Austar Coal Mine

Statement of Environmental Effects

Section 96 Modification
Stage 2
Longwall Panels
A3 – A5

September 2007

Document Control

DOCUMENT DETAILS	**Title**	Section 96 Modification for Stage 2 Longwall PanelsA3 – A5		
	Reference	SoEE Stage 2		
	Revision No	Final		
	Document Status	Approved		
APPROVAL DETAILS	**Revision**	**Date**	**Prepared**	**Approved**
	0	17 September 2007	Keren Halliday	Matthew Fellowes
CIRCULATION	**Organisation**	**Representative**	**Hard copy**	**CD**
	Department of Planning	Paul Freeman	3	10
	Department of Environment and Climate Change	Mitchell Bennett	4	1
	Department of Primary Industries	Julie Maloney	3	1
	Department of Water and Energy	Mark Mignanelli	2	1
	Cessnock City Council	Rod Sandell	3	10
	Mine Subsidence Board	Greg Cole-Clark	1	1
	Hunter-Central Catchment Management Authority	Executive Officer	1	1
	Roads and Traffic Authority	David Young	1	1
	Nature Conservation Council	Executive Officer	1	10

TABLE OF CONTENTS

TABLE OF CONTENTS

ANNEXURES

A Notice of Modification Section 96(2) Modification for Stage 1

B Stage 2 Mining Area Community Involvement Program Report" including community petition form letter, company response and SMP advertisement Coakes Consulting (February, 2007)

C The Prediction of Subsidence Parameters and the Assessment of Mine Subsidence Impacts on Natural Features and Surface Infrastructure Resulting from the Extraction of Proposed Austar Longwalls A3 to A5 in Support of a SMP Application MSEC Report No. MSEC275

D Flooding Assessment Longwalls A3, A4 &A5 Umwelt (February 2007) Report No. 2274/R07/ V2

E Austar Stage 2 Subsidence Management Plan – Environmental Attributes, Impacts and Controls Umwelt (February 2007) Report No. 2274/R06/V2"

1 INTRODUCTION

1.1 BACKGROUND

The Minister for Urban Affairs and Planning granted development approval to the project in 1996 subject to certain conditions. The 1996 consent (DA29/95) permits mining in Consolidated Mining Lease 2 (CML2) with a production rate of up to three million tonnes of coal per annum by conventional retreat longwall mining. The approved extraction height allows up to 4.5 metres of extraction from the Greta seam. The consent also allows for the processing and transport of coal to the Port of Newcastle. Figure 1 shows the locality of the mine and boundaries of the mining leases.

The mine introduced an enhanced form of the conventional retreat longwall system to the Australian Coal Mining Industry in 2006 called Longwall Top Coal Caving (LTCC). To allow for the introduction of LTCC to panels A1 and A2, a modification under section 96(2) of the Environmental Planning and Assessment Act was sought in 2006. The Minister for Planning approved the modification to allow the extraction of up to 6.5 metres of coal in panels A1 and A2 subject to a number of conditions. The Notice of Modification issued on 27 September 2006 is provided in Annex A.

LTCC technology is ideal in thick seams and enables significantly greater resource recovery in seams such as the Greta Seam. Extraction from A1 is nearing completion and results show that the introduction of LTCC has been very successful. It is proposed to continue the use of LTCC with extraction heights up to 6.5 metres in longwall panels A3, A4 and A5. Approval is therefore sought under section 96(2) to cover the use of LTCC in panels A3, A4 and A5.

Without modification to the existing consent, the additional resource recovery currently available to the longwall system will not be realised and the coal resource left behind would be sterilised.

1.2 PROJECT OVERVIEW

Austar Coal Mine is a deep underground coal mine located 10km south of Cessnock in the Newcastle Coalfield. In 2006 a section 96 modification was granted to allow the introduction of LTCC technology. Longwall A1 is currently being extracted using the LTCC technology and development drivage is continuing in preparation for Longwall A2.

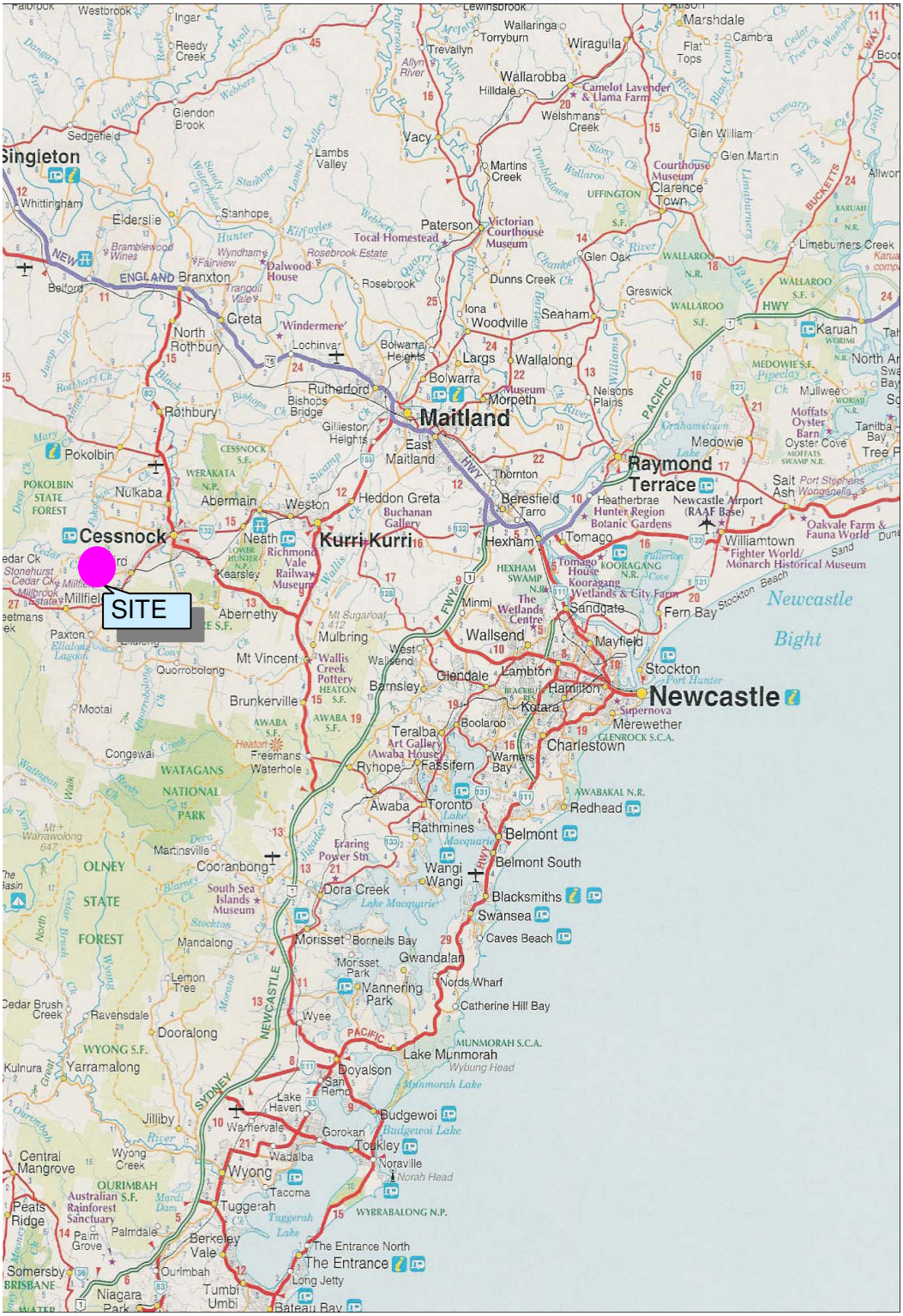

FIGURE 1 *Austar Coal Mine Locality Plan*

The Stage 2 modification involves the proposed extraction of the subsequent three longwall panels named A3, A4 and A5 beneath privately held small rural residential properties at Quorrobolong. Longwall extraction will use exactly the same method as for Stage 1 using the same LTCC equipment. This modification seeks approval to extract the maximum seam height of up to 6.5 metres. However, due to variation in the seam height and coal quality requirements the extraction height will also vary.

It is estimated that approximately 4,600,000 tonnes of coal including development and longwall recovery will be recovered from the three panels. The production rate will not exceed 3,000,000 tonnes of coal per annum which is approved under the current Development Consent (DA 29/95).

There will be no change to the system of coal handling which is operated in accordance with existing approvals. Coal will continue to be brought to the surface by the existing underground conveyor system and transferred to the overland conveyor system to the washery near Pelton. Product coal will continue to be transported primarily by rail to the Port of Newcastle.

No additional surface infrastructure is required to mine Stage 2 of the Project.

1.3 PURPOSE OF THE STATEMENT OF ENVIRONMENTAL EFFECTS

Approval was granted to extract coal by longwall methods in the area covered by Longwalls A3, A4 and A5 under DA29/95. The introduction of LTCC provides the opportunity to increase the height of extraction and recover more coal than possible using conventional longwall methods. Approval is therefore sought under section 96(2) of the *Environmental Planning and Assessment Act 1979 (EP & A Act)* to modify the existing consent to allow for the increased extraction height within the Greta Seam.

