22 January 2021

Mr Stephen O'Donoghue
Director Resource Assessments
Department of Planning, Industry and Environment
Locked Bag 5022
Parramatta NSW 2124

Dear Steve

Airly Mine Panel and Pillar Extraction Plan – Modification 2

Introduction

Centennial Airly is seeking a modification (Modification 2) to the approved Mt Airly Panel and Pillar Zone Extraction Plan (**Extraction Plan**) for miniwall panels MW10 – MW12. The extraction of miniwall panels MW02 - MW05 were originally approved by the Secretary of the Department of Planning on 31 May 2019 with an extended approval for extraction of miniwall panels MW02 – MW15 granted on 25 June 2019. The Extraction Plan modification includes a modification to the pillar design for miniwall panels MW10 – MW11 and change in the approved extraction area to facilitate the return of vertical subsidence levels to <125 millimetres as required by the Airly Mine Extension Project development consent (**SSD 5581**).

Background

Extraction mining commenced in the Mt Airly Panel and Pillar Zone in June 2019. Since 30 January 2020 measured vertical subsidence has been recorded greater than 125 millimetres. A maximum vertical subsidence limit of 125 millimetres was proposed by Centennial Airly in the Airly Mine Extension Project Environmental Impact Statement (**EIS**). This limit was proposed by Centennial Airly to ensure mining operations would protect the surface from subsidence related impacts.

Following the extraction of miniwall panel MW04, vertical subsidence levels were recorded in excess of the 125 mm limit proposed in the EIS. Subsequent extraction in adjacent miniwall panels has resulted in vertical subsidence levels incrementally increasing to greater than 600 millimetres. As a result of elevated subsidence levels being recorded, Centennial Airly have identified an adaptive management approach to the mine design that, once implemented, would result in the maximum vertical subsidence levels being less than 125 millimetres above miniwall panels MW11 and MW12, consistent with the commitments made in the EIS.

Current Mine Design

The miniwall panels within the Mt Airly Panel and Pillar Zone were designed with nominal maximum void widths of 61 metres, which is highly sub-critical with a width to depth ratio 0.4 or less. The formation of chain pillars on 65 metre x 35 metre centres, and with a pillar width of 29.5 metre solid coal, were assessed to achieve a factor of safety greater than 1.6 and provide long term stable support to the surface. This mine design was predicted to result in maximum vertical subsidence of 70 millimetres. significantly less than the maximum 125 millimetres proposed in the EIS.

Centennial Airly Pty Limited
ABN 84 078 693 722

PO Box 201
Wallerawang NSW 2845
T. +61 02 6359 2100
E: info@centennialcoal.com.au
www.centennialcoal.com.au

The subsidence predictions for this mine design were provided by Strata2 Consulting and presented in the Extraction Plan. These subsidence predictions were consistent with those presented by Golder Associates in the EIS and confirmed through a peer review by Mine Subsidence Engineering Consultants (**MSEC**) using empirical modelling.

In addition to the mine design geometry, the mine layout adopted a conservative approach to ensure the protection of cliffs from mining related impacts (with the exception of mining proposed by Extraction Plan Modification 1) by excluding any secondary extraction from within a 26.5 degree angle of draw of the crest of any cliffs identified in the Cliff Line Zone of First Workings.

Elevated Subsidence Investigation

Once elevated subsidence was recorded following extraction in miniwall MW04, investigations by MSEC and the University of NSW (**UNSW**) commenced using the 2D UDEC numerical modelling software. Following further consultation with the Airly Mine Independent Expert Panel (**IEP**) on the recorded subsidence levels and modelling outcomes, it was recommended by the IEP that Centennial Airly engage Strata Control Technologies (**SCT**) to model the current mine design, provide understanding of the mechanism causing the excessive subsidence and provide a revised mine design for reducing subsidence to less than 125 millimetres on Mt Airly as soon as practicable. SCT use the FLAC 2D and 3D numerical modelling software. The IEP believed this to be superior to UDEC as FLAC has the capacity to automatically assign failure to a given element in the model and then reiterate the model until an equilibrium is reached. Following discussions with SCT on the modelling methodology, SCT advised a 2D model would provide an adequate representation of the current situation and any proposals for change.

