



# Austar Coal Mine Longwalls A7 to A10 Extraction Plan



**DOCUMENT CONTROL**

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**SMP PLANS (END OF MAIN TEXT)**

- Plan 1: LWA7 – A10 SMP Application Existing and Proposed Workings
- Plan 2: LWA7 – A10 SMP Application Surface Features
- Plan 3: LWA7 – A10 SMP Application Geological & Seam Data
- Plan 4: Not Required (no other seams above or below the Greta Seam)*
- Plan 5: LWA7 – A10 SMP Application Mining Titles and Land Ownership
- Plan 6: LWA7 – A10 SMP Application Typical Geological Section
- Plan 7: LWA7 – A10 SMP Application Aerial Photograph

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**APPENDICES**

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- Appendix A Project Approval Conditions
- Appendix B Extraction Plan Flowchart & TARP
- Appendix C Subsidence Monitoring Program
- Appendix D Land Management Plan
- Appendix E Biodiversity Management Plan
- Appendix F Built Features Management Plan
- Appendix G Heritage Management Plan
- Appendix H Public Safety Management Plan

## 1 INTRODUCTION

Austar Coal Mine Pty Ltd (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. 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 Mining Complex. Austar has successfully undertaken mining using LTCC technology within the Greta seam between 2006 and 2013 in Austar's Stage 1 and Stage 2 mining areas.

Project Approval 08\_0111 (PA 08\_0111) was granted by the Minister for Planning in September 2009, enabling longwall mining using Longwall Top Coal Caving (LTCC) technology in the Stage 3 area and construction and operation of a new Surface Infrastructure Site (SIS), access road, and services south of Kitchener. PA08\_0111 was modified under delegated authority of the Minister for Planning and Infrastructure on 13 March 2012 to allow realignment of the Stage 3 longwall panels (PA08\_0111 MOD2).

The Stage 3 Project Environmental Assessment (Umwelt, 2008), and Stage 3 Modification Environmental Assessments (Umwelt, 2011 and 2013) have presented comprehensive environmental impact assessment for proposed longwalls LWA7 to LWA19.

An Extraction Plan for Longwalls A7 to A10 (Austar, April 2013) was approved under delegation of the Director General of the Department of Planning and Infrastructure (DP&I) on 30 May 2013. The Extraction Plan was prepared to be suitable to meet the requirements of a Subsidence Management Plan (SMP) and subsequently received SMP approval under delegation for the Director General of the Department of Trade and Investment – Division of Resources and Energy (DRE) on 3 June 2013.

Austar commenced mining using LTCC technology in the first panel in the Stage 3 area (longwall A7) in June 2013 utilising the management strategies of the approved Extraction Plan for Longwalls A7 to A10.

Austar submitted an application to the DP&I to modify PA08\_0111 under s75W of the Environmental Planning and Assessment Act 1979 on 16 October 2013 to extend the finishing end of LWA7 to LWA10. Approval for the modification to LWA7 to LWA10 was granted under delegation of the Director General of the Department of Planning and Infrastructure (DP&I) on 17 December 2013 (PA08\_0111 MOD3).

The location of Austar's previous mining areas, and the Stage 3 project (as modified) is shown with the Austar Mine Complex in **Figure 1.1**.

This version of the Longwalls A7 to A10 Extraction Plan represents an update to the approved Extraction Plan to reflect the mine plan and subsidence impacts of LWA7 to LWA10 (as modified). The Extraction Plan has been prepared in accordance with the requirements of Schedule 3, Condition 4 of PA08\_0111. The Extraction Plan update has also been prepared to meet the requirements for a Subsidence Management Plan variation, which is required by the conditions of Consolidated Mining Lease 2.

## 1.1 SCOPE & OBJECTIVE

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 LWA7 to LWA10 (as modified) within the Greta Seam at Austar using LTCC technology (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 LWA7 to LWA10 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.

It should be noted that the Extraction Plan area does not extend to creeks or alluvial aquifers, therefore a Watercourse Management Plan is not included in the scope of this Extraction Plan. Subsequent Extraction Plans will include a Watercourse Management Plan where required.

## 1.2 DOCUMENT STRUCTURE

The Extraction Plan has been prepared to address conditions of PA08\_0111, and structured in general accordance with draft *Guidelines for the Preparation of Extraction Plans* provided to Austar Coal by the Department of Planning and Infrastructure in 2012.

The document structure includes the following elements:

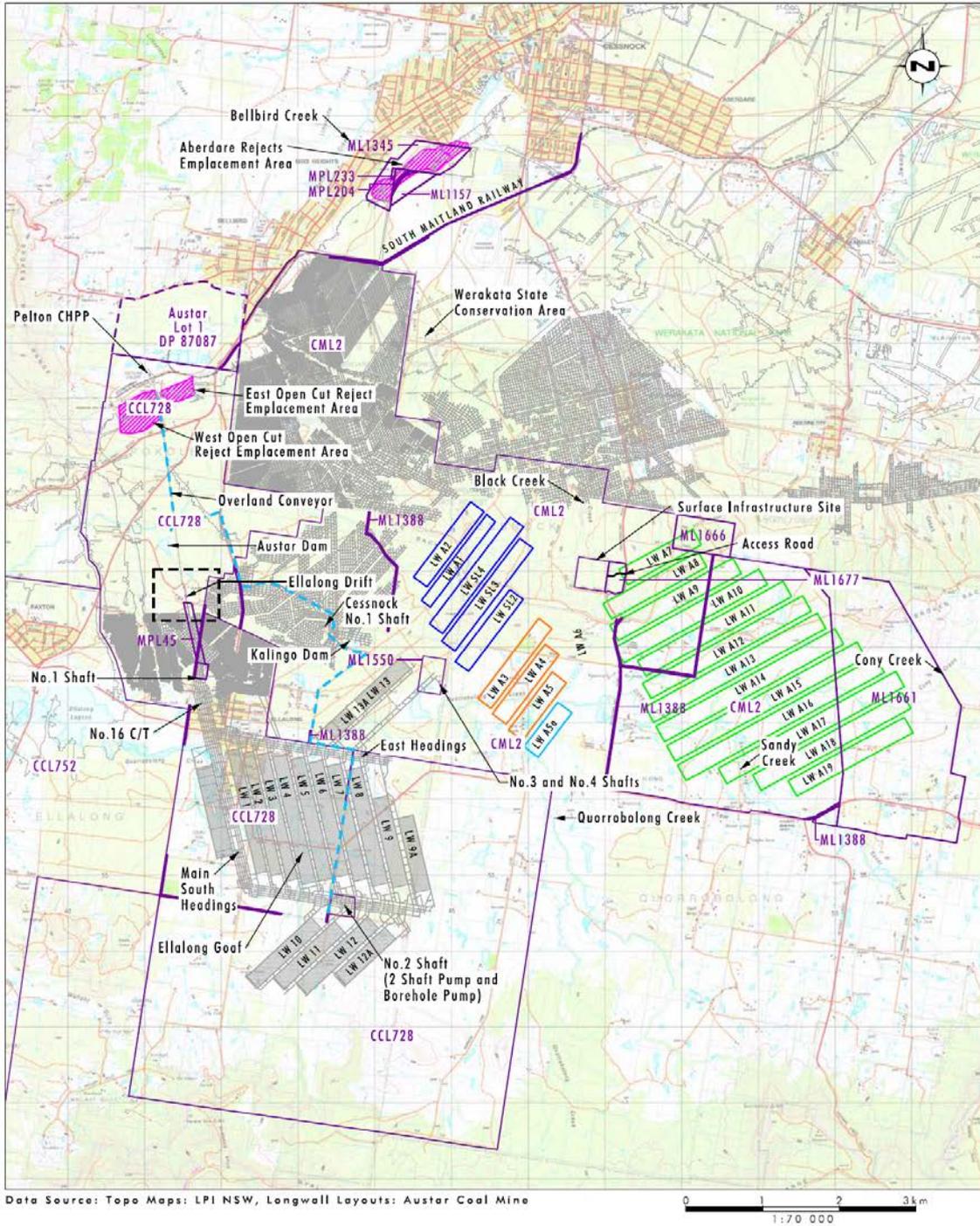
- Section 2 includes an overview of the mine planning and design, overall subsidence predictions, and performance objectives,
- Section 3 includes details on the development of the Extraction Plan, including details of consultation with relevant agencies and other stakeholders within the Extraction Plan 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 individual sub-plans referred to in Section 4. These plans described in **Table 1.1**.

