areas were found to be habitat of the Capertee Stringybark (Eucalyptus cannonii), which is listed as vulnerable on the NSW Threatened Species Conservation Act and the Commonwealth Environment Protection and Biodiversity Conservation Act. It was found that the proposal is unlikely to have a significant effect on this species, or its habitats. Hence a Species Impact Statement is not required to accompany the Project Application in regard to Capertee Stringybark. Nor is referral to Environment Australia required to determine whether the proposal is a controlled action requiring ministerial approval.

The Brown Treecreeper, which is now listed as vulnerable on the Threatened Species Conservation Act was recorded by Lavers (1998). A number of other fauna species listed on the Threatened Species Conservation Act were considered likely to occur at the site. These were Glossy Black-cockatoo, Gang-gang Cockatoo, Masked Owl, Powerful Owl, Diamond Firetail, Eastern Bentwing Bat, Large-eared Pied Bat, Greater Broad-nosed Bat and Eastern False Pipistrelle. The proposal is considered unlikely to have a significant effect on any of these species, or their habitats. Therefore, a Species Impact Statement in relation to these fauna species is not required to accompany the Project Application.

Of these fauna species, Large-eared Pied Bat is listed as vulnerable on Environment Protection and Biodiversity Conservation Act. The proposal is unlikely to have a significant effect on this species. Therefore, referral to Environment Australia is not required to determine whether the proposal is a controlled action requiring ministerial approval.

To ameliorate the impact of the loss of woodland and open forest habitats upon their component flora and fauna species, the following recommendations are made:

- Revegetation of the site should involve the use of the full range of those plant species now occurring on site. In particular seed of Capertee Stringybark should be collected at commencement of the open cut and stored for use in revegetation. Topsoil should be stockpiled for reapplication, as this will contain seed and propagules of many flora species.

- Revegetation areas should be checked regularly to assess establishment and growth rates. This will enable revegetation works to be adaptive to climatic conditions and any particular problems experienced during the re-establishment phase.

- Retain felled timber particularly those pieces with hollows, for reapplication to revegetation areas.

- Inform staff and subcontractors of appropriate procedures should fauna be encountered during construction or operation phases. This should be determined in consultation with the National Parks and Wildlife Service and specify actions to be taken and under what circumstances the Service should be contacted.

4.7 Transportation Impacts

4.7.1 Introduction

The coal supplied from Invincible Colliery to Mt. Piper Power Station and South Coast markets will be by truck transport via public roads. The maximum coal tonnage is expected to be 350,000 tpa which equates to an average of about 50 round trip truck movements each working day.

Approximately 150,000 TPA will be delivered to Mt Piper Power Station, a distance of 3 kilometres along the Castlereagh Highway. This tonnage equates to about 25 round trip truck movements each working day. This section of road is constructed to the highest engineering standards of any part of the highway with a wide concrete pavement, well designed passing lanes and 100kph speed limit.

Furthermore, there is no human habitation adjacent to this section of the highway, as it passes through State Forest and Crown land. This road section was upgraded in about 1985 for the transport of 1 Mtpa of coal from Invincible Colliery to the Lidsdale siding.

Subject to contractual agreements, supply of coal to Shoalhaven Starch at Bomaderry will commence once mining commences at an annual rate of 120,000 TPA with approximately 16 round trip truck movements each day. The proposed

route to Bomaderry will be via the Castlereagh Highway, Great Western and Princes Highways.

Subject to obtaining additional markets a further 80,000 TPA will be transported via the Castlereagh Highway. This tonnage will equate to approximately 9 total round trip truck movements each day.

The tonnage of coal proposed to be hauled by road is approximately the same as hauled during the previous underground operations at Invincible Colliery.

It should be noted that Invincible Colliery ceased operations in 2001 when its coal contract with Delta Electricity ran out.

The mine cannot operate viably if it cannot supply higher ash to the power stations. During the period when Invincible has been on care and maintenance coal has continued to be transported and supplied to Delta Power Stations and other domestic markets from other mines.

Consequently the tonnage of coal being supplied to these markets by Coalpac will have minimal effect on public road traffic volumes.

Plate 11 – Coal Haulage over the Great Dividing Range on the Castlereagh Highway

4.7.2 Management Procedures

The transport of coal from Invincible Colliery on the public road is subject to the following arrangements to control impacts to within reasonable community expectations and minimise the effects on other road users.

The RTA have advised that, with some additional signage, (which Coalpac will erect), the turnout at the intersection of the Invincible access road and the Castlereagh Highway is suitable for the proposed development (see RTA response

in Appendix B).