This Statement of Environmental Effects (SoEE) supports the application by assessing the environmental impacts of the project and comparing them to those impacts predicted in the 1996 consent.

The mine currently holds development consent approval to extract up to 4.5m of coal from the Greta seam. The proposed mine layout is essentially the same as that assessed and approved in 1996 with the exception of the extraction height. The equivalent coal extraction height under this proposal, which is a controlling feature of mine subsidence generation, is of the order of 4.7 metres. This represents an increase in extraction height of 0.2 metres will have marginal influence to subsidence impacts for deep mines.

The impact assessments conducted to support both this application and a Subsidence Management Plan application as required by the Mining Act 1992, are more detailed than those required and presented in the 1995 EIS. This reflects improvements and progress made in environmental impact assessment requirements over the last decade. The subsidence predictions

and the conclusions reached in this impact assessment are substantially the same as those in the 1996 EIS and no issues have been identified that are not readily manageable.

Chapter 2 details the subtle differences in mining method assessed in 1995 and mine layout. The layout has changed primarily to accommodate the geological conditions that were not well defined at the time of the 1995 EIS.

This SoEE assesses the environmental issues relevant to consideration of the application as required in accordance with Section 79(C) of the EP & A Act and covers the issues previously identified by the Department of Planning.

The mine is located in the Cessnock Local Government area. However, the Minister is the approval authority for this application for modification as the Minister issued the original Consent in 1996.

1.4 SITE DESCRIPTION

Figure 1 shows the Stage 2 study area including the locations of longwall panels A3, A4 and A5. The area is known as Quorrobolong and is approximately 10 kilometres south of Cessnock and 3 kilometres east of Ellalong.

The study area is characterised by small rural properties ranging in size from 8ha to 44ha. The majority of the area has been cleared and includes a variety of rural activities including grazing, vineyards and olive groves. There is a small area which contains disturbed native vegetation.

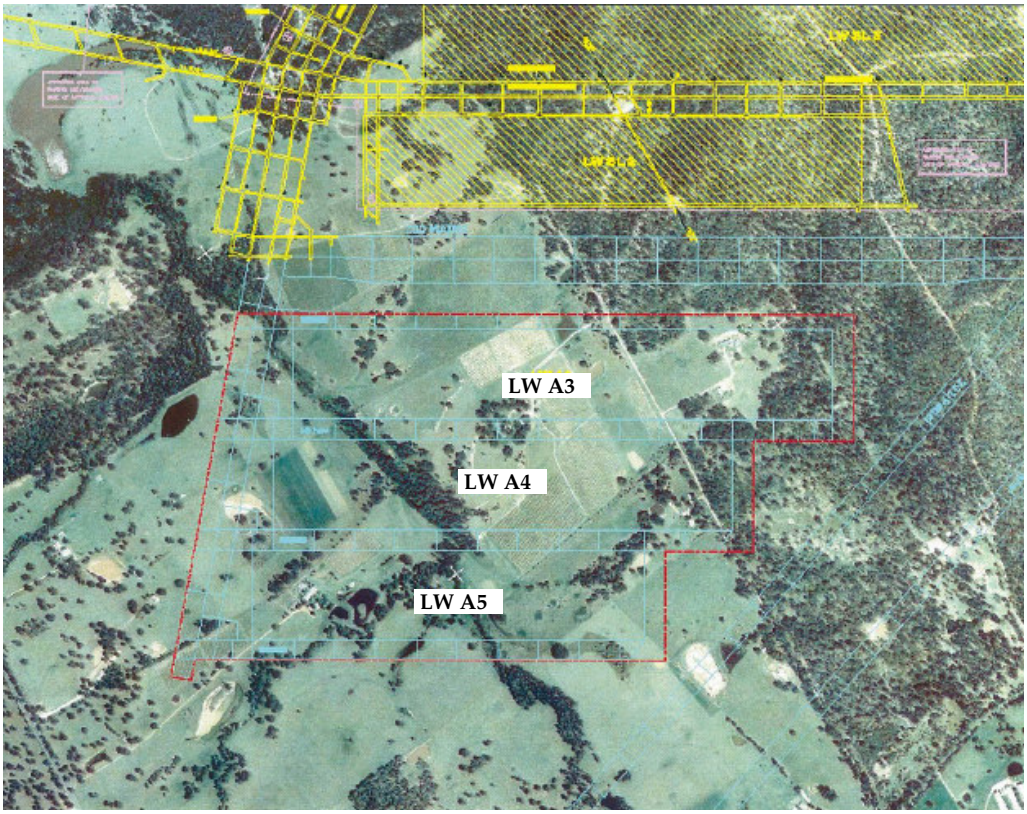

Figure 2 - Stage 2 Assessment Area

2 PROPOSED MODIFICATION

2.1 OVERVIEW

The 1996 Development Consent (DA 29/95) covers mining in the Greta Seam including the area now referred to as Stage 2. The 1996 consent was based on conventional retreat longwall mining with extraction heights ranging from 3.5 to 4.5 metres. The maximum production rate of 3,000,000 tonnes of coal per annum.

The only modification required for Stage 2 is an increase in the maximum allowable extraction height from 4.5 metres to 6.5 metres. This will allow the use of LTCC technology enabling greater resource recovery. All other aspects of the operation will continue in accordance with the existing approvals.

In September 2006 a section 96 modification to DA 29/95 was granted for Stage 1 of the Project. The modification allowed for an increase in extraction height (to 6.5m) for Longwalls A1 and A2 and a number of surface infrastructure upgrades. The modification for Stage 2 is seeking the same increase in extraction height for Longwalls A3, A4 and A5 although no changes to surface infrastructure are required.

2.2 LONGWALL TOP COAL CAVING TECHNOLOGY (LTCC)

2.2.1 Overview

LTCC is substantially the same as conventional retreat longwall mining system. It is an enhanced conventional retreat longwall face modified specifically for the extraction of thick coal seams. A second armoured face conveyor (AFC) is towed behind the shields to recover coal that would otherwise fall into the goaf and be lost. The roof supports are of a modified design incorporating a system of hydraulically operated tail-canopies at the rear of the support. These tail pieces work as chutes such that the broken coal in the goaf area can be recovered onto the second AFC. This process is allowed to continue until all of the coal is recovered and waste rock appears. At this time, the tail canopies can be raised (or extended) and the "chutes" shut. The rear AFC is then pulled forward to stop recovery of product from the goaf.

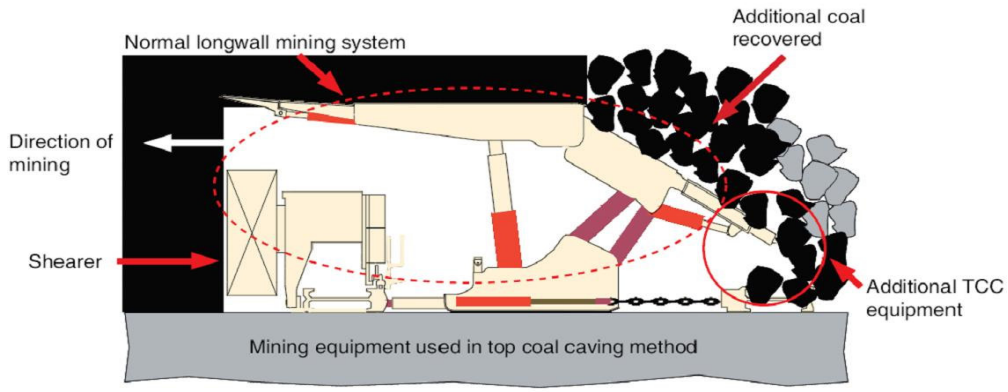

Figure 3 LTCC SYSTEM OF MINING

The operation steps in LTCC are generically described as:

- shearing coal in front of the AFC;
- pulling the support forward and resetting the support to the roof;
- opening the tail-canopy of support to allow broken coal to spill onto the rear conveyor;
- pulling forward the rear conveyor; and
- pushing the front conveyor.

2.2.2 Use of LTCC

The use of LTCC has proven very successful in panel A1 allowing greater resource extraction than could have been achieved using traditional longwall techniques. After 1100m of retreat in LWA1, the LTCC equipment had recovered 648,000 tonnes from the shearer and 544,000 tonnes from the rear caving process for an overall recovery of 90.4% or 1,202,000 tonnes of resource from the 6.5 m thick longwall panel. Only 59mm of subsidence has been recorded which is in line with the predictions.

LTCC has also proven very safe with over 1 year of no Lost Time Injuries (LTI). There has been no indication of accelerated oxidation from mining Longwall A1 panel indicating that the Spontaneous Combustion Management Plan is in full control.

The system operates the longwall face with a low and stable primary cut (3m) which has provided excellent face and strata control with obvious safety and efficiency improvements when compared against conventional single slice thick seam longwall systems. The system is acknowledged as a major improvement for the extraction of the thick Greta seam coal resource and has received significant interest from major mining houses in possession of the thick seam assets throughout Australia and New Zealand.