**Table 1.1      Extraction Plan Sub-Plans**

<b>Plan</b>	<b>Description</b>	<b>Location</b>
Subsidence Monitoring Program	A program to collect actual measured subsidence data, and conduct inspections for environmental consequences of subsidence to compare against predicted impacts which may trigger a response, or set of responses	Appendix C
Land Management Plan	To manage the to manage the potential environmental consequences of second workings on steep slopes and land in general	Appendix D
Biodiversity Management Plan	To manage the potential environmental consequences of second workings on terrestrial flora and fauna	Appendix E
Built Features Management Plan	To manage the potential environmental consequences of second workings on any built feature	Appendix F
Heritage Management Plan	To manage the potential environmental consequences of second workings on heritage sites or values	Appendix G
Public Safety Management Plan	To ensure public safety in the Extraction Plan area	Appendix H

The Subsidence Management Plans prepared for Subsidence Management Plan Approval of the Division of Resources and Energy, and referred to in this Extraction Plan, are included as **SMP Plans** at the end of the Main Extraction Plan text.



Data Source: Topo Maps: LPI NSW, Longwall Layouts: Austar Coal Mine

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1:70 000

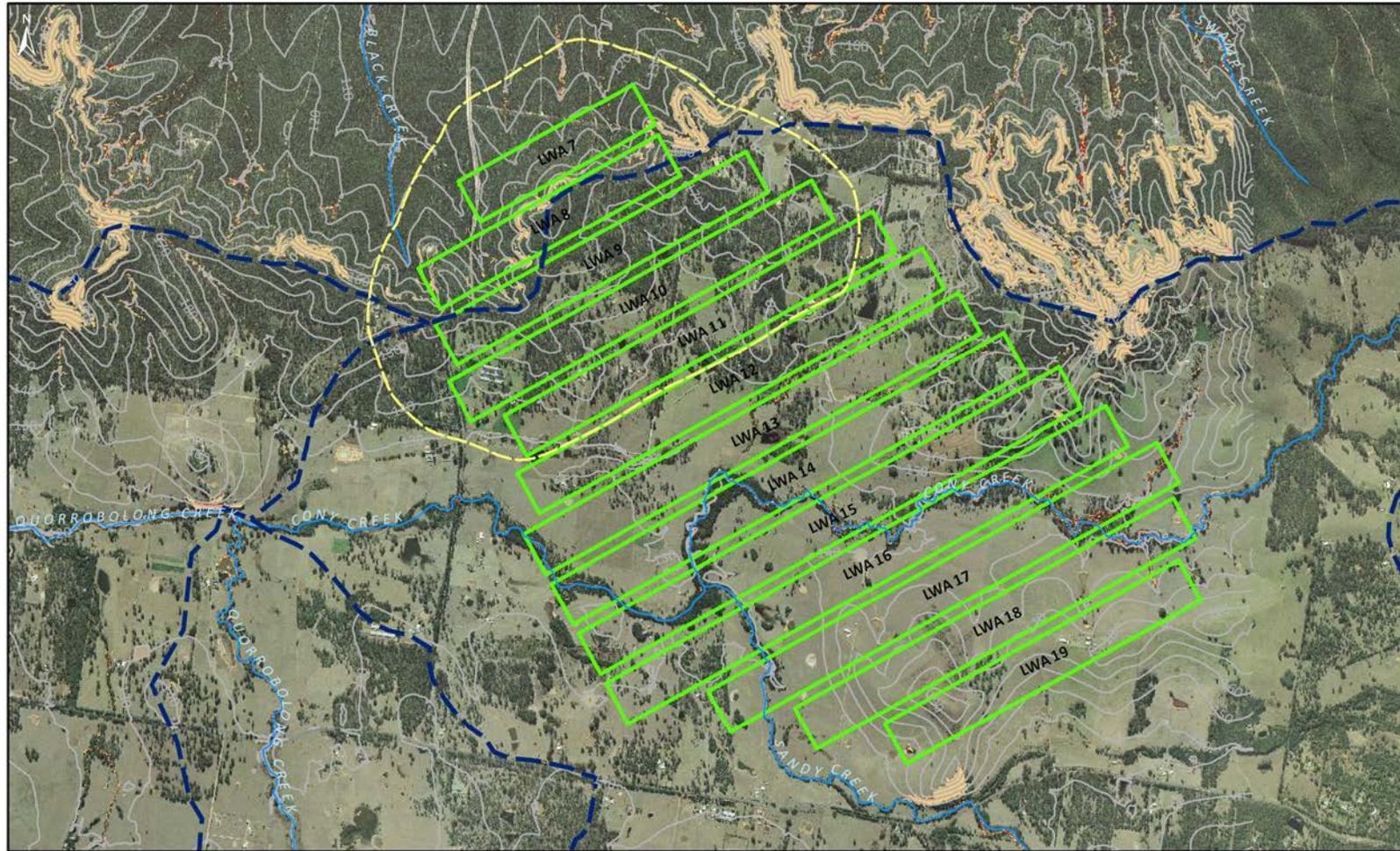
- Legend**
- Layout for Stage 1 Longwall Panels (complete)
  - Layout for Stage 2 Longwall Panels (complete)
  - Layout for Stage 2 Extension Longwall Panel (complete)
  - Layout for Proposed Stage 3 Longwall Panels (MOD 3)
  - Reject Emplacement Areas
  - Old Workings
  - Mining Lease Boundary
  - Auster owned CHPP Land
  - Water Pipeline

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**FIGURE 1.1**  
**Austar Mine Complex**

**Figure 1.1 Austar Mine Complex**

AECOM



- LW A7 - LW A10 Extraction Plan Area (20mm subsidence contour)
- Catchment Boundary
- Creek Lines
- Stage 3 Longwall Panels
- Contours
- Slope (degrees)**
- 18 - 33
- 33 - 66

**LW A7 - LW A10 Extraction Plan Area**  
 Austar Extraction Plan  
 Source: Austar (2012)  
 24/10/2013  
 60282678  
 Fig. **1.2**

0    0.25    0.5    1  
 Kilometres

**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 368 Ha. The majority of the Extraction Plan Area is located to the south of the Broken Back Range, a major landform extending from west of Pokolbin to Mulbring. The landform within the Extraction Plan Area is partly within the upper valley sides of the Quorrobolong Creek catchment, with Cony Creek present downslope but outside of the zone of influence of the Extraction Plan area. A small section of the Extraction Plan area is located at the commencing end of the Black Creek catchment which starts on the northern side of the Broken Back Range.

The topography in the northern part of the Extraction Plan Area is characterised by the steep slopes, narrow ridges and deep gullies of the Broken Back Range, descending to undulating hills in the central and southern portions of the Extraction Plan 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.

