

Austar Coal Mine

ENVIRONMENTAL ASSESSMENT

Stage 3 Modification

VOLUME 1
Main Text
Appendices 1 - 8



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Volume 1

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Austar Coal Mine Project – Stage 3 Modification Environmental Assessment

Prepared by

Umwelt (Australia) Pty Limited

on behalf of

Austar Coal Mine Pty Ltd

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Executive Summary

Austar Coal Mine Pty Ltd (Austar) operates the Austar Coal Mine, which comprises the former Ellalong, Southland and Bellbird South Collieries. These operations, including coal extraction, handling, processing and transport, collectively form the Austar Mining Complex. The underground mining component within Stage 2 of the Austar Mining Complex is currently being undertaken within Consolidated Mining Lease 2 (CML2) under development consent DA 29/95. DA 29/95 was granted by the Minister for Urban Affairs and Planning in 1996, enabling coal extraction from the Greta Seam using a conventional retreat longwall extraction method to a height of up to 4.5 metres. DA 29/95 has been modified to enable extraction of up to 6.5 metres of coal from the Stage 1 and Stage 2 areas respectively using an enhanced form of conventional retreat longwall extraction known as Longwall Top Coal Caving (LTCC). A separate project approval (Project Approval 08_0111) has been granted enabling longwall mining using LTCC technology in the Stage 3 area and construction and operation of a new Surface Infrastructure Site and access road south-west of Kitchener.

To enable more efficient and safer extraction of coal from the Stage 3 area, Austar seeks approval to modify Project Approval 08_0111 to principally facilitate the reorientation of the Stage 3 longwalls. This modification will include removal of longwall A6, and extraction of coal in longwalls A7 to A19, which are a reorientation of previously approved longwalls A7 to A17 to more closely align with the direction of principal stress. In addition, the chain pillar widths are proposed to be increased from 45 metres to 55 metres to reduce roadway failure risks. The proposed Stage 3 Modification will remain entirely within CML2 and existing lease extension application areas MLA 322 and MLA 333 and involves a change to the Stage 3 mine plan only, with no proposed changes to underground mining method, total approved rate or quantity of extraction, or associated surface infrastructure.

Throughout this Environmental Assessment (EA), the area within the 20 mm subsidence contour for the Stage 3 longwall panels as approved is referred to as the 'Stage 3 area'. The area within the 20 mm subsidence contour for the proposed Stage 3 Modification longwall panels is referred to as the 'proposed Stage 3 Modification Area'.

The proposed Stage 3 Modification will result in the reduction of mining risk and an increase in efficiency of longwall extraction associated with the Stage 3 project. Furthermore, no significant increase in environmental impact levels is predicted.

Environmental Risk Assessment

An environmental risk assessment was undertaken for the proposed Stage 3 Modification to review the potential environmental hazards associated with the proposed Stage 3 Modification and determine what controls are required to reduce or eliminate any identified hazards to acceptable levels as far as practicable. The risk assessment was used as a screening process to determine which environmental aspects require further detailed impact assessment. The background information for the project upon which the risk assessment was based is provided in **Sections 2 to 5**, and the results of the environmental risk assessment are provided in **Section 6**. Detailed assessments of environmental aspects identified as requiring further impact assessment during the risk assessment are outlined in **Section 7** and summarised below.

An ongoing community consultation program is being undertaken by Austar regarding the proposed Stage 3 Modification. The key issues raised by the community to date have been incorporated into the detailed assessments of environmental aspects set out in **Section 7** and summarised below.

Subsidence Impacts

A detailed subsidence impact assessment for the proposed Stage 3 Modification has been undertaken by MSEC (2011). The assessment has been based on an Incremental Profile Method (IPM) model that has been calibrated using site specific subsidence information recorded from former mining of the Greta Coal Seam and the Branxton Formation. The data set spans several decades of subsidence monitoring. IPM modelling by MSEC (2011) has been used to produce subsidence predictions for the Maximum Predicted subsidence and Upper Bound subsidence. Maximum Predicted subsidence represents the maximum level of subsidence predicted using the IPM subsidence model that has been calibrated using measured subsidence specific to the Greta seam and Branxton Formation geology. The Upper Bound subsidence predictions have been developed for risk assessment purposes and are based on subsidence equivalent to 65% of the effective extracted seam thickness. MSEC (2011) has stated that based on the chain pillar configuration, the longwall void configuration and the massive nature of the Branxton Formation that maximum Upper Bound subsidence is unlikely to be more than 50% of the effective extracted seam thickness rather than the 65% that has been adopted by MSEC (2011).

Subsidence predictions prepared by MSEC for the proposed Stage 3 Modification indicate that the Maximum Predicted subsidence parameters based on the proposed Stage 3 Modification mine plan are similar to but slightly less than those predicted for the Stage 3 conceptual mine plan as approved under Project Approval 08_0111. The subsidence predictions indicate that all buildings and structures within the area of subsidence resulting from the proposed Stage 3 Modification will remain within Safe Serviceable and Repairable criteria. Detailed assessment of infrastructure within the proposed Stage 3 Modification Area including farm dams, access roads, tanks, swimming pools, tennis courts, fences, electricity and telecommunication services has been undertaken and indicates that subsidence impacts on this infrastructure will be within acceptable levels and will be readily manageable. Similarly, subsidence predictions indicate that mining will not have a significant impact on land use in the area.

New Extraction Plans (EPs) and Built Features Management Plans (BFMPs) providing details of specific management and monitoring activities on a property by property basis will be prepared in consultation with relevant government agencies and landholders prior to longwall extraction within the proposed Stage 3 Modification.

Vibration

A vibration impact assessment for the proposed Stage 3 Modification has been undertaken by Umwelt based on data collected by Austar using vibration monitors in the Stage 2 mining area, and the subsidence impact assessment undertaken by MSEC (2011). Monitoring undertaken within the Stage 2 area to date indicates that a number of minor vibration events have occurred as a result of mining within the Stage 2 area. These events have not been large enough to result in any significant structural impact to residences within the Stage 2 mining area. Based on the data provided in MSEC (2011), and taking into account the findings of vibration monitoring in the Stage 2 area, it is considered that mining in the proposed Stage 3 Modification Area is unlikely to result in vibration impacts in excess of those already approved under Project Approval 08_0111.

