Centennial Coal

Angus Place Colliery

Proposed Mining and Coal Transport

Environmental Assessment

January 2006

Prepared by International Environmental Consultants Pty Limited

Table of Contents

List of Figures

List of Plates

1. Introduction

Centennial Angus Place Pty Ltd owns and operates Angus Place Colliery (Angus Place) which is located approximately 18 km north west of Lithgow in the Western Coalfields of NSW as shown on **Figure 1**. Centennial Angus Place Pty Ltd is a wholly owned subsidiary of Centennial Coal Company Limited. Angus Place has been continuously working the Lithgow Seam by longwall mining methods since 1979. The mine is approved to extract 2.3 million tonnes per annum (Mtpa) and handles this coal for delivery to local power station markets. The surface facilities include conveyors, coal sizer and screens, coal stockpiles and storage bins as well as a workshop, office and hardstand areas.

Angus Place operates under a number of different development consents as described in **Section 2.3.1**.

1.1 Objectives of the Development

Angus Place is the Proponent for this development and seeks approval to ("the Development"):

- the extension and maintenance of mining operations, including associated infrastructure within the existing mining lease (ML 1424 and CCL 704) as described in Chapter 3;
- an increase in the current annual mining rate from 2.3 Mtpa to 3.5 Mtpa;
- the transportation of the increased coal tonnage by truck;
- new surface infrastructure (boreholes and shafts) in the lease area as shown on Figure 5;
- the continuation of the existing operation as described in Chapter 2.

This Environmental Assessment ("EA") has been prepared to accompany an application for the Development. The proposed mining area is shown on **Figure 2** while the existing surface infrastructure is shown on **Figures 3** and **4**. The Application Area is the same as the existing Colliery Holding, which is shown on **Figure 5**.

The development will result in maintaining employment security for the current Angus Place employees and continued efficient and effective extraction of a state significant resource.

1.2 Consultation

1.2.1 Authority Consultation

Angus Place has consulted the Department of Planning (DOP), Department of Primary Industries (Mineral Resources) ("DPI"), Lithgow City Council ("LCC") and Forests NSW on a range of issues regarding this application. Issues raised have been addressed in this report and include:

- A description (**Chapter 3**) and justification (**Section 1.3**) for the proposal;
- Relevant statutory provisions (**Chapter 4**);
- Assess the potential impacts of the proposal on subsidence, surface and groundwater, noise, air quality, Aboriginal and European heritage, flora and fauna, transport, and social and economics (**Chapters 5** and **12**).
- Environmental monitoring and management (**Chapter 13**).

1.2.2 Community Consultation

Interaction with the local community on operational aspects of the mine has been ongoing throughout the life of the mine. Angus Place is committed to open and transparent communication with its neighbours and the local community. In relation to this application, landowners within the area potentially affected by the proposal, were supplied with a community consultation sheet (see **Appendix A)** providing a description of the proposal and any effects on adjoining landowners. There are no private landholdings within the extraction area and 3 key landowners affected by noise from the pit top and the long-established private haulage road.

The sheet also contained information on how an interested party could be further consulted should they wish to do so. Key residents along the haul road have been visited by Angus Place personnel and provided information on the development application, planned operations over the next 15 years and proposed environmental initiatives being implemented. The key issues raised by residents during consultation related to:

- noise from the coal handling plant
- noise from coal entering the coal bin
- trucks not covered which causes coal spillage
- being woken up by noises from the colliery
- blackberries on road easement
- rabbit infestation within the haul road easement

Not all residents were concerned about noise from the mine, however, night time activities which caused disturbance was an important issue. Noise from haulage trucks was not a specific issue raised. A number of commitments were made as a result of the consultation program. These included:

- Completion of the cladding of the CHP in the next two months.

- ❒ Installing the insulation material on the conveyor chute.
- ❒ Monitoring of coal haulage trucks with a view to requiring all trucks to be covered
- ❒ Extending the weed management system to include the Wallerawang Haul road.

Other mitigation strategies were discussed such as better insulating their houses, air conditioning and double glazing. These issues will be further discussed in follow up meetings in the next two months. Based on the results of the noise study undertaken as part of this EA, treatment of the residences is not strictly required since the assessment criteria is met at the majority of residential receptors with only a 1 dB(A) exceedence at the Sharp residence. There is however a number of less intrusive mitigation measures available to assist in further reducing noise nuisance which are further discussed in **Section 7.4**.

1.3 Justification

Angus Place is committed to achieving sustainable development. The proposed Development takes into account long and short-term considerations regarding economic, environmental, social and equity considerations. The proposed mine plan is designed to utilise known resources within ML 1424 and CCL 704 in an efficient manner. Extensive assessment and planning has taken place as a result of the subsidence management plan process. This ensures that Angus Place activities are carried out in a manner that will minimise impact and monitor potential effects (and environmental triggers) on the environment.

The precautionary principle has been applied through collaborative risk assessments and trigger-response action plan development. The assessments and predictions made in this EA will be subject to extensive environmental monitoring to ensure they are verified and corrective actions implemented as necessary.

The mining project will not prejudice future use of the land in the area nor affect the landuse of adjacent areas.

The approval of the Development is justified in that:

- ❒ the environmental impacts have been identified;
- ❒ mitigation and safeguards have been proposed;
- ❒ any impacts are temporary;
- ❒ ongoing monitoring for verification and trigger responses are proposed;
- ❒ the resource is state significant and Angus Place has a good performance record;
- ❒ local and state economic benefits will be gained;
- ❒ continuity in local employment will be maintained; and
- ❒ Angus Place will continue to contribute to the local community in which it operates.

2. Existing Operations

2.1 Background

Since 1949 Newcom Collieries (now Angus Place) has produced coal for domestic supply using bord and pillar mining techniques. To minimise increasing transportation costs and with more efficient transmission methods, it became more economical to locate power stations in the Lithgow coalfields and in 1961 Wallerawang Power Station was commissioned. Newcom supplied around 450,000 tonnes of coal per annum to the Power Station from the mine located at Lidsdale.

It became necessary to increase production from Newcom Collieries to 1.3 million tonnes per annum (Mtpa) with the additional generating units installed at Wallerawang Power Station during the 1970's. An Environmental Impact Statement (EIS) was prepared by the Mine Development Department of the Electricity Commission of NSW and consent issued to Newcom Collieries Pty Ltd.

Angus Place Colliery commenced longwall mining operations 1979 and the Colliery was established at its current locality (**Figure 1**) near the northern extremity of the Lidsdale workings after development consent was granted by the then Blaxland Shire Council (**Section 2.3**).

2.2 Overview of Operations

Angus Place holds coal supply contracts with Delta Electricity for supply of coal to the Mount Piper and Wallerawang Power Stations until 2014. Coal is currently delivered to these markets along private haul roads. With greater than 32 Million tonnes of measured reserves, the mine has a nominal life of 12-15 years. The mine provides direct employment for 215 people plus additional contractors, casuals and local businesses.

Coal extraction is currently undertaken in the area covered by Mine Lease 1424 and Consolidated Coal Lease (CCL) 704. Coal in the Lithgow seam is mined by continuous miner units (to carry out development headings) and a longwall (to carry out secondary extraction). Coal is conveyed to the surface for sizing and fed to the product supply bin to be transported to either Wallerawang or Mt Piper Power Station on private haul roads. No coal washing occurs on site consequently there is no production of washery tailings or reject material.

The mine operates 7 days a week, 24 hours per day.

The current mining area is shown in **Figure 2**.

2.3 Consents, Leases and Licences

2.3.1 Development Consents

Angus Place holds several development consents. The original Development Consent was granted by the then Blaxland Shire Council as a result of an EIS prepared in 1975 by the then Mine Development Department of the Electricity Commission of NSW. A copy of the development consent is unable to be located. With reference to the 1975 EIS documentation it is determined that the approval granted consent to:

- construct and use new surface facilities including bathhouse, coal handling infrastructure, material storage areas and office buildings;
- produce up to 1.25 Mtpa; and
- construct and use an overland coal conveyor to supply coal to Wallerawang Power Station (approximately 5 km long).

A subsequent development consent (DA 81/11090) was granted by the then Department of Environment and Planning on the 24th October 1984 following the preparation and display of an Environmental Impact Statement. The approval granted consent to:

- continue and extend longwall mining beneath the Newnes Plateau;
- install a new longwall miner to increase coal production rates;
- increase maximum production to 2.3 Mtpa;
- use and upgrade of the mine infrastructure including a new drift;
- construct and operate an overland coal conveyor from Angus Place to Mt Piper crossing Wolgan Road; and
- establish a new 5000 tonne finished product bin.

On the 19th January 1990, Lithgow City Council approved DA218/89, which included an environmental assessment and which enabled the colliery to construct an additional coal storage area west of Wolgan Road. The coal storage area was never constructed; however, some of the coal-handling infrastructure was established.

Following the consideration of an environmental assessment, a separate development consent issued to Coal Link Pty Ltd on 18th September 1992 by Lithgow City Council allowed for the construction and operation of the private coal haulage road from Angus Place Colliery to Mt Piper Power Station. This was constructed in lieu of the conveyor approved in the 1984 consent. Angus Place currently pays a royalty to Coal Link to utilise this haul road. As the

consent is issued to an independent party, Angus Place has no direct legislative responsibility.

Following the preparation of a Statement of Environmental Effects in 2003, Lithgow City Council approved DA413/03 for the mine to construct and operate a conveyor, stockpile and associated infrastructure (Conveyor Upgrade Project) on the surface of Angus Place Colliery. The consent gave approval to:

- install and operate a new drift and stacking conveyor with a capacity of 2,500tph;
- install and operate a new reclaim conveyor with a capacity of 1,800tph; and
- increase the capacity of the coal stockpile.

