BAAL BONE COLLIERY
OPERATED BY THE WALLERAWANG COLLIERIES LIMITED

BAAL BONE COLLIERY
Subsidence Management Status Report
LW 29 - 31

Four Monthly Update

REPORT No. 5

For the period:
8th April 2009 to 7th August 2009

Approved by John Hayward
Manager, Mining Engineering
Baal Bone Colliery

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FIGURES

1 INTRODUCTION

This Subsidence Status Management Report fulfils the requirements of Condition 19 of the Baal Bone Subsidence Management Plan (SMP) Longwalls 29 to 31 Approval Conditions. This is the fifth report and covers the period 8th April 2009 to 7th August 2009.

2 PURPOSE AND SCOPE

The purpose of this document is to report the progress of mining, provide a summary of subsidence impacts, the implemented management processes and consultation with relevant stakeholders. It also provides the opportunity for relevant stakeholders to provide feedback as required under Condition 19.

3 FACE POSITION OF THE LONGWALL

Longwall production in the first panel of the new SMP area commenced on 6 July 2009. The faceline had retreated a total of 202 m, to chainage 1261, by 7 August 2009. The first goaf fall was recorded on 13 July 2009 at which time the face had retreated 18m.

4 SUMMARY OF SUBSIDENCE MANAGEMENT ACTIONS

Subsidence management actions undertaken throughout this reporting period are outlined below.

1. Finalisation of all management plans and monitoring programs as required by the SMP Conditions of Approval.
2. Erection of warning signs around the perimeter of the mining area and at strategic points along the various forest tracks that traverse the SMP area.
3. A public notice regarding safety aspects of traversing the SMP area has been drafted for publishing in the local newspaper.
4. Establishment and pre-mining survey of the E-E and F-F subsidence survey lines; **Figure 1**.
5. Completion of nominated periodic re-surveys of the F-F line following commencement of extraction.
6. Commencement of weekly surface inspections.
7. Continuation of ongoing flora, fauna and groundwater monitoring programs.
8. Completion of pre-mining aerial photographs of the Wolgan Escarpment.
9. Completion of pre-mining inspection and video of the access tracks through the SMP area.

5 CONSULTATION WITH STAKEHOLDERS

Consultation with stakeholders during this reporting period has been limited to consultation regarding the finalisation and approval of several management plans and monitoring programs developed in response to the SMP Conditions of Approval.

Stakeholders consulted include:

- Department of Primary Industries – Environmental Sustainability Branch
- Department of Primary Industries – Principal Subsidence Engineer
- Department of Primary Industries – District Inspector of Mines
- Forests NSW and Department of Lands (as landholders)
- Department of Environment and Climate Change
- Department of Water and Energy
- Sydney Catchment Authority

The Director of Environmental Sustainability approved the *Surface and Groundwater Response Strategy*, the *Environmental Monitoring Program* and the *Land Management Plan* on 10 June 2009. The Principal Subsidence Engineer approved the *Subsidence Monitoring Program* for the initial section of LW29 on 29 May 2009, and the Director of Mine Safety Operations approved the *Public Safety Management Plan* on 26 May 2009.

In accordance with Condition 21 of the SMP Approval, copies of all approved documents will be distributed to relevant agencies. Electronic copies will also be posted on a website for access by all other interested stakeholders. Further details regarding the web address will be provided in the next Four Monthly Status Report once the site has been established and documents uploaded.

6 SUBSIDENCE DEVELOPMENT, OBSERVED SUBSIDENCE IMPACTS & MONITORING RESULTS

6.1 Subsidence Impacts

At the end of the reporting period the LW29 face had retreated a total of 202m, so the extraction was still sub-critical. Some tension cracking as predicted has commenced to appear in the goaf area parallel to the start position. There were no subsidence impacts observed outside the nominated angle of draw. Subsidence survey monitoring of the F-F line at the start of LW29 has begun, with the results summarised and discussed at Section 6.2 below.

6.1.1 Wolgan Escarpment

In compliance with Condition 15 of the SMP approval, Dr Ken Mills of SCT Operations Pty Ltd was commissioned by Baal Bone to prepare a thorough technical review of the mine layout, as contained within the SMP and to establish scientific confidence in the finish position of the panels and the width of LW31 in the vicinity of the two known pinch points. Ken undertook a detailed assessment of potential impacts based on previous data gathered at Baal Bone; and particularly in light of recent stress cell monitoring data collected during the extraction of LW26.

