



Austar Coal Mine Longwalls B1 to B3 Extraction Plan

May 2016



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
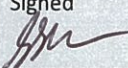
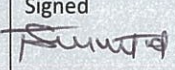
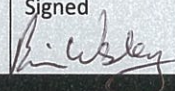
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Plan 1: LWB1 – LWB3 Existing and Proposed Workings
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Plan 3: LWB1 – LWB3 Geological & Seam Data
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Plan 5: LWB1 – LWB3 Mining Titles and Land Ownership
Plan 6: LWB1 – LWB3 Geological Log
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1 INTRODUCTION

Austar Coal Mine Pty Ltd (Austar), a subsidiary of Yancoal Australia Limited (Yancoal), owns Austar Coal Mine, an underground coal mine located approximately 10 kilometres south of Cessnock in the Lower Hunter Valley in NSW. The mine is an aggregate of the former Ellalong, Pelton, Cessnock No.1 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 Coal Mine Complex.

A modification to the Bellbird South development consent (DA29/95 MOD6) was approved under delegated authority of the Minister for Planning on 29 January 2016. The modification extends the Bellbird South consent area and permits the transfer of coal from three conventional longwall panels (Longwalls B1 to B3) within the Ellalong Colliery and Bellbird South Colliery areas to existing infrastructure for processing and transport of coal. The modification also extends the development consent expiry for five years to allow the longwall panels to be extracted.

During 2016, Austar gained further information on the location and nature of geological structures in the area of Longwall B2 and Longwall B3. This resulted in a necessary refinement of the mine plan to shorten those panels at the commencing and finishing ends in response to those structures. Austar was approved by the nominee for the Secretary of the Department of Planning and Environment on 29 April 2016 to shorten Longwall B2 and Longwall B3, and the extent of those shortened panels has been used in all diagrams and subsidence predictions in the preparation of this Extraction Plan.

The location of Austar's mining areas, and previous mining is shown with the Austar Mine Complex in **Figure 1.1**.

1.1 SCOPE & OBJECTIVE

The Extraction Plan for Longwalls B1 to B3 has been prepared in accordance with the requirements of Schedule 3, Condition 3A of DA29/95 (MOD6). The objective of this Extraction Plan is to identify the management strategies for subsidence induced impacts on natural and built features from secondary extraction of longwall panels LWB1 to LWB3 within the Greta Seam at Austar using traditional longwall mining techniques (the **Extraction Plan Area** shown as **Figure 1.2**).

The objective of the Extraction Plan will be achieved by:

- Providing an overview of the planned coal resource recovery methods;
- Identifying the predicted subsidence impacts and/or environmental consequences within the Extraction Plan area associated with the planned coal recovery;
- Identifying the management activities (including monitoring and remediation) prepared to address the predicted subsidence impacts from secondary extraction of longwall panels LWB1 to LWB3 within the Greta Seam at Austar; and
- Identifying the review and reporting activities to allow for assessment of the performance of subsidence management measures by Austar, and identification of areas where either

continual improvement may be achieved, or management of unpredicted subsidence impacts can be managed.

1.2 DOCUMENT STRUCTURE

The Extraction Plan has been prepared to address conditions of DA 29/95 (MOD 6), and structured in general accordance with the *Guidelines for the Preparation of Extraction Plans (Draft V5)* (Extraction Plan Guidelines) provided to Austar Coal by the Department of Planning and Environment in 2016.

The document structure includes the following elements:

- **Section 2** includes an overview of the mine planning and design, overall subsidence predictions, and performance objectives,
- **Section 3** includes details on the development of the Extraction Plan, including details of consultation with relevant agencies and other stakeholders within the Extraction Plan area;
- **Section 4** provides an overview of and details of subsidence management measures including plans prepared to address impacts to relevant environmental and/or built features. The individual management plans are contained in Appendices to the Extraction Plan;
- **Section 5** addresses the key elements of how the Extraction Plan is implemented, including reporting, regular review and key responsibilities;

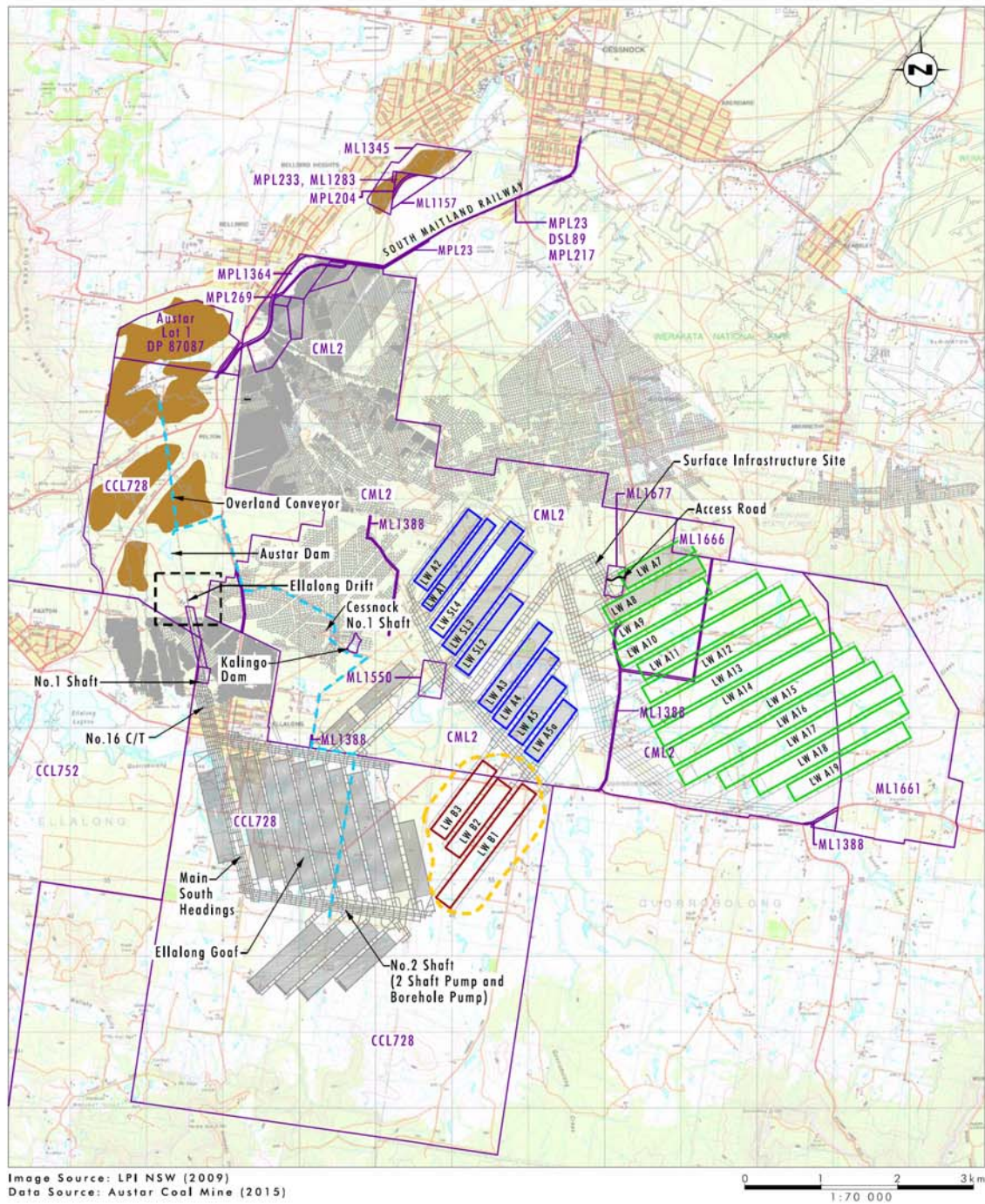
An important component of the Extraction Plan are the key component plans referred to in **Section 4**. These plans described in **Table 1.1**.