Key development consents held by Angus Place are included in **Appendix B**, with the exception of the original Mine consent.

2.3.2 Colliery Holding and Titles

Angus Place Colliery has CCL 704 and ML1424 as its predominant mining leases and includes a sublease of part of mining lease CCL702 as well as several parcels of freehold land owned by Centennial. CCL704 and ML1424 are held by Centennial Angus Place Pty Ltd, while CCL702 is held by Coalpac Pty Ltd. CCL 702 does not form part of the proposed project area. Details and titles registered with DPI – Mineral Resources as the Angus Place Colliery Holding are shown and described on **Figure 3.**

The mineral area held by Angus Place Colliery under mining title is 10,244 hectares. The surface area within the colliery holding comprises 173.3 hectares, of which 31.3 hectares is held under mining title and the remainder being freehold land. This surface area includes the mine surface infrastructure and coal handling facilities, the former Newcom Colliery mine entries and coal stockpile site at Kerosene Vale and part of the coal haul road to Wallerawang Power Station.

In March 2005, DPI – Mineral Resources granted Angus Place a renewal of ML 1424 extending the Mine Lease until 18 August 2024. CCL704 expires on 8 July 2006 and an application to renew this lease for a further 21 years has been lodged.

2.3.3 Licences

Angus Place Colliery holds EPL No 000467 under the *Protection of the Environment Operations Act, 1997*. This licence encompasses both the Angus Place and Kerosene Vale sites. The Licence allows for four water discharge points as shown on **Figures 2, 3** and **4**. The EPL cover Angus Place activities to a scale of 2 – 3.5 Mtpa, a sewage treatment plant and prescribes volume limits and water quality limits for each discharge point. A variation of the EPL is not considered necessary as this application does not propose activities outside the existing Colliery Holding, which represents the EPL defined premises.

The Colliery also holds Dangerous Goods Licence 35/027046. There is no change proposed to the use or purpose of this Licence.

2.4 Existing Surface Facilities

The pit top facilities are shown on **Figure 3** and comprise:

- mine entries;
- coal processing facilities including coal sizing, stockpiling, stacking and reclaim facilities;
- 2000 tonne final product bin and truck loading facilities;
- workshop, stores, fuel and oil storage systems;
- enclosed and bulk open material and equipment stores facilities;
- air compressors;
- high tension electrical switchyard;
- surface water management ponds and pollution control equipment;
- bath house;
- sewage treatment facility; and
- office, carpark and administration buildings.
- ventilation facilities both upcast and downcast;
- mine drift entries;

The total area of the colliery surface infrastructure is approximately 15.6 hectares. There are other mine related surface developments external to the immediate pit top that includes:

- dewatering bores;
- Kerosene Vale decommissioned Newcom Colliery pit top and coal storage area (**Figure 4**);
- Wallerawang Haul Road;
- Mt Piper Haul Road (owned and managed by CoalLink)

2.5 Coal Handling and Transport

Coal is delivered to the surface by conveyor to a stackout/reclaim stockpile which is equipped with underground feeders enabling coal to be loaded onto the reclaim conveyor via a tunnel beneath the stockpile. Coal is then conveyed to the recently refurbished coal sizer.

Crushed and sized coal is then delivered to the truck loading hoppers by conveyor. Loaded trucks then transport the coal to either Mount Piper or Wallerawang Power Stations via private haul road. Coal haulage along the Mt Piper Haul Road is approved for 24 hours per day, 7 days a week. However, truck movements are limited to five loaded truck (return trips) movements per hour between the hours of 9.30pm and 7.00am.

Wallerawang Haul Road operations are conducted between the hours of 7 am and 10.00 pm.

2.6 Mining Operations

The primary method of coal extraction at Angus Place is via retreat longwall. This method extracts large blocks of coal in one continuous operation. Coal is cut by a shearer travelling laterally across the face, retreating normal to the direction of gateroad development. An Armoured Face Conveyor transports coal from the face, on the longwall panel conveyor running the length of the panel and to the surface via the main trunk conveyor.

Development roadways are generally driven by single pass wide head continuous miners, fitted with roof bolting rigs and shuttle cars. The continuous miner cuts and feeds coal into shuttle cars that transport and load coal along a designated length of roadway. The continuous miner then switches to bolting mode and installs roof and rib support.

Existing and proposed mining operations are shown in **Figure 2**.

2.7 Kerosene Vale Site

The Kerosene Vale site is a licensed stockpile area with the license allowing stockpiling up to 500,000 tonnes of coal. Angus Place has a need to stockpile excess coal from time to time. On average, Angus Place stockpiles around 350,000 tonnes at any one time.

Kerosene Vale site is also the location of staging pumps for the water supply for Angus Place. The pump site adjacent to the old mine entries is accessed each week for maintenance and to re-start the pump.

The use of Kerosene Vale will form an ongoing component of the operation and there may be future application for extraction of shallow coal reserves on the site.

2.8 Water Management

2.8.1 Underground

Potable water is reticulated underground for drinking whilst recycled water is used for dust suppression on mining machinery and to provide an alternate emergency supply for underground fire fighting requirements.

Water make from the coal face is pumped from temporary holding dams (fish tanks) and then to longwall goaf areas to settle. Water is then pumped to an underground collection point and then to the surface into concrete tanks. Overflow from the concrete tanks is into two surface settling ponds for further treatment.

Water from the surface concrete tanks is recycled underground for fire fighting, dust suppression and process purposes. Water from these tanks is also used for fire fighting on the surface.

2.8.2 Surface

The surface water management system at Angus Place relies on the separation of clean and dirty water surface runoff and the management of mine water make that is pumped to the surface from underground. Integral to the surface water management system are licensed discharge points that are managed in accordance with the requirements of Angus Place's Environment Protection Licence (EPL) (see also **Section 2.3.3**). Water is discharged from the Colliery to the Cox's River Catchment.

The clean water management system consists of a series of diversion bunds and drains that intercept clean water that would otherwise run across disturbed areas. This water is directed off site and into Kangaroo Creek.

The dirty water management system is more extensive and consists of a number of drains, grit traps, kerb and gutter, collection pits, pipe networks, oil separators and settling ponds. Runoff from the coal handling plant and Pit Top likely to contain coal in suspension is diverted to a network of settlement ponds with mine chitter filter walls. These ponds retain the water and provide sufficient time to allow the suspended materials to settle allowing clean water to discharge from the site. These ponds have a licenced discharge point LDP002 allowing Angus Place to discharge waters into the Coxs River.

Oil contaminated water runoff from the Colliery washdown bay, workshops, diesel fuelling areas and those areas prone to oil contamination are serviced by an oil water separator prior to discharge from the Angus Place site. Separated oil is collected and disposed off site for recycling purposes.

Mine water make is directed to the licensed discharge point LDP001 which directs flows into Kangaroo Creek. Mine water pumped from the old underground mine workings of Kerosene Vale is discharged through LDP004.

A surface water management system is also in place at Kerosene Vale. There is one licensed discharge point (LD003) located at the western end of the settling pond as shown in **Figure 4**. The management system relies on the separation of clean and dirty water. All runoff (dirty water) from the hard stand area is directed into this settling pond. The EPL allows for the discharge of waters during a 1 in 5 year, 24 hour storm event.

2.8.3 Sewage Treatment

The Colliery has its own sewerage treatment system (licensed by the EPA), the operation of which is detailed below:

- Septic Tank System: The septic tank collects waste from the Colliery sewerage network. Any overflow from this system is treated in the Colliery sewerage treatment system.

- Refuse Water: Water from the bathroom and wash basins is piped via a grit arrestor to a central holding sump. Waste

is discharged through a maturator pumping system to oxidation lagoons and is dispersed from the lagoon by a spray irrigation network.

3. The Proposal

3.1 The Proposed Development

Angus Place proposes to extend mining operations at Angus Place Colliery as described in the following sections.

3.1.1 The extension and maintenance of mining operations within the existing mining leases (ML 1424 and CCL 704);

The extension involves addition of further longwall mining to the south of the existing operation within CCL704 and ML1424. The proposed mining area is shown in **Figure 5.**

The area to be mined lies generally west of the upper reaches of the Wolgan River and extends to Kangaroo Creek as shown on **Figure 5**. The proposed mining area lies within Newnes State Forest and there are no private landholdings.

The predominant land uses within (and in the vicinity of) the project area include mining and native hardwood harvesting and recreational activities such as bushwalking, motorcycling and four wheel drive pursuits.

The limited infrastructure above the current longwall mining area consists of mining infrastructure including existing pumping boreholes, sedimentation dams, compounds, geological boreholes, hydrogeological boreholes, poly water pipeline (owned by Springvale Coal), a small dam on Kangaroo Creek as well as fire trails and dirt tracks used by Forests NSW. There will be an ongoing need to develop additional surface infrastructure to support the future underground extraction. These include:

- Services boreholes which typically allow power to be reticulated to the underground mine, but may also involve delivery of ballast, stone dust and compressed air.

- Ventilation facilities including upcast shafts equipped with fans and associated power supply, substations and access tracks.

- Downcast ventilation holes which would be located on the eastern end of each longwall panel to assist with air intake into the working area of the mine.

- Dewatering boreholes and associated pipelines, powerlines and access tracks.

Figure 5 shows the indicative location of these facilities. The final location is subject to mine layout and may be relocated relative to changes in longwall layout.

3.1.2 Mine Plan

The mine plan involves extraction of longwall panels in the 900 district primarily within existing Mining Lease ML 1424. Some of the mining extends into CCL704. The panels are oriented in an east-west direction with extraction commencing on the eastern boundary and retreating to the main 900 series roadways as shown on **Figure 2**. The length of the panels is predominantly governed by the Springvale lease to the east and south and the old Angus Place workings to the west and north.