Vibration from underground mining within the Stage 3 Modification Area will be monitored via an extension of the existing Austar Stage 2 Vibration Monitoring Program (Austar 2009a). Damage to structures as a result of vibration from the underground mining in the Stage 3 Modification Area should it occur will be managed in the same manner as damage to structures as a result of subsidence

Surface Water and Groundwater

To assess the potential impacts of the proposed Stage 3 Modification on flooding and drainage, a detailed flooding and drainage assessment was undertaken by Umwelt. The assessment builds on the previous flooding and drainage assessments undertaken for the Stage 2 and Stage 3 areas (Umwelt 2007, Umwelt 2008b, Umwelt 2010b) which examine the potential impacts of the flooding and drainage regime of Quorrobolong Creek and its tributaries as a result of mining within the Stage 2, Stage 3 and Stage 2 Extension mining areas respectively.

The flooding and drainage assessment was undertaken using an RMA-2 flood model of the Quorrobolong Valley to investigate the impacts of the proposed Stage 3 Modification on flooding and drainage for maximum predicted and Upper Bound subsidence cases, including its cumulative impact taking into account mining as a part of Stages 2 and 3 of the Austar Coal Mine.

The flooding and drainage assessment indicates that:

- the changes to the 100 year ARI flood event as a result of the maximum predicted subsidence of the proposed Stage 3 Modification longwalls will result in only minor changes to the flood extent compared to the Stage 3 longwall layout as approved, and will not increase flood hazard categories at dwellings or along access tracks within the Quorrobolong Valley;
- the proposed Stage 3 Modification will not have a significant impact on the flow regime of the Cony Creek and Quorrobolong Creek systems and there is minimal potential for channel realignment to occur; and
- the potential for mining to result in stream capture within these creek systems is also considered negligible predominantly due to the depth of cover and the strength and thickness of the underlying Branxton Formation.

Drainage line monitoring within the proposed Stage 3 Modification Area will be undertaken as an extension to the existing Stage 2 Ecological Monitoring Program to monitor for any unforeseen or unpredicted impacts.

Analysis of the existing groundwater regime and geology of the area, undertaken by Connell Wagner (2007) indicates that the potential for vertically interconnected cracking to extend from the mining goaf (resulting from longwall extraction) to the surface is negligible.

Due to the geomorphology of the area, including broad and relatively shallow valleys and no confined gorges or deep valleys, and the massive structure of the Branxton Formation that extends from the Greta Coal Seam to the surface, the potential for upsidence or valley closure impacts to occur, or to adversely impact on groundwater in the shallow alluvium of the proposed Stage 3 Modification Area is considered to be negligible. This is consistent with the findings of MSEC (2011). As a result it is considered that the proposed Stage 3 Modification will not adversely impact on groundwater resources in the area.

The changes to the longwall layout proposed as a part of the Stage 3 Modification will result in a total underground storage void that is consistent with that previously approved under Project Approval 08_0111. No significant changes to groundwater inflow beyond that approved under Project Approval 08_0111 are predicted as a result of the proposed Stage 3 Modification. The water balance for the Austar Mine Complex including the Stage 3 Modification longwall layout is therefore considered to be consistent with that described in the Site Water Management Plan (Austar, 2009) and approved by the Department of Planning and Infrastructure in November 2009. The existing Austar Mine Complex water

management system is also considered appropriate for ongoing management of water from the proposed Stage 3 Modification mining area.

A detailed groundwater monitoring program is proposed to record groundwater levels in the alluvium and underlying strata to monitor for any unexpected impacts. It is considered that potential groundwater impacts as a result of the proposed Stage 3 Modification are predictable and controllable.

Heritage

Aboriginal and historic heritage assessments of the surface of the proposed Stage 3 Modification Area were undertaken as a part of the Environmental Assessment of the proposed modification. The assessments build on previous assessments undertaken for the Stage 3 Project and other Austar Coal Mine infrastructure. The assessments include desktop review of impacts and management strategies for sites previously identified during field survey, and further survey and assessment within previously unsurveyed properties where landholders gave access. The properties surveyed included 20 private properties, representing a significant increase in survey area from the surveys undertaken in 2008. These surveys identified additional artefact scatters, isolated finds, and potential archaeological deposits along drainage lines within the proposed Stage 3 Modification Area. Subsidence predictions indicate that maximum predicted mine subsidence movements for the proposed Stage 3 Modification mine plan are predicted to be similar to, but slightly less than those predicted based on the approved Stage 3 mine plan for the majority of site types identified.

In the surveys undertaken in 2008, one axe grinding groove site was identified that could potentially be impacted by Stage 3 mining. MSEC (2011) states that the proposed Stage 3 Modification will result in a substantial reduction in total subsidence impact at the grinding groove site identified in the 2008 survey and documented in Umwelt (2008b), although some potential for fracturing of bedrock still remains. As described in Umwelt (2008b), Austar and Aboriginal stakeholders agreed upon an offset strategy for potential impacts from the Stage 3 mining on the grinding groove. This offset was a monetary contribution of \$100,000 to an Aboriginal project or program (to be decided by Aboriginal stakeholders). While the predicted subsidence impacts on the grinding groove as a result of the proposed Stage 3 Modification have decreased considerably compared with the Stage 3 mine plan as approved, Austar remains committed to the agreed offset for potential grinding groove impacts.

Ecology

An Ecological Assessment of the proposed Stage 3 Modification was undertaken by Umwelt to determine the potential impacts of the proposed Stage 3 Modification on the ecological values of the area. Results of the assessment indicate that the potential impacts on ecological values as a result of subsidence associated with the proposed Stage 3 Modification are likely to be low and will be manageable.

An ongoing monitoring program of riparian habitats within the proposed Stage 3 Modification Area is proposed to document the condition of these habitats throughout the life of the proposed mining development.

Energy and Greenhouse Gas

A comprehensive greenhouse gas and energy assessment for the Stage 3 project was undertaken for the Stage 3 EA (Umwelt 2008a and 2008f). The assessment was undertaken on the basis of the maximum annual run of mine (ROM) coal throughput of 3.6 million tonnes (Mt), for the life of the identified coal resource. As discussed in **Section 3**, the proposed

Stage 3 Modification project is a proposed reorientation of the mine plan only, with no proposed changes to the annual production rate or life of the operation. The estimates of energy usage provided in Umwelt (2008f) are therefore still applicable for the proposed Stage 3 Modification.

Exploration Program

Ongoing exploration works and resultant refinement of the Stage 3 mine plan will be required over the life of the Stage 3 Project. Exploration works will be undertaken so as to avoid significant surface impacts, in accordance with the provisions of the relevant Austar environmental management plans. All exploration works will be undertaken to ensure surface disturbance within environmentally sensitive areas are avoided. If surface disturbance works within environmentally sensitive areas cannot be avoided, further environmental impact assessment will be undertaken. A surface disturbance permitting procedure will be undertaken to ensure surface disturbance works within environmentally sensitive areas are avoided.

