

APPENDIX E: CENTENNIAL'S RESPONSE TO THE IPRP REPORT



Centennial Coal

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7 July 2016

Mr Howard Reed
Manager, Mining Projects
Department of Planning & Environment
GPO Box 39
SYDNEY NSW 2001

Dear Mr Reed

Re: Airly Mine Extension Project SSD 5581 – Response to IRP Report

In April 2014, Centennial Airly Pty Limited (Centennial Airly) submitted an application and accompanying Environmental Impact Statement to the NSW Department of Planning and Environment (the Department) for the Airly Mine Extension Project.

In August 2015, the Airly Mine Extension Project was referred to the NSW Planning and Assessment Commission (PAC) for review by the Department. The PAC released their review report on the Airly Mine Extension Project in November 2015. Centennial Airly's response to the PAC review report was provided in December 2015.

Prior to the Department of Planning and Environment finalising their assessment report for the Airly Mine Extension Project, the Department of Planning and Environment and Centennial Airly, in consultation with the Division of Resources and Energy, commissioned an Independent Review Panel (IRP) to review and report on the accuracy and reliability of mine subsidence impacts presented in the Environmental Impact Statement and associated documentation for the Airly Mine Extension Project. Consistent with advice from the Division of Resources and Energy, the IRP comprised of Professor Ismet Canbulat (University of New South Wales), Mr Don Kay (Mine Subsidence Engineering Consultants) and Dr Ken Mills (Strata Control Technology). A final copy of the jointly prepared review report by the IRP has been enclosed with this letter.

Centennial's Response to the Final IRP Report

The enclosed IRP review report supports the mine design and adaptive management approach proposed by Centennial Airly in the Environmental Impact Statement and considers that any risks can be managed in a post approval environment through the Extraction Plan process. The IRP review report includes some recommendations in regards to subsidence monitoring and management which are accepted by Centennial Airly. A response to each of the IRP recommendations is provided in Attachment 1 to this letter.

Additional Matters for Consideration Following Completion of the IRP Report

Centennial has given some consideration to the impact of the IRP Report on the draft conditions of consent as included in the Department's Preliminary Assessment Report to the Planning Assessment Commission dated August 2015. Specifically, Centennial has considered the consequences of the IRP report on the drafting of the following conditions within Schedule 3:

- Condition 1 and specifically Table 1
- Condition 5
- Condition 6

Condition 1

The second element of the IRP terms of reference was to provide advice and recommendations on the adequacy of the management regime proposed in the draft conditions of consent and specifically the performance measures, management plans and monitoring requirements proposed. As a result of the findings of the IRP, Centennial has reviewed the proposed performance criteria in condition 1, Table 1, and recommends that no changes be made to the draft condition.

Condition 5

As a result of the findings of the IRP, Centennial has reviewed the proposed requirements for an Extraction Plan under condition 5 and recommends that no changes be made to the draft condition.

Condition 6

Centennial has reviewed the proposed condition regarding the establishment of a post approval review panel and makes the following recommended amendments.

- the membership of the post approval review panel should be the same as the Independent Review Panel, to ensure consistency in approach and reduce post approval delay in the provision of advice.
- Condition 6 be redrafted as (redrafting noted in red):

6. The Applicant shall ~~establish~~ *continue to engage the Independent Review Panel a review panel of suitably qualified experts* to provide advice to the Applicant on the preparation of Extraction Plans and their implementation in order to meet the performance measures in Table 1 relating to cliffs and pagoda formations, to the satisfaction of the Secretary. *Specifically this panel will continue to provide advice on the accuracy and reliability of actual vs predicted subsidence impacts on cliff lines, pagodas and the New Hartley Shale Mine. The advice should consider:*

- a) The actual vs predicted subsidence for each mining zone, and the subsequent adequacy of the subsidence monitoring program*
- b) The long term stability of pillar systems after extraction, including the adequacy of system factor of safety (FOS), the final pillar width to height ratios and the geological conditions likely to affect the FOS; and*
- c) The ongoing adequacy of the proposed size of the 'cliff line zone and zone of first workings' as a result of the analysis undertaken in (a) and (b) above.*

Notes:

- ~~This review panel may include a representative of DRE.~~

In addition, specific terms of reference should be established for the functioning of this panel following approval of the Airly Mine Extension Project. These terms of reference should clearly set out the obligations of the panel, including (but not limited to):

- Recognition that the panel is advisory, and not regulatory in nature
- Setting timeframes for the provision of advice to the Applicant that are adequate, clear and transparent
- The Panel is advisory to the Applicant and as such cannot, and should not, seek or engage in representation from other parties (including government and non-government agencies and organisations)
- A secretariat function for the panel would need to be established and understood
- Meetings of the panel would be set out in an annual calendar that would be publicly available
- The panel may not seek advice from other government agencies, external parties or other interested groups without written authorisation of the Applicant

Centennial's experience with post approval expert panels requires that the governance arrangements for such a panel need to be considered in parallel with the approval process for the Airly Mine Extension Project, such that the role and function of the panel is clearly understood.