Plate 12 – Coal Haulage over the Great Dividing Range at Invincible Turnout to Castlereagh Highway

Management procedures will ensure:

- All trucks leaving the colliery are covered to prevent spillage.
- Bitumen road surfaces from the washery to the Castlereagh Highway are maintained.
- The road surface from the mobile crushing plant is stabilised and maintained.
- Haulage contractors are required to maintain trucks to minimise spillage and operators comply with RTA regulations.

Trucks will be loaded at the crushing and screening plant site. Once they leave the crushing and screening area they only travel on stabilised and sealed road surfaces to reach the Castlereagh Highway.

Trucks will operate on the public road between 0700 hours - 2200 hours Mondays to Fridays inclusive, 0700 hours - 1300 hours on Saturdays, and will not operate on Sundays. These are the previous hours of operation.

The haul road from the open cut area to the crushing and screening area and thence to the Castlereagh highway will be managed to keep noise and dust emissions to within reasonable limits in the following way:

i) The road pavement to the mobile crusher will be maintained to control rutting and pot holing and from the mobile crusher to the highway will be stabilised or sealed.

The safe operation of haul road traffic will be based on the Mine Managers rules as required by the Coal Mines Regulation Act. (As amended)

Transport of coal on the haul road will be undertaken during daylight hours wherever practicable but there may be occasions where coal will be transported during the night up until 22:00 hrs.

4.7.3 Environmental Effects

The tonnage of coal to be transported under the proposal from Invincible Colliery, on public roads, will be similar in magnitude to previous underground operations, and will be an average of about 25 round trip movements each working day.

As a consequence of this proposal there will be new environmental impacts arising from the existing and new haul roads which will connect the open cut mining site to the crushing and screening plant and from that plant to the Castlereagh Highway.

These impacts will be mainly in the form of dust and noise and have been dealt with under Sections 4 (4.1 and 4.3).

4.8 Aboriginal Archaeological and European Heritage

4.8.1 Introduction.

During the preparation of the 1997 development application, in order to determine whether or not any indigenous sites or land claims existed within the area a search was made of documentation held by the National Parks and Wildlife Service.

A site inspection by a representative of the Bathurst Local Aboriginal Land Council, Mr. Richard Peters, was carried out in 1997 and again in 2005 in order to ascertain whether or not the site contained, or would be likely to contain, any sites or artefacts of significance.

The heritage assessment carried out by OzArk in February 2006 confirmed the findings of the investigations carried out in 1997.

The search for sites or artefacts significant to European history or heritage was carried out by Graeme Muir of Craven Elliston and Hayes.

4.8.2 Field Survey Methods and Survey Results

The survey method consisted of standard field inspection involving foot traverses around the area of direct impact and the associated area.

As specified in Section 3, the representative from the Bathurst Local Aboriginal Land Council found no evidence of sites or artefacts as a result of the field inspection that he carried out on the 25th of August 1997 or again in 2005.

The search of the National Parks and Wildlife Services database of registered aboriginal sites revealed that there are no sites within the project area.

Further results of the OzArk survey can be viewed in Appendix D.

As listed in Section 3 (3.10), there are four areas which show evidence of the use of the area since European settlement. Three of the areas are associated with industry, particularly coal mining, two of the areas being old open cut coal mines the third adits of an underground coal mine and the fourth the remains of an old building which was probably connected with the nearby coal mining activities.

4.8.3 Conclusions

The results of the Ozark survey revealed the following conclusion;

"It is recommended that:

3) No sites were recorded within the Invincible Open Cut Extension Project study area and consequently there are no constraints to the proposed development on the grounds of cultural heritage.

4) Should any 'Aboriginal objects' or other Indigenous sites be identified elsewhere within the study area during the course of the mining or rehabilitation activities, work in that area should immediately cease and a DEC Archaeologist and the Bathurst LALC be contacted to discuss how to proceed;"

Three of the four sites indicative of European influence are not to be disturbed. All of them are outside the area of impact. The effect of the proposal on the archaeological significance of the area is minimal and therefore there is no archaeological reason to prevent this proposal from proceeding.

The fourth area of significance, the disused open cut to the south was disturbed by the construction of the previous haul road. This operation will not impact on the existing European heritage.

4.9 Safety

4.9.1 Introduction

Coalpac is fully aware of its obligations to ensure the safety of its employees, the employees of the contractor, Big Rim Pty Limited and members of the public who may enter the Project Site.

This obligation extends to the period of operation of the open cut and after all activities on the site have ceased during the terms of the mining leases.