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1.0 Introduction

1.1 Project Overview

1.1.1 Mine History

Austar Coal Mine Pty Limited (Austar), a subsidiary of Yancoal Australia Pty Limited (Yancoal) operates Austar Coal Mine, an underground coal mine located approximately 10 kilometres south of Cessnock in the Lower Hunter Valley in NSW (refer to **Figure 1.1**). The mine is an aggregate of the former Ellalong, Southland and Bellbird South Collieries, and is located in the South Maitland Coalfields. These operations, including coal extraction, handling, processing and transport, collectively form the Austar Mining Complex (see **Figure 1.2**).

The underground mining component within Stage 2 of the Austar Mining Complex is currently being undertaken within Consolidated Mining Lease 2 (CML2) (refer to **Figure 1.1**) under development consent DA 29/95. DA 29/95 was granted by the Minister for Urban Affairs and Planning in 1996, enabling coal extraction from the Greta Seam using a conventional retreat longwall extraction method to a height of up to 4.5 metres.

A modification to DA 29/95 was granted by the Minister for Planning in September 2006 to allow extraction of up to 6.5 metres of coal from two longwall panels (Longwalls A1 and A2) in the Stage 1 area (refer to **Figure 1.1**) using an enhanced form of conventional retreat longwall extraction known as Longwall Top Coal Caving (LTCC). Extraction of coal from Longwalls A1 and A2 (LW A1 and A2) using LTCC technology was completed in November 2008.

A second modification to DA 29/95 was approved by the Minister for Planning in June 2008 to allow extraction of up to 6.5 metres of coal using LTCC technology in the Stage 2 area (see **Figure 1.1**). At this time Stage 2 comprised Longwalls A3 to A5 (LW A3 to A5).

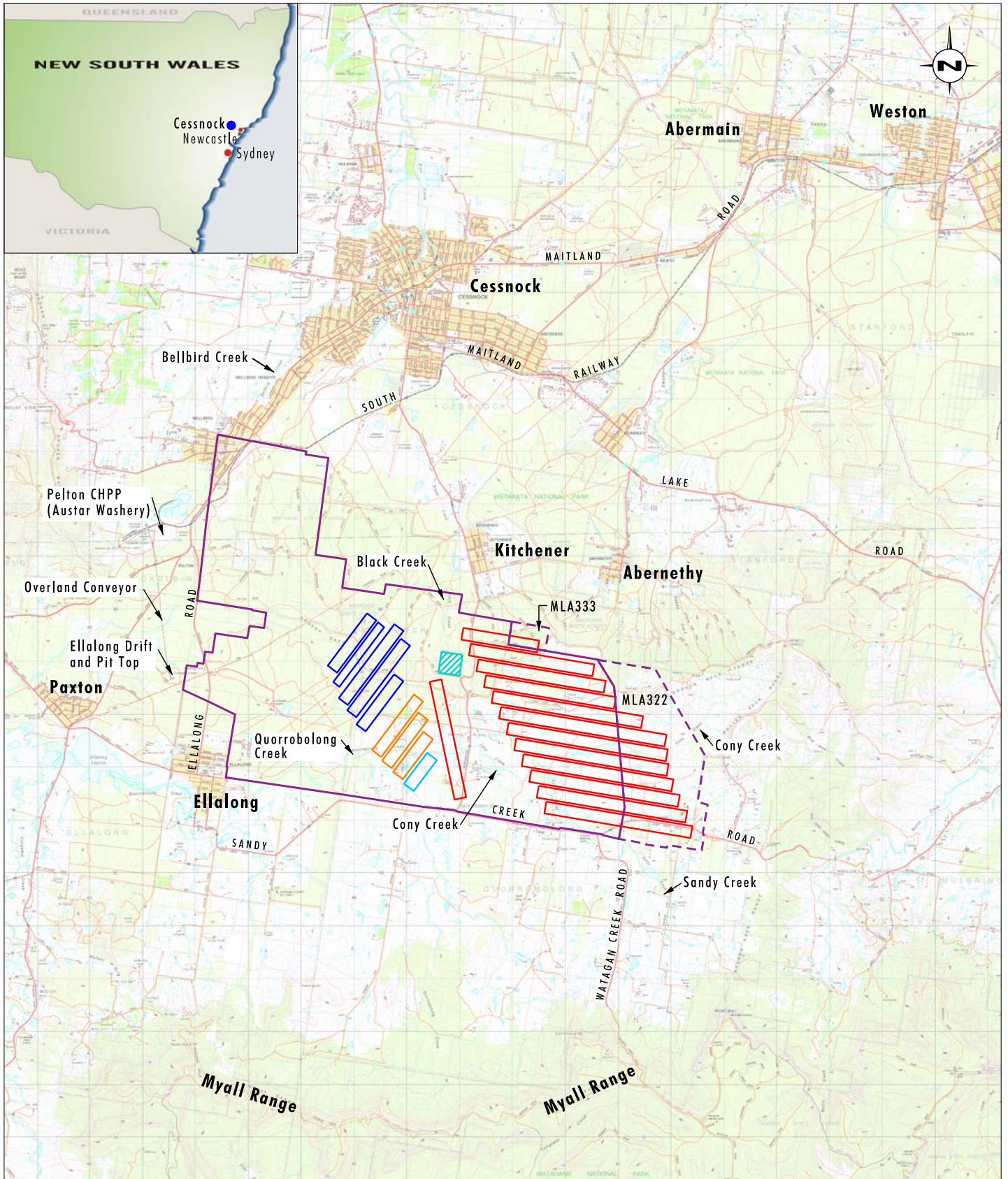
An additional minor modification of DA 29/95 to vary the length and widths of Longwalls A4 and A5 was approved in 2009, and a further modification to DA 29/95 adding Longwall A5a to the Stage 2 area (refer to **Figure 1.1**) was approved in November 2010. Mining in the Stage 2 area commenced during early 2009. It is envisaged that mining in the Stage 2 area will be completed late in 2012. Mining in Stage 2 is wholly within CML2.

Project Approval 08_0111 (provided in **Appendix 1**) was granted by the Minister for Planning in September 2009, enabling longwall mining using LTCC technology in the Stage 3 area and construction and operation of a new Surface Infrastructure Site and access road south of Kitchener (refer to **Figure 1.3**). Underground mining in the Stage 3 area and construction of the new Surface Infrastructure Site are collectively known as the 'Stage 3 Project'. Construction of the Surface Infrastructure Site commenced in December 2009. Longwall mining in the Stage 3 area is scheduled to commence in 2013.