Subsidence has been modelled by SCT to reach a maximum of around 600 millimetres after the extraction of miniwall panel MW07 has been completed. This level of subsidence was realised following the extraction of miniwall panel MW07 and is consistent in both magnitude and position as predicted by the SCT model. This demonstrates a high level of confidence in the accuracy and suitability of the SCT model to predict subsidence levels from miniwall mining in the Panel and Pillar Zone.

Investigation Outcomes

Investigations into the cause of elevated subsidence by SCT have identified the primary mechanism for the elevated subsidence to be failure of the strata above the coal chain pillars between the extraction panels up to 25 metres into the roof. The pillars themselves are regarded as stable. Due to the lower strength, highly frequently faulted and laminated nature of the strata in the roof, combined with the lack of confinement offered by the goaf of the narrow voids, there has been considerable failure of the rock mass above the coal pillars in the extracted areas. The over burden has been adequately supported and sag subsidence is minimal as originally designed, but the failed strata causes much higher movements than originally anticipated until equilibrium is achieved. The investigation outcomes are presented in the SCT report (AIRLY5240 - Airly Mine: Modelling Investigation of Subsidence Mechanism and Pillar Size Assessment (SCT January 2021)) attached as a supporting document to this Extraction Plan modification application.

Elevate Subsidence Impacts

A surface crack (Fracture 01) was identified during visual surface inspections by Centennial Airly on Mt Airly on 7 July 2020 during the extraction of miniwall panel MW06. Fracture 01 is approximately 55 metres long, 11 millimetres wide and 120 metres from the nearest cliff in the Cliff Zone of First Workings.

A second surface crack (Fracture 02) was identified during visual surface inspections of Mt Airly on 10 July 2020. Fracture 02 is in two parts. An approximately 90 metre section and a 15 metre section to the east. The surface crack/fracture is less than 20 millimetres wide and is approximately 70 metres from the nearest cliff in the Cliff Zone of First Workings.

Apart from the two surface cracks, no other surface impacts have been identified. All impacts remain within the performance criteria detailed within the SSD 5581 development consent.

Proposed Mine Design

To bring subsidence back to within the EIS limit of 125 millimetres as soon as possible, investigations by SCT recommended an increase in the maingate 10 chain pillar size to form a barrier pillar followed by an increase to the regular chain pillar width for subsequent chain pillars. A number of scenarios were modelled which showed similar results. A 60 metre (solid) chain pillar width in maingate 10, followed by chain pillars in MG11 and MG12 of 40 metre (solid) width has been identified as the optimal mine design that would result in subsidence being reduced to less than 125 millimetres by the tailgate goaf edge of miniwall panel MW11. Detailed subsidence predictions for this mine design are presented in the SCT report attached as a supporting document to this Extraction Plan modification application.

SCT also recommended not mining more than miniwall panels MW11 and MW12 due to the likelihood of some strata failure occurring with wider spans even with the 40 metre chain pillars.

The revised mine design for the remainder of mining within the Mt Airly Panel and Pillar Zone is presented in attached figure (**AM02488**).

Timing

Due to the rate of extraction using miniwall mining methods in the Panel and Pillar Zone, it is necessary to maintain development several panels ahead of extraction to ensure production continuity. When subsidence exceeded 125 millimetres after extraction in miniwall panel MW04, roadway development had already progressed as far as miniwall panel MW09. This precluded any opportunity to change the mine design to reduce subsidence impacts before miniwall panel MW10. It is not possible to reduce subsidence any sooner than this as MW10 has the smaller existing 29.5m (solid) chain pillar on the tailgate side which will have strata failure, albeit reduced somewhat due to reduced depth of cover over this panel. It is not possible to alter the existing developed miniwall panels to achieve a reduction in subsidence sooner than currently planned.

Extraction Plan Modification

This Extraction Plan modification seeks a change in the mine design for miniwall panels MW10 - MW12 which are required to ensure vertical subsidence levels remain below 125 millimetres for the yet to be developed miniwall panels MW11 and MW12. The change in mine design results in minor changes to approved Extraction Area as presented in Figure **AM02488**. No further mining beyond miniwall panel MW12 is proposed under Mt Airly.

This Extraction Plan modification is supported by updated A0 plans depicting the revised mine design and the subsidence predictions and model outcomes prepared by SCT and presented in the SCT report attached.