In collaboration with Big Rim Pty Ltd, the nominated open cut contractors, Coalpac has prepared a "risk assessment" document and a Mine Safety Management Plan which includes:

- Site Safety Plan
- Site Emergency Program
- Risk Review
- Emergency Procedures

See Appendix C for Mine Safety Plan.

4.9.2 Safety Management

The following safeguards and procedures will be employed:

- Compliance with the Mine Safety Management Plan (Appendix C).
- Compliance with all relevant statutory requirements including the Coal Mines Regulation Act 1982, No. 67 and Regulations thereto and Joint Coal Board No. 34.
- Development of open cut in accordance with Section 2 (2.3.)
- Erection and maintenance of an appropriate perimeter fence around the open cut site to prevent unintentional entry by unauthorised persons, domestic animals and, where practicable, native animals.
- Installation of signs at perimeter identifying nature of operations.
- Extension of current security services at colliery to open cut site.

4.9.3 Environmental Effects

Adherence to the safeguards and procedures identified in Section 4 (4.9.2), which have been carefully planned, will secure the safety of persons working at the mine or otherwise in the vicinity.

4.10 Adjoining Land Users and Land Use

Apart from persons remote from the project site who may be minimally affected by visual impacts (Section 4 (4.4)) and blasting (Section 4 (4.3.5)) adjoining land users are the tenant of Renown Farm (currently Ms Wendy Day who rents the property on a weekly basis from Coalpac), (Section 3 (3.11.4)) and Mr. Michael Bulkeley, the owner of the freehold land to the west of the proposed open cut area.

4.11 Social and Economic Effects

Coalpac operated Invincible Colliery underground for 8 years and during this time won 2.5 million tonnes of coal and directly employed about 46 employees. It was unable to continue with underground operations after 1998 when the original contract with Delta expired. Subsequent contracts with Delta were subject to very competitive prices which could only be supported by supplying coal sourced from open cut operations. Coalpac operated the open cut mine from 1998 to 2001 when increased competition rendered it non-viable. The mine was put on care and maintenance at a significant cost. Recent price increases in coal and the awarding of a contract to Coalpac has resulted in the proposed re-commissioning of the mine.

The mine is well regarded by the various authorities for the effectiveness of the management in respect of mining operations and environmental protection.

Coalpac is determined to maintain employment at the mine whilst ever it is commercially viable to do so.

Looking at the long term future of the mine, it is evident that despite the existence of coal reserves within the holding, the mine will have to close if the proposed open cut mine cannot be operated.

Closure of the mine could be permanent as the company could not financially support a long term underground care and maintenance program and would need to effect rehabilitation of the mine area to comply with the requirements of the various statutory authorities.

Consequently there are a number of very important social and economic impacts on the local community, local government area and also the State which depend on the success of this project.

4.11.1 Direct Employment Generation

During the construction stage and subsequent operations the workforce will number 12.

There will be no changes in the amenity of the area or impacts on the health of the community or safety on the roads because of the limited size and remoteness of the open cut operations.

4.11.2 Indirect Employment Generation

An employment multiplier factor of 1.46 per employee in the mining industry has been adopted for Muswellbrook. Assuming a similar multiplier for the Lithgow region, indirect employment generated by this project will be up to 17 persons.

The Delta coal contract is very important to Invincible Colliery. The mine has been on a care and maintenance program for over 3 years which has put financial demands on Coalpac. Through the recently acquired contract Coalpac can be relieved of its care and maintenance burden and enter into a mode of operation which will lead into long term future operations. It will be noted that the Delta contract provides a base for Coalpac to supply other domestic operations

The Lithgow region has experienced moderate expansion over the past 5 years which has led to an increase in employment and an increase in the number of persons requiring work.

Enquiries with local employment agencies indicate that up to 2000 people are seeking employment although a relatively few in number have mining experience. It is further indicated that most of the new employment is for part time employees. The proposed open cut operation will provide full time permanent employment.

In addition to the increased employment outcomes there will be a number of important social and economic impacts on the local community, local government and the State. These positive impacts will be in the form of increased demand for local goods and business services, Local Government rates and resource rents and royalties received by the State Government.

4.11.3 Economic Effects

Experience from the previous open cut operations indicate that the benefits to the community will compensate for any costs and environmental impacts identified in the EA.
These beneficial effects include:

- The recovery of as much coal as possible from the mine which has a resource conservation advantage;

- Support of the Local Government, State and National economies in the form of taxes rates and levies paid by Coalpac; and

Increase in local employment prospects

4.12 Cumulative Issues

The only activities in the vicinity of the project area are grazing and underground coal mining.