The remainder of Austar operations utilises Austar's existing coal handling and processing infrastructure and facilities. A description of Austar's existing infrastructure and facilities is provided in **Section 2.2**.

1.1.2 Proposed Stage 3 Modification

To enable more efficient and safer extraction of coal from the Stage 3 area, Austar seeks approval to modify Project Approval 08_0111 to allow the longwalls to be reorientated as per **Figure 1.4**. This modification will include removal of longwall A6, and extraction of coal in



Source: Topo Maps: LPI NSW, Longwall Layout: Astar Cool Mine

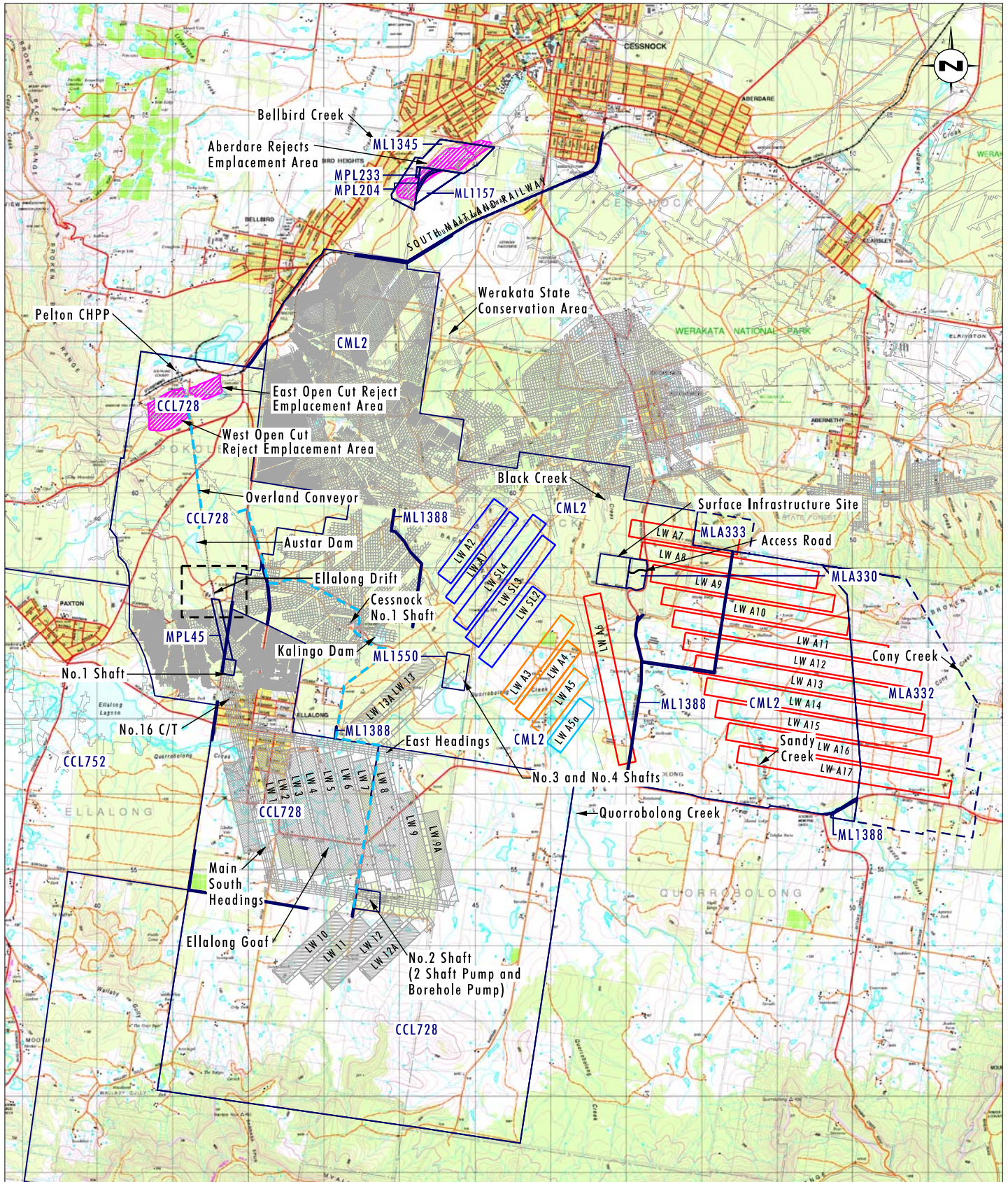
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1:100 000

Legend

- ▭ Layout for Stage 1 Longwall Panels
- ▭ Layout for Stage 2 Longwall Panels
- ▭ Layout for Stage 2 Extension Longwall Panel
- ▭ Conceptual Layout for Stage 3 Longwall Panels as Approved
- ▭ Approved Surface Infrastructure Site
- ▭ Consolidated Mining Lease (CML) 2
- ▭ Pending Mining Lease Application Areas