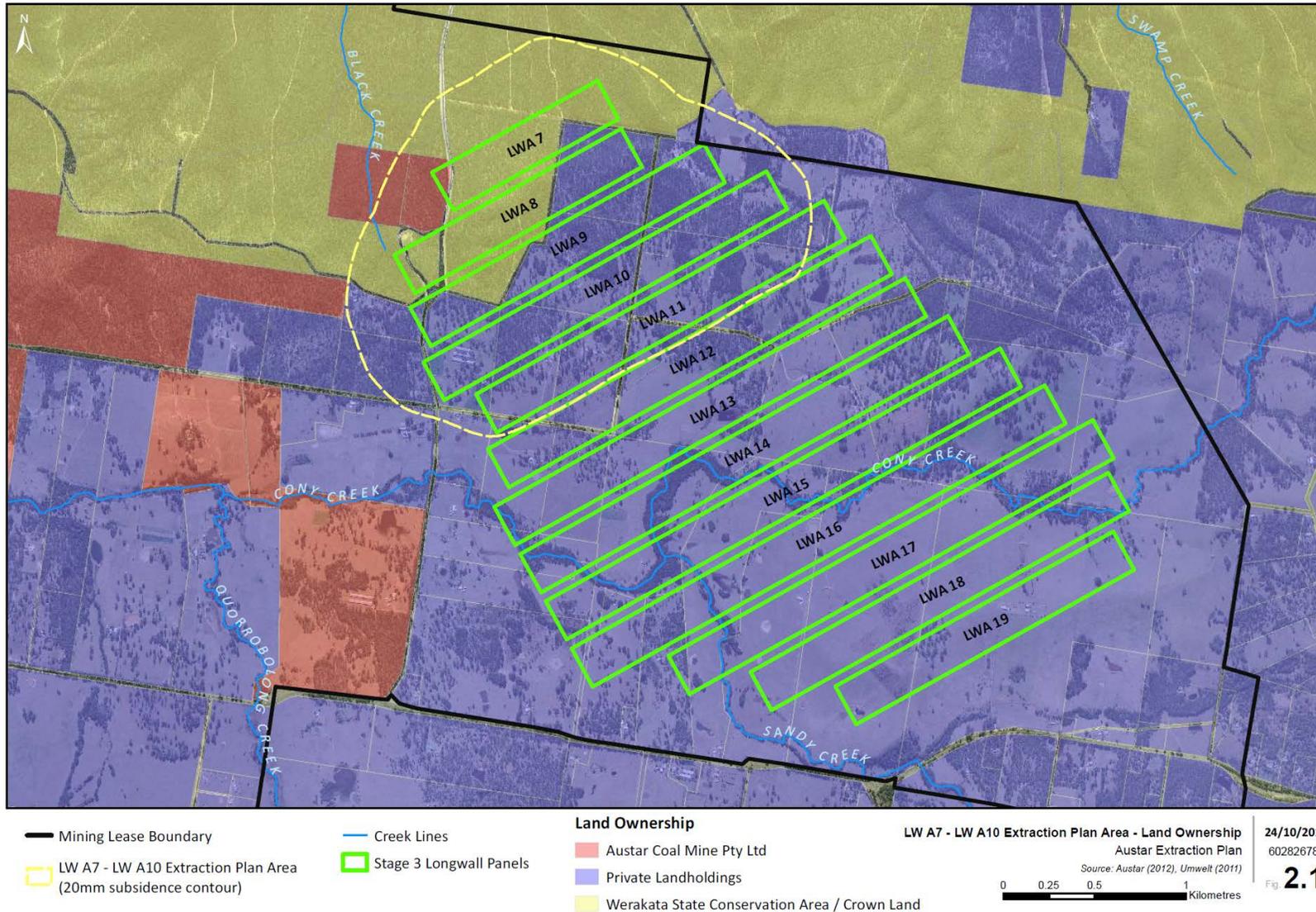
#### 2.1.2 Land Ownership and Tenure

Land ownership within and proximate to the Extraction Plan Area is shown in **Figure 2.1**. The dominant land uses within and adjacent to the Extraction Plan Area include grazing, conservation and mining.

The northern portion of the Extraction Plan Area extends underneath the Werakata State Conservation Area (SCA – administered by NSW National Parks and Wildlife Service) and sections of Crown land and Crown Roads (administered by DPI-Crown Lands), Cessnock City Council roads as well as an area of Austar-owned land to the east of the approved Surface Infrastructure Site. The mid and southern portion of the Extraction Plan Area is primarily located beneath privately owned rural land holdings.

The majority of the Extraction Plan Area is located within Consolidated Mining Lease 2 (CML2), with a small component in the northeastern portion located within Mining Lease 1666 (refer to **Figure 1.1** and **SMP Plan 5**).

AECOM



**Figure 2.1 Stage 3 and Extraction Plan Area Land Ownership**

### 2.1.3 Natural and Built Features within Extraction Plan Area

Natural features within the Extraction Plan Area include:

- Steep slopes of the Broken Back Range (**SMP Plan 2**);
- Ephemeral drainage lines of the Quorrobolong Creek and Black Creek catchments (**SMP Plan 2**);
- Threatened Species Conservation Act listed native vegetation (**Appendix E Figure 3.2**) including:
  - Lower Hunter Spotted Gum and Ironbark EEC; and
  - Threatened flora species (Heath Wrinklewort, Small flower Grevilea).
- Grazing pasture lands; and
- Aboriginal Heritage Sites (**Appendix G Figure 1.1**).

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

- Public roads and tracks (Quorrobolong Road, Coney Creek Lane, Pelton Road, Crown and NPWS tracks);
- Communications infrastructure (buried optic fibre and local copper cables);
- Ausgrid above ground powerlines;
- A poultry farm including poultry sheds;
- Rural property infrastructure (Private dwellings, private access tracks, sheds, farm dams, fences);
- Austar Coal Mine SIS infrastructure and access road; and
- Survey marks.

## 2.2 MINE PLANNING, DESIGN AND RESOURCE RECOVERY

### 2.2.1 Extraction Plan Area (also the SMP Application Area)

The Extraction Plan area under consideration is that area likely to be affected by the mining of Longwalls A7 to A10 (as modified) in the Greta coal seam. The **Extraction Plan Area (Figure 1.2** also shown as **SMP Application Area in SMP Plans)** is defined as the surface area enclosed by a combined limit defined from:

- The 26.5 degree angle of draw line;
- The predicted limit of vertical subsidence, taken as the 20mm subsidence contour; and
- Features sensitive of far field movements.

This area is potentially larger than the 26.5 degree angle of draw defined in Section 6.2 in the Guideline for Application for Subsidence Management Approvals (NSW Department of Mineral Resources, December 2003).

The mine workings in the Extraction Plan Area lie beneath the Werakata State Conservation Area and small privately owned rural properties at Quorrobolong. The area chosen has been limited to avoid impact on Coney Creek or its alluvial lands, and as such allow for continued impact assessment against prediction, including update of impact assessments (if required) prior to submission of Extraction Plan approval for the remainder of the approved Stage 3 area.

### 2.2.2 Mining Domains

Longwalls A7 to A10 are the first in the Approved Stage 3 Mining area. This is the third area of LTCC extraction, following on from Stage 1 (panels A1 and A2) and Stage 2 (panels A3, A4, A5 and A5a). Longwall A6 was removed from the approved Stage 3 plan with the modification to the mine plan approved in March 2012 (PA08\_0111 MOD 2). In December 2013 the Stage 3 Mining Area was further refined (PA08\_0111 MOD 3 to extend the finishing ends of panels A7, A8, A9 and A10 and retract the start position of longwall A8). The mine plan of the most recent modification forms the basis of this current Extraction Plan Area.

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 (LWA7 to LWA10). The Extraction Plan Area is the first in a series of 13 LTCC panels approved as the Stage 3 mining area. This area is contained within Mining Leases CML2, ML1661 and ML1666. The panels will be extracted in sequence commencing in A7. Retreat will be from the eastern end of each panel in a south-westerly direction to the nominated finish position at which point the equipment will be relocated to the following panel.