No detailed subsidence impact assessment or updates to the Extraction Plan management plans are required for the proposed mine design changes for the following reasons:

1. All the workings will remain outside a 26.5 degree angle of draw from all cliffs identified in the Cliff Zone of First Workings. Note that the 26.5 degree angle of draw line has been reviewed as a result of the high resolution cliff identification review done by Aerometrex in 2020. This work more accurately identified the locations of the rock features that comply with the cliff definition in SSD 5581 than previous work undertaken by RPS Australia East (**RPS**) as part of the EIS.
2. No modifications to the Cliff Zone of First Workings are proposed in this modification.

3. Subsidence is expected to be less than 125 millimetres for MW11 and MW12. This is not expected to cause surface cracking or other visible impacts on the surface. Therefore, all other surface features in the area (i.e. minor cliffs, steep slopes and rock outcrops) are unlikely to be impacted by mining.
4. The existing Land Management Plan, Subsidence Monitoring Plan, Public Safety Management Plan and Master Trigger Action Response Plan (**TARP**) remain applicable to the land surface of the area in question.

Justification

The Airly Mine is critical to providing an ongoing alternate and supplementary supply of coal to the Mt Piper Power Station (**MPPS**) as the Springvale Mine continues to experience challenging geological conditions. The proposed mine design changes are based on high confidence modelling outcomes by SCT and represent the optimum design that will result in vertical subsidence levels less than 125 millimetres above miniwall panels MW11 and MW12 while still ensuring a viable mining operation. The implementation of the mine design changes is dependent on approval of this Extraction Plan modification. An expedited determination of this Extraction Plan modification is requested to enable development at the Airly Mine to recommence and ensure no delays in coal extraction. Continuity of extraction is essential to ensure a secure and reliable supply of coal to MPPS.

It should be noted that this mine design is specific to the area of miniwall panels MW10-MW12. Further investigations are required to determine a suitable mine design for mining in areas beyond Mt Airly.

If you require any further information or have any questions in regard to this Extraction plan modification application, please contact me on my mobile, 0407 207 530, or email james.wearne@centennialcoal.com.au.