Table 1.1 Extraction Plan Key Component Plans

Plan	Description	Location
Water Management Plan	To manage the potential environmental consequences of second workings on surface and ground water	Appendix E
Land Management Plan	To manage the potential environmental consequences of second workings on steep slopes and land in general	Appendix F
Biodiversity Management Plan	To manage the potential environmental consequences of second workings on aquatic and terrestrial flora and fauna	Appendix G
Built Features Management Plan	To manage the potential environmental consequences of second workings on any built feature	Appendix H
Public Safety Management Plan	To ensure public safety in the Extraction Plan area	Appendix I
Subsidence Monitoring	A program to collect actual measured subsidence data, and conduct inspections for environmental consequences of subsidence to compare against predicted impacts which	Appendix J

Plan	Description	Location
Program	may trigger a response, or set of responses	
Coal Resource Recovery Plan	To demonstrate effective recovery of available resources obtained through underground mining activities	Appendix K

Graphical Plans which are required by the Extraction Plan Guidelines, and referred to in this Extraction Plan, are included as **Graphical Plans** at the end of the Main Extraction Plan text.



- Legend**
- Completed Bellbird South Stage 1, Stage 2 and Southland Longwall Panels (DA 29/95)
 - Stage 3 Longwall Panels (PA08_0111) (In Progress)
 - LWB1-B3 Extraction Plan Longwall Panels
 - LWB1-B3 Extraction Plan Area
 - Approved Reject Emplacement Areas
 - Completed Underground Workings
 - Mining Lease Boundary
 - Austar owned CHPP Land
 - Water Pipeline

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FIGURE 1.1
Austar Coal Mine Complex

Figure 1.1 Austar Coal Mine Complex

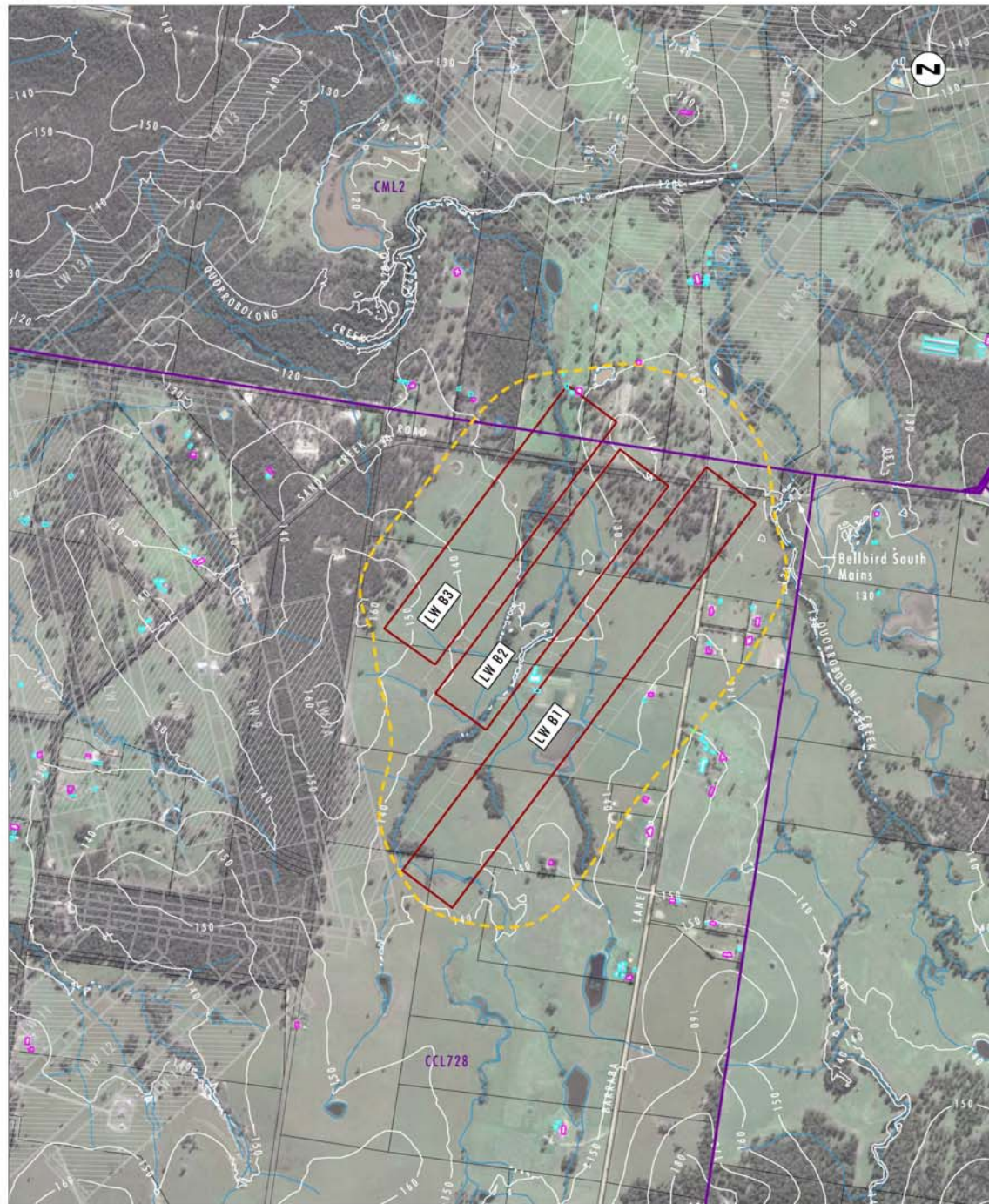


Image Source: Google Earth (2014)
Data Source: Austar Coal Mine (2015)
Note: Contour Interval 10m

Legend

- LWB1-B3 Extraction Plan Longwall Panels
- LWB1-B3 Extraction Plan Area
- Completed Underground Workings
- Mining Lease Boundary
- Drainage Line
- Contour
- Dwelling
- Other Structure

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FIGURE 1.2
LWB1-B3 Extraction Plan Area

Figure 1.2 Extraction Plan Area

2 OVERVIEW

2.1 ENVIRONMENTAL CONTEXT

2.1.1 Environmental Setting

The Extraction Plan Area surface expression is approximately 230 ha and is located in Quorrobolong, approximately three kilometres east of the township of Ellalong in the lower Hunter Valley of NSW.

The landform within the Extraction Plan Area is situated within the Quorrobolong Creek Catchment, a sub-catchment to the larger Wollombi Brook and ultimately the Hunter River catchment. Quorrobolong Creek forms part of the Congewai Creek Management Zone of the Upper Wollombi Water Source within the Hunter Unregulated and Alluvial Water Sources Water Sharing Plan area. Quorrobolong Creek is located to the east and north of the Extraction Plan Area and flows north from the Myall Range then west into Ellalong Lagoon. An un-named tributary of Quorrobolong Creek runs from south to north across the proposed Extraction Plan Area, joining Quorrobolong Creek approximately 600 metres to the northwest.

The topography of the Extraction Plan Area is generally characterised by low undulating hills and creek flats associated with an un-named tributary of Quorrobolong Creek. Elevations within the area range from approximately 130 metres to 160 metres (AHD).

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.