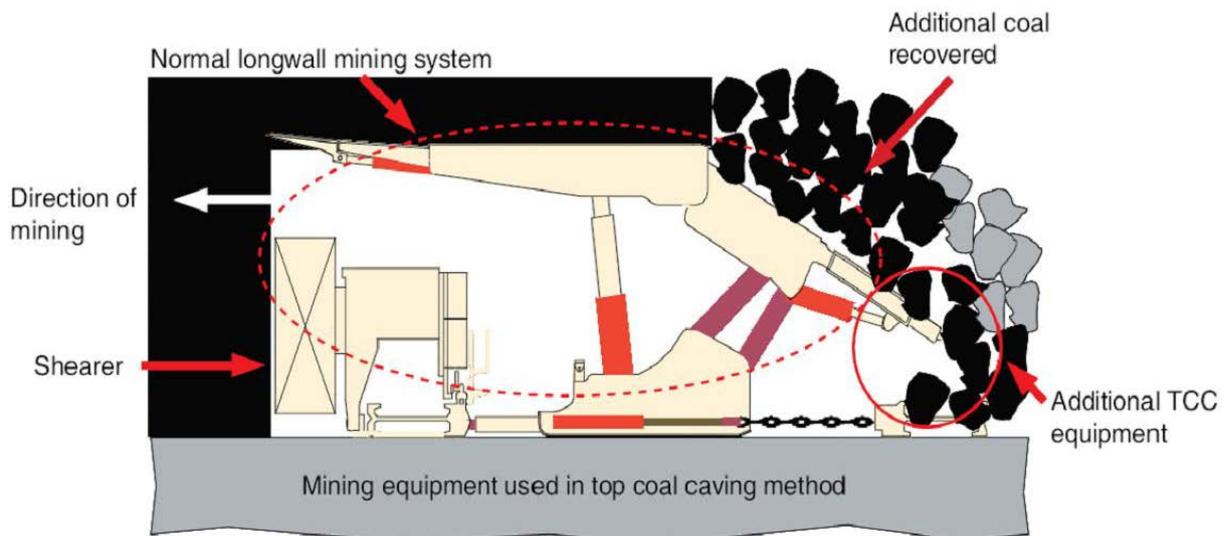
### 2.2.3 Mining Method

The Longwall Top Coal Caving (LTCC) technology mining method is a conventional retreat longwall face with a second armoured face conveyor (AFC) towed behind the shields to recover coal that would otherwise fall into the goaf and be lost. The roof supports are of a modified design incorporating a system of hydraulically operated tail-canopies at the rear of the support which can be moved up and down to allow the broken coal in the goaf area to spill onto the second AFC. This process is allowed to continue until all of the coal is recovered and waste rock appears. At this time, the tail canopies can be lowered and “gates” shut, pulling the AFC forward to stop recovery of product from the goaf. A schematic of the LTCC equipment is shown as **Figure 2.2**.

The operation steps in LTCC are generically described as:

- Shearing coal in front of the AFC
- Pushing the front conveyor
- Setting the support forward
- Opening the tail-canopy of support to allow broken coal to spill onto the rear conveyor
- Pulling the rear conveyor

Austar has developed a LTCC Operational Standard for all aspects of managing the LTCC system.



**Figure 2.2 Schematic of LTCC longwall face showing a typical run of face shield**

Austar intends to mine the Greta seam by the LTCC mining method. Seam thickness varies between 6.25 to 7.0m within the extraction area. Extraction height of the first pass will typically be set at 3.0m with the top coal caving process targeting an equivalent extraction height of between 4.0 and 6.5m.

Development roadways are generally driven at 3.2m high x 5.0m wide by single pass in-place continuous miners. At present the gates are driven to the Dosco parting (a stone marker band within the seam) where it is a predominate parting in the seam. The longwall will ramp down from the gateroads to the base of the seam to maximize resource recovery and coal quality. 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 0 – 0.3m 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 for the Application Area is provided in **Table 2.1**.

**Table 2.1 Extraction Plan Area Estimated Resource Recovery**

<b>Total tonnes of coal (Resource within extraction area)</b>	25.1Mt
<b>Total tonnes extracted through development</b>	1.0Mt
<b>Tonnes extracted by LTCC</b>	12.59Mt
<b>Percentage recovery</b>	54%

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

**Table 2.2 Individual Longwall Tonnages**

<b>Panel</b>	<b>LW Length (m)</b>	<b>LW Block Width (void m)</b>	<b>Average LTCC Extraction Height* (m)</b>	<b>LW ROM Tonnes (Mt)</b>
LWA7	1023	236.8	6.0	2.07
LWA8	1409	236.8	5.8	2.61
LWA9	1800	236.8	6.0	3.64
LWA10	2138	236.8	6.2	4.27

\*Note: Maximum Approved extraction height is 6.5m

**Table 2.3 Longwall Mining Rate and Sequence**

Panel	Start Date	End Date	Estimate Duration (Days)
LWA7	June 2013	Jan 2014	214
LWA8	Apr 2014	May 2015	376
LWA9	July 2015	Dec 2016	533
LWA10	Feb 2016	Feb 2019	719

**Table 2.4 Longwall Geological Attributes**

Panel	Depth of Cover (m)	Seam Thickness (m)	Roof and Floor Conditions	Geological Anomalies*
LWA7	460-520	6.25-6.75	Competent with localised soft floor zones	Nil predicted
LWA8	520-540	6.25-6.75	Competent with localised soft floor zones	Igneous intrusion just outside start line
LWA9	540-560	6.25-6.75	Competent with localised soft floor zones	Igneous intrusion near start of panel (mining plan to be reviewed upon further exploration)
LWA10	540-565	6.50-7.00	Competent with localised soft floor zones	Igneous intrusion near start of panel

\*The extraction area is bounded by the Quorrobolong fault to the south-west and Abernethy fault to the north-east. These major structures are outside the longwall panels and do not pose any risk to extraction or subsidence.

### 2.2.5 Mine Design In Relation to Subsidence Management

The Stage 3 mining area has been re-designed since original approval in September 2009. 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 preceding three years, the re-designed mine plan (approved in March 2012) with further refinements approved in 2013 (PA08\_0111 MOD3):

- Reduces overall strata failure and business interruption risk due to alignment of longwall orientation with the principal stress direction;
- Reduces roadway failure risks and subsidence impact risks due to an increase in chain pillar width from 45 metres to 55 metres;
- Improves access to high quality, thick seam coal to the west of the September 2009 approved longwalls A7 to A17 that would otherwise have been sterilised by the approved mine plan thus maximising resource recovery;
- Reduces risk to longwall production between geologically structured zones in the September 2009 approved longwall A6 by moving the main headings to this location;
- Creates no significant change to the potential impacts to natural and built features compared to the mine plan that was previously approved in 2009; and
- Increases coal recovery and limits business interruption risk via the extension of longwall panels A7, A8, A9 and A10 and the retraction of LWA8 start to outside of the Igneous intrusion.

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 **SMP Plan 6**) mean that despite the increased seam extraction height, 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 (nominally around 300mm). 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. These parameters used for A7 to A10 are:

- Panel width (void) = 236.8m
- Minimum Chain Pillar width (solid) = 55m.

Chain pillar lengths are nominally 150m, however 100m nominal length pillars will also be utilised. As these are greater than the planned minimum widths the variations in lengths are inconsequential to subsidence impact as it will be the minimum widths that govern subsidence levels.

Two main geological features with the potential to impact subsidence are known to exist in the mining area. These are known as the Abernethy and Quorrobolong faults as shown in **SMP Plan 6**. Large faulting has the potential to cause abnormal local subsidence, tilt and strain on the surface. For both mining and subsidence impact reasons these structures have had a standoff distance applied to longwall extraction that limits these risks. 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 maximise resource recovery. In the case of the previously approved A6 longwall panel, the secondary extraction has been removed altogether. In this area and at locations along the Quorrobolong fault there will still be primary workings conducted, however these create no subsidence impact.

## 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. MSEC484 (2011) and MSEC650 (2013).

The impact assessments have been based on the predicted subsided ground movements and multiples of 2.0 times the predicted. An unlikely upperbound set of predictions has also been calculated and included as part of the risk management process. Upperbound predictions are based on achieving a total subsidence of 65% of effective extracted seam thickness and are equivalent to approximately 2.0 times the predicted subsidence parameters. Consideration of the cumulative subsidence effect of the existing Stage 2 longwall and proposed Stage 3 longwalls are also accounted for in the subsidence predictions. This process has generated a range of subsidence predictions from which impact assessments and subsidence management recommendations have been made.

Results from previous subsidence monitoring at the colliery has been utilised in calibration of the model. This includes longwalls SL1 to SL4, longwalls 1 to 13a and the recent LTCC panels A1 to A3. These results and discussions regarding their use in the subsidence prediction for Stage 3 can be located in section 3.6 of MSEC (2011). In summary the use of this information has resulted reliable subsidence prediction over the LTCC panels A1 to A5a with actual subsidence values that are at or slightly below the maximum predicted values and much lower than the Upper Bound cases.