Centennial would like to seek further discussion with the Department during the final assessment of the Airly Mine Extension Project to ensure that these concerns are adequately reflected in the final conditions of approval.

If you have any questions or require any further information in regards to this matter, please contact James Wearne on 0407 207 530 or email james.wearne@centennialcoal.com.au.

Yours sincerely



8/7/16

Mary-Anne Crawford
General Manager Environment and Approvals

Attached:

- Attachment 1 – Centennial Response to the IRP Recommendations

Enclosed:

- Report of the Independent Review Panel Established to Review and Report on Accuracy and Reliability of Mine Subsidence Impacts on Sensitive Features Across the Airly Mine Extension Project Application Area (July 2016)

Attachment 1

Centennial Response to IRP Recommendations

Recommendation 1 - High confidence subsidence monitoring over initial panel and pillar mining areas (i.e. mini wall or partial extraction mining areas) is required to confirm the levels of ground movement are as predicted and the protection zones proposed are appropriate to provide a high level of protection to cliff formations. Initial monitoring should be conducted in areas remote from sensitive features and prior to any mining in these sensitive areas.

Over initial panel and pillar mining areas, Centennial Airly will adopt both conventional (subsidence lines) and trial a range of non-conventional (remote sensing) subsidence monitoring methods. This will allow Centennial Airly to validate the accuracy and suitability of non-conventional subsidence monitoring methods to measure ground movements as a result of mining activities. Conventional subsidence monitoring lines will be established wherever possible in areas of existing disturbance and in consultation with the National Parks and Wildlife Service to limit impacts on the sensitive environment of the Mugii Murum-ban State Conservation Area in which Centennial Airly operates. Subsidence monitoring data collected over initial panel and pillar mining areas will be used to validate and refine the existing subsidence model and predictions. Mining will progress from areas of lower surface sensitive features to areas of higher surface sensitive features. The mine design will be adapted, if required, based on results from initial subsidence monitoring results and will be refined as the mine progresses to ensure adequate protection of cliff formations and compliance with the performance measures detailed within the conditions of consent. A conceptual plan showing the progression of mining at Airly Mine from areas of lower sensitive surface features to higher sensitivity surface features is provided as an Appendix A.

Recommendation 2 - The IRP recommend that at the Extraction Plan stage, an assessment of the likely stability of cliff formations at pinch points is included in the protection zone sizing strategy on a case by case basis to recognise the particular sensitivities of individual cliff formations, particularly cliff height and cliff geometry, to mining induced ground movements and to manage the range of other influences that can affect cliff line stability other than just vertical subsidence.

As part of the Extraction Plan Process, Centennial Airly will include an assessment of the likely stability of cliff formations at pinch points on the protection zone sizing strategy

Recommendation 3 - A program of further work is recommended at the Extraction Plan stage to confirm the loading distributions in the vicinity of steeply dipping terrain below high cliffs where pillar splitting-and-quartering is proposed does not lead to loading conditions significantly higher than the tributary area loading used in the various assessments.

As part of the Extraction Plan, Centennial Airly will confirm the loading distributions in the vicinity of steeply dipping terrain below high cliffs where pillar splitting-and-quartering is proposed.

Recommendation 4 - Issues of public safety and how they will be managed in the vicinity of internal cliffs into the future does not appear to have been specifically addressed and would need to be addressed at EP stage.

As part of the Extraction Plan, Centennial Airly will develop a Public Safety Management Plan to identify management of public safety in the vicinity of internal cliffs.

Recommendation 5 - The IRP recommend conventional survey monitoring with high confidence far field GPS survey control over the initial three or four panels mined using the panel and pillar mining system in areas remote from sensitive features and at the greatest overburden depth that is practical, ideally greater than 250 m.

Over initial panel and pillar mining areas, Centennial Airly will adopt both conventional (subsidence lines) and trial a range of non-conventional (remote sensing) subsidence monitoring methods. This will allow Centennial Airly to validate the accuracy and suitability of non-conventional subsidence monitoring methods to measure ground movements as a result of mining activities. Conventional subsidence monitoring lines will be established wherever possible in areas of existing disturbance and in consultation with the National Parks and Wildlife Service to limit impacts on the sensitive environment of the Mugii Murum-ban State Conservation Area in which Centennial Airly operates.