The results of this review and assessment (SCT Report BBO3432, dated 9 December 2008) indicates that a 30 metre reduction in the width of Longwall 31, down to 220 metres overall width, will ensure a higher level of confidence in the ability of the mine layout to protect the Wolgan Escarpment.

The Principal Subsidence Engineer has been consulted throughout the preparation of this report, as required by Condition 15(a), and has concurred with the recommendations contained therein. Baal Bone has subsequently lodged a Subsidence Management Plan Variation Application to reduce the extraction width of LW31 from 240 metres to 210 metres, which reduces the extracted void width from 250 metres to 220 metres. A copy of the revised SMP Approved Plan is attached as **Figure 2**.

Stress change monitoring instruments have been installed and commissioned in the vicinity of the two pinch points on LW31. Stress changes in the rock strata will be monitored regularly using a remote logger as Longwalls 29, 30 and 31 are extracted. The aim of the stress monitoring is to track horizontal stress changes induced by mining parallel to the longwall goaf edge and to establish the relative magnitude of these mining induced changes relative to the thermal stress changes that occur naturally in a diurnal or seasonal cycle.

To measure the natural diurnal and seasonal changes, an array of temperature measuring sensors will also be installed to measure a thermal profile within the rock strata and variations with time. The stress changes monitored within the cliff forming sandstones will be compared with these thermal changes.

Stress cells will be logged on a twice daily cycle and information downloaded periodically for analysis by SCT Operations. Results will be forwarded to both Baal Bone and the Principal Subsidence Engineer. A summary of this data will also be included in future Four Monthly Status Reports.

Baseline aerial photographic monitoring of the Wolgan Escarpment has also been completed in accordance with the requirements of the *Land Management Plan*.

6.1.2 Rock Features

To date there has been no subsidence impacts on rock features in the SMP area. Weekly inspections of the rock features around the LW29 start area will continue until the longwall face has retreated at least 250m. No further action is currently required on rock features.

6.1.3 Surface Watercourses / Drainage structures

To date there has been no subsidence impacts observed on surface watercourses or drainage structures in the SMP area. Weekly inspections of the surface area will continue during longwall mining.

6.1.4 Fire Trails and Tracks

To date there has been no subsidence impacts on any fire trails or tracks in the SMP area; ongoing weekly inspections are continuing.

6.1.5 Swamp

Baseline seasonal photographic monitoring of the Coxs River Swamp was undertaken on 25 April 2009 and again on 14 August 2009. The next round of seasonal photographic monitoring is scheduled for October 2009.

6.1.6 Fauna

Biodiversity Monitoring Services (formerly known as Mount King Ecological Surveys) completed a baseline seasonal survey in June 2009.

In accordance with Condition 13 of the SMP approval an additional faunal monitoring site has been established in the Cox's River Swamp. Results and data from this site have been included in the latest report.

The report noted that although the survey was undertaken during difficult weather conditions, it was successful, in terms of the number of individuals and diversity of species within the two main fauna groups surveyed. Also, there were sufficient numbers and diversities of these fauna groups to be able to calculate a set of diversity indices that form part of the baseline monitoring database. There is now sufficient data accumulated to provide annual population estimates for all groups of fauna.

It was possible to assess any differences in the biodiversity and habitat condition of those sites by sampling an area that will be subject to underground mining in the future. This comparison showed that there are no significant differences in the biodiversity and habitat complexity over the years. Consequently, the data obtained so far can be used to provide a baseline for monitoring any changes due to mining in the future.

As usual, there were some interesting results from this survey. Although the numbers of birds located were relatively low (due to the cold conditions and many bird species leaving the highlands for warmer coastal lowlands), numbers and diversity of honeyeaters were relatively high (five species), as this group utilized the flowering banksia found in the swamps and creeklines at this time of the year. Also, some woodland birds were sighted, including a Scarlet Robin, a species currently being listed as Vulnerable. Threatened Gang-gang Cockatoos were sighted in the woodland sites. There were characteristic bandicoot diggings located at the Woodland 1 Site. As the Long-nosed Bandicoot has been trapped at Newnes Plateau, it is assumed that these diggings came from this species.