No specific features are expected to greatly affect the reliability of the subsidence predictions, however it should be noted that variations in near surface geology can have a local effect on subsidence parameters such as curvature or strain. Consequently the subsidence predictions for all features are based on the highest values within a 20m radius of that feature. Further discussion on the reliability of the subsidence predictions can be found in MSEC (2011).

### 2.3.2 Extraction Plan Area Subsidence Predictions

Longwalls A7 to A10 are the first panels to be extracted in the Stage 3 area. Whilst the individual panel widths are considered subcritical, the extraction of the four panels will have an overall effective width such that they could be considered supercritical and near maximum subsidence would be achieved. This is similar to the A3 to A5a four panel extracted area of Stage 2 and consequently as the revised subsidence predictions for the Stage 3 Modification (March 2012) include Stage 2 actual subsidence measurements (which have been proven accurate by subsidence monitoring in the Stage 2 area).

This is a revision of the first Extraction Plan for the Stage 3 area (longwalls A7 to A10) prepared by Austar in April 2013. There is currently limited subsidence data for the portion of Stage 3 longwall A7 that has been extracted since June 2013 (approx. 100mm in October 2013). It is considered there is no need for further review and update of the predicted subsidence parameters for A7 to A10 as a part of this Extraction Plan application, and as the Stage 2 subsidence has developed in a predictable manner within predicted levels. Continued monitoring of subsidence parameters within the

Extraction Plan Area in accordance with this Extraction Plan will allow for revised predictions prior to future Stage 3 Extraction Plans.

### 2.3.2.1 Maximum Predicted Subsidence and Curvature

The below tables display the subsidence parameter predictions for the Extraction Plan Area.

Curvature has been assessed and reported as opposed to strain due to the ability to more reliably predict curvature as it is not as affected by things such as variations in near surface geology. A linear relation between curvature and strain can give a reasonable estimate of tensile and compressive strains, however curvature has been evaluated to be a more reliable predictor of subsidence impact as per ACARP Project C10125 included in MSEC484 (2011).

**Table 2.5 Maximum Systemic Ground Movements LW A7 to LW A10**

Parameter	Predicted	Upperbound
Subsidence (mm)	1500	2575
Tilt (mm/m)	6.0	9.0
Hogging Curvature (km <sup>-1</sup> )	0.05	0.06
Sagging Curvature (km <sup>-1</sup> )	0.09	0.15

**Table 2.6 Maximum Incremental Ground Movements for LW A7**

Parameter	Predicted
Subsidence (mm)	450
Tilt (mm/m)	2.5
Hogging Curvature (km <sup>-1</sup> )	0.02
Sagging Curvature (km <sup>-1</sup> )	0.03

**Table 2.7 Maximum Incremental Ground Movements for LW A8**

Parameter	Predicted
Subsidence (mm)	850
Tilt (mm/m)	4.0
Hogging Curvature (km <sup>-1</sup> )	0.03
Sagging Curvature (km <sup>-1</sup> )	0.09

**Table 2.8 Maximum Incremental Ground Movements for LW A9**

Parameter	Predicted
Subsidence (mm)	850
Tilt (mm/m)	4.5
Hogging Curvature (km <sup>-1</sup> )	0.04
Sagging Curvature (km <sup>-1</sup> )	0.08

**Table 2.9 Maximum Incremental Ground Movements for LW A10**

Parameter	Predicted
Subsidence (mm)	850
Tilt (mm/m)	4.0
Hogging Curvature (km <sup>-1</sup> )	0.04
Sagging Curvature (km <sup>-1</sup> )	0.08

### 2.3.2.2 Horizontal Movements

It has been shown that the maximum horizontal movement is approximately 15 times the maximum tilt at any one point for the subsidence at Austar (Refer MSEC484 Section 4.6). The maximum tilt occurs during the extraction of LWA10 for the application area being 6.0mm/m. This equates to a maximum horizontal movement of 90.0mm.

Conventional horizontal movements do not directly impact on natural features or items of surface infrastructure, 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 features and items of surface infrastructure are addressed in the impact assessments for each feature, which have been summarised in the Land Management Plan (**Appendix D**) and the Built Features Management Plan (**Appendix F**).

### 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 precise 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 survey tolerance. The impacts of far-field horizontal movements on the natural features and items of surface infrastructure within the vicinity of the Study Area is not expected to be significant.

#### **2.3.2.4 Upsidence and Valley Closure**

Upsidence and Valley closure are of particular importance to the watercourses of Cony and Sandy Creeks which traverse the Stage 3 mining area. As stated previously the Extraction Plan Area extending to only A10 will avoid impact on any of the creek systems. Movements exceeding 20mm are not predicted at Cony Creek until after the mining of LWA11 and at Sandy Creek after LWA13, and as such there are no predicted environmental consequences to creek systems in the Extraction Plan area.

## 2.4 PERFORMANCE OBJECTIVES

Performance objectives in relation to subsidence impacts at Austar are presented in **Table 2.10**. These objectives have been used when developing management strategies of this Extraction Plan.

**Table 2.10 Performance Objectives from PA08\_0111**

Condition No.	Condition Requirement										
Schedule 3, Condition 1	<p>The Proponent shall ensure that the project does not cause any exceedance of the key performance measures in Table 1.</p> <p><i>Table 1: Subsidence Impact Performance Measures</i></p> <table border="1"> <thead> <tr> <th colspan="2" style="background-color: #d3d3d3;"><b>Water Resources and Flooding</b></th> </tr> </thead> <tbody> <tr> <td style="background-color: #d3d3d3;"><i>Flooding</i></td> <td><i>No significant increased risk on built features, unless the landowner agrees otherwise in writing.</i></td> </tr> <tr> <th colspan="2" style="background-color: #d3d3d3;"><b>Built Features</b></th> </tr> <tr> <td style="background-color: #d3d3d3;"><i>Built Features</i></td> <td><i>Safe, serviceable and repairable, unless the owner agrees otherwise in writing.</i></td> </tr> </tbody> </table> <p><i>Note: The Proponent will be required to define more detailed performance indicators for these performance measures in the various management plans that are required under this approval</i></p>	<b>Water Resources and Flooding</b>		<i>Flooding</i>	<i>No significant increased risk on built features, unless the landowner agrees otherwise in writing.</i>	<b>Built Features</b>		<i>Built Features</i>	<i>Safe, serviceable and repairable, unless the owner agrees otherwise in writing.</i>		
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<i>Flooding</i>	<i>No significant increased risk on built features, unless the landowner agrees otherwise in writing.</i>										
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<i>Built Features</i>	<i>Safe, serviceable and repairable, unless the owner agrees otherwise in writing.</i>										
Schedule 6, Condition 1	<p>The Proponent shall achieve the rehabilitation objectives in Table 6 to the satisfaction of the Executive Director, Mineral Resources.</p> <p><i>Table 6: Rehabilitation Objectives</i></p> <table border="1"> <thead> <tr> <th style="background-color: #d3d3d3;"><b>Domain</b></th> <th style="background-color: #d3d3d3;"><b>Rehabilitation Objective</b></th> </tr> </thead> <tbody> <tr> <td style="background-color: #d3d3d3;"><i>Land affected by the project (including watercourses and steep slopes)</i></td> <td><i>Rehabilitate landform, landuse and ecosystem function to that existing pre-mining and consistent with the surrounding landform.</i></td> </tr> <tr> <td style="background-color: #d3d3d3;"></td> <td><i>Reduce safety hazards to no more than those existing pre-mining.</i></td> </tr> <tr> <td style="background-color: #d3d3d3;"></td> <td><i>Minimise erosion risk.</i></td> </tr> <tr> <td style="background-color: #d3d3d3;"><i>Built features</i></td> <td><i>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.</i></td> </tr> </tbody> </table>	<b>Domain</b>	<b>Rehabilitation Objective</b>	<i>Land affected by the project (including watercourses and steep slopes)</i>	<i>Rehabilitate landform, landuse and ecosystem function to that existing pre-mining and consistent with the surrounding landform.</i>		<i>Reduce safety hazards to no more than those existing pre-mining.</i>		<i>Minimise erosion risk.</i>	<i>Built features</i>	<i>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.</i>
<b>Domain</b>	<b>Rehabilitation Objective</b>										
<i>Land affected by the project (including watercourses and steep slopes)</i>	<i>Rehabilitate landform, landuse and ecosystem function to that existing pre-mining and consistent with the surrounding landform.</i>										
	<i>Reduce safety hazards to no more than those existing pre-mining.</i>										
	<i>Minimise erosion risk.</i>										
<i>Built features</i>	<i>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.</i>										
Statement of Commitments No .	Commitment										
1.3.2	<p>The Mine Plan submitted as part of the Extraction Plan (EP) for longwall extraction will take into consideration monitoring results from previous Austar Mine Complex operations and will be designed to ensure that subsidence as a result of mining does not exceed Upper Bound predictions as set out in the EA for subsidence, tilt, tensile strain and compressive strain. Those being:</p> <ul style="list-style-type: none"> <li>• <b>Maximum Upper Bound</b> subsidence ranges from approximately 825 mm for LWA7 to approximately 3000 mm for LWA19.</li> <li>• <b>Maximum Upper Bound</b> tilt ranges from approximately 4.0 mm/m for LWA7 to approximately 11 mm/m for LWA19.</li> <li>• <b>Maximum Upper Bound</b> conventional hogging curvature ranges from approximately 0.04 km<sup>-1</sup> for LWA7 to approximately 0.09km<sup>-1</sup> for LWA19.</li> <li>• <b>Maximum Upper Bound</b> conventional sagging curvature ranges from approximately 0.06km<sup>-1</sup> for LWA7 to approximately 0.15km<sup>-1</sup> for LWA19.</li> </ul>										