The objective of introducing LTCC technology to the Australian coal mining industry has been realised and a Stage 2 approval would continue to allow the technology to be show cased. Up to 23% of coal resources along the Eastern states of Australia have been identified as potentially suitable for LTCC

extraction. Without its further development and implementation, there will potentially be millions of tonnes of coal resources sterilised.

2.3 MINE PLAN

2.3.1 Overview

The layout of Panels A3 to A5 is generally in accordance with the conceptual mine plan approved in 1996. Panels A3 to A5 correspond with LW 17 to LW 19 respectively. Some minor modifications to the alignment and panel length have been incorporated to accommodate geological constraints identified following the approval of the conceptual mine plan provided in the 1995 EIS. Figure 3 shows the approved conceptual mine and the final layout of Panels A3 to A5 that are covered by this application to modify the consent.

The geology in the area was not well delineated in 1995 and the conceptual plan was based on information available at the time. Additional exploration and geotechnical analysis since 1995 has provided more detailed geological knowledge of the area.

The minor change in rotation of the panels is due to the influence of joint and stress orientation on the serviceability, stability and safety of mining the panels. Probable mining conditions as a result of joints and stress orientation can be predicted by geotechnical modelling and also by studying the orientation of previous longwall panels and the conditions encountered. The orientation finally used in the area and currently proposed provides marked improvements when compared with the conditions encountered during the mining of Longwall 13 which was aligned on the 1995 mine plan orientation.

The other adjustments and justification for the proposed mine plan is explained in detail in the following sections.

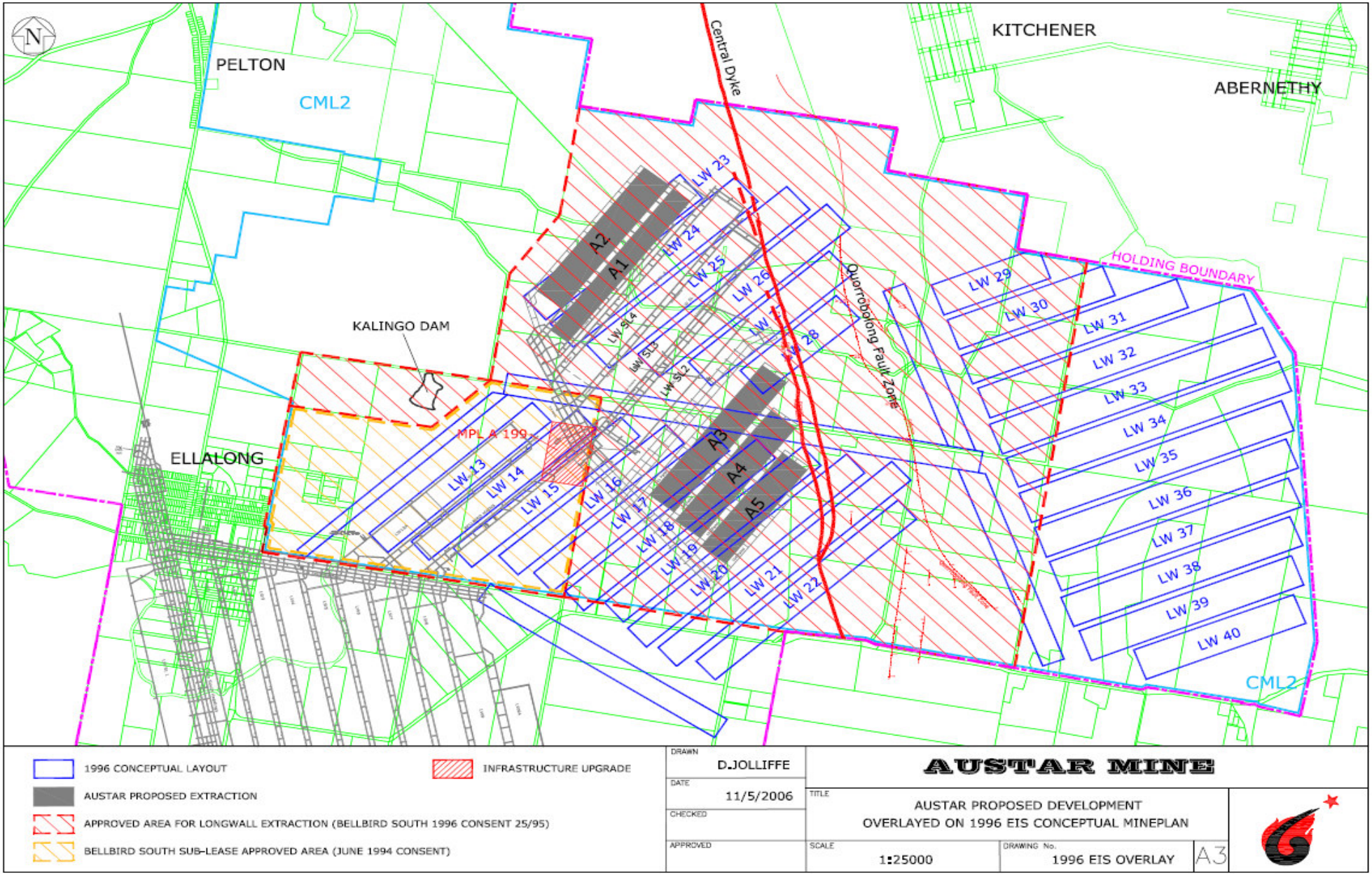

Figure 4 - Longwalls A3 - A5 proposed and as shown in 1996 EIS

2.3.2 *Justification of the Mine Plan*

There are a number of considerations that have influenced the final mine plan. They are summarised as follows:

Physical and Geological Boundaries

The study area has several geological features and mine access issues that provide natural boundaries to mining. These include:

- Swamp Fault Zone;
- Central Dyke;
- previously extracted SL2 panel; and
- the need to access future mine resource areas.

Access to future resource areas within CML2

Stage 2 of the project will provide for 3 years of mining based on the current forecast production rate of approximately 1.7 Mtpa. To provide for future development within the Greta seam, a series of main headings will be incorporated in the mine plan. To facilitate this longer term requirement the only viable option available is to provide a set of mains parallel with SL2 panel.

This option will:

- optimise the resource to the north-east of the Central Dyke and in particular the Quorrobolong Fault Zone, the main geological feature that delineates mine planning options for the remainder of the life of mine reserves within CML2;
- connect with a new upcast shaft site owned by Austar; and
- maintain continuity of longwall operations at the mine.

Natural Surface Constraints

The major natural features identified are the creek systems comprising Quorrobolong and Cony Creeks and the flood prone Quorrobolong Valley. The alignment of these features to the study area restricts the options for mine design to influence the impacts.

Panel Orientation

There were three options available to fit a workable mine design into the constrained study area. The longwall panels could be aligned sub-parallel with SL2 panel, the Swamp Fault Zone or the Central Dyke. The sub parallel with SL2 panel was selected as the principle stress direction is significantly more favourably aligned than the other two options.

It places a set of main headings against the Swamp Fault. This reduces the potential for the Swamp Fault to cause major impact to mine design due to

unknown deviation of the fault and removes the secondary extraction area well away from the fault system.

Additionally, the area immediately north of the Swamp Fault Zone has comparatively higher sulphur and lower thickness than moving away from the Swamp Fault Zone. This makes the area a preferable location for the placement of main headings optimising resource recovery within the study area.

The alignment also approaches the Central Dyke favourably. The potential impact due to silling is reduced and significant coal abutments will be left adjacent to the Central Dyke.

2.4 REJECT HANDLING AND DISPOSAL

There will be no change to the current approved system of coal handling, transport and reject disposal. Coal will continue to be brought to the surface by the underground conveyor system and transferred to the overland conveyor system to the washery near Pelton. Product coal will continue to be transported to the Port of Newcastle. Coarse and fine rejects will continue to be managed in accordance with the provisions set out in the MOP. The disposal of reject material is an integral component of the rehabilitation strategy for the site and long term mine closure plan as identified in the MOP.

2.5 RESOURCE ASSESSMENT

The coal resources in Stage 2 are in the Greta seam which is part of the Greta Coal Measures. The seam is approximately 6.5 metres thick and dips to the south-east at 3 to 6 degrees. The Greta seam contains only minor non-coal bands. The seam floor is usually sandstone and mudstone and the seam roof is usually coarse pebbly sandstone and conglomerate. The upper levels of the Greta seam commonly contain high levels of pyrite. Overburden depth ranges from 470 metres to a maximum of 545 metres.

The 1996 consent allows for the removal of a seam thickness of up to 4.5 metres which was based on the maximum capacity of the equipment available at the time. However, the introduction of LTCC technology will allow the full thickness of the Greta seam (ie. 6.5 metres) to be extracted.

The coal is classified as a high volatile low ash bituminous coal, with high specific energy, high fluidity and medium to high sulphur content, making it suitable for export as a coking coal.

2.6 RESOURCE RECOVERY

The mine layout for the area is governed by the constraints discussed in Section 2.3. A comparison has been made extracting the proposed mine layout under the existing DA25/95 consent and what is available to be recovered by the granting of this modification and using LTCC.