6.1.7 Flora

Gingra Ecological Surveys have submitted their 2009 seasonal monitoring report which summarises baseline monitoring completed during spring 2008 and autumn 2009.

The results show an increase in species diversity at all sites during the period between spring 2007 and autumn 2009. The total number of species records in spring 2007 was 119 records, summer 2007 was 113, autumn 2008 was 161 records, spring 2008 was 131 and in autumn 2009 was 157.

Species richness at most sites were at the higher end of the previously recorded range, with species richness exceeding previously recorded levels following good summer rainfall. The Long Swamp site BB10 has relatively low species diversity due to the nature of swamp grasses and sedges and a relatively low number of spaces between clumps available for establishment and growth of smaller herbs.

The species richness data obtained to date provide baseline information across a range of seasonal conditions enabling future assessment of the relative impacts of subsidence against climatic variation and other forms of disturbance.

In terms of weeds, Yorkshire Fog has increased in abundance at Long Swamp over the monitoring period (2007 to 2009). This appears to be related to improved seasonal conditions. Catsear is now evident at 3 sites. This is also likely to be related to improved seasonal conditions and is consistent with observations across the region.

Comparison of results over the monitoring period show a response to seasonal conditions with recent increased levels of species richness and of weed occurrence and abundance.

6.1.8 Underground Water Make

Data continues to be collected from the mines dewatering bores, flow meters and data loggers regarding mines water discharges and underground water storage levels. This data continues to be used to calibrate a mine water make model. Using flow meter data and the estimated goaf storage capacities determined so far, it has been calculated that the average level of groundwater seepage into the mine is in the order of 3.9 ML/day; it has been estimated that less than 5% of this currently originates from the LW29-31 SMP area.

6.1.9 Ground Water

Ian Forster from Aurecon (previously known as Connell Wagner) monitors data loggers in the six piezometers on a bimonthly basis to gather baseline data regarding groundwater level fluctuations in the vicinity of the Coxs River Swamp. To date, the data obtained confirms a strong correlation between groundwater levels and prevailing climatic conditions; most particularly the relationship to rainfall.

Data downloaded on 29 March 2009 indicated that the groundwater levels in all of the bores showed a slight decline over the previous two months. This is despite heavy rainfall at Lithgow in the middle of February. It is expected that the rainfall was not as heavy at the swamp, as the station on the plateau did not register as much rainfall as the Lithgow gauge. Nevertheless, there was a slight rise in level in some of the bores due to the February rainfall. The rainfall in March was well below average, so the decline in levels from mid-February is not surprising. As expected, the greatest fall in groundwater level was in the bores on the ridges, with only small falls in level in the swamp itself.

Data from the 25 May 2009 download once again indicated that the water level in all of the piezos continued to fall sightly over the past two months, although recent rainfall has impacted on some of the bores. There was no indication of any abnormal or unexplained movements in the water levels.

Data downloaded on 27 July 2009 confirmed that the period June/July 2009 has once again seen below average rainfall at Lithgow with a two month total of about 80 mm compared to the average of 135 mm. This has resulted in another slight decline in the groundwater level in most of the observation bores. There were no major rainfall events during this period.

There was a notable gap in the data for Bore BBP6 for the period 4 June to 16 July. It has been determined that the contractor responsible for collecting water quality samples failed to reinstall the instrument when samples were collected on 4 June; the instrument was subsequently replaced by the contractor when the July water samples were collected on the 16th. A normal data stream recommenced after this date.

Coincidentally, an anomalous reading was also recorded on 16 July at BBP1 and investigations are currently underway to confirm the correct reinstallation and calibration of the instrument, and to check the integrity of the downloaded dataset. Results of this investigation are still pending and a report will be included in the next Four Monthly Status Report.

Baseline groundwater quality monitoring commenced in September 2008 and is currently being undertaken on a monthly basis. Results of monitoring to date does not indicate any anomalies with groundwater quality at any of the bore sites, apart from slightly elevated iron and copper levels, and slightly lower pH levels in several of the swamp piezos, presumably due to the lower inflows received during the past four months.

6.2 Subsidence Development (Summary of Survey Results)

Baseline (pre-mining) survey monitoring of the E-E and F-F lines were conducted on 10 July 2009 and 27 May 2009 respectively. Refer **Figure 1** for locations.