### 3 DEVELOPMENT

#### 3.1 EXTRACTION PLAN TEAM

The team that has prepared the Extraction Plan was endorsed by the Director General of DP&I on 28 March 2013. 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 Coal Mine - Gary Mulhearn, Adrian Moodie, Carly McCormack
Built Features Management Plan	Austar Coal Mine - Gary Mulhearn, Adrian Moodie
Public Safety Management Plan	Austar Coal Mine - Gary Mulhearn, Adrian Moodie
Land Management Plan	AECOM - Gabriel Wardenburg, Dee Murdoch
Biodiversity Management Plan	Umwelt – Brendan Rice, Chloe Parkins, Rebecca Vere
Heritage Management Plan	Umwelt – Jan Wilson, Andy Roberts

#### 3.2 AGENCY CONSULTATION

##### 3.2.1 Department of Planning and Infrastructure

The Extraction Plan is required to be completed to the satisfaction of the Director General of the Department of Planning and Infrastructure (DP&I).

##### 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.

There is also a parallel Subsidence Management Plan approval requirement of Austar Coal Mine’s Consolidated Mining Lease 2 (CML2) which requires approval of the Director General of the Division

of Resources and Energy. The Subsidence Management Plan process, including approval of the Subsidence Management Plan will satisfy the DRE requirements of Project Approval 08\_0111.

### **3.2.3 Office of Environment & Heritage**

The Aboriginal Cultural Heritage Management Plan was prepared in consultation with the Registered Aboriginal Parties and OEH. This plan, including the consultation requirements was approved by DP&I in May 2012, and an update was approved by DP&I on 30 May 2013. Consultation on an addendum report to the ACHMP to reflect changes to the mine plan (PA08\_0111 MOD3) was also undertaken with the Registered Aboriginal Parties and OEH during late 2013.

OEH was consulted in the development of the approved Biodiversity Management Plan (Umwelt, May 2013). The updated BMP included in this Extraction Plan was provided to OEH for comment through the SMP Application process. The BMP builds off the current Stage 2 ecological monitoring program, based on comments on that program from OEH in 28 February 2012.

### **3.2.4 Mine Subsidence Board**

The Mine Subsidence Board has been consulted in the preparation of the process for Built Features Management Plans in the Stage 2 Mining Area, and in the early parts of the Stage 3 Mining Area, 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 which is part of National Park Estate administered by the National Parks and Wildlife Service, private landholders, Council and DPI-Crown 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 National Parks and Wildlife Service**

The National Parks and Wildlife Service (NPWS) have been consulted regarding access to the Werakata State Conservation Area for the Extraction Plan Subsidence Monitoring Program, and also in relation to the predicted environmental consequences of extraction within the Extraction Plan area. NPWS granted a licence to Austar on 13 May 2013 to formalise arrangements for the Extraction Plan monitoring program, including establishment of subsidence monitoring lines to the point of restricting access in accordance with the Public Safety Management Plan in the case that safety risks are identified.

### 3.3.2 Private Landholders

The Stage 3 Modification project was approved in May 2012, and the Stage 3 Project was previously approved in September 2009. During each process landholders within the Stage 3 Project area were consulted with via mail, public meetings, and through the Austar Community Consultative Committee. Within the Extraction Plan Area, Austar has been progressing access agreements and has reached agreement with five of the private landholders in relation to formalising an access agreement to allow Austar to access the land 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 is progressing further with one of the other major landholders within the Extraction Plan area, and continues to liaise with other landholders. The benefit of the access arrangement 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 Stage 3 mining is 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](http://www.austarcoalmine.com.au)).

An update consultation letter on the proposed modification to the Stage 3 mining area (proposed MOD3), including the notification of the planned update to the Extraction Plan has also been provided to landholders in the Stage 2 and Stage 3 mining areas in October 2013.

### 3.4 INFRASTRUCTURE OWNER CONSULTATION

In accordance with the Built Features Management Plan development, Austar has consulted with infrastructure owners to develop individual Built Features Management Plans to manage potential subsidence effects. Owners include:

- Roads (Cessnock City Council, National Parks and Wildlife Service);
- Telstra; and
- Ausgrid.

Austar has agreed on appropriate management strategies with NPWS, Telstra, Ausgrid, and Cessnock City Council.

Each of the infrastructure owners are consulted with during updates to the Extraction Plan.