FIGURE 1.1

**Astar Mine Complex
Locality Plan**



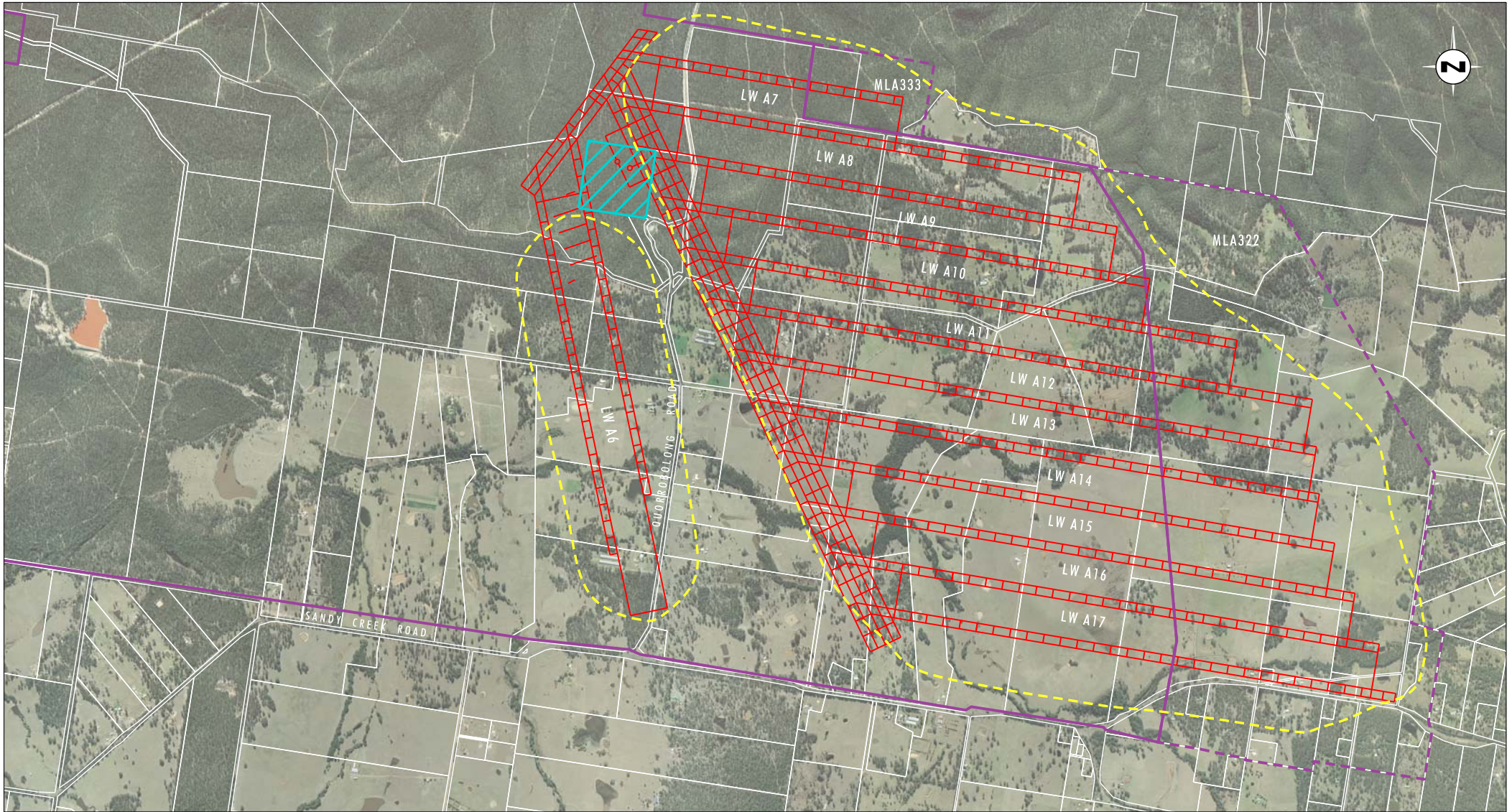
Source: Topo Maps: LPI NSW, Longwall Layouts: Auster Coal Mine

0 1 2 3 km
1:70 000

Legend

- Layout for Stage 1 Longwall Panels
- Layout for Stage 2 Longwall Panels
- Layout for Stage 2 Extension Longwall Panel
- Conceptual Layout for Stage 3 Longwall Panels as Approved
- Reject Emplacement Areas
- Old Workings
- Mining Leases
- Pending Mining Lease Application Areas
- Water Pipeline

FIGURE 1.2
Auster Mine Complex



Source: Longwall Layout: Astar Coal Mine, Cadastre: LPI NSW,
Aerial Photography: AAM Hatch 2006

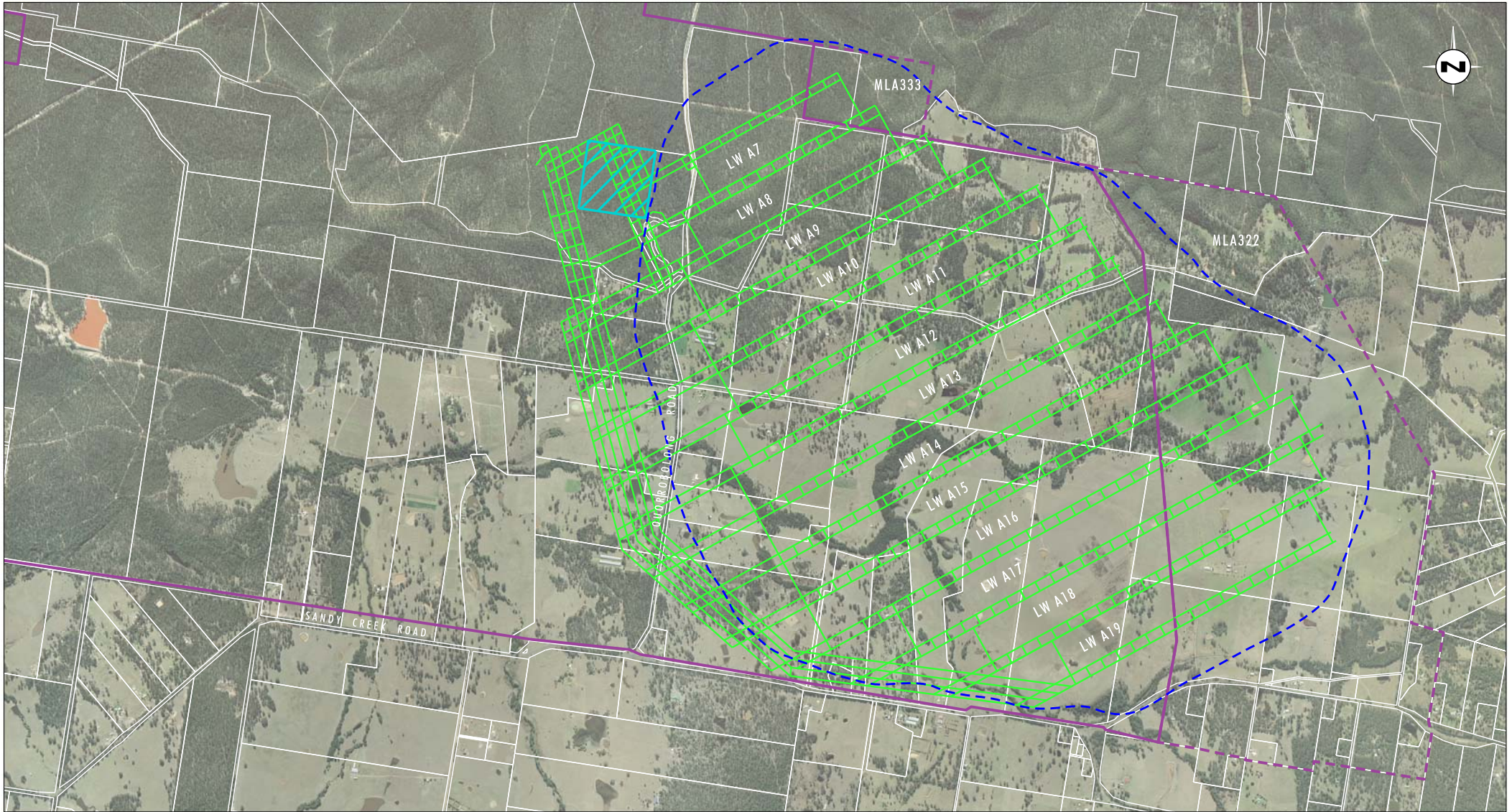
0 0.5 1 1.5km
1:32 000

Legend

- ▭ Conceptual Layout for Stage 3 Longwall Panels as Approved
- 20mm Subsidence Contour for Conceptual Panels as Approved
- Approved Surface Infrastructure Site
- Consolidated Mining Lease (CML) 2
- Pending Mining Lease Application Areas