The design of the 900 district panels has taken into account a range of mining, environmental and geological constraints and has been determined based on best available knowledge.

A detailed Subsidence Management Plan application has been provided to the DPI as part of the approval required under the Mining Lease. Should further knowledge determine that changes to the layout are required, these will be addressed through the DPI's Subsidence Management Plan process.

3.1.3 An increase in the current annual mining rate from 2.3 Mtpa to 3.5 Mtpa

It is proposed to increase the approved production limit from 2.3 Mtpa to 3.5 Mtpa. This will result in the extraction of the resource at a faster rate. There will be no additional mining impacts by the faster removal of the coal. There will be a potential impact from the transport of the coal as discussed below.

3.1.4 The transportation of increased coal tonnage by truck

The proposed increased tonnage will require transportation of 3.5 Mtpa of coal offsite using the privately owned haul roads leading to both Wallerawang and Mount Piper Power Stations. The Colliery is not proposing to increase the operating hours of the Wallerawang Haul road beyond the current 0700 to 2200 hours.

The main potential impact will be noise which has been assessed by Atkins Acoustics (**Appendix E**), the results of which are discussed in **Chapter 7**.

3.2 Interaction with Existing Operations

The proposed development does not propose any changes to the existing operations. The existing surface infrastructure will be used for coal handling and processing. There will be no change to the current mining methods and the proposed extension to mining lies within the existing ML 1424 and CCL704 which forms part of the Colliery Holding. All proposed environmental controls, reporting and monitoring initiatives are outlined in **Chapter 13**.

The previously approved overland conveyor to Wallerawang Power Station may be constructed in the future when economic circumstances justify it, however at this stage, the current trucking activities will continue.

4. Planning Framework

4.1 Development Approval Process

The Environmental Planning and Assessment Act (NSW) 1979 (EP&A Act) is the principal piece of legislation that governs the approval process for the Development.

With effect from 1 August 2005, the EP&A Act was amended by the addition of a new Part 3A which deals with the approval of major projects. This project has been assessed by the Department of Planning under the provisions of the State Environmental Planning Policy (Major Projects) 2005, as being a project to which Part 3A of the EP&A Act applies.

The Project Application has been lodged with the Department of Planning and the subsequent requirements for this Environmental Assessment are attached as Appendix A.

4.1.1 Permissible Development

In accordance with State Environmental Planning Policy (Major Projects) 2005, the Minister for Planning has formed the opinion that this project is one to which Part 3A of the EP&A Act applies.

The future mining areas of longwall panels 28 to 33 are zoned 1(f) – Rural (Forestry) under the Lithgow City Council Local Environmental Plan 1994 (Lithgow LEP). In this zoning development for the purpose of mining is permissible with development consent.

The existing pit top facilities are also covered by the Lithgow LEP, and is zoned Rural (General) 1(a). Mining is permissible under this zoning.

4.2 State Environmental Planning Policies

No core koala habitat was found within the development application area. Consequently, SEPP 44 is considered to not apply to the Development.

The Development is within the area subject to SEPP 58 - Protecting Sydney's Water Supply. As the Development is State Significant, the concurrence of the Sydney Catchment Authority is not required. However water management and protection of the catchment remains a key management issue on both the pit top and in the mining area and are considered in the environmental impact assessment.

4.3 Other Approvals and Legislation

Prior to relevant mining commencing in the development area, a Subsidence Management Plan (SMP) approval is required from the Department of Primary Industries (Mineral Resources) ("DPI") as a requirement of the Mining Act 1992. The SMP application has been prepared in accordance with the DPI Guidelines. Relevant stakeholders to the SMP area have been identified and consulted.

Under the *Mines Subsidence Compensation Act 1961*, the approval of the Mine Subsidence Board (MSB) is required for the erection or alteration of improvements and subdivision of land within a mine subsidence district. The application area is not located within a Mine Subsidence District.

Under the provisions of Part 3A, the determination of the project will incorporate any additional matters listed under other key environmental legislation including the *Threatened Species Conservation (TSC) Act 1995* the Water Management Act 2000 and *National Parks and Wildlife Act 1974*.

4.4 Commonwealth Legislation

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is legislated by the Commonwealth Government. Under this Act the approval of the Commonwealth Minister of the Environment is required for any action that may have a significant impact on matters of national environmental significance, which includes threatened species. There is one threatened species - the Blue Mountains Water Skink, and an endangered ecological community - Temperate Highland Peat Swamps (THPS) - that require assessment under the EPBC Act.

4.5 Key Assessment Requirements

The Director General's Requirements, which are attached as Appendix A, list the key environmental assessment requirements for this project. These are as follows:

- Subsidence;
- Surface and Groundwater;
- Noise – including detailed description of the measures that would be implemented to minimise noise impacts associated with the colliery and the proposed increased road haulage rates to the Wallerawang Power Station;
- Air Quality
- Heritage – both Aboriginal and non-Aboriginal;
- Flora and Fauna;
- Transport; and
- Social and Economic.

These key issues are described in detail in the following sections.

5. Subsidence Assessment

A key assessment issue for the proposed mining is mine subsidence. A Subsidence Impact Assessment has been undertaken by GE Holt and Associates for longwalls 930 to 980 (refer to SMP Appendix C Section 10). Longwall panel 920 is also contained within the proposed extension area and subsidence has been assessed in the report undertaken by Strata Control Technology. These subsidence reports cover the areas within the proposed mining area.

5.1 Overview of the Mining Area

The proposed extension to the longwall mining area for Angus Place Colliery is located underneath the Newnes Plateau. The significant features of the Newnes Plateau include:

- Fairly level terrain along the Coxs River and on top of the Newnes Plateau.
- Low undulating hills along the foothills of the plateau.
- Near vertical sandstone formations and escarpments along the plateau; and
- Steep slopes descending from the plateau into the Wolgan Valley.

The eastern area of the Colliery Holding generally drains into the Wolgan River Valley while the western area generally drains into the Coxs River which is part of the Warragamba Outer Catchment Area.

5.2 Topography

The surface of the Newnes Plateau is gently to moderately inclined and covered mostly by particularly friable sandstones of the Narrabeen Group. The area is typically rugged with cliffs associated with the escarpment edges along the Plateau that are nearly vertical in relief, deep gullies and elevated ridge tops. The proposed mining area is situated underneath the level terrain on the top of the Newnes Plateau, broad valleys and headwater valleys of the upper reaches of the Wolgan River and Kangaroo Creek. Elevation within the project area varies between 900metres above sea level and 1160 metres above sea level.

Any ground within the project area at a grade of 1 in 3 (33.33%) or greater has been considered as a “steep slope”. Six (6) sections of steep slope have been delineated from the surface contour plan in the project area. These areas consist of:

Kangaroo Creek –

- 1 section approximately 500m on the eastern side (LW 930 – LW 940).

Narrow Swamp stream – 3 sections,

- 1 approximately 350m on the eastern side (start of LW 930);
- 1 approximately 550m on the western side (LW 930 – LW 940); and
- 1 approximately 250m on the eastern side (LW 960).

East Wolgan stream – 2 sections,

- 1 approximately 120m on the western side (LW 950); and
- 1 approximately 350m on the western side (LW 960).

The areas are generally well vegetated, some contain areas of rock outcrop on the slope and several areas of rock formation, less than 20m high above the slope, exist.

5.3 Escarpments and Rock Formations

There are no escarpments or rock formations greater than 20m high within the project area. The project area is situated on the higher section of the Newnes Plateau and this area is limited to flat plateau with ridge tops, broad valleys and headwater valleys. This area contains none of the sheer cliffs, escarpments, high rock formations and pagoda complex landforms typically associated with the escarpment. None of these significant features are found on the higher sections of the plateau where the extended mining area is situated.

Some minor rock formations less than 20m high are located on valley slopes along Kangaroo Creek and East Wolgan Swamp. Due to their location they are not within view of any road. These rock formations are not considered to have scenic potential, and are not defined as cliffs due to their relatively low height, location and surrounding landforms.

5.4 Soils

Soils types within ML 1424 and CCL 704 are described in the following sections, based on the Wallerawang 1:100 000 soil landscape.

- Newnes Plateau Soil Landscape
- Medlow Bath Soil Landscape
- Deanes Creek Soil Landscape
- Wollangambe Soil Landscape
- Warragamba Soil Landscape

It was determined during the investigations for the SMP that the strain levels are too low to cause ground cracking, and the tilt levels are too low to cause significant alteration to the natural surface. This is consistent with results of past monitoring at Angus Place, demonstrating that surface cracking and resultant erosion potential has been negligible. It is not anticipated that there will be any other impacts on the soils in the area since no clearing of vegetation or soil removal will occur. No erosion additional to natural erosion will result from the mining. However, regular inspections will be made of each longwall panel during and after extraction, to identify any areas of surface cracking. In the event that

surface cracks are found that may pose an erosion risk, works will be undertaken to fill the cracked areas to minimise the risk of soil erosion. This will be particularly important in areas with soils that have high water erosion potential.

5.5 Subsidence Predictions

Panel 920 is currently being extracted and subsequent subsidence monitoring data has been used in the assessment of impacts of the remaining panels. Subsidence values of up to 1.3 metres were predicted for longwall panel 920. Results of subsidence monitoring completed in December 2004 show a maximum subsidence level of 531mm and a strain value of 6mm/m.

A summary of subsidence, strain and tilt predictions is shown in **Table 5.1**.