## 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:

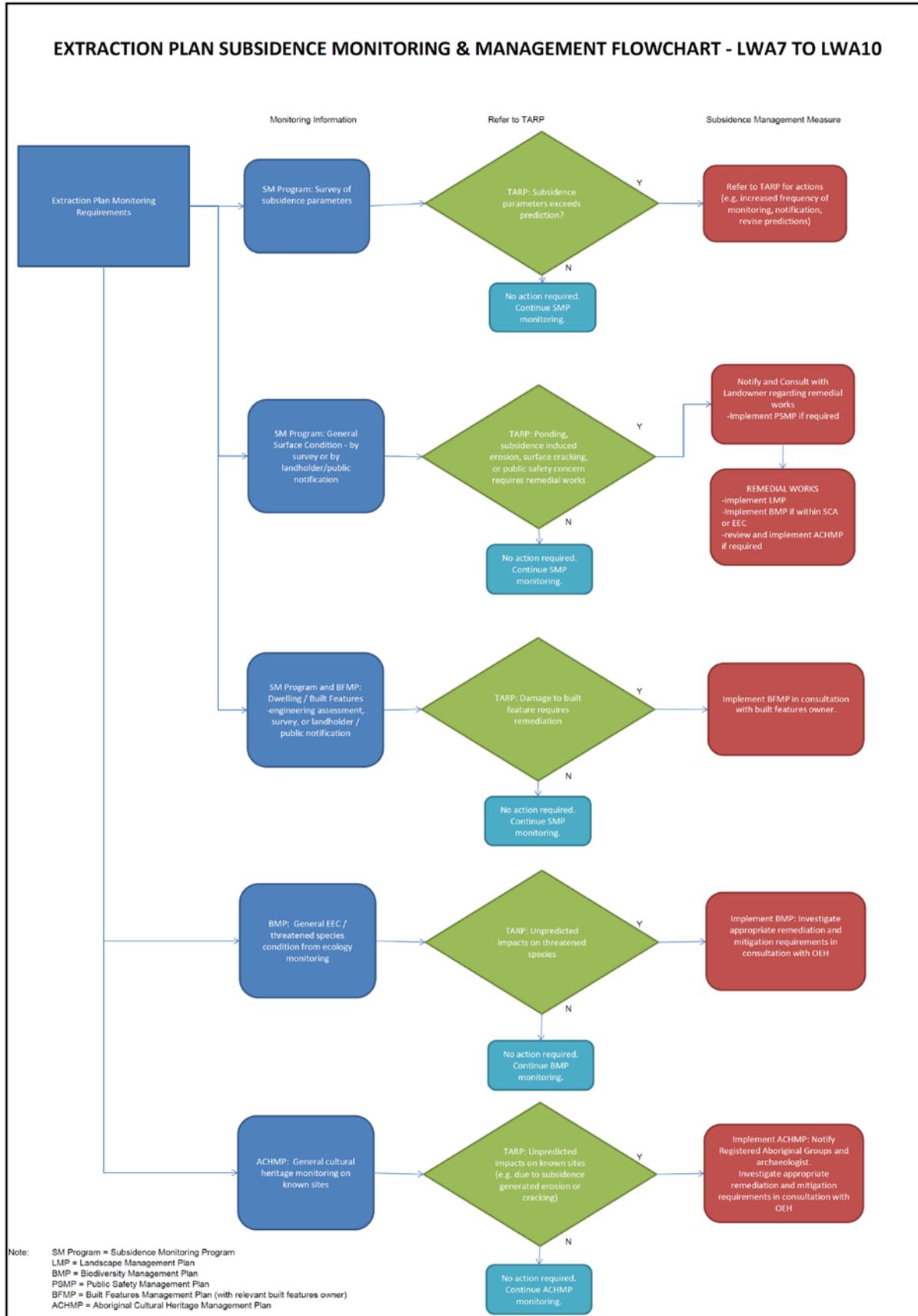
- **Land Management Plan** – to manage the potential environmental consequences of second workings on steep slopes and land in general;
- **Biodiversity Management Plan** – to manage the potential environmental consequences of second workings on terrestrial flora and fauna (additional **monitoring** 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;
- **Heritage Management Plan** – to manage the potential environmental consequences of second workings on heritage sites or values (additional **monitoring** specific to Aboriginal Cultural Heritage is also collected to assess impact); 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 **LWA7 to LWA10 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 SM Program.

### 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 7 Condition 5 of PA08\_0111 and to satisfy Mining Lease conditions.

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

- (a) Describe the works that were carried out in the past year, and the works that are proposed to be carried out over the next year;
- (b) Include a comprehensive review of the monitoring results and complaints records of the mine complex over the past year, 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 EA and Extraction Plan;
- (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 mine complex;
- (e) Identify any discrepancies between the predicted and actual impacts of the mine complex, 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 mine complex.

The Annual Review / AEMR will be published on the Austar website upon completion and submission to DP&I 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 6 Schedule 7 of Project Approval 08\_0111 Austar will notify the Director-General 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 Director-General and any other relevant agencies notified.

## 5.2 REVIEW OF THE EXTRACTION PLAN

Regular review of the Extraction Plan and/or any of the sub-plans is required by PA08\_0111. In particular, Austar is required to review, and if necessary revise, the strategies, plans, and programs of this Extraction Plan within 3 months of the submission of an:

- Audit under condition 7 of schedule 7;
- Incident report under condition 6 of schedule 7; and
- Annual Review under condition 3 of schedule 7.

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

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

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

## 6 REFERENCES

MSEC (2013), *Stage 3 – Longwalls A7 to A10, The Effects of the Proposed Modified Commencing End of LWA8 and Modified Finishing Ends of LWA7 to LWA10 in Stage 3 at Austar Coal Mine on the Subsidence Predictions and Impact Assessments*, Report No. MSEC650, Revision A

MSEC (2011), *Stage 3 – Longwalls A7 to A19 Subsidence Predictions and Impact Assessments for Natural Features and Surface Infrastructure in Support of a Modification to the Development Consent*, Mine Subsidence Engineering Consultants, Report No. MSEC484, May 2011.

MSEC (2007), *The Prediction of Subsidence Parameters and the Assessment of Mine Subsidence Impacts on Natural Features and Surface Infrastructure resulting from the Extraction of Proposed Austar Longwalls A3 to A5 in Support of a SMP Application*. Report Number MSEC275, Revision C.

Umwelt (2013), *Austar Coal Mine LWA7-A10, Modification – Stage 3 Area, Environmental Assessment*, October 2013

Umwelt (2011), *Austar Coal Mine Project – Stage 3 Modification Environmental Assessment*, September 2011.

# Plans

## SMP Plans

# Appendices

# **Appendix A**

# **Project Approval Conditions**

**Table A1: Project Approval 08\_0111 Conditions relevant to the Extraction Plan**

Condition No.	Condition Requirement	Addressed in EP
Schedule 3, Condition 4	<b>Extraction Plan</b> The Proponent shall prepare and implement an Extraction Plan for all second workings in the mining area to the satisfaction of the Director-General. 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 Director-General, and be approved by the Director-General 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;	SMP Plans (A3)
	(c) include detailed plans of any associated surface construction works;	Not Applicable
	(d) include the following to the satisfaction of DRE:	
	<ul style="list-style-type: none"> <li>• a coal resource recovery plan that demonstrates effective recovery of the available resource;</li> </ul>	S2.2
	<ul style="list-style-type: none"> <li>• revised predictions of the subsidence effects and subsidence impacts of the extraction plan, incorporating any relevant information that has been obtained since this approval; and</li> </ul>	S2.3
	<ul style="list-style-type: none"> <li>• a Subsidence Monitoring Program to:               <ul style="list-style-type: none"> <li>○ validate the subsidence predictions; and</li> <li>○ analyse the relationship between the subsidence effects and subsidence impacts of the Extraction Plan and any ensuing environmental consequences;</li> </ul> </li> </ul>	Appendix C
	(e) include a: <ul style="list-style-type: none"> <li>• Watercourse Management Plan, which has been prepared in consultation with OEH and NOW, to manage the environmental consequences of second workings on watercourses (including flooding and ponding) and alluvial aquifers;</li> </ul>	Not applicable for LWA7 to LWA10 (no creeks or alluvial aquifers)
	<ul style="list-style-type: none"> <li>• Include a Land Management Plan, to manage the potential environmental consequences of second workings on steep slopes and land in general.</li> </ul>	Appendix D
	<ul style="list-style-type: none"> <li>• Heritage Management Plan, which has been prepared in consultation with OEH and the relevant Aboriginal groups, to manage the potential environmental consequences of second workings on heritage sites or values;</li> </ul>	Appendix G
	<ul style="list-style-type: none"> <li>• 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</li> </ul>	Appendix F
	(f) include a Public Safety Management Plan, which has been prepared in consultation with DRE, to ensure public safety in the mining area.	Appendix H