There is no obvious interaction between the underground or open cut coal mining and the grazing.

It is possible that native fauna have retreated away from existing grazing and mining

activities, further into the Ben Bullen State Forest and the very low level of native animal population detected by the fauna survey could be partly due to this retreat.

It is likely however that this low native fauna population is mainly due to feral and domestic animals, which unfortunately inhabit most of the Australian bushland and have a devastating, effect on animal populations.

The Ben Bullen State Forest has always been a source of pit timber.

This industry has now become defunct due to the advent of roof bolting techniques for coal mine roof support. However timber is being sourced from the forest on an intermittent basis for milling.

The proposed open cut operations will impose additional stress on the forest during the period of operation and will cause the loss of native vegetation and fauna which is within the open cut area. This will be mitigated and eventually recovered by the rehabilitation activities which will follow the mining operation. The adjoining forest area will be an important refuge which will assist rehabilitation of the fauna and flora impacts.

The monitoring of cumulative environmental effects will be undertaken in conjunction with the monitoring of other environmental impacts.

4.13 Bushfire Management

The need for adequate bushfire controls was discussed during consultation with the Rural Fire Service.
Coalpac will arrange to discuss bushfire control with the Rural Fire Service prior to commencement of operations at the project site.

Coalpac will implement a number of measures and safeguards to minimise bushfire risk which will be similar to those adopted in previous operations and will comply with statutory requirements. These will include:

- Fitting fire extinguishers to all earthmoving and mining equipment.
- Fitting and maintaining efficient exhaust systems and spark arresters to mobile equipment.
- Advising bush fire brigade, other authorities and neighbours of any burning-off operations.
- Ensuring that vehicles with low level exhaust systems do not leave defined tracks in locations and conditions likely to lead to ignition of combustible plant material.

SECTION 5

Measures Proposed to Mitigate Adverse Effects of the Project on the Environment

5.1 This document has referred to a range of mitigation measures to ensure that the ongoing operations will continue to meet pollution control standards and assessment criteria. The measures are reviewed below.

5.2 Air Pollution

The methods of controlling and minimising the generation of air pollutants on the mining site will be as follows:

- Restricting the area of disturbance to practicable limits.
- Avoiding stripping and mining activities where practicable during dry and windy weather.
- Applying appropriate amounts of water to haul roads within the open cut and to the crushing and coal storage area at intervals necessary to prevent dust generation. Providing a hard surfaced pavement to the haul road from the crushing and coal storage area to Invincible Colliery Pit Top.
- Controlling exhaust emissions from vehicles by programmed equipment maintenance to comply with EPA requirements.
- Directing vehicle exhaust discharges away from the grounds surface.
- Equipping rock drills with a dust collection device (cyclone) and/or water injection.
- Equipping the mobile crusher, crusher feeder and screens with water sprays.
- Where overburden is encountered and blasting becomes necessary drilling and blasting will be undertaken in accordance with methods used in the open cut operations from 1998 – 2001. Details of these methods and associated management methods adopted to control blasting impacts and resulting outcomes are shown in Appendix G.
- Rehabilitating disturbed surfaces as quickly as practicable.
- Maintaining the practice of covering coal trucks delivering coal on public roads.

5.3 Water Pollution Mitigation Measures

5.3.1 Surface Water

Through the fundamental principle of the water management plan, which separates the clean and dirty water systems, the provision of appropriate pollution control facilities to treat contained dirty water and the transfer of water into the main colliery dam, any discharges from the open cut site will be kept to a minimum and will comply with water quality criteria referred to in Section 4 (4.2.2).

This principle was successfully applied to the previously worked open cut areas during the period 1998 -2001.

Pollution control settling basins will control run-off. Temporary erosion and sedimentation will be controlled by installation of silt fences and straw bale structures.

5.3.2 Ground Water

The strata at the project site dips in an easterly direction towards existing underground mine workings.

Underground mining operations have shown that the mine workings do not contain significant accumulations of ground water and therefore have limited effect on the local water table.

The proposed open cut workings will be small in extent compared with the existing mine workings, comparatively shallow and close to the coal outcrop and there will be no up-dip reservoirs of recharge waters.

Therefore there will be no significant effect on the local or regional water table or on ground water quality.

No potential contaminants will be stored or used on the site except for fuel and lubricants. These substances will not cause contamination of groundwater as they will be handled and stored as described in Section 4 (4.2.3.6). Absorption material will be kept at sites where lubricants are used to control any spills which might occur.

5.4 Noise Mitigation Measures

Mitigation measures will be the maintenance of haul road pavement surfaces and the imposition of speed limits on haul trucks.