Table 5.1 – Subsidence, Strain and Tilt Predictions

	Maximum Predicted Subsidence range (mm)	**Maximum Predicted Tilt range (mm/m)**	**Maximum Predicted Tensile Strain range (mm/m)**	**Maximum Predicted Compressive Strain range (mm/m)**
Longwall 930	1140	11.75 – 16.72	3.95 – 5.63	7.75– 11.03
Longwall 940	1140	11.44 – 16.10	3.85 – 5.42	7.55 – 10.63
Longwall 950	1140	11.75 – 15.53	3.95 – 5.22	7.75 – 10.25
Longwall 960	1140	11.75 – 15.53	3.95 – 5.22	7.75 – 10.25
Longwall 970	1140	11.44 – 14.99	3.85 – 5.04	7.55 – 9.89
Longwall 980	1140	11.44 – 14.49	3.85 – 4.88	7.55 – 9.56

The assessment found that subsidence at Angus Place is governed by mined height of coal, rather than panel width and depth. Maximum likely subsidence will be relatively constant over the entire area and is predicted to be 1.14m.

Upsidence is expected to occur in the incised valleys and monitoring over the finish end of Kangaroo Creek over the end of longwall panel 920, will provide site specific data relating to upsidence.

5.6 Impact Assessment

GE Holt and Associates indicate that the geological sequence that overlies the Angus Place mine workings is one that accommodates mining related movements better than most. There are no escarpments or rock formations greater than 20m high within the proposed new mining area. The additional panels are situated on the higher section of the Newnes Plateau and this area is limited to flat plateau with ridge tops, broad valleys and headwater valleys. This area contains none of the sheer cliffs, escarpments, high rock formations and pagoda complex landforms typically associated with the escarpment. None of these significant features are found on the higher sections of the plateau where the SMP application area is situated.

Some minor rock formations less than 20m high are located on valley slopes along Kangaroo Creek and East Wolgan Swamp. Due to their location they are not within view of any road. These rock formations are not considered to have scenic potential, and are not defined as cliffs due to their relatively low height, location and surrounding landforms. Holt determined that it is unlikely that the low levels of predicted subsidence will affect the minor rock features situated on the sides of the valleys in the proposed mining area.

The subsidence impact assessment, contained in the SMP, found that there will be little if any visible evidence of subsidence. Simple amelioration measures are proposed to correct any surface damage should it occur. The anticipated level of surface impacts has been used as the basis for predicting impacts on biophysical and cultural heritage values which are addressed in the following chapters.

5.7 Subsidence Management

As part of the Subsidence Management Plan application, a management plan has been developed that proposes management solutions/action plans developed as a response to the subsidence impact assessment. The full Management Plan may be found in Volume 2 of Appendix C. the management plan is based around a detailed subsidence monitoring program developed in consultation with DPI (through the SMP process). As a safeguard, the management plan includes trigger response action plans (eg contingency plans) based on monitoring results. These initiatives are detailed in Chapter 12.

Subsidence will be managed in accordance with any approved SMP and its conditions.

6. Surface and Groundwater Assessment

A key assessment issue identified by the Department of Planning is the potential impacts on surface and groundwater systems.

6.1 Surface Water

Watercourses in the proposed mining area consist of three first order streams in the headwaters of the western arm of the Wolgan River and one first order stream in the upper reaches of Kangaroo Creek as shown on **Figure 2**.

6.1.1 Wolgan River

The Wolgan River tributaries flow north and eventually drain into the Capertee River to become the Colo River, before flowing into the Hawkesbury River and into the ocean. It flows through East Wolgan Swamp, West Wolgan Swamp and Narrow Swamp

Around 1700 metres of the Wolgan River tributary containing East Wolgan Swamp is located in the application area of which about 1050 metres are proposed to be undermined by longwall panels 960 and 970. East Wolgan Swamp is a broad valley upland swamp. A surface water channel is present along its lower reaches with some subsurface flow present in its upper sections. Stream channel width increases from 300mm – 1000mm, in the upper reaches, to 1000mm – 4000mm along the lower sections. The longitudinal bed slope ranges from 1.5 % to 3.8% and channel depth ranges from 100mm to 500mm. The stream channel has no significant bed or bank erosion evident. Several gullies feed into this watercourse.

Around 2500 metres of the Wolgan River tributary containing both Narrow Swamp and Upper Wolgan Swamp is located in the proposed mining area. A 500 metre section of the Narrow Swamp will be undermined by the proposed longwall panels 930 and 940. This Swamp consists of several minor breaches feeding into a narrow flat valley. A surface water channel is present along the majority of the stream, but flows are subsurface along sections of the swamp where the channel is covered by vegetation. Average bed slope is 4 to 5%, ranging from 2% to 5.9%. The channel depth ranges from 200mm to 500mm with bed widths from 500mm to 3000mm. The channel is typically located in the centre of the upland swamp and, where surface flows are present, is highly defined. No significant bed or bank erosion is evident as the banks consist of extensive riparian vegetation.

The third watercourse commences over LW 960 and flows in a generally NE direction through West Wolgan Swamp with only one feeder gully on the eastern side over LW 930. The bed grade ranges from 2.1% to 4.0%. A 2200 metre section of the Wolgan River tributary containing West Wolgan Swamp is located in the centre of the longwall panels in the project area. Around 800 metres of West Wolgan swamp will be undermined by longwall panels 930 to 950. This

Swamp consists of a broad flat swamp situated at a high elevation (1120 to 1140 metres).

6.1.2 Kangaroo Creek

Kangaroo Creek, part of the Coxs River catchment, flows generally NNW through the western edge of the proposed longwall blocks. A 2100 metre section will be undermined by longwall panels 930 to 980.

Kangaroo Creek is situated in a valley some 100 metres wide at longwall 930, increasing to 200 metres wide at longwall 970. A small dam is located above longwall 970. Valley depth decreases from about 60 metres above longwall 930 to about 20 metres above longwall 970. A surface water channel is present along some of the stream, however flows are subsurface in other sections. As with the other watercourses the channel is typically located in the centre of the bed and is defined where flows are present. No significant bed or bank erosion is present. Some five gullies of varying bed slopes feed into the watercourse from both sides at grades ranging from 5 to 10%. Kangaroo Creek bed slopes range from 1.7% to 4.0%.

6.1.3 Impact Assessment and Safeguards

Potential impacts on these streams from the proposed mining activities were assessed by GE Holt and Associates. It was found that their gradient, in addition to the thick sandstone bedrock will allow stream flows to continue even though there may be minor changes to the patterns of surface flow as a result of the low level of mining related movements. The steep slopes on each side of tributaries to the Wolgan River and Kangaroo Creek are unlikely to be affected by the low level of subsidence tilts and strains at the start and finish ends of the proposed panels. The potential impact on stream flow will be monitored into the future (**Chapter 13)**.

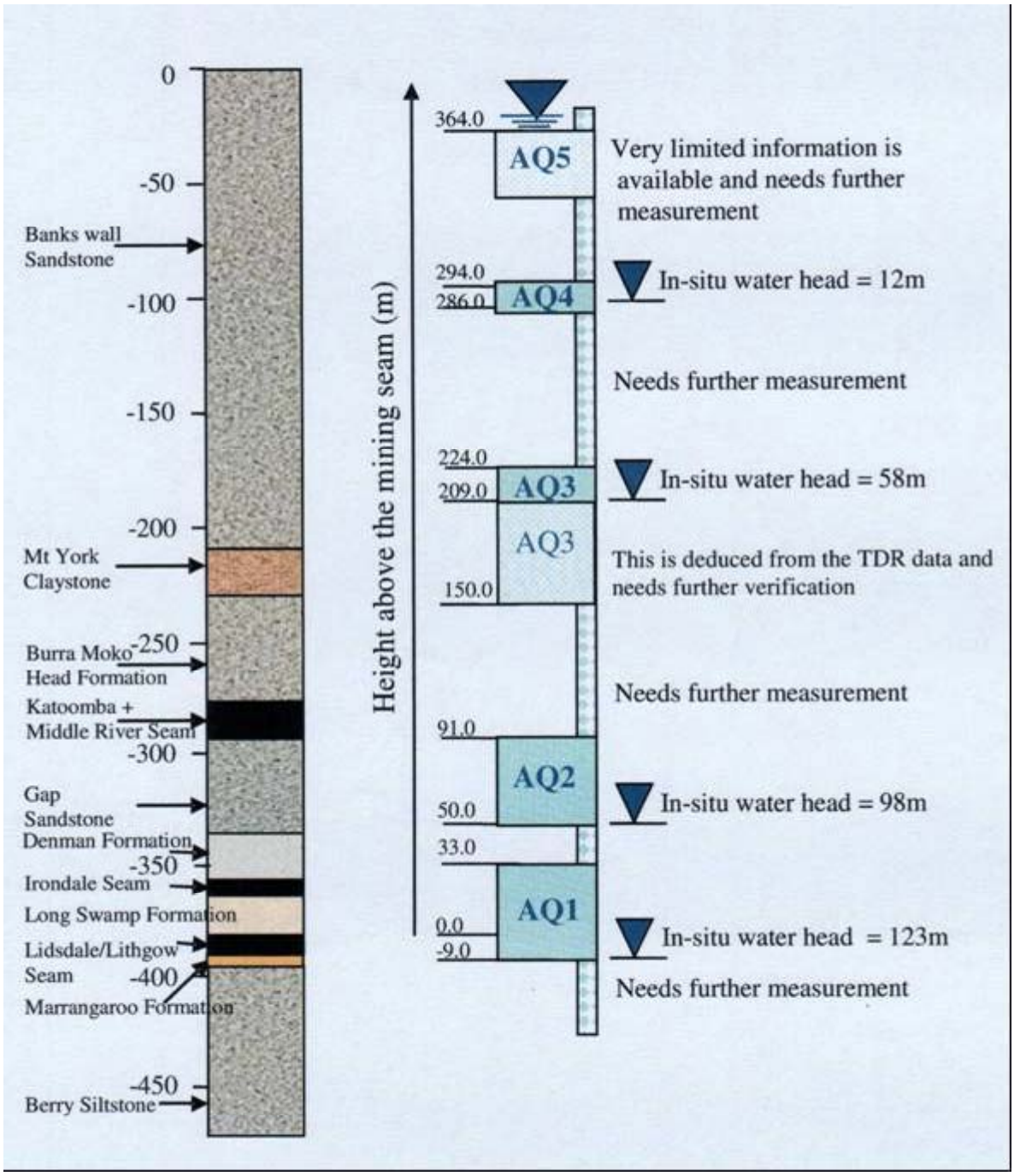
6.2 Groundwater

Connel Wagner has completed an assessment of groundwater for Angus Place Longwalls 930 to 980 (refer to Appendix H of the SMP). This considers detailed work undertaken for the adjacent Springvale Colliery.