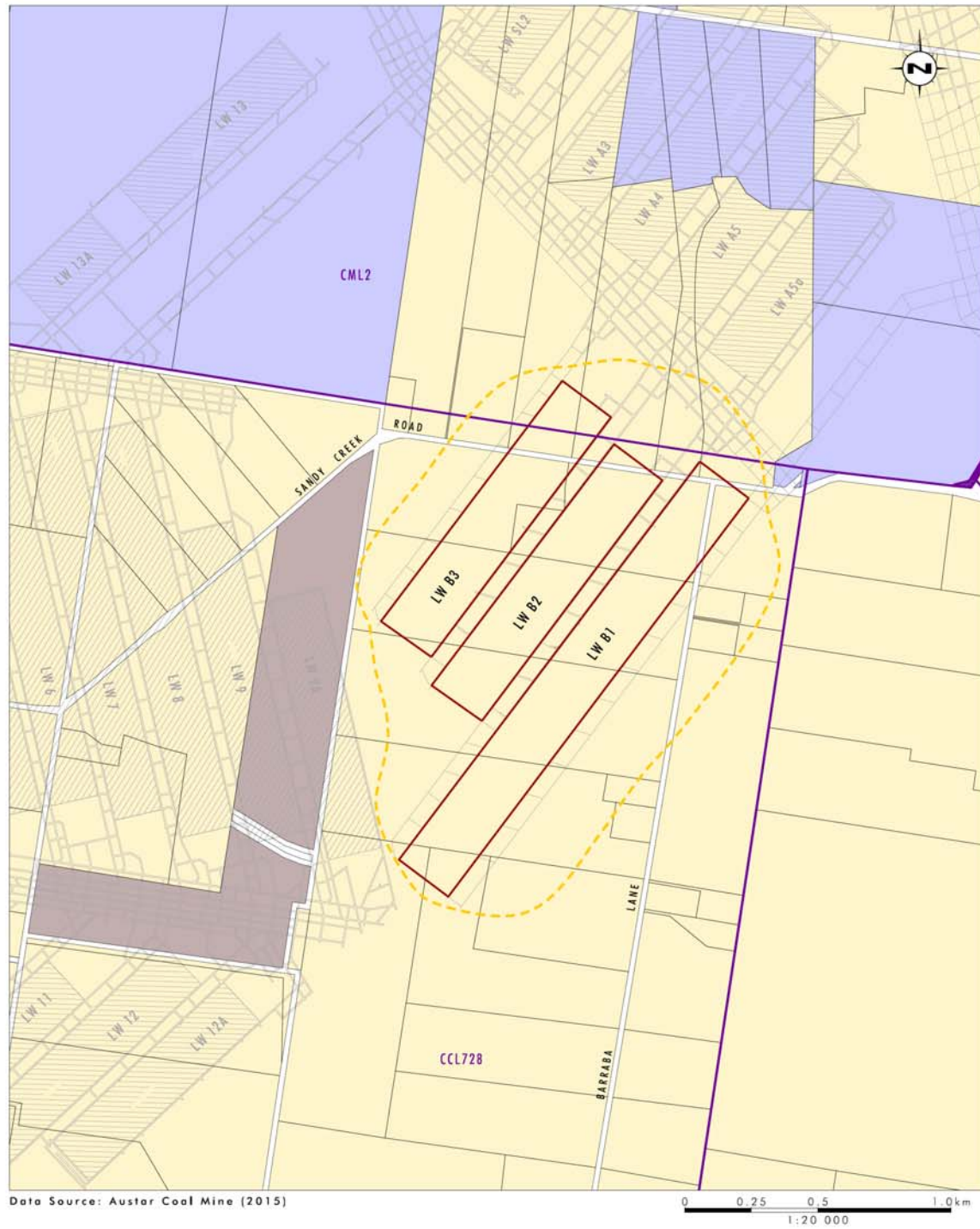
2.1.2 Land Ownership and Tenure

Land ownership within and proximate to the Extraction Plan Area is shown in **Figure 2.1**.

Land use surrounding the Extraction Plan Area is primarily rural to the north, east and south, with vegetated parcels of Crown and Austar owned land to the west. The dominant land use within and surrounding the area is grazing, however also includes rural residential, vegetated land and underground mining and coal processing associated with the Austar Coal Mine. The villages of Kitchener, Abernethy, Ellalong, and Paxton are located within 4 km north and west of the Extraction Plan Area. The Watagans National Park is located approximately 4 kilometres south and the Werakata State Conservation Area is located approximately two kilometres to the north.

The Extraction Plan Area is located predominantly to the south of Sandy Creek Road, with the northern end of the proposed longwalls extending beneath Sandy Creek Road and Barraba Lane, both of which are local Council roads.

The majority of the Extraction Plan Area is located within Consolidated Coal Lease 728 (CCL728), with a small component in the northern portion located within Consolidated Mining Lease 2 (CML2) (refer to **Figure 1.1** and **Graphical Plan 5**).



Legend

- LWB1-B3 Extraction Plan Longwall Panels
- LWB1-B3 Extraction Plan Area
- Completed Underground Workings
- Mining Lease Boundary
- Austar Owned Land
- Privately Owned Land
- Crown Land

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FIGURE 2.1
Land Ownership

Figure 2.1 Extraction Plan Area Land Ownership

2.1.3 Natural and Built Features within Extraction Plan Area

Natural features within the Extraction Plan Area include:

- Ephemeral drainage lines of the Quorrobolong Creek and an unnamed tributary (**Graphical Plan 2**);
- Threatened Species Conservation Act listed native vegetation including:
 - Melaleuca shrub with emergent Eucalypts potential EEC;
 - Spotted Gum Ironbark Forest and Riparian Cabbange Gum Open Forest EEC; and
 - Threatened flora species (Netted Bottlebrush, Heath Wrinklewort, Small flower Grevilea).
- Riparian Swamp Oak Open Forest;
- Grazing pasture lands; and
- An Aboriginal Archaeological Site (**Graphical Plan 2**).

Built features within the Extraction Plan Area are shown on **Graphical Plan 2** and include:

- Public roads, bridge, culverts (Sandy Creek Road, and Barraba Lane);
- Communications infrastructure (local copper cables);
- Ausgrid above ground powerlines;
- Private groundwater bores;
- Rural property infrastructure (Private dwellings, private access tracks, sheds, farm dams, fences); and
- Permanent Marks and State Survey marks (PM's and SSM's)

2.2 MINE PLANNING, DESIGN AND RESOURCE RECOVERY

2.2.1 Extraction Plan Area

The Extraction Plan Area under consideration is that area likely to be affected by the mining of Longwalls B1 to B3 in the Greta coal seam. The **Extraction Plan Area (Figure 1.2** also shown as **Extraction Plan Area in Graphical Plans)** is defined as the surface area enclosed by the predicted limit of vertical subsidence, taken as the 20mm subsidence contour resulting from the extraction of the proposed Longwalls B1 to B3.

2.2.2 Mining Domains

Longwalls B1 to B3 are within the Bellbird South Mining area (as modified). This is Austar's fourth area of Longwall mining, following on from Stage 1 (panels A1 and A2), Stage 2 (panels A3, A4, A5 and A5a) and Stage 3 (panels A7 and A8).

The area has a long history of coal extraction. Previous longwall mining includes the Southland longwall panels SL1 to SL4 and Ellalong longwall panels LW1 to LW13. These longwall panels and surrounding regional bord and pillar extraction workings can be seen in **Figure 1.1** in relation to the Austar workings (Stage 1,2,3) and Extraction Plan Area (LWB1 to LWB3).

The Extraction Plan Area is contained within Mining Leases CML2 and CCL728. Retreat will be from the western end of each panel in a north-easterly direction to the nominated finish position at which point the equipment will be relocated to the following panel.

2.2.3 Mining Method

Austar intends to mine the Greta seam by conventional retreating longwall mining methods. Seam thickness varies between 3.3 to 4.7m within the extraction area. Extraction height will typically be 3.4m.

Development roadways are generally driven at 3.2m high x 5.4m wide by single pass continuous miners. Coal quality, geotechnical, geological and equipment issues will be the main drivers for variation in development or longwall extraction heights.

2.2.4 Mining Parameters

No other economic seams exist above or below the Greta coal seam within the Extraction Plan Area. The Pelton seam lies at the top of the Paxton formation above the Greta seam and within the Extraction Plan Area is less than 1.0m thick. This is sub-economic to extract. Thus no other seams within the Extraction Plan Area are proposed to be extracted now or into the future.

The estimated recovery of the resource within the Extraction Plan Area is provided in **Table 2.1**.

Table 2.1 Extraction Plan Area Estimated Resource Recovery

Total tonnes of coal (Resource within extraction area)	12.3Mt
Total tonnes extracted through development	0.35Mt
Tonnes extracted by Longwall	3.7Mt
Percentage recovery	33%

Particulars relating to each longwall panel is given in **Table 2.2**.