Existing consent 4,638,000 tonnes

As proposed using LTCC 4,996,000 tonnes

An additional 358,000 tonnes of coal will be available for recovery if the proposed modification to the consent is approved.

2.7 KEY BENEFITS FROM MODIFICATION

The use of LTCC in panels A3 to A5 will provide a number of direct and indirect benefits. The LTCC system has several major advantages over standard longwall machinery for extracting thick coal seams. Up to 23 % of the coal reserves in the eastern states of Australia have been identified as suitable for extraction by the LTCC method.

Standard longwall machinery is restricted to extracting a maximum height of 4.5 metres. In the case of thick seams such as the Greta seam, a significant portion of coal is sterilised with coal lost in the goaf. The LTCC system can extract up to 80 % of the additional seam section that would otherwise be sterilised in seams ranging 5 to 12 metres thick.

The system has proven to provide safety advantages to thick single slice operations in the areas of face stability and control of operation as well as spontaneous combustion management. Safety statistics from extraction in panel A1 support these findings with Austar achieving 1 year of operation with no lost time injuries.

The use of the technology in the Greta seam for Longwalls A3 to A5 represents an opportunity to continue to prove the applicability of the LTCC technique. It is rapidly gaining acknowledgement of having widespread application to other coal mines in Australia.

Socio-economic benefits of the proposed modification is discussed in Chapter 4.

2.8 CONSULTATION AND COMMUNITY ENGAGEMENT

A range of consultation activities have been undertaken and are summarised below. The full report prepared by Coakes Consulting is provided in Annex B.

The key activities are summarised as follows:

1. Detailed and personal meetings with directly affected private landholders. Work is ongoing to progress private mining agreements with the landholders. These will govern co-operation and the conduct for mining beneath their properties and the management of impacts that may result. A component of this process is a Property Subsidence Management Plan for each affected property.

2. Five Community Information Sheets covering a range of topics were produced and were distributed to over 1000 people and households across broader community. These are included in Annex B and are titled:

    a. Community Information Sheet 1 – Mining Overview

    b. Community Information Sheet 2 – A Guide To Longwall Mining

    c. Community Information Sheet 3 – Subsidence Effects and Longwall Mining

    d. Community Information Sheet 4 – Stage 1 Mining Activities

    e. Community Information Sheet 5 – Historical and Current Mining Proposals

3. A community information day attended by approximately 65 residents. Independent specialists were on hand to give presentations on subsidence, hydrology, exploration and the mining proposal.

4. Presentations to targeted community groups. A total of 13 community group presentations were conducted with the following groups:

    - Rotary Club of Cessnock
    - Hunter Regional Development Corporation (HDEC)
    - Lions Club of Cessnock Inc
    - Cessnock Mens Probus Club
    - Hunter Valley Winemakers Association
    - TAFE NSW – Hunter Institute
    - Kurri Kurri Chamber of Commerce
    - Wollombi Chamber of Commerce
    - Minewatch
    - Coalfields Heritage Group
    - Mindaribba Local Aboriginal Land Council
    - Cessnock Tidy Towns Committee
    - Cessnock Landcare Inc

Following discussions with the President of the Cessnock Landcare Inc group, a joint meeting was requested for combined Landcare and catchment management groups. The following groups were invited:

- Ellalong Wetlands Protection Group
- Communities of Congewai Catchment Inc

- Congewai Valley Landcare Inc
- Ellalong Tidy Towns
- Millfield Progress Assoc & Tidy Towns
- Mt Vincent Landcare

The President of the Cessnock Landcare Inc is affiliated with all the groups but only he and one other person attended the presentation. Subsidence, hydrology and ecology consultants were available at the meeting for presentations and questioning.

2.9 GOVERNMENT CONSULTATION

The key stakeholders identified as part of the Stakeholder Consultation Strategy and the communications methods used to consult with each group are summarised in *Table 2.2.*

Table 2.2 Summary of Government Agency Consultation

Stakeholder	Communication Method
Cessnock Council	Project presentation to Mayor Briefings for Councillors and staff
Department of Planning	Project presentations Site visit Formal correspondence regarding Development Consent
State Members	Personal briefings including site visit
Department of Primary Industries (Minerals) - Safety	Personal briefings including site visit Visit to mines in Shandong Province in China to view the LTCC technique Scoping session for the introduction of the LTCC technique Ongoing visits following introduction of LTCC
Department of Primary Industries (Minerals) – Resource Recovery, Subsidence and Environment	Personal briefing for Principal Subsidence Engineer Briefing presentation to Environment branch Co-ordinated project presentation to technical officers of subsidence and environment
Department of Primary Industries (Forestry)	Personal phone discussions Issue of a briefing paper
Department of Environment and Conservation	Presentation to Area Manager
CFMEU members	Visit to mines in Shandong Province in China to view the LTCC technique
Department of Natural Resources	Presentation
Mine Subsidence Board	Presentation to Chief Executive Officer

3 PLANNING AND STATUTORY FRAMEWORK

3.1 INTRODUCTION

This section addresses the legal framework within which the application is made and in which it will be considered by the Minister for Planning.

3.2 MODIFICATION UNDER SECTION 96 (2)

Section 96(2) of the EP&A Act empowers the consent authority to modify a consent under certain conditions as follows:

(2) **Other Modifications**

A consent authority may, on application being made by the applicant or any other person entitled to act on a consent granted by the consent authority and subject to and in accordance with the regulations, modify the consent if:

(a) it is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which consent was originally granted and before that consent as originally granted was modified (if at all), and

(b) it has consulted with the relevant Minister, public authority or approval body (within the meaning of Division 5) in respect of a condition imposed as a requirement of a concurrence to the consent or in accordance with the general terms of an approval proposed to be granted by the approval body and that Minister, authority or body has not, within 21 days after being consulted, objected to the modification of that consent, and

(c) it has notified the application in accordance with:

(i) the regulations, if the regulations so require, or

(ii) a development control plan, if the consent authority is a council that has made a development control plan that requires the notification or advertising of applications for modification of a development consent, and

(d) it has considered any submissions made concerning the proposed modification within the period prescribed by the regulations or provided by the development control plan, as the case may be.

3.3 SUBSTANTIALLY THE SAME DEVELOPMENT

The Minister has the power to modify consent DA29/95 provided he *"is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which consent was originally granted and before that consent as originally granted was modified "*

In April 2006 a Statement of Environmental Effects was submitted to support a request to modify the Consent under Section 96(2) for Stage 1. The Minster for Planning approved the modification in September 2006 subject to a number of conditions as outlined in the Notice of Modification (Annex A).

Like the modification for Stage 1, this SoEE demonstrates that Stage 2 of development as proposed to be modified would be substantially the same development as was originally approved under the 1996 consent.

Longwalls A3 to A5 are in generally in the same location as the approved longwall panels 17 to 19 respectively. There will be no increase in the approved production rate of 3 Mtpa and there are no changes to infrastructure. Coal treatment and handling, reject management, water management, staffing and coal transport will continue as approved in the 1996 consent.

3.4 CONDITIONS REQUIRING MODIFICATION

While the Minister would decide whether to grant approval and if so the terms of any such approval, the applicant seeks the following modification to the Notice of Modification (DA29/95) issued by the Minister for Planning in 2006.

Existing condition:

SCHEDULE 2

General

The Applicant shall carry out the development generally in accordance with the:

(a) DA 29/95 and accompanying Environmental Impact Statement prepared by HLA Envirosciences Pty Limited, dated August 1995;

(b) modification application MOD-49-4-2006 and accompanying Statement of Environmental Effects, titled *Austar Coal Mine Section 96 Modification*, prepared by Environmental Resources Management Australia Pty Ltd (ERM) and dated April 2006;

(c) information from ERM clarifying the modification application MOD-49-4-2006, dated 13 July 2006; and

(d) conditions of this consent.

This condition is sought to be modified to reference this SoEE as follows:

The Applicant shall carry out the development generally in accordance with the:

(a) DA 29/95 and accompanying Environmental Impact Statement prepared by HLA Envirosciences Pty Limited, dated August 1995;

(b) modification application MOD-49-4-2006 and accompanying Statement of Environmental Effects, titled *Austar Coal Mine Section 96 Modification*, prepared by Environmental Resources Management Australia Pty Ltd (ERM) and dated April 2006;

(c) information from ERM clarifying the modification application MOD-49-4-2006, dated 13 July 2006; and

(d) modification application and accompanying Statement of Environmental Effects, titled Austar Coal Mine Section 96 Modification prepared by Austar Coal Mine and dated August 2007 as may be modified by the conditions set out herein.

3.5 PLANNING AND REGULATORY FRAMEWORK

As specified in Section 96(3) of the EP&A Act in determining an application for such a modification, the consent authority must take into consideration matters referred to in section 79C(1) of the EP&A Act which are relevant to the modification. These matters are as follows:

'(a) the provisions of:

(i) any environmental planning instrument, and

(ii) any draft environmental planning instrument that is or has been placed on public exhibition and details of which have been notified to the consent authority, and

(iii) any development control plan, and

(iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph),

that apply to the land to which the development application relates,

(b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,

(c) the suitability of the site for the development,

(d) any submissions made in accordance with this Act or the regulations, and

(e) the public interest.'