Following commencement of extraction of LW29, three dimensional subsidence movement surveys on the F-F line were undertaken on 3 August and again on 11 August 2009. Results from these surveys confirm that subsidence movements remain within the acceptable range as defined in the SMP Application and as noted in the Subsidence Monitoring Program.

A slightly elevated level of horizontal movement (ie. 7mm) was however noted at Station 20 on the F-F line, which is inside the goaf area. Following a discussion with Dr Ken Mills of SCT Operations Pty Ltd, it was concluded that the steep nature of the terrain at this point would have exacerbated the level of horizontal movement (ie. creep) in a downslope (northward) direction; and that the systematic horizontal movement would nevertheless remain within the predicted range.

A summary of the survey monitoring results obtained during this reporting period are included in the table below:

Parameter	Predicted Results	Maximum measured result (to date)
Vertical subsidence (mm)	1400 - 1600	1276
Horizontal movement (mm)	400	407
Tensile strain (mm/m) K=1.5	9 - 16	11.1
Tilt (mm/m) K=5.0	32 - 52	25

7 ADEQUACY, QUALITY AND EFFECTIVENESS

The adequacy, quality and effectiveness of the implemented management processes based on compliance with approval conditions is considered to be satisfactory to date.

However, a review of the Groundwater Trigger Action Response Plan (TARP) contained within the *Environmental Monitoring Program* is currently being undertaken by Dr Bruce Hodgson of Aurecon (Connell Wagner). Dr Hodgson prepared a report titled *Determination of Groundwater Quality TARP Trigger Values* which was used to support the groundwater quality TARP trigger values as nominated in the *Environmental Monitoring Program*.

These trigger values were determined by analysing pre-mining baseline water quality data collected between November 2008 and April 2009. In order to utilise the widest possible dataset and to better reflect the protocols detailed in the ANZECC (2000) water quality guidelines, the Groundwater TARP water quality trigger values are currently being reassessed using an additional three months of pre-mining monitoring data.

The results of this review will be included in the next Four Monthly Status Report.

8 PROPOSED ADDITIONAL / OUTSTANDING MANAGEMENT ACTIONS

To date, no additional management actions are required, nor is there any need for early responses or emergency procedures to be undertaken as there have been no negative or unexpected subsidence impacts due to the extraction of the subject longwalls.