The crushing and screening plant will be located within the existing refuse emplacement area which will provide effective noise bunding, an additional bund on the western limit of the crusher site will be constructed to reduce noise from crusher operations.

The installation of residential grade mufflers on the 992 loaders and 773B off highway haul trucks will be undertaken should additional noise mitigation be required.

The western batters of all open cut excavations will provide noise attenuation and it is anticipated that no exceedances of specified criteria will occur.

5.5 Visual Impact Mitigation Measures

The visual impact of the clearing of vegetation, exposure of highwalls and ground disturbance will be minimised through progressive rehabilitation as mining operations proceed.

These impacts, although low due to the small extent of the open cut workings, will continue during the programmed life of the project.

Following rehabilitation, these impacts will reduce as the revegetation becomes established.

The coal stockpiles at the crushing and screening plant will be contained within the existing refuse emplacement area, adjacent to the refuse stockpiles, and will not result in any change in the existing visual impacts.

Soil and overburden stockpiles will be formed as low in height as is practicable.

Fencing will be low and within the cleared freehold land to control stock, plant and equipment. Existing fencing is located on the western side of the site making it less visible.

The haul road running south from the open cut area will be minimally visible from the viewpoints where it enters the previous open cut area but otherwise screened by existing vegetation.

Existing vegetation will screen temporary buildings and plant.

5.6 Topsoil Resource Loss Mitigation Measures

5.6.1 Introduction

Soil resources within the project site require careful management so that they are not wasted or lost through wind or water erosion and are available for rehabilitation of the disturbed areas.

Management measures to maximise the soil resource will include:

- Progressive stripping and removal of soil.

- Consultation with the Department of Lands (Soil Conservation Service) to determine the quality of the soil and suitability for rehabilitation.

- Separately stockpiling different qualities of topsoil and subsoil as it is exposed during recovery.

- Adopting stockpiling techniques to minimise the potential for erosion and loss of soil viability.

- Topsoil final landform surfaces progressively.

Preliminary soil tests have been undertaken by the Department of Lands (previously the Department of Land and Water Conservation) and results are given in Section 3 (3.4.1).

5.6.2 Erosion and Sedimentation Controls

Permanent measures such as containment of "clean" water from above the disturbed areas and containment of runoff from disturbed areas by the sediment basins and temporary measures including contour banks, drains and silt-stop fences are discussed in Section 2 (2.9) and Section 4 (4.2).

Soil erosion will be controlled through these measures and the program of progressive rehabilitation.

5.6.3 Stripping and Storing Method

As discussed in Section 2(2.3.4) soil will be stripped progressively and selectively stored, where necessary, prior to spreading on rehabilitated surfaces.

Control of erosion will be effected by alignment of stockpiles with the contour of the storage site and diversion of runoff water from above the stockpile with drains and embankments.

Seeding will be undertaken in consultation with the Department of Lands (Soil Services Division.).

5.6.4 Environmental Effects

The methods outlined above for the removal and stockpiling of soil and the control of erosion and sedimentation will ensure that environmental effects are acceptable within the Project Site and do not affect adjoining areas.

5.7 Mitigation of Impact on the Ecology

5.7.1 Introduction

The impact of the proposed open cut mine on the flora and fauna which exists on the site will not be significant.

The implementation of the rehabilitation measures discussed in Section 4 (4.6.2.3) will minimise the future effects of the impacts.

5.7.2 Flora

5.7.2.1. Mitigation Measures

The rehabilitation plan will include the following measures:

- To ensure zero net vegetation loss, the 10 hectares of the mining lease not utilised to the west of the site (adjacent to the haul road and existing rehabilitation areas) will be planted with species consistent with those existing on the project area and the adjoining forest area. This will support the maintenance of diversity of the flora in the study area.

- Particular attention will be paid to providing sufficient quantities of the tree species Eucalyptus Viminalis and E.cannonii, in the rehabilitated landform, so that the possible koala habitat and species diversity are restored to the area upon completion of the project.

- The rehabilitation plan will be designed to re-establish the plant communities that formerly existed on the site. ie use plants to include understorey and groundcover species wherever possible to maintain the balance within the rehabilitated community.

- Careful attention will be paid to rehabilitated areas in the early stages of rehabilitation to ensure that weeds and introduced plants such as Blackberry and Patersons Curse do not take over.

- The topsoil will be spread with a minimum of disturbance and the tree tops and limbs will be strategically placed in order to gain maximum effect.