FIGURE 1.3

Stage 3 Conceptual Mine Plan as Approved



Source: Longwall Layout: Astar Coal Mine, Cadastre: LPI NSW, Aerial Photography: AAM Hatch 2006

0 0.5 1 1.5km
1:32 000

Legend

- ▭ Proposed Stage 3 Modification Longwall Panels
- - - 20mm Subsidence Contour for Proposed Stage 3 Modification
- ▨ Approved Surface Infrastructure Site
- ▭ Consolidated Mining Lease (CML) 2
- - - Pending Mining Lease Application Areas

FIGURE 1.4

Proposed Stage 3 Modification Longwall Layout

longwalls A7 to A19, which are a reorientation of longwalls A7 to A17 shown in **Figure 1.3**. The location of the main headings is proposed to be moved to the west (refer to **Figure 1.4**) and the width of chain pillars is also proposed to be increased to reduce roadway failure risk and in turn subsidence impact risks. The proposed Stage 3 Modification will remain entirely within CML2 and existing lease extension application areas MLA 322 and MLA 333 and involves a change to the Stage 3 mine plan only, with no proposed changes to underground mining method, total approved rate or quantity of extraction, or associated surface infrastructure. A comparison between the longwall layouts of the Approved Stage 3 and Stage 3 Modification is provided in **Figure 1.5**. Throughout this Environmental Assessment (EA), the area within the 20 mm subsidence contour for the Stage 3 longwall panels as approved (**Figure 1.3**) is referred to as the 'Stage 3 area'. The area within the 20 mm subsidence contour for the proposed Stage 3 Modification longwall panels (**Figure 1.4**) is referred to as the 'proposed Stage 3 Modification Area'.

As Project Approval 08_0111 was granted under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act), Austar seeks approval for the modification under section 75W of the EP&A Act. A Minister's consent granted under Part 3A can only be modified by the Minister under section 75W. This EA will accompany the development application to the NSW Minister for Planning and Infrastructure (DP&I) and has been prepared in accordance with the Environmental Assessment Requirements (EARs) as set out in **Appendix 2**.

1.2 Project Justification

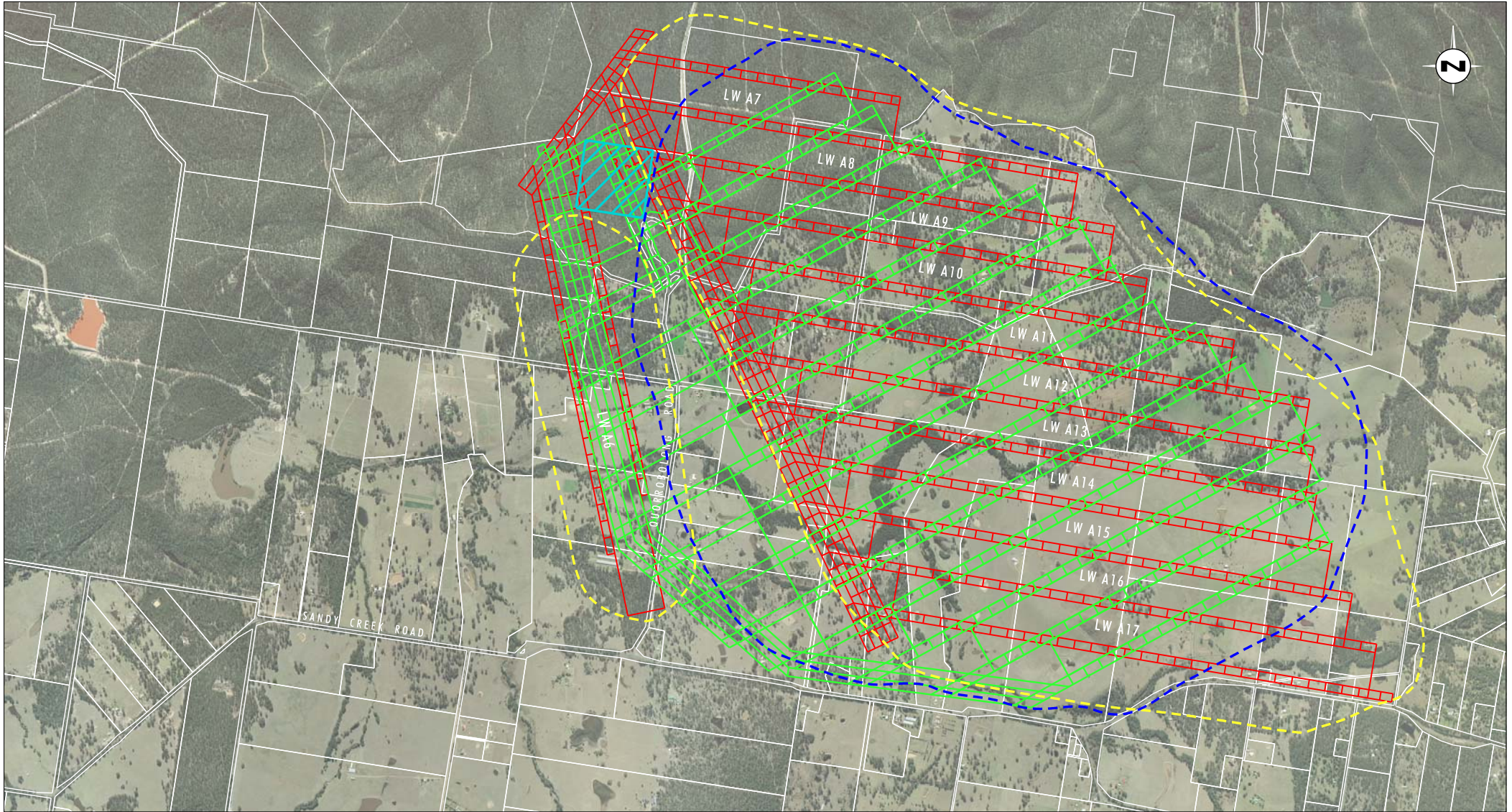
1.2.1 Geological and Safety Considerations

Following finalisation of the approved Stage 3 mine plan in mid 2008, further geological information has become available regarding the stress orientation, impact of geological structures on east-west orientated panels and approved longwall A6, and improved coal quality in the western area of Stage 3. Based on the geological information gained during Austar's exploration program over the last three years, the proposed modification to the mine plan will result in:

- reduction in overall strata failure and business interruption risk due to alignment of longwall orientation with the principal stress direction;
- reduction in roadway failure risks and subsidence impact risks due to an increase in chain pillar width from 45 metres to 55 metres;
- access to high quality, thick seam coal to the west of approved longwalls A7 to A17 that would otherwise have been sterilised by the approved mine plan thus maximising resource recovery; and
- reduction in risk to longwall production between geologically structured zones in approved longwall A6 by moving the main headings to this location.