6.2.1 Existing Aquifers

Five aquifer zones have been identified in the overburden strata above the adjacent Springvale Colliery. These are indicated on **Figure 7** and are numbered AQ1 to AQ5 from lowermost to uppermost.

Figure 7. Aquifer Positions within the Mining Area



AQ1 is identified to extend from the Floor Sandstone at least up to 33m above the Lidsdale / Lithgow Seam. Due to the lack of measurements beyond a few metres into the Floor Sandstone), the extent of AQ1 into the floor beneath the Lithgow Seam could not be confirmed. The elevation head in AQ1 is approximately 900m.

AQ2 is identified between 50 and 91m above the Lidsdale/Lithgow Seam. The elevation head in AQ2 is approximately 950m.

AQ3 is identified between 209 and 224m above the Lidsdale/Lithgow seam. The elevation head in AQ3 is approximately 1060m.

AQ4 is identified between 286 and 294m above the Lidsdale/Lithgow Seam. The elevation head in AQ4 is approximately 1090m. Piezometric level placed at a depth of 90m from the surface (i.e. 292m above the mining seam) could be seen to change only marginally during the mining of LW409 suggesting that mining has little effect on AQ4.

AQ5 is identified at about 364m above the Lidsdale/Lithgow Seam and is possibly 20m to 30m thick. The thickness of this aquifer may be controlled by the topography and the depth of weathering. The elevation head in AQ5 is approximately 1130m.

At Angus Place, the available data indicate that the two main shrub swamps (Narrow Swamp and East Wolgan Swamp) are fed by the uppermost aquifer, AQ5, which is located about 30 to 50 metres below the ridges adjacent to these swamps (and at greater depth beneath the ridge top further to the south). Both swamps occupy watercourses that flow in a general northerly direction into a tributary of the Wolgan River. The remaining swamp (West Wolgan) appears to be fed by a perched aquifer above aquifer AQ5.

Aquifer zones AQ1 and AQ2 are located in the Illawarra Coal Measures and are associated with coal seams while AQ3, AQ4 and AQ5 are all located in the Banks Wall Sandstone unit of the Narrabeen group.

The lowermost four aquifers (AQ1 to AQ4) are confined aquifers (bound by aquitards or aquicludes) and the uppermost aquifer (AQ5) appears to be an unconfined aquifer (i.e. there is no covering aquitard).

In addition to these main aquifers, there is evidence of a perched aquifer of limited extent, at shallow depth beneath the main ridge on the southern side of the project area.

In a review of groundwater regimes in the local area, it was found that (based on the available piezometric data) the hydrogeological regime in the proposed extraction area, including the overburden aquifers, has been largely unaffected by (or has largely recovered from) many years of coal extraction in the surrounding area. The exception is the Lithgow Seam, which has probably been significantly depleted of groundwater in some areas.

In a layered sedimentary rock sequence, most groundwater flow is generally in the horizontal direction, although some vertical flow occurs from the ground surface (infiltration), downward into the uppermost unconfined aquifer. A very limited volume of groundwater may also flow vertically from one confined aquifer to another, depending on the magnitude of the permeability of the intervening strata, and the degree of vertical jointing and faulting in the system. Bish (1999) confirmed that the general flow direction in the aquifers in this region is towards the north-east, away from the subcrop zone, where recharge to the aquifers can occur. This potential recharge zone is located to the west of the Angus Place Pit Top. No estimates have been attempted of the potential recharge rates in this area, as it has been intensively mined in both open cut and underground mines.

6.2.2 Impacts on Groundwater

Connel Wagner anticipates that the proposed mining at Angus Place is not likely to result in any significant, long-lasting impact on the upper two aquifers, therefore the regional consequences on these aquifers is considered to be negligible.

It is considered likely that the lower two aquifers would almost certainly be drained into the goaf. Searches have shown that there are no domestic, industrial or agricultural users of the groundwater resources in these aquifers in the area surrounding the Angus Place Colliery, probably due to their great depth and relatively low yield. Consequently, there will be no immediate impact on the aquifers from the mining.

It has already been shown that the drawdown in these aquifers does not currently extend beyond a radius of 1200 metres, however, continuous pumping over the next 15 years in both Angus Place and Springvale Collieries may extend the drawdown somewhat. Nevertheless, even if the drawdown radius doubles, the impact should be minimal, as the water in these lower aquifers represents a negligible contribution to stream flow and vegetation support in the region, due to their depth and the lack of any upwards groundwater flow to local creeks.

Once mining is completed, and pumping ceases, the drawdown radius will contract slowly, as the strata re-pressurise and the mine fills with water. Previous experience has shown that the pre-mining conditions will eventually re-establish following mining. Other abandoned mines in the vicinity of Angus Place have filled with water since mining activities ceased, including Newcom and Fernbrook Collieries.

The recharge area for the lower aquifers is located to the west and northwest of the mine. These areas have been largely mined out, in open cut and underground mines, so that the permeability of the coal measure strata in these areas has been significantly increased over a wide area. It is also probable that rainfall infiltration has increased in this area. Due to this increased permeability, the recharge to the coal seams has been enhanced, so that the recovery of the aquifer systems should be accelerated. Based on these facts, it is concluded that the regional hydrogeological regime at Angus Place will be restored in the long term.

Pumping tests conducted at the nearby Clarence Colliery (ERM, 2003) were designed to examine whether on a regional scale, that there may be very slow drainage of the important upper aquifers into the lower aquifers over a period of decades, with resulting impacts on the overlying shrub swamps. For this to occur there would need to be a reasonable hydraulic connection between the upper and lower aquifers. The Katoomba Seam (aquifer AQ2) was pumped out and the near-surface aquifer zone monitored for any resultant drop in pressure. The testing showed that there was no measurable impact on the upper aquifers. Based on the available data this is not considered to be a valid proposition.

Angus Place proposes to carry out groundwater monitoring as outlined in **Chapter 13**.

Aquifer AQ5 is an unconfined aquifer, which feeds two shrub swamps and is currently monitored by one piezometer. To date, this piezometer has shown no evidence that the aquifer has been affected by mining at either Springvale (at about 600 metres away), or Angus Place, (at a distance of 1100m away). While there is no available data which demonstrates the effect of undermining on this aquifer, an indication of the likely impact can be gained from the monitoring of the Junction Swamp (over Springvale Longwalls 408 and 409) which was carried out as part of Springvale's environmental assessments.

This small swamp is fed by a perched water table, well above the level of AQ5, but it experienced similar movements to those that will affect AQ5. Due to inherent differences, the impact on AQ5 would not be expected to be as great as that noted in the perched aquifer at the Junction Swamp. If this is the case, then AQ5 should experience only minor temporary changes in groundwater levels due to tilting and subsidence. Based on piezometric data, the water head in AQ5 is about 30 metres above the base of the aquifer zone, although it may be less than this beneath other ridges. If the change in head due to undermining were to be limited to a temporary decline of only a few metres, then the expected impact on flows from the aquifer would be minimal.

7. Noise Impact Assessment

Potential noise impacts were identified by the Department of Planning as a key issue to be addressed in the Environmental Assessment. There has been extensive noise assessment undertaken at Angus Place over recent years. The majority of this work has been undertaken by Heggies Australia, while more recent work has been done by Atkins Acoustics. The most recent study undertaken by Atkins Acoustics is attached as Appendix E.

Previous reports and assessments have been provided to both the Department of Planning and the Department of Environment and Conservation. Of particular interest to these authorities is the development of a noise management strategy, irrespective of the proposed additional coal to be transported offsite.

The following table represents the current situation, the predicted additional noise from the pit top and trucking 3.5 Mtpa to Wallerawang Power Station, but also shows the anticipated overall decrease in noise attributed to the implementation of the noise reduction plan. The assessment has been undertaken in accordance with the DEC Industrial Noise Policy.

Table 7.1 – Current Situation and Predictions
Combined Pit Top and Trucking (L_{Aeq})

Reference Location	Assessment Goal		Existing Ambient Noise Level		Predicted Noise Level at 3.5 Mtpa		Potential Reductions as a result of this Plan	
	Day	Evening	Day	Evening	Day	Evening	Day	Evening
Sharpe	**39**	**35**	**44**	**44**	**45**	**45**	**3.7**	**7.2**
Mason (East)	**39**	**37**	**51**	**51**	**52**	**52**	**3.7**	**7.2**
21 Neubeck Street	**42**	**38**	**45**	**46**	**47**	**47**	**3.7**	**7.2**
Mason (West)	**39**	**35**	**42**	**43**	**44**	**44**	**3.7**	**7.2**

By achieving these noise reductions the overall noise impacts from the increased trucking will be less than is currently being experienced at the nearest residential receptors. The proposed noise management strategy is detailed in the following section.