5.7.3 Fauna

5.7.3.1 Mitigation of Impact on Fauna Habitat

Mr. Dean Lavers and Mr. Paul Burcher in preparing the fauna reports from the field investigations, recommend the following amelioration measures be undertaken to minimise any potential impact:

- Implementation of appropriate soil conservation practices.

- Use of cleared vegetation material to assist in providing mulch and seed sources for stabilisation and regeneration.

- Maintenance trails, which may need to be formed within the forest above the open cut site, will be kept to a minimum.

- Fresh water dams or ponding areas adjacent to the open cut site will be protected from contaminants or disturbance. This will ensure that watering sites for native fauna will remain intact and unpolluted.

5.8 Mitigation of Transportation Impacts on the Castlereagh Highway

5.8.1 Mitigation Measures

The transport of coal from Invincible Colliery on the public road is subject to the following procedures to control impacts to within reasonable community expectations and minimise the effects on other road users.
The procedures include:

- All trucks leaving the colliery are covered to prevent spillage.

- Bitumen road surfaces from the washery to the Castlereagh Highway are maintained.

- The road surface from the mobile crushing plant is stabilised and maintained.

- Haulage contractors are required to maintain trucks to minimise spillage and to ensure that operators comply with RTA regulations.

Trucks will be loaded at the crushing and screening plant site, or the washery. Once they leave the crushing and screening area or the washery they only travel on stabilised and sealed road surfaces to reach the Castlereagh Highway.

Trucks will operate on the public road between 0700 hours - 2200 hours Mondays to Fridays inclusive, 0700 hours - 1300 hours on Saturdays, and will not operate on Sundays. These are the previous hours of operation for open cut coal transport.

The haul road from the open cut area to the crushing and screening area and thence to the Castlereagh Highway will be maintained to keep noise and dust emissions to within reasonable limits.

The safe operation of haul road traffic will be based on the Mine Managers rules as required by the Coal Mines Regulation Act (as amended).

Transport of coal on the haul road will be undertaken during daylight hours wherever practicable but there may be occasions where coal will be transported during the

night up until 22:00 hrs.

5.9 Mitigation of Impacts on Archeological Sites

5.9.1 Mitigation Measures

No archeological site will be adversely affected. Refer to Section 3 (3.10.1).

If sites or artefacts are discovered during the course of operations all works in the area will be suspended until investigations are carried out to ascertain the significance of the site.

Work within the affected area will cease until all investigations are complete and all of the necessary permits and approvals are obtained.

5.10 Mitigation of Impacts from Blasting Operations

It is proposed to adopt soft blasting techniques.

Following blast monitoring, where required, charge weight will be adjusted if necessary.

SECTION 6

ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

6.1 Basis of Environmental Management

A basis for ongoing environmental management will be implemented to ensure continual compliance with existing and future requirements and community expectations. The EMS will be designed to ensure compliance with approvals and licences to be obtained.

6.2 Approvals and Licences to be Obtained

Approvals and licences will include:

- Project consent from DOP.
- EPA approval and licence.
- Approval of Safety Management Plan by Department of Primary Industries (Minerals).

6.3 Objectives of the Environmental Management System

The objectives of the EMS are to have an organized approach to managing the environmental aspects of the company's operations and to set up, assess and monitor conformance with the environmental policy and objectives.

To facilitate and operate an EMS an Environmental Management Plan (EMP) must be designed and established to provide a system of reporting and monitoring to review the company's operations against established environmental performance indicators.

Benefits of an EMS incorporating the EMP are:

- Assistance in compliance with regulations.
- Demonstration of due diligence.
- Reduction in environmental liability
- Effective planning for future environmental and rehabilitation costs.

6.4 Outline of Environmental Management System

The EMP includes an outline of the yearly mining plan, monitoring of the results, the rehabilitation program and embodies the requirements of EPA licences and approvals, Planning Consent conditions and Coal Lease conditions.
Documentation held on the site will include:

- Normal reporting requirements of the EPA and DMR.
- Details of trucking movements.
- Monthly water quality sampling results.
- Monthly dust deposition results.
- Noise and blasting results.
- A complaints protocol detailing any complaints and the response dealing with them.
- Details of areas which are shaped but not rehabilitated, sowed, completed and self sustaining and the total areas to date and areas for each year.
- Rainfall registration.

6.5 Environmental Monitoring

An environmental monitoring program will be undertaken in the areas of water, noise and air. This program will verify the impact predictions made in this EA and provide a basis for any changes in operations which may be necessary.

The monitoring locations are shown on Figure 14 of Page 81

Dust emissions will be monitored monthly at the receptors at the two nearest residences, “Billabong” and”Hillview”.