LEGEND	DATE	14.01.2016
YEARS 1 to 4	DRAWN	JS
YEARS 5 to 9	SCALE	Not To Scale
YEARS 10 to 14		
YEARS 15 to 20		
PANEL AND PILLAR ZONE		
CLIFF LINE ZONE OF FIRST WORKINGS		
PARTIAL PILLAR EXTRACTION ZONE		
SHALLOW ZONE		
NEW HARTLEY SHALE MINE		
INTERACTION ZONE		
EXISTING WORKINGS		

AIRLY MINE EXTENSION PROJECT 20 YEAR MINING SCHEDULE



Plan No. AM00500_Rev1



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19 July 2016

Mr Thomas Watt
Senior Planning Officer
Department of Planning & Environment
GPO Box 39
SYDNEY NSW 2001

Dear Mr Watt

Re: Airly Mine Extension Project SSD 5581 – Response to Additional IRP Recommendations

Please find below a response from Centennial Airly in relation to the additional recommendations within the Independent Review Panel (IRP) report for the Airly Mine Extension Project. In addition to the below, it should be noted that the IRP report does suggest that the Airly Mine Extension Project proposed mine plan no longer involves pillar lifting as an extraction method (i.e. the partial pillar extraction zone has been removed from the mine plan). Although it is not currently proposed to undertake partial pillar extraction as originally proposed in the Environmental Impact Statement (EIS), this mining method is still considered as a potential option should it be considered appropriate. Any future use of this mining method will be considered as part of a future Extraction Plan and subject to review and consideration of any subsidence impacts by the post approval Independent Review Panel.

Not using the partial pillar extraction method would result in less impact than originally predicted in the EIS and would therefore not be a significant change to the Project. The impacts to the mine plan would be as follows:

- the shallow zone increases in size to move up to the maximum assessed depth of 110m,
- the cliff zone of first working increases in size to the slopes below the cliffs to a depth of 110m,
- subsidence would reduce from the maximum predicted value of 49mm at the maximum assessed depth of 100m (table 10 Golder 2014) for single sided lifting partial pillar extraction to 25.5mm at a comparative depth for splitting and quartering with a worst case including post mining flooding. Splitting and quartering with no post mining flooding at 110m depth is predicted to have 20mm or less subsidence (section 7.4 Golder 2014 Subsidence Impact Assessment).

1. The monitoring program should include re-surveys of subsidence across the first mined panels to confirm the significance or otherwise of potential delayed sag subsidence over narrow panels.

The number and frequency of re-surveys and the appropriate time to cease re-surveys (i.e. when subsidence is deemed to have ceased) will be determined as part of the Extraction Plan to be

developed post approval. Such details would be determined in consultation with any post approval Independent Review Panel to ensure that the subsidence impact of both multiple panels and time are properly understood.

2. It is recommended that early panels of each mining system are located in areas where high confidence measurements of the surface movements can be measured across multiple panels so that the ground movements can be confirmed as being < 125 mm within the survey tolerance.

The panel and pillar mining system proposed will cover a wide enough area that multiple adjacent panels would be mined. Therefore it will be possible to measure the impacts of multiple panels from this mining system. Section 8.5 of the Environmental Impact Statement and Section 8.0 of the associated Airly Mine Extension Project Subsidence Impact Assessment mention that the initial mining area of Mount Airly is well suited to the installation of conventional, high confidence subsidence monitoring arrays to establish mining system performance. Airly has committed to carrying out such monitoring on Mount Airly. This would include multiple panel monitoring as well as correlations between surface movements and underground pillar stresses as well as proving the effectiveness of remote monitoring techniques.

As the pillar splitting and quartering (shallow zone) and partial pillar extraction mining systems are only to be practiced below the cliffs in a narrow perimeter around the outside of the mesa complex, the limited area of these workings does not allow for multiple panels to be arranged side by side. It would not be possible to measure multiple panel impacts. There are some limited opportunities to install conventional subsidence monitoring for workings below the cliffs. Airly has already installed one subsidence monitoring line over the splitting and quartering workings of the 200 panel which is currently in the post mining phase of measurements.

A further subsidence monitoring line is currently in the approval phase. This is to be located in the area of Airly Gap over the splitting and quartering workings of the 121 panel as committed to in Mod 3 of DA162/91. This will monitor from the shallowest extremity to the base of the cliffs in that area to ascertain the movement from the planned extraction depth range of 30-110m and beyond to the base of the cliffs.

3. The IRP recommend monitoring strategies such as satellite interferometry is conducted across the monitoring area and adjacent areas more than once to develop confidence in the results prior to mining. Broad coverage is a strength of this system.