Table 2.2 Individual Longwall Tonnages

Panel	LW Length (m)	LW Block Width (void m)	Average Extraction Height (m)	LW ROM Tonnes (Mt)
LWB1	1,882	237	3.4	1.03
LWB2	1,141	237	3.4	1.00
LWB3	1,137	237	3.4	1.44

Table 2.3 Longwall Mining Rate and Sequence

Panel	Start Date	End Date	Estimate Duration (Days)
LWB2	July 2016	Dec 2017	150
LWB3	Feb 2017	July 2017	150
LWB1	Feb 2018	Aug 2018	195

Table 2.4 Longwall Geological Attributes

Panel	Depth of Cover (m)	Seam Thickness (m)	Roof and Floor Conditions	Geological Anomalies
LWB1	505-555	3.4-4.6	Distal from geological anomalies the roof is expected to be competent with some zones of potentially soft floor.	The Swamp Fault Zone is expected in the outbye end of LWB1. The Barraba Fault Zone is expected at the inbye end of LWB1.
LWB2	490-545	3.7-4.6	Distal from geological anomalies the roof is expected to be competent with some zones of potentially soft floor.	The Swamp Fault Zone was encountered in the outbye ends of the gateroads in LWB2. The Barraba Fault Zone is anticipated to be greater than 50m inbye of LWB2.
LWB3	480-540	3.8-4.7	Distal from geological anomalies the roof is expected to be competent with some zones of potentially soft floor.	The Swamp Fault Zone is expected in the outbye end of LWB3. The Barraba Fault Zone is anticipated to be greater than 50m inbye of LWB3.

2.2.5 Mine Design In Relation to Subsidence Management

Geological and geotechnical information across the Bellbird South mining area has been drawn from a number of historical boreholes and mining information compiled during development in the area.

The alignment of longwall orientation with the principal stress direction (being sub parallel) is favourable geotechnically, as this minimises the “stress notching” effect on longwall retreat.

Longwall panels have been located and aligned favourably to known geologically structured zones, namely the Swamp Fault and Barraba Fault zones.

Primary subsidence and environmental management strategies within the mine design involve the panel and chain pillar width design and the avoidance of large geological features (faults) that have the potential to create abnormal localised subsidence. The large depth of cover and massive sandstone overburden (Branxton Formation) creates a somewhat different subsidence development profile than typical shallower, weaker overburden, underground coal mines in the region. The thickness, strength and lack of discontinuities in the Branxton Formation (refer **Graphical Plan 6**) mean that the subsidence is controlled by the compression of the strata above and around the chain pillars with minimal inter-panel flexure of the overburden between the chain pillars. Consequently subsidence is largely controlled by the stability and thus size of the chain pillars and amount of deformation in the Branxton formation as it spans the chain pillars. Design of the panel width and chain pillar width thus has been a primary consideration and input into the subsidence and impact assessment whilst still allowing safe and productive mining. The parameters used for B1 to B3 are:

- Panel width (void) = 237m
- Minimum Chain Pillar width (solid) = 59.5m.

Chain pillar lengths are nominally 150m, however a small number of pillars of shorter length will also be used. As the length of these pillars are greater than the above stated minimum widths, the variations in lengths are expected to have minimal subsidence impact, as it will be the minimum pillar widths that have the most impact on subsidence levels.

The two main geological features within the mining area are known as the Swamp and Barraba Fault Zones (refer to **Graphical Plan 3**).

The Swamp Fault system consists of a number of closely spaced normal faults with a typical orientation of NNW-SSE and displacements down to the ENE. Total displacement was mapped to be between 0.6 metres and 1.0 metres in the gateroad between LWB1 and LWB2, and between 1.2 metres and 1.5 metres in the gateroad between LWB2 and LWB3.

The Barraba Fault Zone consists of a number of faults orientated NNW-SSE. The fault zone has been projected to rotate from intersections in the Ellalong LW9 gateroads where measured fault displacements ranged from 0.1 metres to 7.2 metres. Longhole drilling has indicated displacements of greater than 10 metres inbye of LWB2.

Large faulting has the potential to cause abnormal local subsidence, tilt and strain on the surface. As further exploration information becomes available on the exact location of these structures adjustments to the start and finishing positions of the longwalls may occur to minimise mining and subsidence impact risks and maximise resource recovery.

2.3 SUBSIDENCE PREDICTIONS

2.3.1 Prediction Method and Reliability

Subsidence predictions for the Extraction Plan Area have been provided by Mine Subsidence Engineering Consultants Pty Ltd (MSEC) using the calibrated Incremental Profile Method. Detailed description of the prediction technique used, factors that may affect the development of subsidence, and the relevance of input data are provided in Report No. MSEC833 (2016).

The Incremental Profile Method was originally calibrated for the local conditions at the Mine during the preparation of the Subsidence Management Plan Application for Longwalls A3 to A5 in Stage 2. The calibration was based on the available ground monitoring data at that time, which included: eight monitoring lines above Longwalls SL1 to SL4 and Longwalls 1 to 13A at Ellalong Colliery; and three monitoring lines above Longwalls A1 and A2 in Stage 1 of the Mine.

Subsequent to the calibration, Austar has extracted Longwalls A3 to A5A in Stage 2 and Longwalls A7 and A8 in Stage 3 at the Mine. The mine subsidence movements were monitored along four monitoring lines in above Longwalls A3 to A5A and four monitoring lines above Longwalls A7 and A8. The comparisons between the observed and predicted movements showed that the observed vertical subsidence, tilts and strains were typically less than those expected. These were provided in the End of Panel subsidence review reports for each of these Longwalls.

It is considered that the calibrated Incremental Profile Method has provided reasonable, if not, conservative predictions for the monitoring lines above the Longwalls extracted in Stages 1 to 3 at the Mine. It has not been considered necessary to undertake any further refinement of the subsidence prediction model based on the available results. It is expected that the calibrated Incremental Profile Method would provide reasonable, if not, slightly conservative predictions for the proposed Longwalls B1 to B3.

2.3.2 Extraction Plan Area Subsidence Predictions

Longwalls B1 to B3 are the first panels to be extracted in the Bellbird South area. The following sections provide the maximum predicted conventional subsidence parameters resulting from the extraction of the proposed Longwalls B1 to B3. The predicted subsidence parameters and the impact assessments for the natural and built features are provided in MSEC833 in **Appendix C**.

The predicted subsidence, tilt and curvature have been obtained using the Incremental Profile Method, which has been calibrated and reviewed based on the local mining conditions, as described in Section 2.3.1. The predicted strains have been determined by analysing the strains measured at the Mine.

The maximum predicted subsidence parameters and the predicted subsidence contours provided in MSEC833 in **Appendix C**, describe and show the conventional movements and do not include the valley related upsidence and closure movements, nor the effects of faults and other geological structures. Such effects have been addressed separately in the impact assessments for each feature provided in MSEC833 in **Appendix C**.

2.3.2.1 Maximum Predicted Conventional Subsidence, Tilt and Curvature

A summary of the maximum predicted values of incremental conventional subsidence, tilt and curvature, due to the extraction of each of the proposed Longwalls, is provided in **Table 2.5**. It is proposed that the Longwalls would be extracted in order of LWB2, LWB3 and then LWB1.

Table 2.5 Maximum Predicted Incremental Conventional Subsidence, Tilt and Curvature due to the Extraction of Each of the Proposed Longwalls

Longwall	Maximum Predicted Incremental Conventional Subsidence (mm)	Maximum Predicted Incremental Conventional Tilt (mm/m)	Maximum Predicted Incremental Conventional Hogging Curvature (km^{-1})	Maximum Predicted Incremental Conventional Sagging Curvature (km^{-1})
LWB2	250	1.0	0.01	0.02
LWB3	525	2.5	0.02	0.05
LWB1	500	2.0	0.03	0.05

The predicted total conventional subsidence contours, after the completion of each of the proposed Longwalls B2, B3 and B1, are shown in Drawings Nos. MSEC833-10 to MSEC833-12 in **Appendix C**. The predicted total subsidence contours including the adjacent existing and approved Longwalls at Ellalong and Austar Mines are shown in Drawing No. MSEC833-13 in **Appendix C**. A summary of the maximum predicted values of total conventional subsidence, tilt and curvature within the Study Area is provided in **Table 2.6**.

Table 2.6 Maximum Predicted Total Conventional Subsidence, Tilt and Curvature after the Extraction of Each of the Proposed Longwalls

Longwall	Maximum Predicted Total Conventional Subsidence (mm)	Maximum Predicted Total Conventional Tilt (mm/m)	Maximum Predicted Total Conventional Hogging Curvature (km^{-1})	Maximum Predicted Total Conventional Sagging Curvature (km^{-1})
LWB2	250	1.0	0.01	0.02
LWB3	725	3.0	0.02	0.05
LWB1	925	3.5	0.03	0.05

The maximum predicted total subsidence resulting from the extraction of the proposed Longwalls is 925 mm, which represents 27% of the proposed extraction height of 3.4 metres. The maximum predicted subsidence occurs directly above the proposed Longwall B2.