7.1 Noise Management Strategy

The proposed noise management strategy would involve both physical controls on the trucks and the progressive implementation of management systems. These works would be monitored to verify the improvements made and to fine tune the assessment model. It is noted that any truck management strategy would need to take into account the needs of Delta Electricity and the provisions of the current coal supply contract. Delivery rates are often dictated by the customer demands

and so the management systems must be flexible enough to cater for these variations.

7.2 Physical Control Methods

Based on the noise measurements undertaken by Heggies Australia, there is a significant variation in the noise output of individual trucks. Also, the minimum noise output achieved is still higher than can be reasonably achieved through additional noise mitigation measures. A two (2) stage approach is proposed to reduce the noise level of the trucks.

The first stage involves achieving a consistent noise level from all existing trucks. A noise audit of all trucks would be undertaken to identify noisier trucks. It is anticipated that control measures would include simple muffler replacement and suspension maintenance/upgrade or truck replacement.

The second stage would involve implementing additional attenuation on the trucks. This work could include additional body dampening, engine compartment sealing and installation of residential grade mufflers. A cost/benefit analysis would need to be undertaken on each option to ensure that there would be a realistic improvement in noise output compared with the cost imposition and reduced efficiency.

7.3 Management Control Measures

Previous assessments have made a number of conservative noise modelling assumptions. These assumptions would be verified over the next 12 months with a view of progressively reducing the noise impacts on receivers.

7.3.1 Bunching

The current model assumed that there would be some bunching of trucks along the haul route. A factor of 1.2 was included in the model. This is a conservative assumption given that the trucks are physically separately at the loading end and at the unloading end of the haul road. Each truck takes at least 2 minutes to load at the Angus Place loading bin and therefore commence its trip with a 2 minute gap. Likewise, the trucks are again separated at the unloading point as each truck is unloaded individually. The only bunching that occurs is at each end of the route as trucks wait to be either loaded or unloaded.

Unless trucks deliberately slow down on route, the separation distance should remain relatively constant. To ensure this requires operator training and regular inspections by Angus Place staff.

7.3.2 Truck Speed

Loaded trucks reach speeds of up to 90 km/hr on route to Wallerawang Power Station while the return trip they can reach speeds of 110 km/hr. By limiting truck speed to 80 km/hr each way overall noise levels would reduce. Although

this increases the travel time it will also reduce the number of trucks waiting to be loaded and unloaded at each end. This in turn further reduces the potential for bunching without unduly affecting total delivery capacity.

This option needs to be monitored to ensure that the expected benefits are obtained without adversely affecting delivery capacity.

7.3.3 Peak Truck Numbers

The modelling undertaken to date has assumed a peak hourly loaded truck rate of 23. This is a maximum hourly rate rarely achieved and would, if achieved consistently, equate to an annual tonnage in excess of 5.3 Mtpa. This is clearly a conservative assumption and takes into account a number of underlying assumptions and possibilities.

The absolute minimum average hourly loaded truck rate would be 15 trucks/hour, however this rate could not realistically be achieved given the variations in customer demands and fluctuations in supply at the mine. A realistic target would be a maximum of 18 trucks per hour. This could be achieved by:

- Minimising down time due to the trucking operators. Common breaks currently occur during lunchtime and shift changes.
- Ensuring that the correct numbers of trucks are operating each day.
- Ensuring that trucks are loaded with a minimum of 50 tonnes each load. At present, truck loads vary from 45 tonnes to 55 tonnes.

Ultimately, larger truck capacity could be introduced, however this would require modifications to the weighbridge and unloading point at Wallerawang Power Station. Providing larger trucks has the potential to further reduce peak truck numbers.

7.4 Implementation of Noise Management Strategy

The following factors need to be considered when implementing the noise management strategy:

- Coal supply from Angus Place to Delta Electricity is strictly governed by contract conditions. These conditions dictate both total tonnage over the contract period as well as delivery rate. The rate of delivery can vary according to coal reserves held at the power station, short term electricity supply contracts between Delta and regional distribution authorities and interactions between Wallerawang and Mount Piper Power Stations. Severe monetary penalties apply if contract conditions are not met.

- The truck loading rate is 1,200 tonnes per hour at the pit top. At 50 tonnes per truck load, the maximum theoretic number of trucks that would be loaded is 24 however in practice the time it takes for each loaded truck to leave the bin and be replaced by an empty truck limits the peak number to 23 per hour. This rate has been achieved on very rare occasions.

- The ideal rate of loading is 18 trucks per hour, which equates to 900 tonnes per hour. This can, and has been, consistently achieved to date.

- The management task of limiting truck peaks to 15 loaded trucks per hour may cause short term storage problems at the pit top. This option needs to be trialed before confirming that it can be successfully implemented.

- Limited truck speed to 80 km/hr also needs to be trialed before physical controls are imposed on the trucks. The trial would need to confirm that the reduced speed still allows at least one truck to be waiting for loading and unloading. If this can be confirmed then the option would be imposed first by management and training. If this proves ineffective speed governors would be installed on the trucks.

- The current transport contract expires in June 2007 and the implementation of these controls under the current contract could be negotiated with the contractor. There is currently no contractual mechanism to force the contractor to modify its truck fleet or otherwise restrict the effective usage of these trucks for general cartage.

7.5 Program

Information on the proposed management strategy is currently being gathered. Angus Place proposes to progressively implement the program based on the information collected and ongoing noise monitoring to verify the achievement of the anticipated noise reductions. The program for implementation, which is based on recommencement of longwall coal production in December 2005, will be as follows:

- By March 2006 confirm the ability to remove the bunching factor built into the noise model.
- By March 2006 identify individual trucks requiring first stage noise attenuation
- By April 2006 complete the truck trials to confirm optimal peak hourly truck movements
- By June 2006 complete the noise attenuation of the private trucks
- By July 2006 prepare and lodge a report to the Department of Environment and Conservation as part of a Pollution Reduction Program attached to the Environment Protection Licence detailing the implementation of the noise management strategy and include actual noise audit results.
- By December 2006 provide a program of options for further reducing noise levels if required.

8. Air Quality Assessment

Potential air quality impacts were identified by the Department of Planning as a key issue to be addressed in the Environmental Assessment. This issue is addressed in the following sections.

8.1 Dust Emissions

8.1.1 Existing Dust Emissions

Dust monitoring occurs at eight sites within the vicinity of the surface operations **(Figure 3)**. The average monthly total solid matter for all gauges was at or below 2 g/m^2/month compared to an EPA standard of 4 g/m^2/month with the exception of one gauge. There were six high readings from gauge 5 throughout the year resulting in an annual average result of 5.03 g/ m^2/month. The contents of the gauge at the time of the high readings included a grey dust. Dust gauge 5 is located on Angus Place land, around 800 metres from the nearest private resident. A recent micro analysis was carried out on the dust fallout monitored at DG 5. The results showed that less than 1% of the dust fall out collected was coal dust. The majority of material was of a silica base.

There was only one other result above the recommended limit. Dust gauge 3 recorded a level of 4.1 g/ m^2/month during September. Field notes recorded organics in the dust gauge which may have contributed to the elevated dust levels. Dust gauge 3 is located to the south of the mine car park. This gauge is not located adjacent a residential property and the elevated dust levels are unlikely to be effecting any nearby residential properties. The annual average from this gauge during 2004 was 2.06 g/ m^2/month.

8.1.2 Potential Impacts and Mitigation

Potential dust sources at the Colliery are unsealed or dirty traffic areas, coal stockpiles, ventilation fans and uncovered coal haulage trucks. The routine management of these potential sources will maintain depositional dust at appropriate levels, as evidenced above. Established dust controls for the existing surface facilities will be maintained and include:

- Provision of three quarter enclosures on the main conveyors. The enclosed portion is against the prevailing wind direction.

- Dust suppression sprays are being considered for the gantry conveyor. The recent construction of an underground feeder system creates significantly less dust than the previous manual excavation and loading using mobile plant.

- Installation of an enclosed coal chute at the stacking conveyor discharge point. This is based on passive dust control principles and has an inherently very low level of dust emission (greater than 98% reduction on conventional transfers).

- Enclosure of the main transfer point between the drift conveyor and the stacking conveyor. There is also an enclosed head chute and tail end feeder which minimises dust generation.

- Belt cleaners are located at the main conveyor end points to minimise fine coal being tracked along the underside of return belts.

Dust monitoring will continue to measure the impact of the proposed project (**Section 13.5**).

8.1.3 Dust Management for Pit Top

Infrastructure on the Pit Top has been designed to reduce dust generation. Dust reduction practices include:

- The recent construction of an underground feeder system creates significantly less dust than the previous manual excavation and loading using mobile plant.

- Installation of an enclosed coal chute at the stacking conveyor discharge point. This is based on passive dust control principles and has an inherently very low level of dust emission (greater than 98% reduction on conventional transfers).

- Enclosure of the main transfer point between the drift conveyor and the stacking conveyor. There is also an enclosed head chute and tail end feeder which minimises dust generation.

- Belt cleaners are located at the main conveyor end points to minimise fine coal being tracked along the underside of return belts.

Angus Place also has a surface environmental management system which covers general cleaning of hardstand areas, including beneath the existing conveyors.

Dust monitoring will continue to measure the impact of the proposed project, as described in **Chapter 13**.

8.2 Other Air Emissions

Angus Place does not require pre-draining or otherwise require gas controls. Exhaust gases from mine ventilation facilities essentially represent ambient air with slightly elevated carbon dioxide concentrations caused by operation of diesel equipment. No specific air quality controls are required nor implemented.

9. Heritage Assessment

Heritage issues, including European and Aboriginal Heritage were identified by the Department of Planning as a key issue to be addressed in the Environmental Assessment. This issue is addressed in the following sections.