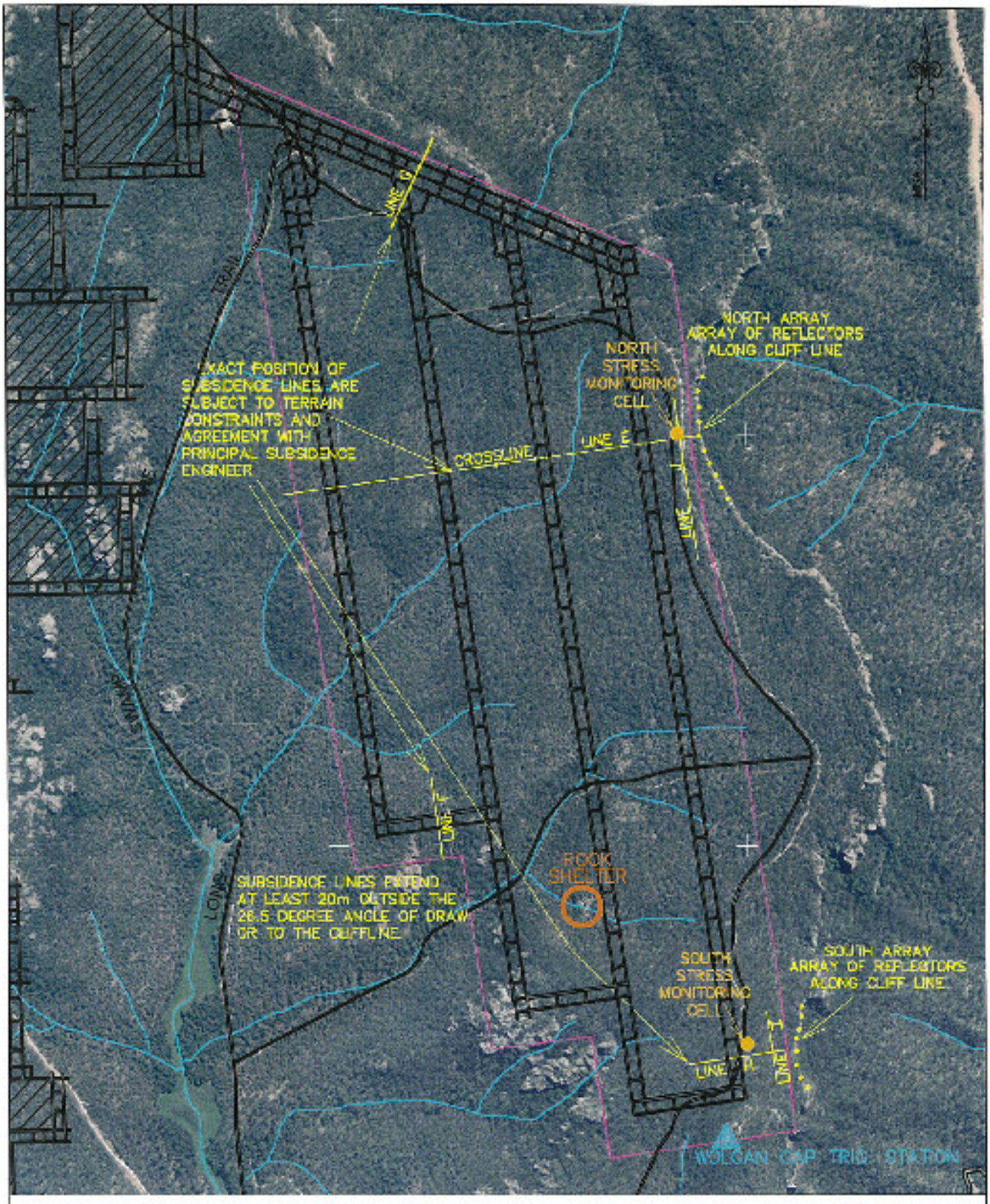
9 CONCLUSIONS

Longwall production in LW29 commenced on 6 July 2009, with the faceline retreating a total of 202m during the reporting period. The first goaf fall was recorded on 13 July 2009 at which time the face had retreated 18m.

With the exception of the potentially questionable data received from monitoring piezo BBP1, all monitoring results are within expected / predicted parameters. Routine and scheduled seasonal monitoring will continue.

Investigations into the accuracy of the BBP1 data and the review of the groundwater quality TARP trigger values are pending; collation and interpretation of the stress cell monitoring data will be ongoing now that extraction has commenced. Updates will be provided in the next Four Monthly Status Report.

FIGURE 1: Proposed Subsidence Survey and Data Monitoring Locations
(Source: *Baal Bone Colliery LW29-31 SMP Subsidence Monitoring Program*)



DRAWN JWS	# BAAL BONE COLLIERY	OAKBRIDGE
DATE 30/4/2009	TITLE FIGURE 1: PROPOSED SUBSIDENCE SURVEY AND DATA MONITORING LOCATIONS	
CHECKED		
APPROVED		
SCALE N.T.S. A4	COMPUTER PATH G:\Archives\Technical Services\Survey\Survey Plans\Subsidence\LW29-31	DRAWING No. Bbm_LW2931 Subsidence Monitoring.dwg