The maximum predicted total conventional tilt is 3.5 mm/m (i.e. 0.35 %), which represents a change in grade of 1 in 285. The maximum predicted total conventional curvatures are 0.03 km⁻¹ hogging and 0.05 km⁻¹ sagging, which represent minimum radii of curvatures of 33 kilometres and 20 kilometres, respectively.

The predicted conventional subsidence parameters vary across the Study Area as the result of, amongst other factors, variations in the depths of cover, seam thickness and overburden geology. To illustrate this variation, the predicted profiles of conventional subsidence, tilt and curvature have been determined along Prediction Line 1, the location of which is shown in Drawings Nos. MSEC833-10 to MSEC833-13 in **Appendix C**. The predicted profiles of conventional subsidence, tilt and curvature along this prediction line, resulting from the extraction of the proposed Longwalls, are shown in Fig. C.01, in **Appendix C**.

2.3.2.2 Horizontal Movements

The predicted conventional horizontal movements over the proposed Longwalls are calculated by applying a factor to the predicted conventional tilt values. The comparisons between observed and back-predicted strains along the monitoring lines above the previously extracted Longwalls at the Mine indicates that a factor of 15 provides a better correlation for the prediction of conventional horizontal movements at Austar Coal Mine.

The maximum predicted conventional tilt within the Extraction Plan Area, at any time during or after the extraction of the proposed Longwalls, is 3.5 mm/m, which occurs adjacent to the maingate of Longwall B3. This area will experience the greatest predicted conventional horizontal movement towards the centre of the overall goaf area resulting from the extraction of the proposed Longwalls. The maximum predicted conventional horizontal movement is, therefore, approximately 50 mm, i.e. 3.5 mm/m multiplied by a factor of 15.

Conventional horizontal movements do not directly impact on natural and built features, rather impacts occur as the result of differential horizontal movements. Strain is the rate of change of horizontal movement. The impacts of strain on the natural and built features are addressed in the impact assessments for each feature which have been summarised in the Land Management Plan (**Appendix F**) and the Built Features Management Plan (**Appendix H**).

2.3.2.3 Far Field Movements

The predicted far-field horizontal movements resulting from the extraction of the proposed Longwalls are very small and could only be detected by ground surveys. Such movements tend to be bodily movements towards the extracted goaf area, and are accompanied by very low levels of strain, which are generally less than the order of survey tolerance (i.e. less than 0.3 mm/m).

The potential impacts of far-field horizontal movements on the natural and built features within the vicinity of the proposed longwall are not expected to be significant. It is not considered necessary, therefore, that monitoring be established to measure the far-field horizontal movements resulting from the proposed mining.

2.3.2.4 Valley Related Movements

Quorrobolong Creek and the drainage lines located within the Extraction Plan Area have shallow incisions into the natural surface soils. It is unlikely, therefore, that these watercourses would experience any significant valley related movements resulting from the extraction of the proposed Longwalls.

2.4 PERFORMANCE OBJECTIVES

Performance objectives in relation to subsidence impacts at Austar are presented in **Table 2.7**. These objectives have been used when developing management strategies of this Extraction Plan.

Table 2.7 Performance Objectives from DA29/95

Condition No.	Condition Requirement
Schedule 3, Condition 2	<p>Subsidence Impact Assessment Criteria</p> <p>If the subsidence generated by the development results in damage to any residence on privately-owned land (excluding the land listed in Table 1) that in the opinion of the MSB exceeds safe, serviceable and repairable criteria, the Applicant shall, upon receiving a written request for acquisition from the landowner, acquire the land in accordance with the procedures in conditions 3 to 5 of Schedule 4.</p> <p>However, the Applicant does not have to act on any such request if:</p> <p>(a) the Applicant has a current written negotiated agreement with the landowner in regard to the management of subsidence-related impacts, and a copy of this agreement has been forwarded to the Department by the Applicant; or</p> <p>(b) the landowner has agreed to the MSB purchasing the land under the Mine Subsidence Compensation Act 1961.</p>
Schedule 3, Condition 3D	<p>Provision of Biodiversity Offsets</p> <p>If subsidence impacts associated with EA (MOD 6) cause significant adverse impacts to threatened species, populations, habitats and/or endangered ecological communities and the Secretary determines that:</p> <p>(a) it is not reasonable or feasible to remediate the impact or environmental consequences; or</p> <p>(b) remediation measures implemented by the Applicant have failed to satisfactorily remediate the impact or environmental consequence,</p> <p>then the Applicant shall provide a suitable offset to compensate for the impact or environmental consequence, to the satisfaction of the Secretary.</p> <p><i>Note: An offset required under this condition must be proportionate with the significance of the impact or environmental consequence.</i></p>

Condition No.	Condition Requirement						
Schedule 3, Condition 28	<p>Rehabilitation Objectives</p> <p>The Applicant shall achieve the rehabilitation objectives in Table 6 to the satisfaction of DRE.</p> <p><i>Table 6: Rehabilitation Objectives</i></p> <table> <tr> <th>Domain</th><th>Rehabilitation Objective</th></tr> <tr> <td>Land affected by the development (including watercourses and steep slopes)</td><td> <p>Rehabilitate the site so that landuse and ecosystem function is the same as pre-mining and consistent with the surrounding landform</p> <p>Reduce safety hazards to no more than those existing pre-mining</p> <p>Minimise erosion risk</p> </td></tr> <tr> <td>Built features</td><td>Repair/restore/replace to pre-mining condition or better, unless a claim under the Mine Subsidence Compensation Act 1961 is made for the repairs, restoration or replacement.</td></tr> </table>	Domain	Rehabilitation Objective	Land affected by the development (including watercourses and steep slopes)	<p>Rehabilitate the site so that landuse and ecosystem function is the same as pre-mining and consistent with the surrounding landform</p> <p>Reduce safety hazards to no more than those existing pre-mining</p> <p>Minimise erosion risk</p>	Built features	Repair/restore/replace to pre-mining condition or better, unless a claim under the Mine Subsidence Compensation Act 1961 is made for the repairs, restoration or replacement.
Domain	Rehabilitation Objective						
Land affected by the development (including watercourses and steep slopes)	<p>Rehabilitate the site so that landuse and ecosystem function is the same as pre-mining and consistent with the surrounding landform</p> <p>Reduce safety hazards to no more than those existing pre-mining</p> <p>Minimise erosion risk</p>						
Built features	Repair/restore/replace to pre-mining condition or better, unless a claim under the Mine Subsidence Compensation Act 1961 is made for the repairs, restoration or replacement.						

3 DEVELOPMENT

3.1 EXTRACTION PLAN TEAM

The team that has prepared the Extraction Plan was endorsed by the Director, Resource Assessments of the Department of Planning and Environment (DPE) on 8 February 2016. The Extraction Plan Team is presented in **Table 3.1**.

Table 3.1 Extraction Plan Team

Extraction Plan Component	Team Members
Extraction Plan coordination and preparation	Austar/Yancoal: <ul style="list-style-type: none"> Gary Mulhearn – Environment & Community Manger Daniel Lee – Regional Registered Surveyor NSW Tony Sutherland – Regional Technical Services Manager NSW
Built Features Management Plan	Austar/Yancoal – Gary Mulhearn, Daniel Lee, Tony Sutherland
Public Safety Management Plan	Austar/Yancoal – Gary Mulhearn, Daniel Lee, Tony Sutherland
Land Management Plan	Austar/Yancoal – Gary Mulhearn, Daniel Lee, Tony Sutherland
Coal Resource Recovery Plan	Austar/Yancoal – Daniel Lee, Tony Sutherland
Biodiversity Management Plan	Umwelt – Chloe Parkins, Rebecca Vere
Water Management Plan	Umwelt – Susan Shield Dundon Consulting Pty Ltd – Peter Dundon Austar – Gary Mulhearn
Subsidence Predictions	Mine Subsidence Engineering Consultants – James Barbato

3.2 AGENCY CONSULTATION

3.2.1 Department of Planning and Environment

The Extraction Plan is required to be completed to the satisfaction of the Secretary of the DPE.