Yours sincerely

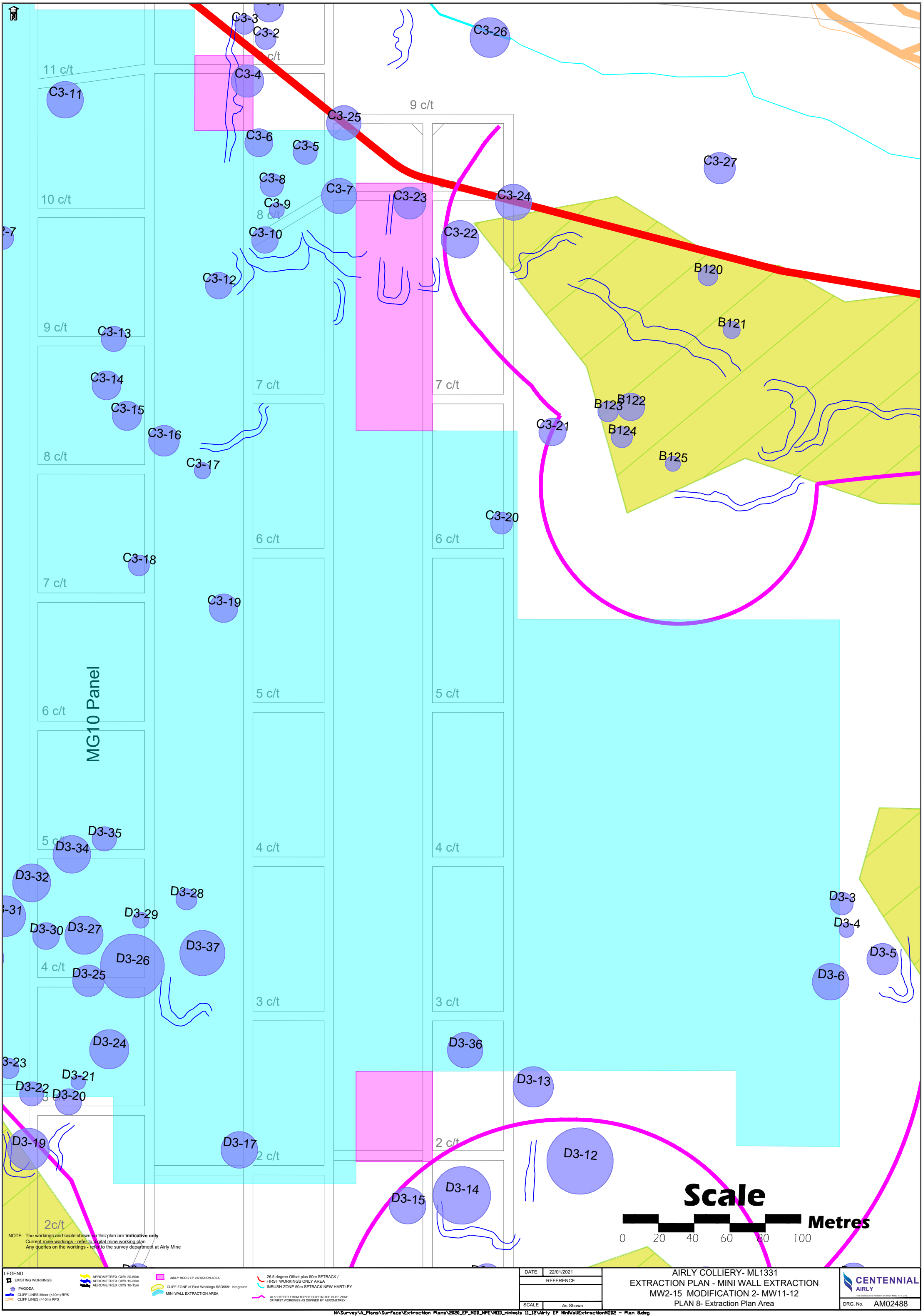
James Wearne
Group Manager Approvals

Attached:

- Plan AM02488

Enclosed:

- AIRLY5240 Airly Mine: Modelling Investigation of Subsidence Mechanism and Pillar Size Assessment (SCT January 2021)
- Revised Mt Airly Panel and Pillar Zone A0 Plans (Plans 1-8)


C3-3
C3-2
C3-26
11 c/t
C3-4
C3-11
9 c/t
C3-25
C3-6
C3-5
C3-27
C3-8
C3-7
C3-23
C3-24
10 c/t
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C3-12
B120
B121
9 c/t
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B124
B125
8 c/t
C3-17
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6 c/t
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C3-18
7 c/t
C3-19
5 c/t
5 c/t
MG10 Panel
6 c/t
D3-35
D3-34
5 c/t
4 c/t
4 c/t
D3-32
D3-28
D3-3
D3-31
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D3-21
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D3-22
D3-20
3 c/t
D3-19
D3-17
2 c/t
2 c/t
D3-12
D3-15
D3-14
2c/t
Scale
Metres
0 20 40 60 80 100
NOTE: The workings and scale shown on this plan are indicative only
Current mine workings - refer to digital mine working plan
Any queries on the workings - refer to the survey department at Airly Mine
LEGEND
EXISTING WORKINGS
PAGODA
CLIFF LINES Minor (<10m) RPS
CLIFF LINES (>10m) RPS
AEROMETREX Cliffs 20-50m
AEROMETREX Cliffs 15-20m
AEROMETREX Cliffs 10-15m
AIRLY MOD 2 EP VARIATION AREA
CLIFF ZONE of First Workings SSD5581 integrated
MINI WALL EXTRACTION AREA
26.5 degree Offset plus 50m SETBACK / FIRST WORKINGS ONLY AREA
INRUSH ZONE 50m SETBACK NEW HARTLEY
26.5° OFFSET FROM TOP OF CLIFF IN THE CLIFF ZONE OF FIRST WORKINGS AS DEFINED BY AEROMETREX
DATE 22/01/2021
REFERENCE
SCALE As Shown
AIRLY COLLIERY- ML1331
EXTRACTION PLAN - MINI WALL EXTRACTION
MW2-15 MODIFICATION 2- MW11-12
PLAN 8- Extraction Plan Area
CENTENNIAL AIRLY
THIS DRAWING IS THE PROPERTY OF AIRLY MINE PTY. LTD.
DRG. No. AM02488
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