Relevant planning instruments, development control plans and policies related to the proposed modification are addressed in this chapter. The likely

environmental, social and economic impacts of the proposed modification are addressed in Chapter 4.

3.6 REGIONAL PLANNING

3.6.1 Hunter Regional Environmental Plan 1989

The Hunter Regional Environmental Plan 1989 (HREP) aims to promote the balanced development of the Hunter Region, to encourage orderly and economic development and to bring about optimum use of land and other resources consistent with conservation of natural features and the needs and aspirations of the community.

Part 6, Division 1 of the HREP specifically addresses objectives concerning extractive materials. The policies in Clause 41 of the HREP for control of mineral resources and extractive industry developments are reproduced below in italics. Each policy is followed by a comment on how Austar mine addresses these issues.

(1) *Consent authorities, in considering proposals for mining or extraction (including dredging):*

(a) *should consider the conservation value of the land concerned and apply conditions which are relevant to the appropriate post-mining or extraction land use.* The conservation value and existing land use of the land would remain unchanged;

(b *should, in respect of extraction from river banks or channels, ensure that instability and erosion are avoided.* Not applicable to this proposal;

(c) *should consult with officers of the Department of Mineral Resources, and of the Department of Agriculture, to determine appropriate post-mining or extraction land uses*. Mining longwalls A3 and A5 would not impact on the current land use;

(d) *should ensure the progressive rehabilitation of mined or extracted areas.* Any minor rehabilitation or remediation works of cracking or eroded areas over longwalls A3 to A5 would be progressively undertaken in consultation with land owners and the PSMP. A rehabilitation plan for the emplacement areas has been completed and is part of the Mine Operations Plan (MOP). There will be no changes as a result of this modification;

(e) *should minimise the likelihood and extent of a final void and the impact of any final void, or facilitate other appropriate options for the use of any final void.* Not applicable as this is an underground mine;

(f) *should minimise any adverse effect of the proposed development on groundwater and surface water quality and flow characteristics.* Minor

impacts on surface flows of the ephemeral creeks are anticipated with no areas of ponding or erosion predicted. Groundwater impacts are expected to be negligible and have no adverse effect on nearby bores. Monitoring of aquifer levels will be undertaken as part of the overall environmental monitoring program for the mine as a precautionary measure;

(g) *should consider any likely impacts on air quality and the acoustical environment.* There will be no changes to noise or dust emissions.

(h) *should be satisfied that an environmentally acceptable mode of transport is available.* There will be no changes to the approved method of transporting coal in excess of 98% of coal being transported from the mine by rail

(i) *should have regard to any relevant Total Catchment Management strategies.* The proposed modifications are compatible with the Hunter Catchment Management Strategy (2002) management targets of:

- maintaining riparian health –streams above longwalls A3 to A5 are not expected to be adversely affected;
- prevent soil degradation – no proposed activities would impact on soil degradation;
- conserving native vegetation and biodiversity – no clearing of vegetation will be required. Subsidence impacts on vegetation are expected to be minimal; and
- prevent increased salinity – all mine water discharged from the site is treated in the existing mine water treatment plant prior to discharge. The residual brine is pumped into the disused workings as approved. Water will be managed according to the approved Site Water Management Plan.

3.6.2 Lower Hunter Regional Strategy

The Lower Hunter Regional Strategy was released in November 2006. The primary purpose of the strategy is to ensure that adequate land is available and appropriately located to accommodate the projected housing in a sustained manner, employment and environmental needs of the region's population over the next 25 years.

The Regional Strategy is based upon a population growth scenario which forecasts a regional population of 675 000 persons by 2031. This equates to an additional 160 000 persons over the period 2006–31. This growth scenario responds to current levels of growth and recognises that this growth will continue as the Region broadens its economic role in the context of the NSW and national economy. Monitoring of population growth will ensure that the

Strategy can respond to growth rates higher or lower than expected. It is also recognised that growth is likely to continue beyond 2031.

The adopted growth scenario is one which responds responsibly to the challenge of managing growth in a way that is economically, socially and environmentally sustainable and enables the environmental and lifestyle assets and values, which are themselves key drivers of growth in the Region, to be preserved.

The site is not identified in the Regional Strategy as a new release area, future investigation area or being within an existing urban area. It is classified as Rural and Resource Land which is land that provides valuable economic, environmental and social benefits to the region including agriculture, aquifers, mineral and timber resources.

3.6.3 Cessnock Local Environment Plan 1989

The principal local planning instrument applying to the site is the Cessnock LEP. The stage 3 mining area has a 1(A) Rural zone. The objectives of the 1(a) Rural zone are:

(a) to enable the continuation of existing forms of agricultural land use and occupation,

(b) to ensure that potentially productive land is not withdrawn from production,

(c) to encourage new forms of agricultural land use,

(d) to enable other forms of development which are associated with rural activity and which require an isolated location, or which support tourism and recreation, and

(e) to ensure that the type and intensity of development is appropriate in relation to:

  (i) the rural capability and suitability of the land,

  (ii) the preservation of the agricultural, mineral and extractive production potential of the land,

  (iii) the rural environment (including scenic resources), and

  (iv) the costs of providing public services and amenities.

Mining is a permissible activity in the zone with the consent of Council.

The proposed modification will not result in any changes to the current agricultural use or rural nature of the area. There is a long history of mining in the Cessnock LGA and the site. The modification will allow for the continuation of mining using existing approved infrastructure.

4 IMPACT ASSESSMENT

4.1 INTRODUCTION

This chapter addresses the likely impacts of the proposed modification and where appropriate, management and mitigation measures are outlined and discussed in detail in Chapter 5.

4.2 SUBSIDENCE IMPACTS

4.2.1 Introduction

G.E. Holt & Associates (1995) assessed the impact of subsidence from proposed longwall operations in the Bellbird South Extension of Ellalong Colliery. The assessment covered longwall panels 17, 18 and 19 as shown on the 1995 mine layout which are in the same area as panels A3, A4 and A5 of the current mine layout.

A more recent and comprehensive subsidence investigation and assessment was completed by Mine Subsidence Engineering Consultants (MSEC 2007). This assessment is based on the current mine layout for Longwalls A3, A4 and A5. The full subsidence report for Stage 2 is provided in Annex C.

4.2.2 Mine Layout

Modelling subsidence impacts in the Bellbird South Extension (G.E Holt, 1995) considered standard longwall mining in eight panels (LW15 to LW22) in the former Ellalong Workings. LW17, 18 and 19 correspond with longwalls A3, A4 and A5 respectively. A mining height of 3.4 m to 4.5 m was assumed which was a greater height than had been previously mined at Bellbird. Other parameters include a panel width of 255m and overburden depth ranged from 420m to 550m.

The MSEC (2007) report considers subsidence impacts that may result from LTCC mining longwalls A3, A4 and A5. Parameters used include panel widths of 227m and mining a maximum seam height of 6.5m. Figure 4 shows the current layout for longwall panels A3, A4 and A5 overlaid on the original 1995 mine plan. The variation to the mine layout was driven by the following issues:

- physical and geological boundaries;
- access to future workings;
- access to future resources;
- surface constraints; and
- orientation of panels.

The 1995 mine plan has ten adjacent longwall panels with void widths of 211.7m and chain pillars 38m wide. The 2007 mine plan has three adjacent longwall panels with void widths of 227m and chain pillars 45m wide.

4.2.3 Surface Features

The 1995 Subsidence Report includes a description of the area and a list of visible surface features that existed in 1995. However, it is not as comprehensive as the more recent assessment by MSEC (Annex C). The recent assessment identifies all natural and manmade surface features in the Stage 2 subsidence zone. They are summarised as follows:

- *Natural Features*: rivers or creeks, aquifers, steep slopes, land prone to flooding, State Conservation Areas, State Forests and natural vegetation;
- *Public Utilities*: roads, culverts, water, gas or sewage infrastructure, electricity transmission lines, and telecommunication lines;
- *Farmland and Facilities*: agricultural utilisation or suitability, farm buildings or sheds, tanks, gas or fuel storages, irrigation systems, fences, farm dams, and wells or bores;
- *Industrial, commercial and business establishments;*
- *Areas of archaeological or heritage significance;*
- *Permanent survey control marks; and*
- *Residential Establishments*: houses, associated structures.

Detailed drawings showing locations are provided in the full report in Annex C.

4.2.4 Subsidence Predictions

The 1995 EIS predicted cumulative subsidence from the ten longwalls 13-22 at a maximum mining height of 4.5m, a longwall panel width of 211.7m, and a chain pillar width of 38m. Table 2 of the 1995 Subsidence Report shows the maximum predicted subsidence of 1.44m, tensile strain of 0.71mm/m, compressive strain of 2.16mm/m and tilt of 6.48mm/m.

Subsidence predictions for the new mine layout by MSEC used the calibrated Incremental Profile Method which has been calibrated to local data using previous subsidence monitoring results. A description of the method is provided in the MSEC Report in Annex C.

Table 4.1 shows the results of the subsidence predictions by MSEC. It shows the maximum predicted cumulative subsidence after the extraction of each longwall.