Airly has already begun a baseline data collection of the entire mining lease using the Cosmo Skymed X band InSAR satellite constellation with data analysis from TRE in Canada. A preliminary stack of 15 images was collected from February to June 2016 and assessed in July. Some indications of movement were detected in the vicinity of the 101A panel that was being extracted at the time providing some initial indications that this technology may be applicable. TRE have indicated that a baseline of around 12-18 months of data is required to increase point density in treed areas and bring accuracy levels down to low single digit millimetres. Airly Mine is currently reviewing a proposal to extend the baseline data collection for another 12 months. The ongoing subsidence monitoring program will be detailed within the Extraction Plan. A review of the adequacy of the baseline data and ongoing subsidence monitoring program should form part of the role of the post approval IRP.

4. It is further recommended that mining under significant cliff lines that rely on subsidence being less than 125 mm for their protection is delayed until there is monitoring experience to demonstrate that subsidence levels can be maintained at the same or similar levels to those experienced at Clarence Colliery.

This can be accommodated in the mine plan and addressed through the post approval Extraction Plan.

5. A probabilistic study to quantify the risks of sink hole formation is recommended in relation to mining in the shallow zone.

Airly Mine already has two separate reports prepared on the subject of sink hole formation in shallow areas of the mine commissioned as part of the High Risk Activity for mining at depths <50m required under the Work Health and Safety (Mines) Regulation 2014. The risk from such an occurrence was considered to be low. A Public Safety Management Plan is in place for the current Extraction Plan under DA162/91 that addresses management of sinkhole formation based on the assessment reports. This management plan was also accepted as adequate for the purposes of the High Risk Activity notification for shallow workings. Any need for further assessment of the risk of sinkhole formation will be addressed as part of the development of the Extraction Plan for shallow workings post approval.

6. The existing proposed setback for second workings to cliff lines in the vicinity of the New Hartley Shale Mine interaction zone is a distance defined by half the depth of cover (or 26.5 degrees). The IRP recommend this be increased by an additional 50 m (i.e. half DoC plus 50 m) from the top of all significant and internal cliffs in the vicinity of the old workings.

This can be accommodated in the mine plan and addressed through the post approval Extraction Plan.

Yours sincerely



James Wearne
Group Approvals Manager



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4 August 2016

Mr Thomas Watt
Senior Planning Officer
Department of Planning & Environment
GPO Box 39
SYDNEY NSW 2001

Dear Mr Watt

Re: Centennial Response to DRE Feedback on IRP Review Report

On 29 July 2016, Centennial Airly Pty Limited (Centennial Airly) received feedback from the NSW Division of Resources and Energy (DRE) in relation to the Airly Mine Extension Project Independent Review Panel report. The correspondence received from DRE acknowledges that the subsidence risks of the Project can be managed through a post approval Extraction Plan process which is consistent with both the approach proposed by Centennial Airly and the recommendations of the Independent Review Panel report.

The correspondence from DRE identified that the Centennial Airly response to the Independent Review Panel report dated 7 July 2016 did not address all Independent Review Panel recommendations within the report, only those within the Executive Summary. The additional recommendations contained throughout the Independent Review Panel report were addressed in correspondence provided to the Department dated 19 July 2016.

DRE noted that the layout assessed by the Independent Review Panel was not consistent with the layout proposed in the Environmental Impact Statement (EIS). This matter was addressed by Centennial Airly in correspondence to the Department dated 19 July 2016. In this correspondence, it was identified that although it is not currently proposed to undertake partial pillar extraction as originally proposed in the EIS, this mining method is still considered as a potential option, should it be considered appropriate, with any future use of this mining method considered as part of a future Extraction Plan. The implementation of this mining method would be subject to further review and consideration by the post approval Independent Review Panel at the time.

Centennial Airly has provided the Department with proposed conditions of consent relating to the role and functions of the Independent Review Panel post approval in correspondence dated 7 July 2016. Based on previous experience, the proposed changes to this condition of consent by Centennial Airly is considered to be adequate to allow the Independent Review Panel the ability to function as an advisory body to the Department on the adequacy and suitability of mine design, subsidence risks and monitoring programs through the Extraction Plan process. The prescriptive amendments and inclusions proposed by DRE to be included in the conditions of consent provide unnecessary restrictions on the future operational flexibility of the mine and do not allow for an adaptive management approach to be adopted. Centennial Airly considers that detailed Terms of Reference should be developed by the Department for the role and functions of the Independent Review Panel post approval.

The Independent Review Panel report supported the mine design approach adopted for the Airly Mine Extension Project with their recommendations generally accepted by Centennial Airly. The role and function of the Independent Review Panel post approval and through the Extraction plan process is considered adequate with no requirement to include the prescriptive conditions of consent proposed by DRE.

Yours sincerely



James Wearne

Group Approvals Manager