1.2.2 Surface Impact and Coal Tonnage

As identified by the relevant 20 mm subsidence contours shown in **Figure 1.5**, the area of surface impact from the proposed Stage 3 Modification mine plan will be generally within the envelope of the approved Stage 3 mine plan for the majority of the underground mining area. Surface impacts are proposed to be decreased in the west of the approved Stage 3 area via the removal of Longwall A6, decreased in the south-east and north-west by reorientation of longwall panels, and increased for a section of land between the approved Longwall A6 and the western extent of approved Longwalls A7 to A17.



Source: Longwall Layout: Astar Coal Mine, Cadastre: LPI NSW,
Aerial Photography: AAM Hatch 2006, Subsidence Contours: MSEC

0 0.5 1 1.5km
1:32 000

Legend

- Conceptual Layout for Stage 3 Longwall Panels as Approved
- Proposed Stage 3 Modification Longwall Panels
- 20mm Subsidence Contour for Conceptual Panels as Approved
- 20mm Subsidence Contour for Proposed Stage 3 Modification
- Approved Surface Infrastructure Site

File Name (A4): R64_V1/2274_943.dgn

FIGURE 1.5

Approved Stage 3 and Stage 3
Modification Longwall Comparison

The land surface area within the 20 mm subsidence contour for the Stage 3 conceptual mine plan (as approved) and the proposed Stage 3 Modification mine plan is provided in **Table 1.1**. The proposed modification will result in a reduction in the extent of surface impact due to subsidence. Total run of mine (ROM) coal extraction over the life of the mine will remain within the approved annual extraction of 3.6 million tonnes of ROM coal per year over a 21 year mine life.

Table 1.1 – Proposed Change to Surface Impact Area

	Conceptual mine plan (as approved)	Proposed modification mine plan	Proposed Change	Percentage Change
Area within 20 mm subsidence contour (ha)	1350 ha	1210 ha	-143 ha	- 11%

The proposed mine plan modification is therefore anticipated to reduce risk and provide for more consistent production with less interruption, whilst having no significant increase in overall environmental impact levels.

1.2.3 Ecologically Sustainable Development

The proposed Stage 3 Modification is consistent with the approved Stage 3 Project in relation to the principles of Ecologically Sustainable Development (ESD). The use of LTCC mining methods allows for the maximisation of resource extraction. Furthermore the reorientation of the longwalls and increase in pillar dimension is predicted to result in less surface disturbance due to subsidence, and a greater amount of resource extracted that would have otherwise been sterilized under the approved Stage 3 mining plan, as presented in **Table 1.1**.

The more efficient extraction of resources with no significant increase in impact due to subsidence aligns with the principle of improved valuation and pricing of resources as described in **Section 9.1.4**. In addition, analysis indicates that the proposed Stage 3 Modification coal resource can be extracted without having a significant impact on the ecology of the surrounding area (see **Section 5.5**). This is consistent with another principle of ESD, the conservation of biological diversity and ecological integrity as described in **Section 9.1.3**. Further detail of how the Stage 3 Modification project relates to the principles of ESD can be found in **Section 9.1**.

1.3 Austar Coal Mine Pty Limited

As discussed in **Section 1.1**, Austar Coal Mine Pty Ltd is a subsidiary of Yancoal Australia Pty Limited (Yancoal). Yancoal is a subsidiary of Yanzhou Coal Mining Company Limited (Yanzhou) and is one of the largest coal mining companies in China. Yanzhou has significant experience in the application of LTCC technology in thick seam recovery and longwall mining in China, and has brought this technology and application to Australia.

1.4 Stage 3 Modification Project Environment

1.4.1 Overview of Environmental Features

The majority of the proposed Stage 3 Modification Area is located to the south of Broken Back Range, a major landform extending from west of Pokolbin to Mulbring. The landform within the Stage 3 Modification Area is primarily within the Quorrobolong Creek catchment, with two named tributaries (Sandy Creek and Cony Creek) running through the proposed Stage 3 Modification Area. A small section of the proposed Stage 3 Modification Area is located in Black Creek catchment which is located to the north of Broken Back Range. The topography in the north of the proposed Stage 3 Modification Area is characterised by the steep slopes, narrow ridges and deep gullies of the Broken Back Range, descending to undulating hills and alluvial flats in the central and southern portions of the proposed Stage 3 Modification Area.

The climate of the region is classified as warm temperate, characterised by seasonal variations from hot wet summers to mild dry winters. Rainfall is summer dominant, often occurring as short duration high intensity storms, with an average of 800 to 950 millimetres of rain falling in the region per annum. A more detailed description of the environmental features of the proposed Stage 3 Modification Area is provided in **Sections 5 and 6**.

1.4.2 Land Ownership and Tenure

Land ownership within and proximate to the Stage 3 Modification Area is shown in **Figure 1.6**. As indicated on **Figure 1.6** the Stage 3 Modification longwall extraction area is primarily located beneath rural land holdings. The northern portion of the mine plan extends underneath the Werakata State Conservation Area (SCA) and sections of Crown land, as well as an area of Austar-owned land to the east of the approved Surface Infrastructure Site.