Table 4.1 Maximum Predicted Cumulative Subsidence Parameters

Longwall	Maximum Predicted Cumulative Subsidence (mm)	Maximum Predicted Cumulative Tilt (mm/m)	Maximum Predicted Cumulative Tensile Strain (mm/m)	Maximum Predicted Cumulative Compressive Strain (mm/m)
After LWA3	295	1.5	0.2	0.4
After LWA4	1130	5.1	0.7	1.7
After LWA5	1390	5.8	0.7	1.9

Source: MSEC 2007

The 1995 and 2007 assessments show very similar figures for subsidence, tensile strain, compressive strain and tilt.

As part of the risk assessment process, the 2007 MSEC Report also investigates a number of other subsidence cases in order to develop mitigation plans for greater than expected subsidence. The cases used are 1.25, 1.5, 1.75 and 2.0 times the actual predicted subsidence in addition to an absolute upper bound case.

Table 4.2 shows the upper bound case which has been included in the MSEC Report. These predictions were used to assess the worst possible case of subsidence on the identified surface features.

Table 4.2 Predicted Maximum Upper bound Cumulative Subsidence Parameters

Longwall	Maximum Predicted Cumulative Subsidence (mm)	Maximum Predicted Cumulative Tilt (mm/m)	Maximum Predicted Cumulative Tensile Strain (mm/m)	Maximum Predicted Cumulative Compressive Strain (mm/m)
After LWA3	630	2.9	0.4	0.8
After LWA4	2335	9.4	1.1	3.1
After LWA5	2955	10.9	1.2	3.7

Source: MSEC 2007

4.2.5 Subsidence Impacts

Impact upon Landforms, Land Surface Use and Improvements

The Subsidence Management Plan identifies a range of surface features and assesses the subsidence impacts for each. Subsidence is expected to develop, for the most part, slowly and incrementally as mining proceeds. It is likely that some vibration and rock

breaking sounds will be perceptible on the surface as rock fracturing occurs. However, there is no potential for craters or subsidence holes to suddenly develop. It is possible, but unlikely, that step changes in surface subsidence may occur adjacent to geological structures, but no significant geological structures have so far been identified in the area of Longwalls A3, A4 and A5. That outcome would also be possible by mining up to 4.5m thickness allowable under the current consent.

The 1995 subsidence report gave some general description of predicted subsidence impacts, but no detailed analysis of specific surface features. MSEC compiled detailed subsidence predictions for a number of significant surface features, including:

- Quorrobolong Creek and Cony Creek;
- drainage lines;
- steep slopes;
- Nash Lane;
- Pelton Fire Trail;
- drainage culverts;
- wells and bores;
- archaeological sites;
- survey control marks;
- houses, buildings, structures and fences;
- pipelines;
- overhead transmission lines; and
- telecommunication lines.

The impact on these features has been predicted for both the maximum predicted levels and also the maximum upper bound levels of subsidence calculated for the relevant area. There have been no features identified that can not be readily managed, even at the upper bound subsidence levels.

A flood assessment by Umwelt (2007) which is included as Annex D indicates that there will be no changes to flood inundation of access roads to dwellings or their associated flood hazards.

In addition, the flooding assessment indicates that the subsidence associated with mining will not result in the inundation of any dwellings during the 1 in 100 year ARI storm event that were not previously inundated. However, it is predicted that the freeboard above the 1 in 100 year ARI storm event of some dwellings upstream of the Stage 2 mining area will be increased with the predicted subsidence (Umwelt 2007).

Impact Upon Surface Water and Groundwater Systems

The impact of mining on strata movement and fracture zones has been assessed by MSEC. The height of the facture zone is dependent on the width of the longwall panel and the spanning capacity of the stratum at the top of the fracture zone. The depth of cover above the longwall generally exceeds 500 metres and it is considered unlikely that the fracture zone will extend to the surface with the height of vertically interconnected cracking expected to be less than 220 m (MSEC 2007).

The predicted impacts on the creek lines within the Stage 2 mining area are summarised as follows:

- tensile and compressive strains have the potential to cause surface cracks in the alluvial creek beds. However, at the levels predicted it is likely that a number of smaller cracks are likely to occur rather than a single large crack;

- surface tensile cracking tends to occur within the top few metres of surface soils and would be expected to be filled with alluvial materials during subsequent flow events;

- the surface tensile cracking could potentially occur within the tensile zones around the perimeters of the longwalls;

- the predicted and upperbound compressive strains along the alignments of the creeks are unlikely to be large enough to result in the buckling and dilation of the underlying strata along the creeks;

- buckling and dilation of underlying strata may occur due to valley closure movements. These are likely to result in minor shallow fracturing of the rock under sections of the Quorrobolong Creek system. This fracturing has negligible potential to adversely impact on surface flows or groundwater;

- surface tensile cracking could also occur in locations where the underlying strata buckles and the depth of the overlying alluvials is shallow. In these cases, however, the surface cracks are likely to be filled with the alluvials during subsequent flow events;

- minor cracking may occur along the Quorrobolong and Cony Creek alignment but it is unlikely that to have an impact on channel stability of flows within the creek system.

- in periods of low flow, the dilated strata beneath the creekbeds would become water charged and the surface water would flow over any surface cracking. In times of low flow after a period of no flow, initially some of the surface water could be diverted into the dilated strata beneath the creek beds;

- if these cracks and fractures in the underlying strata were found to not heal naturally, remedial measures may be required such as grouting;

- vertical fracturing may occur within the constrained zone, however, this is likely to be discontinuous within the Hawkesbury Sandstone that underlays the creeklines. Therefore it is unlikely that there will be any net loss of water from the creek due to dilation and fracturing; and

- groundwater availability to riparian vegetation is not likely to substantially change as a result of mining (Umwelt 2007).

The flooding assessment considers the potential impacts on Cony Creek and Quorrobolong Creek within the Stage 2 subsidence zone (Umwelt 2007). It also considers potential ponding and the shallow alluvial aquifers associated with those creeks.

The assessment on surface and groundwater systems found:

- both expected and upper bound subsidence levels are not expected to affect the physical stability of the creek banks or create significant increases in the localised steepness of channel beds of the subsided landform;

- no significant changes in ponding are expected and therefore mitigation measures for the creeks are unlikely;

- any minor cracking that may occur along the creeks is unlikely to impact channel stability or flows due to the likelihood that any cracks would be naturally filled with alluvial material; and

- flood depth will typically increase over the mining area, but with minimal impact on flow velocities.

A small number of groundwater bores in the area were found to contain water that was unsuitable for domestic or agricultural purposes.

Dams

The MSEC report includes a section on farm dams (section 5.14). The report assesses the likely subsidence levels at the dam sites, predicts impacts on dam wall stability, changes to freeboard water levels and storage capacity. Both the maximum predicted and the upper bound subsidence levels have been included in the assessment.

In summary, the report recommends visual monitoring of the dams during longwall extraction to identify any deterioration of the dam walls. However, it concludes that it is unlikely that there will be any significant long term impact on farm dams that would occur from the extraction of longwalls A3, A4 and A5.

Flora and Fauna Impacts

Umwelt (2007b) completed an ecological assessment for Longwall Panels A3, A4 and A5 and is included as Annex D. The assessment identified flora and fauna, including threatened species, and assessed the potential impacts of the proposed longwall extraction.

An analysis of the predicted levels of subsidence and associated changes to hydrology found that the impact of the proposed development on the ecology of the study area is likely to be negligible. The proposed development is not expected to have a significant impact on any threatened species, populations or EECs recorded or with potential to occur within the study area.

Monitoring is recommended prior to extraction and after extraction to ensure there are no unforseen impacts.

4.2.6 Subsidence Conclusions

The 1995 EIS assessed potential subsidence impacts on natural and man made surface features and surface and groundwater systems in very general terms. It is therefore difficult to make direct comparisons between the predicted impacts in the 2007.

The finding of the assessments prepared in 2007 (MSEC) found that all houses will remain beneath safe, serviceable repairable (SSR) even at upperbound predictions. SSR can be defined as follows:

- Safe - no danger to users;
- Serviceable - available for its intended use; and
- Repairable - damaged components economically replaceable.

The management measures that may be required are readily achievable and will be compiled into individual PSMP's. Impact to services is low and public infrastructure management plans will be developed in consultation with the relevant authorities.

A detailed flood model has been generated for the catchment. The impacts are minor and the management measures identified are readily achievable. They will be incorporated into a monitoring program and mitigation / remediation plan for the pertinent properties as part of the PSMP's.

In relation to surface hydrology, it has been assessed that there will be no significant change to:

- catchment boundaries;
- channel alignment or bank stability; and
- in channel or out of channel ponding.

Groundwater availability to riparian vegetation is also not likely to substantially change as a result of mining. Impacts to flora and fauna are assessed as likely to be negligible and the impact to Ellalong Lagoon is likely to be negligible.

4.2.7 *Ground Vibration*

The settlement of ground resulting from systematic subsidence is generally a series of gradual and progressive movements, the effect of which is not apparent to an observer at the surface. Minor effects from vibration are normally associated with mining at shallow depths of cover and would not generally be expected to occur in deeper mines with greater than 500 metres of cover (MSEC).