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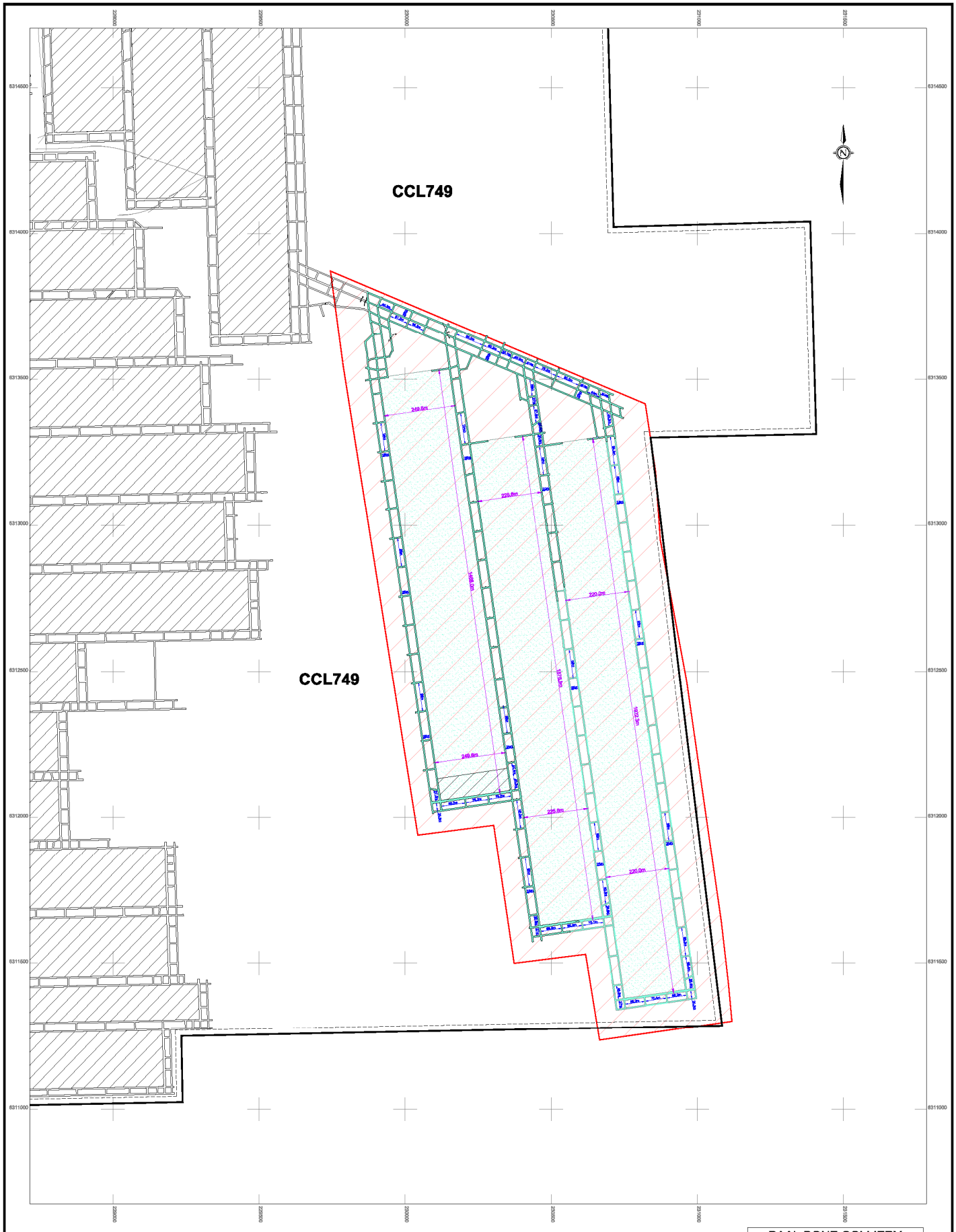
FIGURE 2: Revised SMP Approved Plan
(incorporating a reduction in the width of LW31)



Legend - U/G

- Application Area
- Existing Mine Workings
- Proposed Mine Workings

100 0 100 200 300 400 500

Mine Working are shown as of 31/03/2007.

Void Dimensions are shown in PURPLE

Proposed Mine Working Pillar Dimensions are shown in BLUE (Solid Coal)

Areas to be mined as part of this approval coloured

Mining Lease Boundary

Mine Manager
I, John Hayward, holder of Mine Manager's Certificate of Competency No. 1889, testify to the acceptance of the information shown on this plan.

John Hayward Date

Director General Date

Mine Surveyor
I, John Stevens, Registered Mining Surveyor (under Surveying Act 2002), certify that to the best of my knowledge & belief this plan conforms to the accuracy standards required by the DPI/MR in the SMP Guidelines

John Stevens Date

BAAL BONE COLLIERY

The Wallerawang Collieries Limited

Subsidence Management Application - Lithgow Seam
Longwalls 29, 30 & 31
"SMP Approved Plan" - Variation

SCALE	1:4000	DATE	22 July 2009
DRAWN	TCDS/JWS	DRG NO	BB501-07-01A
CHECKED	KP	REV NO	1
APPROVD	J.HAYWARD	SIZE	A0