6.5.1 Noise and Blast Monitoring

Noise and blast monitoring will be undertaken in conjunction with the blasting program (Appendix “G”) to ensure compliance with EPA criteria.

Noise monitoring will be undertaken at the locations shown on Figure 14: page 81, following the commissioning of the works to verify design performance specifications and compliance with EPA assessment criteria.

Annual checks will be undertaken as the open cut area progresses to check on noise impacts.

6.5.2 Water Monitoring

Water monitoring will be undertaken in the event of any discharge of dirty run-off water from the area, however this should not occur as all dirty run-off water will be retained within the site or pumped into adjoining underground mine workings.

During discharge conditions samples will be taken and analyzed for total suspended solids, total dissolved solids, and turbidity and pH samples will be taken from adjacent water courses and tested for background water quality.

Water will only be discharged from settling ponds when water quality meets EPA Licence conditions.

Rainfall records will be kept for the site.

6.5.3 Air Quality Monitoring

Dust deposition gauges will be located as shown on Figure 14: page 81.

Readings of dust depositions will be recorded each month. Readings will be taken prior to works commencing, during the commissioning phase and during open cut operations.

Subject to dust monitoring results, the program will be reviewed each year and adjusted to the conditions of operations.

Dust monitoring will continue as required by the EPA until dust levels are controlled to its satisfaction.

6.5.4 Rehabilitation Monitoring

The annual rehabilitation plan required by the Department of Primary Industries (Minerals) will be provided as part of the EMP and will be used to monitor areas of disturbances and details of rehabilitation progress to ensure that the level of total disturbance is in keeping with the industry standards.

The success of re-vegetation procedures will be monitored to ensure the effectiveness of planting.

The requirements of the Department of Planning and the relevant Sections in which they have been addressed have been attached as Appendix A to this EA.

SECTION 7

Evaluation of the Impacts of the Proposed Project

7.1 Introduction

This section evaluates the impacts of the proposed Project by consolidating and reviewing the predicted impacts as identified in Section 4.

These inputs are based on knowledge of the same impacts which were encountered in the previous open cut operation and the findings and opinions of the consultants having specialist knowledge relevant to the proposal.

The reasons justifying the carrying out of the Project in the manner proposed, having regard to biophysical, economic and social considerations including the following principles of ecologically sustainable development, are assessed in this section.

7.2 Biophysical Considerations

The following is a summary of the predicted biophysical inputs of the proposed Project.

- Open cut operations will result in modification of the existing site topography. The rehabilitation of the site will recreate a landform similar to that, which currently exists.

- Open cut mining will involve the removal and stockpiling of topsoil from the site. This topsoil will be used in the rehabilitation process resulting in minimal impact on the site.

- There will be no discharge of dirty water from the open cut site, during mining operations and no impact on the quality of water run-off within the Burrendong catchment area.

- The water drained from the open cut into the extensive underground workings will have no significant effect on the quality of the ground water as it will be collected from the limited catchment area of the active open cut workings.

- The collection of seed from the threatened species Eucalyptus Cannonii for later use in rehabilitation efforts will help ensure the future of the species.

- There will be no significant impact to any threatened fauna species as result of the proposal as explained in Section 4(4.6.3.2).
- No items of indigenous or non-indigenous heritage will be affected by the proposed open cut mining operations as no sites have been identified on the

project site.

- The implementation of air pollution control methods outlined in Section 4 (4.1.4) concluded that the dust deposition on the three closest residences and the town of Cullen Bullen will be minimal, and there will no adverse effects on vegetation or wildlife in the State Forest area adjoining the project site.

- Visual impacts will be minimal because of the location of the project site, which is visually shielded by the topography from all directions as discussed in Section 4(4.4).

- The impact resulting from product transport to power stations and other domestic markets will be approximately the same as during previous haulage operations from Invincible Colliery. This arises from the situation that during the period of care and maintenance, since 2001, coal has continued to be transported to domestic markets from other mines on the Castlereagh Highway. Part of this coal will be sourced from Invincible Colliery and will travel the same route.

- The closest residences are located 2 Km from the project area. The predicted noise levels at these residences satisfy the recommended noise assessment criteria.
  The predicted noise levels generated by open cut operations are unlikely to have a significant effect on animal behavior.

7.3 Economic Considerations

The economic considerations are primarily:

- Continued supply of coal to Wallerawang and Mount Piper Power Stations.

- Employment for local people from the Lithgow area and indirect employment resulting from services to the employees and the mine.

7.4 Community Concerns

Experience from the previous open cut operations at the project site did not result in any specific objection's from the community and in particular from the nearest residents.
Recent discussions with the same residents indicate that they have no objections to the operations of the mine.