It is possible that some vibration may be felt at the surface. However, as there are no identified significant geological structures above the proposed longwalls, the level of vibration would generally be low and not of sufficient amplitude to result in any significant structural impact. If structural impacts occur due to vibration they would be minor and easily repaired using normal maintenance (MSEC).

4.2.8 *Potential for Increased Subsidence due to Earthquake*

Past events show that it is unlikely that a seismic event would result in additional subsidence above the proposed longwalls. Following the Newcastle earthquake in 1989 there was no recorded significant damage to mine workings and no additional subsidence measured above mined areas within the Newcastle coalfield (MSEC). Any small additional consolidation resulting from an earthquake event is unlikely to result in the maximum upperbound systematic subsidence parameters being exceeded.

4.3 *WATER MANAGEMENT*

4.3.1 *Surface Water*

Overview

A flood assessment was conducted by Umwelt (2007) to:

- define the 1 in 100 year Average Recurrence Interval (ARI) flood; and
- define the potential future impacts on flooding resulting from underground mining of Longwalls A3, A4 and A5.

Approach

The assessment utilised the XP-Storm one dimensional hydrodynamic model and the RMA-2 two dimensional hydrodynamic model to produce a description of flood behaviour and potential impacts from subsidence associated with underground mining. The full report is provided as Annex D to this report.

Conclusions

The flooding assessment of longwall panels A3, A4 and A5 indicates that flood depths will typically increase in the mining area. However, there will be minimal impact on the velocity of flows (Umwelt).

The flooding assessment also indicates there will be no significant changes to flood inundation of access roads to dwellings or their associated flood hazards. In addition,

the assessment indicates that subsidence associated with mining will not result in the inundation of any dwellings during the 1 in 100 year ARI storm event.

It is predicted that the freeboard of dwellings located upstream of Stage 2 mining area (to as far as 600 metres upstream of the Quorrobolong Road bridge) will be increased as a result of the predicted subsidence during a 1 in 100 year ARI storm event (Umwelt).

4.3.2 Groundwater

Overview

There will be no material effects on the groundwater of the area with the expected level of subsidence.

There are no registered groundwater extraction bores located within the 20mm subsidence zone. The closest known bore (GW054676) is low yielding (1 L/sec), poor quality (14000 – 16000uS/cm) and is unsuitable for domestic or stock use. It is primarily used by DWE for monitoring purposes and is located outside the upper bound subsidence contour and therefore unlikely to be subjected to any significant subsidence, tilts or strains.

There are no known bores yielding water that is used by property holders within the Stage 2 mining area and no known significant groundwater dependent ecosystems in the area.

Monitoring

No changes will be made to the water management system as a result of the Stage 2 modifications. The SWMP incorporates piezometric monitoring of the shallow alluvium aquifer systems. The current plan is capturing base line data designed for Stage 2 mining and no changes are anticipated. The surface and groundwater monitoring programs will continue as approved.

4.4 HERITAGE

4.4.1 Aboriginal Heritage Review

An archaeological survey was undertaken as part of the 1995 EIS by HLA Envirosciences which included the areas expected to be impacted by the 1995 mine layout. One Aboriginal heritage site was identified on the crest of a spur within the Stage 2 study area. As part of the review, HLA Envirosciences recommended that subsidence monitoring be done. The report identified that potential increases in erosion, especially adjacent to creek lines and wetlands were the major potential threats to any Aboriginal heritage sites if they existed.

A more recent review of the Stage 2 area by Umwelt is included in section 3 of Umwelt Report No. 2274/R06/V2. It recognises that although much of the land has been cleared for farming, it is possible that surface and subsurface Aboriginal heritage sites

might exist within the subsidence zone, especially adjacent to creek lines and slightly elevated areas.

Predicted surface subsidence impacts on creeks have been assessed as minimal and therefore it is unlikely that remediation works will have to be undertaken which could impact on Aboriginal heritage sites. However it recommends that if any work is required a full Aboriginal assessment be undertaken prior to disturbance.

4.4.2 European Heritage Review

In the 1995 EIS, HLA Envirosciences identified that farming related historic sites and mining related historic sites were the two types of European heritage sites in the study area. Four specific sites were identified and are described in section 4 of Umwelt Report No. 2274/R06/V2. None of the sites exist within the Stage 2 impact assessment area.

Hunter Regional Environmental Plan 1989 (Heritage)

The following items within the locality were listed as being of regional environmental heritage significance under Schedule 2 of the Hunter Region Environmental Plan 1989 (Heritage):

Cessnock

- South Maitland Railway

Millfield

- Former Rising Sun Inn, Wollombi Rd
- Maitland Main Colliery; and
- Millfield Greta Colliery

Paxton

- Stanford Main No. 2 Colliery (includes cottage/equipment); and
- Paxton Hotel

Bellbird

- Bellbird Colliery

Ellalong

- Kalingo Colliery and several related buildings

None of the items identified as regionally significant are located within the Stage 2 area.

4.5 ECOLOGY

An ecological assessment was completed for the 1995 EIS after a number of site inspections and surveys which concluded that:

> *"No rare or endangered fauna were observed during the study. The proposed development should not cause adverse impacts upon fauna or flora populations."*

In February 2007, an ecological report was completed by Umwelt to assess the potential impact of the mining in A3, A4 and A5. The results are summarised as follows:

4.5.1 Flora

No endangered flora species were recorded during the field surveys, however, two species were identified as ones that potentially occur in the study area (refer to section 3.3 of the Umwelt report). The study also concluded that there were no endangered flora populations which had the potential to occur in the area. A full list of the flora species recorded is included in the Umwelt report

A number of vegetation communities were identified including Derived Grassland, Spotted Gum – Ironbark Forest, and Riparian Swamp Oak – Rough-barked Apple Open Forest. A description of these communities, as well as the location within the study area and the significance of the communities is outlined in section 3.2 of the Umwelt Report. The Spotted Gum – Ironbark Forest is an endangered ecological community, but it was concluded that the proposed development was unlikely to have an impact on the community. The Riparian Swamp Oak – Rough-barked Apple Open Forest was considered to be similar to an endangered community known as the River-flat Eucalypt Forest, and it was assessed that due to the location near creeks it could be impacted by potential changes to surface and groundwater, and therefore a further assessment was undertaken under the EP&A Act. After conducting a seven point test, it was concluded that the proposed development would not result in a significant impact on the community.

4.5.2 Fauna

Section 4 of the Umwelt Report defines two broad habitat types which are Riparian Habitat and Open Forest Habitat. A list of all the fauna species identified during surveys, either by visual sighting or from scat samples is included as Appendix 3 to Umwelt Report No. 2274/R06/A1/V2. Two threatened species were recorded during the survey – the speckled warbler (*Pyrrholaemus sagittate)* and the grey-crowned babbler *(Pomatostomus temporalis temporalis)*. A further 21 species were considered to have the potential to occur within the study area. No seven point test for significance was required because it was concluded that the development was unlikely to result in an impact on any of the species.

No endangered fauna species were identified in the area or assessed as potentially in the area. There are no critical habitats in the study area. A list of 13 migratory species assessed as potentially occurring within the study area is also included in section 4 of the Umwelt Report.

An assessment of SEPP 44 concluded that the study area does not comprise potential koala habitat.

4.5.3 Subsidence Impact

The longwall extraction proposed in the Stage 2 application involves only underground mining and therefore is unlikely to cause major disturbance to the surface. The potential ecological impacts of the development are limited to the riparian and floodplain areas where there is the potential for minor changes to the surface and groundwater systems.

"Analysis of the predicted levels of subsidence and associated changes to hydrology has identified that the impacts of the proposed development on the ecology of the study area are likely to be negligible. The proposed development is not expected to have a significant impact on any threatened species, populations or EECs recorded or with potential to occur within the study area." [Umwelt Report No. 2274/R06/V2].

4.6 SOCIO-ECONOMIC ASSESSMENT

4.6.1 Introduction and Overview

The potential socio-economic effects associated with the Austar Mine as approved in the 1996 Consent were reported on in the socio-economic assessment undertaken for the Bellbird South Extension (HLA Envirosciences, 1995). Many of the findings remain relevant and are referred to in this assessment along with additional information now available.

The principal socio-economic effect of the proposed modification and adoption of LTCC mining is that it will enable the continuation of mining at the Austar Mine. Continuation of employment at the mine and the consequential already identified socio-economic contributions. This proposal relates only to Stage 2 but it will lay the basis for a continuation of mining at Austar Mine (subject to further approvals).

4.6.2 Demographics and Employment

Cessnock is the nearest major regional centre with a population of 17,831 (including Bellbird) at the 2001 Census (ABS, 2001). Nearby towns include Paxton (554), Ellalong (575), Millfield (483) and Kitchener (303). The entire Greater Cessnock LGA had an estimated population of 47,143 in 2004 (Cessnock City Council 2004). Located in the Lower Hunter region along with the Newcastle, Lake Macquarie, Port Stephens and Maitland LGA's, this area has been the subject of rapid population growth in the last 10 years (Department of Planning, 2005).