Condition No.	Condition Requirement	Addressed in EP												
Schedule 3, Condition 5	(a) a program to collect sufficient baseline data for future Extraction Plans;	This Extraction Plan												
	(b) a revised assessment of the potential environmental consequences of the Extraction Plan, incorporating any relevant information that has been obtained since this approval;	S2.3												
	(c) a detailed description of the measures that would be implemented to remediate predicted impacts; and	S4												
	(d) a contingency plan that expressly provides for adaptive management.	S4.2												
Schedule 6, Condition 1	<p><b>Rehabilitation Objectives</b></p> <p>The Proponent shall achieve the rehabilitation objectives in Table 6 to the satisfaction of the Executive Director, Mineral Resources.</p> <p><i>Table 6: Rehabilitation Objectives</i></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #cccccc;">Domain</th> <th style="background-color: #cccccc;">Rehabilitation objective</th> </tr> </thead> <tbody> <tr> <td>Surface Infrastructure Site</td> <td>Revegetate the cleared portion of the site with a structured native vegetation community similar to that existing pre-mining, or other landuse approved by the Director General</td> </tr> <tr> <td>Biodiversity offset area</td> <td>Additional objectives/criteria to be set through condition 4 below Implement the offset strategy described in the EA and shown conceptually in Appendix 5</td> </tr> <tr> <td>Land affected by the project (including watercourses and steep slopes)</td> <td>Additional objectives/criteria to be set through condition 4 below Rehabilitate landform, landuse and ecosystem function to that existing 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 1981</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> </tbody> </table>	Domain	Rehabilitation objective	Surface Infrastructure Site	Revegetate the cleared portion of the site with a structured native vegetation community similar to that existing pre-mining, or other landuse approved by the Director General	Biodiversity offset area	Additional objectives/criteria to be set through condition 4 below Implement the offset strategy described in the EA and shown conceptually in Appendix 5	Land affected by the project (including watercourses and steep slopes)	Additional objectives/criteria to be set through condition 4 below Rehabilitate landform, landuse and ecosystem function to that existing 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 1981</i> is made for the repairs, restoration or replacement	Community	Minimise the adverse socio-economic effects associated with mine closure	<p>Land Affected by the project: Appendix D – LMP</p> <p>Built Features: Appendix F - BFMP</p>
Domain	Rehabilitation objective													
Surface Infrastructure Site	Revegetate the cleared portion of the site with a structured native vegetation community similar to that existing pre-mining, or other landuse approved by the Director General													
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Built features	Repair/restore/replace to pre-mining condition or better, unless a claim under the <i>Mine Subsidence Compensation Act 1981</i> is made for the repairs, restoration or replacement													
Community	Minimise the adverse socio-economic effects associated with mine closure													
Schedule 7, Condition 2	<p><b>Management Plan Requirements</b></p> <p>The proponent shall ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:</p>													
	(a) A description of: <ul style="list-style-type: none"> <li>The relevant statutory requirements (including any relevant approval, licence, or lease conditions);</li> </ul>	Appendix A (this section)												
	<ul style="list-style-type: none"> <li>Any relevant limits or performance measures/criteria;</li> </ul>	S2.4												
	<ul style="list-style-type: none"> <li>The specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures;</li> </ul>	S2.4												
	(b) A description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	This Extraction Plan												
	(c) A program to monitor and report on the: <ul style="list-style-type: none"> <li>Impacts and environmental performance of the project;</li> <li>Effectiveness of any management measures;</li> </ul>	S5												
	(d) A contingency plan to manage any unpredicted impacts and their consequences;	S4.2												
	(e) A program to investigate and implement ways to continually improve the environmental performance of the project over time;	S5												

Condition No.	Condition Requirement	Addressed in EP
	(f) A protocol for managing and reporting any: <ul style="list-style-type: none"> <li>• Incidents;</li> <li>• Complains;</li> <li>• Non-compliances with statutory requirements; and</li> <li>• Exceedences of the impact assessment criteria and/or performance criteria; and</li> </ul>	S5
	(g) A protocol for periodic review of the plan.	S5.2
Schedule 7 Condition 4	<p><b>Revision of Strategies, Plans and Programs</b>            Within 3 months of the submission of an:</p> <p>(a) audit under condition 7 of schedule 7;            (b) incident report under condition 6 of schedule 7; and            (c) Annual Review under condition 3 of schedule 7,</p> <p>the Proponent shall review, and if necessary revise, the strategies, plans, and programs required under this approval to the satisfaction of the Director-General.</p> <p><i>Note: This is to ensure the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the project.</i></p>	S5.2

Austar has made the commitments in **Table A2** in relation to subsidence impacts from the Stage 3 area.

**Table A2: Statement of Commitments from PA 08\_0111**

Commitment	Addressed in EP
<p><b>1.3 Subsidence</b></p> <p>1.3.1 Austar Coal Mine will manage the impacts of mining subsidence as required by the conditions of the consent, conditions of the ML and other DII conditions.</p> <p>1.3.2 The Mine Plan submitted as part of the Extraction Plan (EP) for longwall extraction will take into consideration monitoring results from previous Austar Mine Complex operations and will be designed to ensure that subsidence as a result of mining does not exceed Upper Bound predictions as set out in the EA for subsidence, tilt, tensile strain and compressive strain. Those being:</p> <ul style="list-style-type: none"> <li>• <b>Maximum Upper Bound</b> subsidence ranges from approximately 825 mm for LWA7 to approximately 3000 mm for LWA19.</li> <li>• <b>Maximum Upper Bound</b> tilt ranges from approximately 4.0 mm/m for LWA7 to approximately 11 mm/m for LWA19.</li> <li>• <b>Maximum Upper Bound</b> conventional hogging curvature ranges from approximately 0.04 km<sup>-1</sup> for LWA7 to approximately 0.09km<sup>-1</sup> for LWA19.</li> <li>• <b>Maximum Upper Bound</b> conventional sagging curvature ranges from approximately 0.06km<sup>-1</sup> for LWA7 to approximately 0.15km<sup>-1</sup> for LWA19.</li> </ul> <p>1.3.3 Where a potential subsidence impact is identified on private property, Austar Coal Mine will prepare a Built Features Management Plan in consultation with the property owner. This plan will clearly outline impacts of mining on the property and the management and remediation measures to be implemented.</p>	<p>This Extraction Plan</p> <p>S2.3</p> <p>Appendix F – BFMP</p>

Commitment	Addressed in EP
<p>1.3.4 Subsidence management measures to be implemented as part of the project will include:</p> <ul style="list-style-type: none"> <li>• subsidence monitoring lines to be located as determined as part of the EP process where access is granted;</li> <li>• visual assessment of all natural features and items of surface infrastructure before, during and following mining to detect subsidence impacts such as surface cracking, irregularities in the subsidence profile, erosion, damage to structures, changes in drainage patterns or loss of water from drainage structures where access is granted;</li> <li>• detailed subsidence monitoring in accordance with DRE requirements. This data will be utilised to regularly update the subsidence predictions for Stage 3;</li> <li>• remediation and rehabilitation of subsidence impacts will be carried out, where required, as soon as practicable following subsidence using methods specified in the EP where access is granted;</li> <li>• building structures located within the subsidence affectation area will be inspected by a structural engineer prior to and after undermining and appropriate management measures implemented where access is granted ;</li> <li>• informing all relevant service providers of the potential impacts of mining subsidence on services;</li> <li>• farm dams within the subsidence affectation area will be monitored during and following undermining where access is granted, to ensure they remain in a safe and serviceable condition. Remediation works will be undertaken as required;</li> <li>• in the event of any significant loss of water from a privately-owned farm dam, Austar Coal Mine will provide an alternate source of water, as required, until the dam is repaired where access is granted ; and</li> <li>• any privately-owned bores within the subsidence affectation area will be monitored during and following undermining where access is granted. If the capacity of any utilised private bore is reduced to unacceptable level as a result of subsidence, Austar Coal Mine will provide an alternative supply of water until such time as the MSB re-establishes or replaces the bore.</li> </ul> <p>1.3.5 Austar Coal Mine will, prior to undermining of Quorrobolong Road, Nash Lane and Coney Creek Lane prepare and implement a Traffic Management Plan to manage any subsidence impacts on the roads and associated culverts and bridges in consultation with Cessnock City Council and DRE and to the satisfaction of the Director-General.</p> <p>1.3.6 Austar Coal Mine will prepare management plans in consultation with relevant service providers, for the protection of infrastructure and services within the potential Stage 3 mine subsidence area to ensure these remain in a safe and serviceable condition throughout the mining period. These plans will be submitted to the Director General for approval as part of the EP prior to undermining of the services.</p>	<p>Appendix C – SM Program Appendix C – SM Program, Appendix F – BFMP</p> <p>Appendix C – SM Program</p> <p>Appendix D – LMP</p> <p>Appendix F – BFMP</p> <p>Appendix F – BFMP Appendix F – BFMP</p> <p>Appendix F – BFMP</p> <p>Appendix F – BFMP</p> <p>Appendix F – BFMP</p>

# **Appendix B**

## **Extraction Plan Flowchart & TARP**

# **Appendix C**

# **Subsidence Monitoring Program**

# Appendix D

# Land Management Plan

# **Appendix E**

# **Biodiversity Management Plan**

# **Appendix F**

# **Built Features Management Plan**

# **Appendix G**

# **Heritage Management Plan**

# **Appendix H**

# **Public Safety Management Plan**