3.2.2 Division of Resources and Energy

There are several components of the Extraction Plan that are required to be completed to the satisfaction of the DRE. These components include:

- A Coal Resource Recovery Plan;

- Revised predictions of subsidence effects;
- Subsidence Monitoring Program; and
- Public Safety Management Plan.

3.2.3 Office of Environment & Heritage

OEH has provided comment during the environmental assessment for the LWB1-LWB3 Modification Environmental Assessment process during 2015 in relation to biodiversity matters. The BMP included in this Extraction Plan was provided to OEH for comment prior to submission of the Extraction Plan.

3.2.4 Mine Subsidence Board

The Mine Subsidence Board (MSB) has been consulted in the preparation of the process for Built Features Management Plans in the Stage 2 and 3 Mining Areas, and in the early parts of the Bellbird South Mining Area. The MSB has been advised the proposed timing of extraction within LWB1-B3 longwall panels, and will continue to be consulted during preparation of individual Built Features Management Plans in conjunction with the Built Feature owners.

3.3 LANDHOLDER CONSULTATION

As indicated previously, the Extraction Plan area includes land owned by private landholders, Council and DPI- Lands.

The land above the Extraction Plan area is largely privately owned rural holding zoned RU2. This permits development of similar structures to that currently existing which are manageable under the systems and procedures outlined in this management plan. There will be a process included in the individual Built Features Management Plans for landholders to make Austar aware of any new developments planned for prior to extraction.

3.3.1 Crown Land

The DPI-Lands have been consulted regarding the Extraction Plan process including the preparation of individual Built Features Management Plans, which will be developed prior to subsidence impacts occurring.

3.3.2 Private Landholders

The Bellbird South LWB1-B3 modification was approved in January 2016. During the modification process, landholders within the Bellbird South LWB1-B3 area were consulted with via mail, individual meetings, and through the Austar Community Consultative Committee.

Within the Extraction Plan Area, Austar has been progressing access agreements and has reached agreement with the major private landholders in relation to formalising an access agreement to allow Austar to undertake environmental assessments for the modification process. Further consultation in relation to longer term access to undertake monitoring proposed under this Extraction Plan, and to allow remediation works (if these are required). The timing of mining is also discussed during this consultation process.

Austar continues to liaise with other landholders through the Extraction Plan process. All landholders have been advised of the LWB1-B3 modification approval and the preparation of the Extraction Plan. They have all been advised that individual Built Features Management Plans will be prepared in consultation with each of the landholders prior to subsidence impacts occurring. The individual BFMPs also will include details of remediation strategies to land (should they be required). The benefit of the access arrangements ahead of mining is to streamline the any land remediation works to be undertaken by Austar (that are not covered by the Mine Subsidence Board).

Regular updates on the status of mining progression and environmental performance, including results of subsidence monitoring, and timing for mining will be provided directly to landholders above the Extraction Plan area, and is presented to the Austar Community Consultative Committee, with minutes of these meetings uploaded to the Austar website (www.austarcoalmine.com.au).

3.4 INFRASTRUCTURE OWNER CONSULTATION

In accordance with the Built Features Management Plan development, Austar has consulted with infrastructure owners, and will continue to consult with these stakeholders during the development individual Built Features Management Plans to manage potential subsidence effects. Owners include:

- Roads, Lane (Cessnock City Council);
- Telstra; and
- Ausgrid.

Each of the infrastructure owners are consulted with during updates to the Extraction Plan and preparation of the individual Built Features Management Plans.

3.5 RISK ASSESSMENT

A risk assessment was conducted on 22 January 2016 to identify, assess and review any potential subsidence impacts to the surface and sub-surface as a result from the mining of the proposed EP application area at Austar. A copy of the risk assessment is included in **Appendix D**.

The risk assessment was facilitated by HMS Consultants and involved a team consisting of members of Austar staff, Yancoal and a specialist consultant in subsidence.

A key step in the process was the gathering of data related to the application to present to the team. Once the scope and mandate of the team was determined a number of tools were used to identify issues relating to the application and identify risks as a result of the mining process. Whilst worst

case scenarios were discussed by the risk assessment team, the worst case scenario was not necessarily the consequence severity chosen for risk ranking. The risk assessment team used their industry and site experience, as well as their knowledge of the effectiveness of the actual Austar controls, to choose the most appropriate consequence severity for risk ranking. The losses were ranked according to their likelihood and consequences with quantification where possible. Once this had been completed current and additional controls were identified, followed by nominated further actions in order to eliminate or control the identified risk issue to an acceptable level.

In total twenty six (26) risk issues were identified. Of those risks assessed, there was one (1) “High” risks identified by the risk assessment team. One (1) risk was assessed as having a potentially “Major” consequence. The high risk issue is shown in **Table 3.2** with the risk assessed as having a potentially “Major” consequences being risk SP#2.01.01.

Table 3.2 High Risk

SP#	Risk Issue	Existing Control	Further Actions
2.01.01	Injury to road user due to impact of mine subsidence	<ol style="list-style-type: none"> 1. Subsidence impact assessment predicts minor and manageable impacts to road surface 2. Flooding and drainage assessment indicates road is already subject to flooding, and there will be no change in flood hazard category. 3. Past experience mining in area shows no impact to Nash Lane or Quorrobolong Road with mining conducted to date. 4. Sandy Creek Road has been previously managed during longwall mining by Ellalong Colliery. 5. Extensive mining has occurred in the Southern Coalfields at similar depths of cover which have been manageable in a safe and serviceable condition during mining. 	<ol style="list-style-type: none"> 1. Pre-mining condition inspection of road 2. Subsidence monitoring program to include visual inspection of road surface and survey monitoring 3. Public Safety Management Plan to include mitigation of identified public safety hazards immediately. 4. Built Features Management Plan – Council to be prepared in consultation with Cessnock City Council and MSB.

The risk assessment identified existing controls but also highlighted a number of additional controls or further actions that the team thought necessary to manage subsidence.

The full risk assessment report including a full list of risks in assessment order, risk rank order and consequence order respectively are shown in **Appendix D**.

4 SUBSIDENCE MONITORING AND MANAGEMENT

4.1 FRAMEWORK

The overall framework for subsidence monitoring and management of impacts of this Extraction Plan may be described as:

- A **Subsidence Monitoring Program** (actual measured subsidence, and inspections for environmental consequences of subsidence to compare against predicted impacts) which may trigger a response, or set of responses.

The response is commensurate with the nature of the measurement or the impact which has been identified. The Extraction Plan relies on a set of individual management plans which are intended to address impacts to particular environmental or built features within the Extraction Plan Area. These plans include:

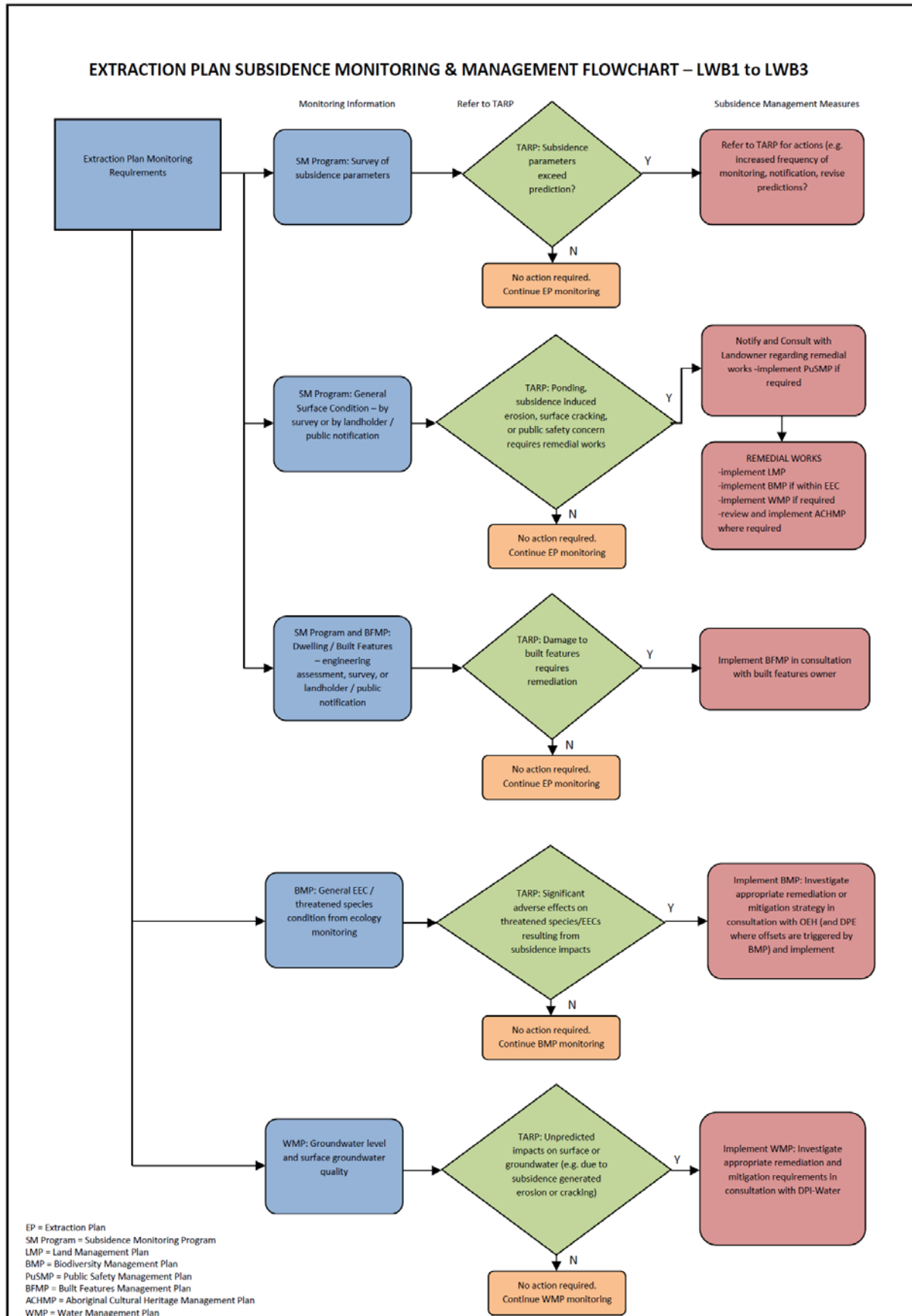
- **Water Management Plan** – to manage the potential environmental consequences of second workings on surface and groundwater;
- **Land Management Plan** – to manage the potential environmental consequences of second workings on steep slopes and land in general;
- **Biodiversity Management Plan** – to manage the potential environmental consequences of second workings on aquatic and terrestrial flora and fauna (additional **monitoring** specific to Biodiversity is also collected to assess impact);
- **Built Features Management Plan** – to manage the potential environmental consequences of second workings on any built feature; and
- **Public Safety Management Plan** – to ensure public safety in the Extraction Plan area.

4.2 EXTRACTION PLAN TARP

Austar has developed an overall subsidence management **LWB1 to LWB3 Extraction Plan Trigger Action Response Plan** (TARP) to manage subsidence within the Extraction Plan Area. This TARP is included in **Appendix B** and includes individual triggers to instigate actions, including public safety activities, remedial works or review of subsidence predictions. The TARP also specifically includes both adaptive and contingency management based on results of the Subsidence Monitoring (SM) Program and specific management plans.

4.3 EXTRACTION PLAN SUBSIDENCE MONITORING AND MANAGEMENT FLOWCHART

Austar has developed a **flowchart** to illustrate the mechanics of how the relevant Subsidence Monitoring Program, sub-management plans, and the TARP are used at Austar to manage subsidence impacts. The flowchart is provided below and is included in **Appendix B** with the TARP.



5 PLAN IMPLEMENTATION

5.1 REPORTING FRAMEWORK

5.1.1 Annual Review / Annual Environmental Management Report (AEMR)

The Annual Review / AEMR is prepared to summarise Austar's environmental performance for the reporting year and is prepared in accordance with Schedule 5 Condition 5 of DA29/95 and to satisfy Mining Lease conditions.

In relation to the Extraction Plan, the Annual Review/AEMR will:

- (a) Describe the development (including any rehabilitation) that was carried out in the past year to 30 June, and the development that is proposed to be carried out over the next year to 30 June;
- (b) Include a comprehensive review of the monitoring results and complaints records of the development over the previous year to 30 June, which includes a comparison of these results against:
 - the relevant statutory requirements, limits or performance measures/criteria;
 - the monitoring results of previous years; and
 - the relevant predictions in the EIS and EA (MOD5) and EA (MOD6);
- (c) Identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
- (d) Identify any trends in the monitoring data over the life of the development;
- (e) Identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and
- (f) Describe what measure will be implemented over the next year to improve the environmental performance of the development.

The Annual Review / AEMR will be published on the Austar website upon completion and submission to DPE and DRE.

5.1.2 Regular Stakeholder Extraction Plan Update Reporting

The results of monitoring undertaken in accordance with this Extraction Plan will be provided on a quarterly basis to the Austar Coal Mine Community Consultative Committee. The results will also be published on the Austar website.

Landholders and stakeholders within the affected Extraction Plan area will be provided with regular updates on the progress of mining, results of subsidence monitoring, and of any particular subsidence induced consequences and the remediation measures employed. The frequency of reporting will occur nominally on a monthly basis.

5.1.3 Incident Reporting

In accordance with Condition 4 Schedule 5 of DA 29/95 Austar will notify the DPE and any other relevant agencies, of any incident or non-compliance or exceedance of performance criteria associated with the Extraction Plan performance at the mine complex as soon as practicable after Austar becomes aware of the incident.

Where the incident also classes as an actual or potential “material harm” incident, the Austar Pollution Incident Response Management Plan (PIRMP) will be triggered and the EPA will be notified immediately.

Within 7 days of the date of the incident or non-compliance, Austar will provide a detailed report on the incident to the DPE and any other relevant agencies notified.

5.2 REVIEW OF THE EXTRACTION PLAN

Review of the Extraction Plan and/or any of the sub-plans, and revision if necessary, shall occur where unpredicted impacts and/or environmental consequences are identified through the monitoring and management strategies proposed in the Extraction Plan.

Review of the Extraction Plan and/or any of the sub-plans is also required following any modification to DA29/95, or if directed by the Secretary of DPE.

Any revision to the Extraction Plan including component sub-plans must be completed to the satisfaction of the Secretary of DPE.

5.3 COMPLAINTS HANDLING

Complaints in relation to the management of subsidence will be managed using the established protocols in the Austar Environmental Management System.

5.4 EXTRACTION PLAN ROLES AND ACCOUNTABILITIES

Detailed below are key personnel involved with implementing this Extraction Plan to manage subsidence, their roles and responsibilities.

Role	Responsibilities
Operations Manager (OM)	<ul style="list-style-type: none"> • Make appropriate resources available for the implementation of this Extraction Plan • Conduct underground mining activities in accordance with the Extraction Plan Coal Resource Recovery Plan. • Notify and liaise with DRE Inspectors (if required)
Environment and Community Manager (ECM)	<ul style="list-style-type: none"> • Owner of the Extraction Plan • Ensure that all environmental monitoring and reporting is undertaken in accordance with the Extraction Plan and sub environmental management plans • Manage / implement subsidence management actions required by the Extraction Plan in relation to Built Features and general landform • Train remediation contractors on mitigation measures within the Extraction Plan for remedial works • Liaise with Mine Subsidence Board in relation to Built Features impacts • Liaise with Government Agencies in relation to environmental consequences of subsidence and proposed management strategies • Liaise with Landholders in relation to environmental consequences of subsidence and in relation to access for the Extraction Plan monitoring program and any remediation works • Notify and liaise with neighbours and community in relation to mining timing and monitoring performance • Review and update the Extraction Plan and sub plans as required

Role	Responsibilities
Technical Services Manager (TSM)	<ul style="list-style-type: none"> • Liaise with Government Agencies and Community members in relation to subsidence matters and the Extraction Plan subsidence predictions and monitoring program • Coordinate Mine Surveyor to ensure subsidence monitoring is undertaken in accordance with the Extraction Plan • Provide training for subsidence impact measurements and observations in accordance with SM program • Review subsidence monitoring data against predictions and TARPs in order to trigger any actions required on the basis of subsidence results • Manage / implement subsidence management actions required by the Extraction Plan in relation to Infrastructure • Review subsidence predictions based on monitoring information and the TARPs • Provide support and guidance in relation to subsidence effects to Environment & Community Manager
Mine Surveyor	<ul style="list-style-type: none"> • Ensure that all subsidence monitoring is completed to the requirements of the Subsidence Monitoring Program and provided to the TSM for review • Liaise with the Environment & Community Manager to gain required access for subsidence monitoring • Provide training for subsidence impact measurements and observations in accordance with SM program

6 REFERENCES

MSEC (2016), *Longwalls B1 to B3, Subsidence Predictions and Impact assessments for the Natural and Built Features in Support of the Extraction Plan for Longwalls B1 to B3 at the Austar Coal Mine*, Report No. MSEC833, Revision A.