9.1 European Heritage

As a part of the requirements for the Angus Place SMP, a search for areas of Heritage Significance was undertaken for the mining area. The search resulted in no items of heritage significance over the proposed project area.

9.2 Aboriginal Heritage

An aboriginal archaeological survey of the proposed mining area was coordinated by Environmental Resources Management Australia (ERM) as presented in the SMP (refer to Appendix G of the SMP). The survey was conducted from the 7th December 2004 through to 10th December 2004 and involved representatives of the Bathurst Local Aboriginal land Council (BLALC) and Gundungurra Tribal Council Aboriginal Corporation (Gundungurra).

It is noted in the report that subsidence effects caused by longwall mining will not impact upon all Aboriginal heritage site types. Landforms located along creeklines and valley floors are at greatest risk, whilst sites located on flat or gently undulating topography are at minimal risk. Site types of greatest risk include rockshelters, rock art and grinding groves. Other sites including artefact scatters and scarred trees are unlikely to be at risk.

The surveys were targeted to examine landscape areas that had both a high potential to yield at risk Aboriginal heritage and areas that were considered at high risk of experiencing subsidence impacts. The surveys undertaken therefore were designed to follow watercourses, which form valley landforms within the study area.

No Aboriginal heritage sites with the potential to be impacted by longwall mining were found in the Angus Place extended mining area and analysis of the landforms observed during site survey suggests that it is unlikely such sites would be present.

9.2.1 Potential Impacts on Archaeology

ERM noted that occasional individual artefacts may occur undetected within the Angus Place mining area due to the low ground visibility. Despite this, simple open stone artefact scatter sites or open archaeological deposits are not likely to be affected by subsidence impacts. Despite the fact such sites were not detected in the current survey due to poor visibility, no further effort is warranted to identify or assess such sites.

It was found that no Aboriginal heritage sites with the potential to be impacted by longwall mining were found in the Angus Place project area, and analysis of the landforms observed during site survey suggests that it is unlikely such sites would be present.

10. Flora and Fauna Assessment

Potential impacts on Flora and Fauna resources within the mining area were identified by the Department of Planning as a key issue to be addressed in the Environmental Assessment. This issue is addressed in the following sections.

10.1 Flora

Flora surveys have been undertaken by Mr Roger Lembit of Gingra Ecological Surveys as shown in Appendix C.

10.1.1 Existing Vegetation Units

Baseline and continuing monitoring has identified three (3) plant communities occurring in the proposed mining area. These include Newnes Plateau Woodland, Montane Gully Forest and Newnes Plateau Shrub Swamp. Detailed descriptions of these communities are included in the SMP.

The majority of the study area supports Newnes Plateau Woodland, with other communities being restricted to relatively small areas close to the boundaries of the study area. Only two vegetation units (Newnes Plateau Woodland and Newnes Plateau Shrub Swamp) occur above proposed Longwalls 930-980 (see attached plan "Vegetation Units Longwalls 920-980 in Appendix D of the SMP). Within these two communities, three flora species listed under the Threatened Species Conservation Act 1995 potentially occur (*Boronia deanei, Derwentia blackelyi and Persoonai hindii*), however, only *Boronia deanei* has been positively identified in the field. This was identified during an options assessment for Angus Place infrastructure. The area in which the species was identified was avoided and did not require further assessment. This options survey was not documented.

10.1.2 Potential Impacts on Vegetation Communities

The dominant vegetation system in the proposed mining area is Newnes Plateau Woodland. This community exists on relatively deep soil profiles which are not adversely affected by subsidence. It has been subject to previous underground mining and monitoring indicates that there is no evidence that detrimental effects have occurred.

Monitoring within Newnes Plateau Shrub Swamps to date has not shown any impact from underground mining. These have recently been listed as an endangered ecological community under the TSC Act 1995. An eight-part test was conducted (Appendix D) and concludes that the proposed longwall mining operation is not likely to have a significant impact on Newnes Plateau Shrub Swamp and a Species Impact Statement is not required. The nature of the proposed mining operation and experience of longwall mining beneath the Newnes Plateau at Angus Place and Springvale indicate that the mining operation proposed will not cause any significant alteration of habitat.

10.1.3 Species of Conservation Significance

A number of rare, threatened or significant plant species have been recorded for the Wallerawang 1:100 000 map sheet. However, few of these species have been recorded for the Angus Place mining areas and even fewer are considered likely to occur within the current study area due to the lack of diversity of vegetation types in the area.

Table 10.1: Plants Species from the Wallerawang Area listed under the Threatened Species Conservation Act 1995 or Environmental Protection and Biodiversity Conservation Act 1999.

SPECIES	LOCATION	HABITAT
Acacia bynoeana	Dargans Creek	Montane Heath
Apatophyllum constablei	Glen Davis	Talus-slope Woodland
Boronia deanei	Newnes Plateau, Springvale Coal Lease area	Newnes Plateau Shrub Swamps
Darwinia peduncularis	Plateaux near Glen Davis	Pagoda Complex
Derwentia blakelyi	Newnes Plateau, Clarence, Springvale Coal Lease area,	Newnes Plateau Woodland
Eucalyptus cannonii	Mount Piper, Cullen Bullen, Pearsons Lookout	Talus-slope Woodland, Tablelands Grassy Woodland Complex, Capertee Valley Woodland
Grevillea evansiana	North of Glen Davis	Pagoda Complex, Sydney Sandstone Ridgetop Woodland
Grevillea obtusiflora ssp. foecunda	Capertee Valley	Talus-slope Woodland
Haloragodendron lucasii	Yarramun Creek, Bungleboori Creek	Montane Gully Forest
Leionema sympetalum	Glen Davis	Talus-slope Woodland
Persoonia acerosa	Dargans Creek	Pagoda Complex
Persoonia hindii	Newnes Plateau	Sclerophyll forest or woodland
Persoonia marginata	Capertee, Kandos State Forest	Tablelands Grassy Woodland Complex
Prostanthera cryptandroides	Glen Davis, Mount Gundangaroo, Green Gully	Talus-slope Woodland
Prostanthera stricta	Capertee Valley, Genowlan Mountain	Talus-slope Woodland, Scribbly Gum-Stringybark Woodland
Pultenaea glabra	Mount Wilson, Mount Irvine	Newnes Plateau Shrub Swamps
Pultenaea sp. (Genowlan Point)	Mount Genowlan	Scribbly Gum-Stringybark Woodland

Only three species from **Table 10.1** (bold type) have been recorded during the Angus Place vegetation monitoring program - *Boronia deanei, Persoonia hindii* and *Derwentia blakelyi*.

10.1.4 Potential Impacts on Threatened Species

Eight part tests have been completed on these species to determine whether or not a Species Impact Statement (SIS) is required. The eight part tests found that longwall mining is not likely to have a significant impact on any of the species. Consequently, no SIS is required. The eight part tests are included in SMP while

a separate eight part test has been prepared for the Newnes Plateau Shrub Swamp Endangered Ecological Community (refer to **Appendix D).**

10.2 Fauna

Long term fauna monitoring sites have been established at Angus Place Colliery by Mount King Ecological Surveys. The purpose of this work is to identify impact (if any) of mining induced subsidence on native fauna. The aim of the surveys to date has been to collect terrestrial fauna base-line data to be used to monitor changes (if any) in populations that may occur over time. Information regarding the presence of fauna, species diversity, population numbers and habitat characteristics were also obtained. Fauna monitoring is further discussed in **Chapter 13**.

Fauna monitoring was undertaken in winter/spring, and summer of 2004. The results from this monitoring are included in (refer to Appendix E of the SMP). The surveys recorded a total of 48 bird, three reptile, one amphibian and 13 native (plus three introduced) mammal species within Angus Place Colliery mining area. Although the number of herpetofauna species was low (due to the cold conditions), the bird and mammal species diversities were typical of that expected from the Central Tablelands. The recently described Agile Antechinus is a new record for the area.

10.2.1 Threatened Fauna Species

Four endangered species and 24 vulnerable species (as listed under the TSC Act) have been previously sighted within a 20km radius of the mining area. Of these species, five have been sighted during fauna monitoring at Angus Place. (see **Table 10.2)**.

Table 10.2 Threatened and Endangered Species previously recorded within Angus Place including the Proposed Project Area

Common Name	Schedule Threatened Species Conservation Act 1995	2004 Sightings within mining area	Previous Sightings within Angus Place Lease area	Previous Sightings within a 20 Km radius of the mine	Results from 8 Part Test carried out
Stuttering Frog	Endangered			1	
Blue Mountains Water Skink	Endangered		1(near west branch of Wolgan River)	10	V. low potential to be significantly affected
Broad-headed Snake	Endangered		1(ridge at headwaters of Wolgan River)	1	Will not be significantly affected
Regent Honeyeater	Endangered		1(1996 at NW cnr of mine boundary	19	Will not be significantly affected
Hooded Robin	Vulnerable	1		5	Will not be significantly affected