7.5 Sustainable Development

It is recognizable that sustainable practices by industry and the community are important for the future well-being of the world environment.

The principles of ecologically sustainable development have been a consideration in

the design of this proposed project.

The following sub-sections refer to the four sustainable development principles incorporated in the design.

7.5.1 The Precautionary Principle

The two principle issues in the application of the precautionary principle which public and private decisions should be guided by are:

i. careful evaluation to avoid wherever practicable serious and irreversible damage to the environment and,

ii. an assessment of the risk weighted consequences of the various options.

These issues have been addressed in the development of the proposal by:

- Designing the environmental management plan to comply with the conditions attached to the new Project consent existing licenses and a revised mining operations plan.

- Proposing to use existing infrastructure and disturbed sites to minimize unnecessary environmental damage.

- Adopting a mining plan which ensures the maximum recovery of coal from the land which will be disturbed by mining operations.

- Proposing progressive rehabilitation aimed at reinstating areas disturbed by mining to a condition consistent with the original landform and likely long term land use.

7.5.2 Intergenerational Equity

The principle of intergenerational equity requires that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for future generations.

In the proposed Project this will be achieved by the following means:

- The preservation of the existing undisturbed environment through appropriate mining and conservation practices.

- Well planned and effective rehabilitation designed to restore the disturbed areas of the project site landform and land use within practicable limitations.

- The mining of coal for power generation which is an essential element in the prosperity of the current generation supporting its ability to develop more

sustainable methods of servicing the needs of future generations.

7.5.3 Conservation of Biological and Ecological Integrity

This requires that a fundamental objective of the proposal development is to ensure conservation of biological diversity and ecological integrity.

In the proposed Project this will be achieved by the preservation of the existing undisturbed environment, through appropriate mining and conservation practices, and well planned and progressive rehabilitation to meet these conservation objectives.

7.5.4 Improved Valuation, Pricing and Incentive Mechanisms

The main issue that forms the basis of these principles is that the polluter charges the users of the goods and services prices which will cover the cost of providing the goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.

The acceptance of this principle is part of the proposal development which is designed to optimize economical coal mining whilst recognizing the need, where practicable, to minimize environmental impacts.

It is based on the knowledge that the prices negotiated for the purchase of the coal will cover the improved valuation costs.

7.6 Justification of the Proposed Project

The proposed Project, if approved by DOP would:

(a) enable the proposal to obtain access to a coal resource for supply to the Delta power stations and other domestic markets;

(b) provide for a long term supply of coal to meet coal contracts;
(c) enable the Proponent to re-open the Invincible underground mine giving access to the extensive underground coal reserves; and

(d) provide direct and indirect employment for persons living in the Lithgow area.

The potential future operation of Invincible Colliery, which has previously proved to be economically viable, environmentally acceptable and capable of meeting the communities need for the efficient utilisation of NSW coal resources, is the justification for the open cut project.

Invincible Colliery coal, previously supplied to Mt. Piper and Wallerawang Power Stations, is regarded by Delta Electricity as being eminently suitable for power generation purposes and has the additional advantage of being supplied from a

mine site close to the power station. This has led to Delta awarding the three year coal supply contract to Coalpac.

Coal is an ongoing essential requirement for electricity generation in NSW. The establishment of infrastructure at Invincible Colliery together with the existence of previous worked open cut mines has resulted in the inevitable environmental disturbance associated with all mining operations.

It is justifiable to proceed with the open cut project which will facilitate the maximum practical recovery of coal resources with a minimum additional environmental disturbance.

The alternative is to develop a new mine site which would result in an increased environmental disturbance for the same tonnage of coal recovered.

The benefits arising from the project are mainly related to employment generation and economic outcomes.

These aspects are dealt with in Section 4(4.11).

7.7 Consequences of Not Proceeding with the Proposed Project

The Proposed Project

The consequences of not proceeding with the proposed Project would include:

- the closure of Invincible Colliery;
- the loss of a significant coal resource within 3km of the Mt. Piper Power Station and 10km of Wallerawang Power Station; and
- the loss of potential employment for employees directly or indirectly employed by the mining operation.

7.8 Conclusion

The proposed Project provides for the mining and processing of a significant coal resource for power station and domestic markets. It will provide a source of long term employment to the Lithgow area.

The mining operations will be in accordance with the environmental management measures detailed in this EA and developed with regard to the principles of ecologically sustainable development.

Where environmental impacts have been identified practical safeguards have been proposed to ensure mitigation.