Traditionally the major areas of employment for Cessnock residents were mining and manufacturing. More recently however, there has been an increase in wine, tourism, and the commercial and retail sectors. There has been a steady decline in employment in mines in the South Maitland Coalfields (which includes Cessnock) largely due to depleted reserves. Austar Mine is the only operational mine in the Cessnock area. The 200 jobs generated by continuing operation of the mine represent a valuable sector of employment.

The demographic break-up of the full workforce during 2006 is shown in Table 4.3; however, current staff demographics are shown in *Table 4.4*.

Table 4.3 Austar Mine Demographics – 2007

LGA	Total Staff	% Breakdown
Cessnock	79	42
Lake Macquarie	41	22
Maitland	26	14
Newcastle	20	11
Singleton	9	5
Wyong	5	3
Port Stephens	5	3
Other	1	1
Total	**186**	

Note : 261 were people employed until quota restrictions at Port of Newcastle forced reduction of workforce

4.6.3 Economic Impacts

The mine underwent a $250 million refurbishment to enable longwall extraction to recommence in 2006. This has provided significant economic benefits to flow on to the Cessnock LGA and the Hunter Region. The modification of the existing consent for Stage Two of the project will enable the continuation of longwall mining using LTCC technology and greater resource recovery. Ultimately the project will provide between 250 and 270 jobs.

Turnover for the mine will be in the order of $230 million per annum with total recoverable resource contained within the existing mine lease CML2 valued at $5.2 billion.

Beneficial economic activities resulting from mining include employment and the purchase of goods and services from businesses in the region. Other economic and employment benefits arise indirectly through the provision of ancillary services such as supplies and coal transport. In addition, there is an estimated additional flow on effect multiplier in the order of 4:1 to the local community.

Recommencement of full mining has also had significant beneficial effects on public sector revenue. Benefits flow from increased employment, increased production and transport and export of coal. Benefits also accrue to the Federal Government through increased revenue from company tax, excise on imported equipment and goods and other taxes such as sales tax, income tax and fuel excises.

The State Government receives revenue from various taxes, royalties and payments for services by statutory bodies. These include rail freight for transporting coal to the Port of Newcastle and port charges. Payroll tax is also levied on the wages of mine employees and on those jobs created through the flow-on effect of the mine.

4.6.4 Social Impacts

Mining within Stage 2 will provide continued employment for the Austar workforce and revenue for those businesses and service providers that are utilised by the mine.

Continued operations as proposed will not increase the need for additional social infrastructure and will assist in maintaining the social fabric of Cessnock and surrounding villages.

5 ENVIRONMENTAL MANAGEMENT AND MONITORING

5.1 KEY MANAGEMENT MEASURES

5.1.1 Flora and Fauna

To ensure the continued protection of significant ecological values within Stage 2, the area will be monitored following mining. This will identify any unforeseen impacts and enable appropriate remediation measures to be implemented. In addition, the monitoring will ensure that any remediation measures are implemented successfully. In particular, emphasis will be given to identifying changes to the potential River-flat Eucalypt Forest EEC resulting from mining.

As there will be minimal ground disturbance, specific surveys targeting fauna groups is not deemed necessary. Should the results of monitoring reveal reason to conduct surveys the monitoring program will be appropriately adapted.

Baseline monitoring will be undertaken prior to mining and repeated twice a year. The monitoring program may include quantitative survey plots, vegetation condition assessment and photo monitoring. The duration of monitoring will be reviewed after mining has commenced and will be largely dependent on the level of impact that occurs.

5.1.2 Rehabilitation

Subsidence impacts from Panel A3 to A5 have been assessed up to a maximum possible level of 2955mm but are expected to be less than 1400 mm. Any subsidence damage is expected to be minimal. Conditions on monitoring and repair will be addressed in the Subsidence Management Plan approval required from the DPI prior to conducting second workings.

There will be no changes to existing infrastructure or facilities.

5.1.3 Surface and Groundwater

Based on the level of subsidence anticipated, it is not expected that there will be any significant adverse effects on surface water or groundwater systems. Should there be any significant impacts on stream bed and bank stability, stream flow, groundwater levels or groundwater quality require rehabilitation, a post mining rehabilitation plan that addresses the specific issue of concern will be implemented. Where private property may be involved such work would be undertaken in consultation with the landholder as part of the PSMP process. Monitoring protocols have been identified and will be incorporated into the EMP as detailed in Section 5.2.

5.1.4 Heritage

The continuation of the Austar Mine would maintain the history of mining in this area and also allow various European heritage items, in particular, the Kalingo Colliery buildings, to remain in context.

It is expected that there will be no significant impacts due to subsidence from Panels A3 to A5. It anticipated that no surface works will be required, however, should any

surface works be required a full Aboriginal assessment would be undertaken prior to disturbance. Similarly, other isolated finds or artefact scatters that may occur in this area are not expected to be significantly impacted by subsidence therefore no mitigation measures are required.

5.2 ENVIRONMENTAL MONITORING PROGRAM (EMP)

An Environmental Monitoring Plan (EMP) has been developed which encompasses environmental monitoring requirements for the site. It establishes the monitoring protocols, frequency and locations for key parameters.

Air quality

There will be no change to air emissions as a result of the Stage 2 modification. All existing infrastructure will continue to be used within the existing approved level of production.

The existing air quality monitoring program consists of five (5) dust deposition gauges, two (2) high volume air sampler (HVAS) and a meteorological station located near the washery.

Noise

There will be no change to the noise levels as a result of Stage 2 modification. All existing infrastructure will continue to be used within the existing approved level of production.

The environmental monitoring plan for the site identifies five monitoring locations for noise monitoring which is conducted on a quarterly basis. Monitoring will continue in accordance with the existing plan.

Water

No changes will be made to the surface water management system as a result of the Stage 2 modifications. The SWMP incorporates piezometric monitoring of the shallow alluvium aquifer systems. As the current plan is capturing base line data designed for Stage 2 extraction there are no changes anticipated and the surface and groundwater monitoring programs will continue as approved.

Subsidence

A detailed subsidence monitoring program will be developed for Panel A3 to A5 in consultation with the Department of Primary Industry. The subsidence monitoring plan will include a network of subsidence monitoring lines across each longwall panel that are surveyed on a regular basis.

In addition, pre-mining surveys will detail the condition of individual properties in the form of Property Subsidence Management Plans. This will include a pre mining condition report of directly undermined residences by a suitably qualified structural engineer.

Vibration

A vibration monitoring plan will be designed in consultation with the Principal Subsidence engineer and the Mines Subsidence Board during the SMP approval phase.

6 CONCLUSION

6.1 ECONOMIC AND SOCIAL

The purchase of the former Southland Mine by Yancoal Australia was a significant capital investment. Approximately 200 personnel are currently employed by Austar. When quota restrictions at the Port of Newcastle are resolved and full production of 3 MTPA is reached, the mine will provide up to 275 jobs.

This section 96 modification, if approved, would provide an economic basis for access to approximately 385,000 tonnes of additional product coal for export from an area that already has consent to mine. There has been no issue identified that should prohibit the approval to recover the additional 358,000 tonnes of resource made possible by the use of LTCC technology.

6.2 RESOURCE RECOVERY

The introduction of LTCC technology in panels A3, A4 and A5 will allow for the continued use of a mining system that is more efficient than other longwall systems currently used in Australia. It would result in up to 80 % of the Greta seam in longwalls A3, A4 and A5 being mined and significantly less coal being sterilised in the goaf.

6.3 ENVIRONMENTAL EFFECTS

Environmental and amenity impacts are expected to be minimal and similar to those predicted for the Bellbird South Extension.

Rehabilitation would be carried out as outlined for the Bellbird South extension and would be in accordance with the Mine Operations Plan. The rehabilitation strategy for the reject emplacement area would gradually improve the visual amenity of the mine and aim for a stable final landform. The land use in the vicinity of panels A3, A4 and A5 will not change as a result of the project.

Subsidence will be monitored and managed as proposed in this statement as well as in accordance with any Subsidence Management Plan approval issued by the DPI.

6.4 CONCLUSION – SUBSTANTIALLY THE SAME DEVELOPMENT

The likely impacts of Stage 2 have been assessed using methods that predict the expected impacts. In some cases, predictions are based on actual impacts measured during the operation of the mine. These impacts have been described throughout this SoEE and demonstrate that the proposed modification is substantially the same as the approved development. The likely impacts to existing groundwater and surface water resources, air quality, noise and vibration, visual character and heritage have been assessed and the proposed modification would not significantly increase the impacts to these characteristics compared to the approved development.

Stage 2 as proposed will be conducted in substantially the same manner as it was originally approved in the 1996 Consent. Coal production, coal handling, beneficiation and transport as well as manning and surface and subsurface operations will be generally as approved. There are no changes to the surface infrastructure. The mining method of longwall operation remains the same. The additional experience of LTCC mining in panels A3 to A5 will lay a foundation for further mining and approvals required at Austar Mine for Stage 3 of the project.

ANNEXURES

ANNEX A

Notice of Modification

ANNEX B

Community Involvement Program Report

ANNEX C

Subsidence Assessment Report

ANNEX D

Flooding Assessment

ANNEX E

Environmental Attributes, Impacts and Controls