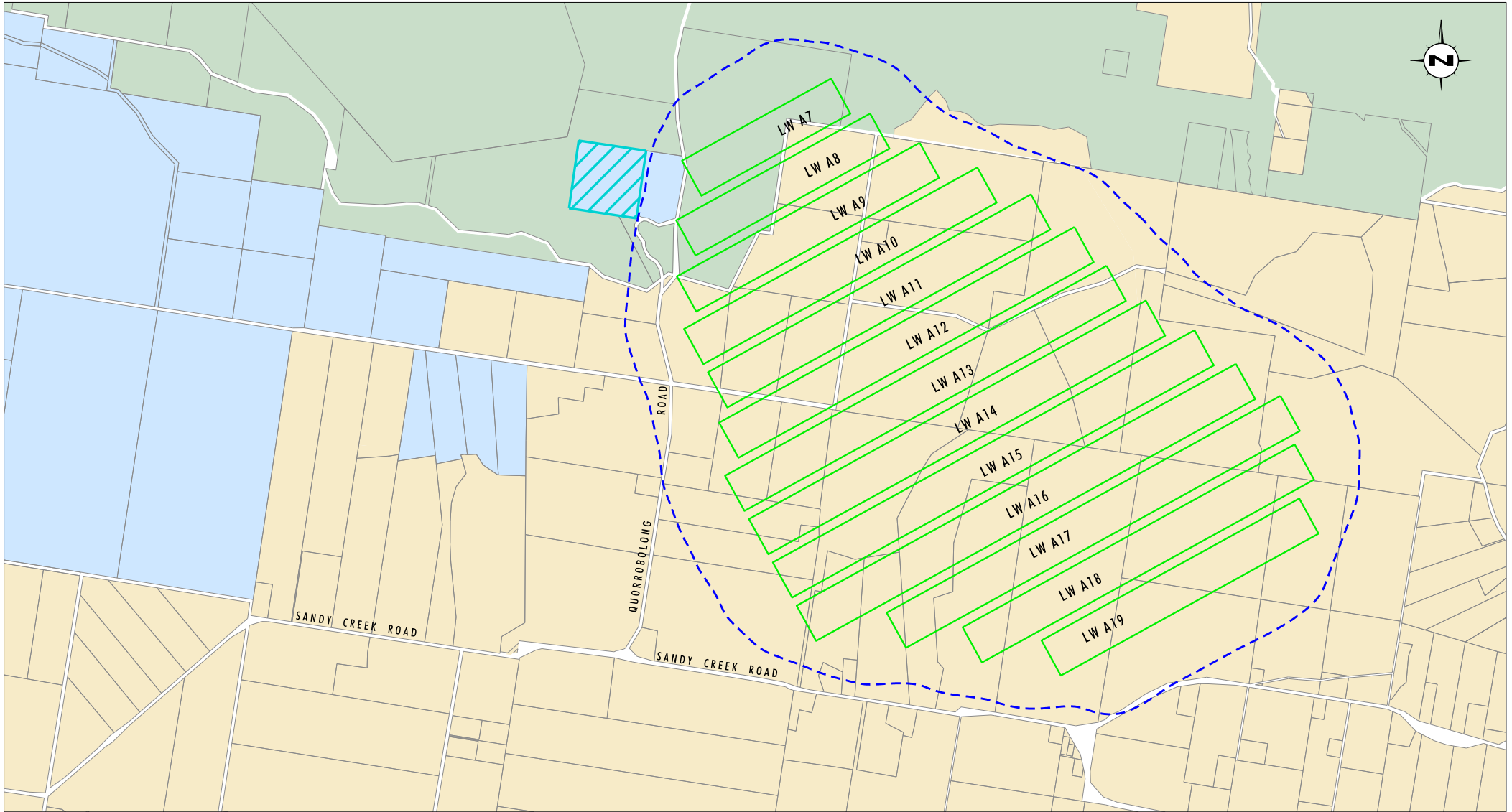
The dominant land uses within and adjacent to the project area include grazing, conservation and mining. The majority of the proposed underground mining area is located within CML2, with the remainder being located within pending mining lease application areas (refer to **Figure 1.1**). Land in the northern section of the mining lease forms part of the Werakata SCA. Land use in the south of the mining lease consists of rural cattle grazing and poultry production. The villages of Kitchener, Abernethy, Bellbird, Paxton, Pelton and Ellalong (refer to **Figure 1.1**) are located in proximity to the proposed Stage 3 Modification Area.

1.5 Environmental Assessment Team

This EA was prepared by Umwelt (Australia) Pty Limited on behalf of Austar with specialist input provided by the following organisations/specialists. The specialist reports prepared for this EA and their authors are presented in **Table 1.2**.

Table 1.2 – Specialist Reports included within this EA

Report	Author
Ecological Assessment	Umwelt (Australia) Pty Limited
Aboriginal Heritage Assessment	Umwelt (Australia) Pty Limited
Flood and Drainage Assessment	Umwelt (Australia) Pty Limited
Mine Subsidence Impact Assessment	Mine Subsidence Engineering Consultants Pty Ltd



Source: Cadastre: LPI NSW, Land Ownership: Mineral Resources 2003, Longwall Layout: Austar Coal Mine

0 0.5 1 1.5 km
1:32 000

Legend

- Proposed Stage 3 Modification Longwall Panels
- 20mm Subsidence Contour for Proposed Stage 3 Modification
- Approved Surface Infrastructure Site
- Austar Owned Land
- Werakata State Conservation Area / Crown Land
- Privately Owned Land

FIGURE 1.6

Land Ownership

The EA Statement of Authorship and a full listing of the project team members and their respective roles are provided in **Appendix 3**.

1.6 Environmental Assessment Structure

The EA has been conducted in accordance with the EARs issued in April 2011. The EARs are provided in **Appendix 2**.

The EA comprises a main text component and supporting studies, which include **Appendices 1 to 11**. An overview of the layout of the main text is presented in **Table 1.3** below.

Table 1.3 – Environmental Assessment Structure

EA Section	Environmental Assessment Details
Executive Summary	Executive Summary.
Section 1	A summary of the existing Austar operations, a general overview of the Project, key project components, the Project proponent. A Stage 3 Modification site context, indication of the environmental assessment team and structure is also provided with an overview of the approval process, authority consultation and project timing.
Section 2	Description of the existing Austar operations and approvals including environmental management and monitoring at the Austar Mine Complex.
Section 3	Austar Stage 3 Modification Project description including a summary of the proposed changes to underground mining development and operations. A description of the resource and details of the workforce and hours of operation are also provided.
Section 4	Detailed assessment of the current planning context, the Commonwealth and State legislation, State Environmental Planning Policies, the Lower Hunter Regional Strategy and the Cessnock City Council Local Environment Plan.
Section 5	Description of the environmental context of the Proposed Stage 3 Modification.
Section 6	Risk analysis for the proposal and potential environmental risks that need to be considered in planning and assessing the Project.
Section 7	The environmental assessment and management for the proposed Stage 3 Modification mining area including subsidence, surface water and drainage, groundwater, noise, air quality, ecology, heritage, greenhouse gas and energy, socio-economic aspects.
Section 8	Statement of Commitments from Austar for the Stage 3 Modification.
Section 9	A detailed overview and justification of the Project including environmental impacts, site suitability, project alternatives, the need for the Project, benefits of the Project and the principles of ecologically sustainable development.
Section 10	Glossary and Abbreviations.
Section 11	References.