Common Name	Schedule Threatened Species Conservation Act 1995	2004 Sightings within mining area	Previous Sightings within Angus Place Lease area	Previous Sightings within a 20 Km radius of the mine	Results from 8 Part Test carried out
Rosenberg's Goanna	Vulnerable			1	Will not be significantly affected
Red-crowned Toadlet	Vulnerable			3	V. low potential to be significantly affected
Glossy Black-cockatoo	Vulnerable			17	Will not be significantly affected
Turquoise Parrot	Vulnerable			5 sites	Will not be significantly affected
Square-tailed Kite	Vulnerable			4	Will not be significantly affected
Powerful Owl	Vulnerable		1	6	Will not be significantly affected
Brown Treecreeper	Vulnerable	1		19	Will not be significantly affected
Diamond Firetail	Vulnerable			6	Will not be significantly affected
Speckled Warbler	Vulnerable			3	Will not be significantly affected
Brush-tailed Rock-wallaby	Vulnerable		1 (1998 Sunnyside Ridge E edge mine)	5	Will not be significantly affected
Koala	Vulnerable		1 (see above)	16	Will not be significantly affected
Spotted-tailed Quoll	Vulnerable		1 (1996 near Blackfellows Hand Rock)	6	Will not be significantly affected
Yellow-bellied Glider	Vulnerable			5	Will not be significantly affected
Squirrel Glider	Vulnerable		1 (1998 near Wolgan River)	3	Will not be significantly affected
Eastern Pygmy-possum	Vulnerable			1	Will not be significantly affected
Eastern Bentwing Bat	Vulnerable	1	2 (1998 near Sunnyside Ridge and Wolgan River)	11	Will not be significantly affected
Eastern False Pipistrelle	Vulnerable	1	1 (1998 near Sunnyside Ridge)	11	Will not be significantly affected
Large-eared Pied Bat	Vulnerable			8	Will not be significantly affected
Giant Dragonfly	Vulnerable			Numerous	V. low potential to be significantly affected
Bathurst Copper Butterfly	Vulnerable			28	Will not be significantly affected
Black-chinned Honeyeater	Vulnerable	1		5	Will not be significantly affected

Common Name	Schedule Threatened Species Conservation Act 1995	2004 Sightings within mining area	Previous Sightings within Angus Place Lease area	Previous Sightings within a 20 Km radius of the mine	Results from 8 Part Test carried out
Barking Owl	Vulnerable			3	Will not be significantly affected
Swift Parrot	Vulnerable			19 (six sites)	Will not be significantly affected

There are other threatened species known from the general area surrounding Angus Place Colliery e.g. Freckled Duck (*Stictonetta naevosa*) and Blue-billed Duck (*Oxyura australis*), but their precise locations are not known.

A shown above, five threatened species were located during the 2004 surveys. These were the Brown Treecreeper, Hooded Robin, Black-chinned Honeyeater (eastern sub-species), the Eastern Bent-wing Bat and the Eastern False Pipistrelle. The bird species are part of a suite of threatened species that are listed because of their declining population status within the western slopes of NSW. In the Newnes Plateau region woodland habitat has been retained (albeit logged), and such bird species are still to be located. Future monitoring within the mining area will continue to determine the presence of species. This monitoring will be ongoing and will be continually compared to the baseline monitoring as presented in **Table 10.2** (above)

10.2.2 Impact on Threatened Species

Eight Part tests have been carried out on each of these species to determine whether or not underground mining activities will have an impact on them or their habitat. The eight part tests are included in Appendix E of the SMP which concluded that expected implications would be minor if any and that a Species Impact Statement would not be required.

Due to their reliance on sensitive habitat types some threatened species that will be subject to particular monitoring in the future include Stuttering Frog, Broad-headed Snake, Giant Dragonfly, Eastern Bentwing Bat, Large-eared Pied Bat, Blue Mountains Water Skink, Red-crowned Toadlet and Brush-tailed Rock Wallaby.

11. Transport Assessment

Transportation, and in particular the transport of coal to Wallerawang Power Station was identified by the Department of Planning as a key issue to be addressed in the Environmental Assessment.

11.1 Transport Impact

Transport of coal be internal haulage roads are key components of the Development. There will be no impact on use of the public road system as a result of this development. The proposal includes the continuation of the existing truck transportation but at a higher rate. The key environmental issue associated with the transport is noise from the private haul road and this is assessed separately in Chapter 7.

The truck loading rate is 1,200 tonnes per hour at the pit top. At 50 tonnes per truck load, the maximum theoretic number of trucks that would be loaded is 24 however in practice the time it takes for each loaded truck to leave the bin and be replaced by an empty truck limits the peak number to 23 per hour. This rate has been achieved on very rare occasions.

11.2 Transport Impact Management

In order to progressively reduce the impacts of transportation noise on the nearest residential receptors, which are those located adjacent to, or nearby, the private haul road to Wallerawang Power Station, a Noise Management Strategy will be progressively implemented. This strategy is discussed in Chapter 7, which when fully implemented, well reduce the noise impacts of the future trucking operation to below that experienced at present.

12. Social and Economic Assessment

Social and economic impacts resulting from the proposed development were identified by the Department of Planning as a key issue to be addressed in the Environmental Assessment.

The continuation of mining does not involve any impact on any private land holdings or land improvements. There are no known groundwater users within or surrounding the mining area.

The continuation of mining will ensure the ongoing employment of 215 employees plus additional contractors, casuals and support for local businesses. The continuation of operation at Angus Place will result in ongoing expenditure at the mine, including maintenance, services and materials the majority of which will continue to be invested in the local economy.

There has been significant capital investment made at Angus Place over recent years and ongoing economic contributions to the local economy will result from the extension of the mine. The continued economic activity within the Lithgow region, and in particular the local area, will ensure the continued support of local business.

The New South Wales Government will benefit directly from a continuation in revenue associated with taxes, royalties, charges and other indirect revenues. The National economy will benefit from continuing taxes including Australian corporate tax on profits generated, indirect taxes and excise (fuel, fringe benefits tax, payroll tax, goods and services tax etc).

The primary social issue is the noise produced from both the pit top and trucking operation. A number of mitigation measures have been proposed to further reduce the impact of noise on local residents. The implementation of these measures combined with ongoing consultation should ensure that this issue is controlled in the future.

13. Environmental Monitoring and Management

The Colliery is an established operation that has in place environmental management procedures and systems. These relate mainly to the appropriate environmental management of the existing surface facilities. As described in safeguards and mitigation in the previous section, appropriate management practices will be maintained.

The new Subsidence Management Plan process creates a comprehensive environmental management discipline for subsidence. The SMP for Angus Place was submitted in early June and is currently being reviewed by the relevant government authorities as well as the SMP interagency committee. The SMP is included in digital form as Appendix C and when approved and implemented will result in various environmental management outcomes.

The monitoring of the existing operation is an integral part of the operational performance assessment and this will be maintained. A detailed subsidence monitoring programme will be developed in consultation with the DPI to monitor vertical subsidence, tilts and strains where appropriate. This will be accompanied by detailed environmental monitoring programmes as described below, to determine the performance of the impact assessment and identify any further investigations and actions that may be required.

The results of all proposed monitoring will be regularly analysed for trends. Trigger points for further investigations will be determined in consultation with relevant agencies prior to mining. The results of environmental monitoring and any further investigations will be included in the AEMR.

13.1 Groundwater Monitoring

A detailed monitoring program has been put in place on the Newnes Plateau to monitor the effects of subsidence on aquifers and swamps using piezometers, nested piezometers and extensiometers as shown **Figure 8.** These instruments measure depth continuously using dataloggers that are downloaded regularly. Piezometers have been established in each swamp and on the ridgelines between each swamp. These instruments monitor the upper aquifer, AQ5. This has been identified as a priority since AQ5 supplies groundwater to the swamps and is therefore considered the most important aquifer.

13.2 Surface Water

Stream flow monitoring, conducted since early 2004, has been established to monitor both upstream and downstream flows in Kangaroo Creek, Narrow Swamp and East Wolgan Swamp. This allows the comparison of upstream and downstream flows to determine changes in water flows across the mining area (**Figure 6**). Stream flow monitoring will continue at two weekly intervals at these

points to further establish baseline stream flow trends prior to the commencement of longwall mining. A Pygmi Stream Flow meter records the average stream flows in Kilolitres per day across the stream at the monitoring point. Various water quality parameters are also assessed, including:

- Total suspended solids
- pH
- Electrical conductivity
- Manganese
- Iron and
- Temperature

Water quality and discharge volume monitoring will also continue as required by the EPL. Results of this monitoring will be reported annually in the annual return and the Annual Environment Management Report (AEMR)

13.3 Shrub Swamps

Specific monitoring will be undertaken at identified Newnes Shrub Swamps as shown in **Table 13.1**.

Table 13.1. Shrub Swamp Monitoring Program

Site	Groundwater	Fauna	Flora	Photo survey
East Wolgan Swamp	2 continuous data loggers 50m apart	1 site – 6 monthly	2 quadrats - quarterly	Prior to mining
West Wolgan Swamp	2 continuous data loggers 50m apart	1 site – 6 monthly	4 quadrats - quarterly	Prior to mining
Narrow Swamp	2 continuous data loggers 50m apart	1 site – 6 monthly	4 quadrats - quarterly	Prior to mining

13.4 Flora and Fauna

In addition to the Shrub Swamp flora monitoring (**Table 13.1**) additional flora monitoring is proposed within the Newnes Plateau area. This includes quarterly monitoring of 4 vegetation quadrats within the Newnes Plateau area as shown on **Figure 6.**

Four long term fauna monitoring sites have been established to collect baseline data, then to monitor changes (if any) which may occur. These sites are shown in **Figure 6**. Monitoring will continue on a 6 monthly basis. Additional sites are currently being considered for Kangaroo Creek, Newnes Plateau Shrub Swamp or Woodland and these may be included in the monitoring program when appropriate.

13.5 Dust Monitoring

The Colliery will maintain its network of depositional dust monitoring as shown on **Figure 2 and 3**.

13.6 Noise Monitoring

Periodic noise monitoring and/or modelling will be undertaken in accordance with the noise management strategy to ensure compliance with relevant criteria.

Declaration:

This document has been prepared by:

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29 January 2006

Appendix A – Director General's Requirements

Appendix B – Development Consents

Appendix C – Angus Place SMP

Appendix D – Eight Part Test – Newnes Plateau Shrub Swamp

Appendix E – Noise Assessment