Umwelt (2015), *Austar Coal Mine – LWB1-B3 Modification, Environmental Assessment*, November 2015.

Graphical Plans

Appendices

Appendix A

Project Approval Conditions

Table A1: Development Consent (DA 29/95 MOD 6) Conditions relevant to the Extraction Plan

Condition No.	Condition Requirement	Addressed in EP
Schedule 3, Condition 3A	Extraction Plan The Proponent shall prepare and implement an Extraction Plan for all second workings in the Longwalls B1-B3 mining area to the satisfaction of the Secretary. This plan must:	This Extraction Plan
	(a) be prepared by a team of suitably qualified and experienced experts whose appointment has been endorsed by the Secretary, and be approved by the Secretary prior to the commencement of any second workings covered by the Extraction Plan;	S3.1
	(b) include a detailed plan for the second workings, which has been prepared to the satisfaction of DRE, and provides for adaptive management;	Graphical Plans
	(c) include detailed plans of any associated surface construction works;	Not Applicable
	(d) include the following to the satisfaction of DRE:	
	• a coal resource recovery plan that demonstrates effective recovery of the available resource;	Appendix K
	• predictions of the subsidence effects and subsidence impacts of the proposed second workings, incorporating any relevant information that has been obtained since the preparation of EA (MOD6); and	S2.3
	• a Subsidence Monitoring Program to: <ul style="list-style-type: none"> ○ validate the subsidence predictions; and ○ analyse the relationship between the subsidence effects and subsidence impacts of the proposed second workings and any ensuing environmental consequences; 	Appendix J
	(e) include a: <ul style="list-style-type: none"> • Water Management Plan, which has been prepared in consultation with OEH and DPI-Water, to manage the environmental consequences of second workings on water resources (including flooding and ponding and alluvial aquifers); 	Appendix E
	• Biodiversity Management Plan, which has been prepared in consultation with OEH, to monitor and manage the potential environmental consequences of second workings on aquatic and terrestrial flora and fauna, with a specific focus on threatened species;	Appendix G
	• Land Management Plan, to manage the potential environmental consequences of second workings on steep slopes and land in general;	Appendix F
	• Built Features Management Plan, which has been prepared in consultation with the owner of the relevant feature, to manage the potential environmental consequences of second workings on any built features; and	Appendix H
	(f) include a Public Safety Management Plan, which has been prepared in consultation with DRE, to ensure public safety in the mining area.	Appendix I

Condition No.	Condition Requirement	Addressed in EP										
Schedule 3, Condition 3D	Provisions of Biodiversity Offsets If subsidence impacts associated with EA (MOD 6) cause significant adverse impacts to threatened species, populations, habitats and/or endangered ecological communities and the Secretary determines that:											
	(a) it is not reasonable or feasible to remediate the impact or environmental consequences; or											
	(b) remediation measures implemented by the Applicant have failed to satisfactorily remediate the impact or environmental consequence, then the Applicant shall provide a suitable offset to compensate for the impact or environmental consequence, to the satisfaction of the Secretary. <i>Note: An offset required under this condition must be proportionate with the significance of the impact or environmental consequence.</i>	Appendix G										
Schedule 3, Condition 28	Rehabilitation Objectives The Applicant shall achieve the rehabilitation objectives in Table 6 to the satisfaction of DRE. <i>Table 6: Rehabilitation Objectives</i> <table><tr><th>Domain</th><th>Rehabilitation objective</th></tr><tr><td>Surface Infrastructure</td><td>To be decommissioned and removed, unless DRE agrees otherwise</td></tr><tr><td>Land affected by the development (including watercourses and steep slopes)</td><td>Rehabilitate the site so that landuse and ecosystem function is the same as pre-mining and consistent with the surrounding landform Reduce safety hazards to no more than those existing pre-mining Minimise erosion risk</td></tr><tr><td>Built features</td><td>Repair/restore/replace to pre-mining condition or better, unless a claim under the <i>Mine Subsidence Compensation Act 1961</i> is made for the repairs, restoration or replacement</td></tr><tr><td>Community</td><td>Minimise the adverse socio-economic effects associated with mine closure</td></tr></table>	Domain	Rehabilitation objective	Surface Infrastructure	To be decommissioned and removed, unless DRE agrees otherwise	Land affected by the development (including watercourses and steep slopes)	Rehabilitate the site so that landuse and ecosystem function is the same as pre-mining and consistent with the surrounding landform Reduce safety hazards to no more than those existing pre-mining Minimise erosion risk	Built features	Repair/restore/replace to pre-mining condition or better, unless a claim under the <i>Mine Subsidence Compensation Act 1961</i> is made for the repairs, restoration or replacement	Community	Minimise the adverse socio-economic effects associated with mine closure	Land Affected by the project: Appendix F – LMP Built Features: Appendix H - BFMP
Domain	Rehabilitation objective											
Surface Infrastructure	To be decommissioned and removed, unless DRE agrees otherwise											
Land affected by the development (including watercourses and steep slopes)	Rehabilitate the site so that landuse and ecosystem function is the same as pre-mining and consistent with the surrounding landform Reduce safety hazards to no more than those existing pre-mining Minimise erosion risk											
Built features	Repair/restore/replace to pre-mining condition or better, unless a claim under the <i>Mine Subsidence Compensation Act 1961</i> is made for the repairs, restoration or replacement											
Community	Minimise the adverse socio-economic effects associated with mine closure											
Schedule 3, Condition 29	Progressive Rehabilitation To the extent that mining operations permit, the Applicant shall carry out rehabilitation progressively, that is, as soon as reasonably practicable following the disturbance.	Appendix F Appendix G										
Schedule 5, Condition 5	Annual Reporting By the end of September each year, unless the Secretary agrees otherwise, the Applicant shall review the environmental performance of the development to the satisfaction of the Secretary. This review must:											
	(a) describe the development (including any rehabilitation) that was carried out in the previous year to 30 June, and the development that is proposed to be carried out over the current year to 30 June;	S5.1										
	(b) include a comprehensive review of the monitoring results and complaints records of the development over the previous year to 30 June, which includes a comparison of these results against the: <ul style="list-style-type: none">relevant statutory requirements, limits or performance measures/criteria;monitoring results of previous years; andrelevant predictions in the EIS and EA (MOD5) and EA (MOD 6);	S5.1										

Condition No.	Condition Requirement	Addressed in EP
	(c) identify any non-compliance over the past year, and describe what actions were (or are being) taken to ensure compliance;	S5.1
	(d) identify any trends in the monitoring data over the life of the development;	S5.1
	(e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and	S5.1
	(f) describe what measures will be implemented over the next year to improve the environmental performance of the development.Fst	S5.1

Appendix B

Extraction Plan Flowchart & TARP

Appendix C

MSEC Subsidence Report

Appendix D

Extraction Plan Area Risk Assessment

Appendix E

Water Management Plan

Appendix F

Land Management Plan

Appendix G

Biodiversity Management Plan

Appendix H

Built Features Management Plan

Appendix I

Public Safety Management Plan

Appendix J

Subsidence Monitoring Program

Appendix K

Coal Resource Recovery Plan