Department of Planning and Environment

Our ref: MP08_0150-PA-46

Gary Brassington
Approvals Manager
Illawarra Metallurgical Coal Holdings Pty Ltd
Port Kembla, NSW, 2502

29 July 2022

Subject: Appin Mine Extraction Plan: Longwalls 709-711 & 905 for Bulli Seam Operations Project (Condition 5, Schedule 3 of consent MP 08_0150)

Dear Mr Brassington

I refer to your submission dated 13 October 2021, requesting approval of the Appin Mine Extraction Plan for Longwalls 709-711 and 905. I also acknowledge your responses to government agency comments, advice from the Independent Advisory Panel for Underground Mining (the Panel), the Department's review comments and requests for additional information between 12 January and 21 July 2022.

The Department has carefully considered the Extraction Plan and subsequent additional information, government agency advice, and the Panel's advice and recommendations.

As nominee of the Planning Secretary, I provide conditional approval of the Extraction Plan for Longwalls 709-711 and 905 (dated October 2021), and as subsequently amended by updated documents (dated July 2022) and commitments included in the responses noted above. This approval is subject to the conditions outlined in **Table 1**.

Table 1: Conditional approval

Condition	Details
1.	The individual Property Subsidence Management Plans (PSMPs) for LW905 must be completed within one month of this approval, and thereafter on a longwall-by-longwall basis and prior to the extraction of the first influencing longwall.
2.	The last three objectives included in the Extraction Plan's Landslide Risk Assessment (GHD, 2021) for LW905 must be completed within three months of this approval and thereafter on a longwall-by-longwall basis, to the satisfaction of the Planning Secretary.
3.	Prior to extraction of LW711, IMC must prepare and submit to the Department a report examining the potential expected range of effects associated with mine-induced modification of groundwater on slope instability. The report must be supported by the outcomes of monitoring of subsidence effects, impacts and environmental consequences required by the development consent and this approval. This report must also include discussions on reasonable and feasible measures for mitigating potential mine-induced impacts on slope instability.

Condition	Details
4.	IMC must submit to the Department an updated groundwater assessment report within three months of this approval. This report must be supported by an updated groundwater model which has been peer-reviewed by an independent expert.
5.	Prior to extraction of LW710A, IMC must install a deep multi-level piezometer directly above LW711 for monitoring direct impacts of mining.
6.	IMC must within three months of this approval update the Water Management Plan to the satisfaction of the Planning Secretary. The management plan must include: a) a program to validate the groundwater model every three years with additional monitoring data and a comparison of monitoring results and modelled predictions; and b) a program for monitoring surface flows and water quality impacts on third order watercourses overlying the longwalls.

The Department has prepared a Reasons for Approval setting out its reasons for this conditional approval (**Attachment 1**).

Please ensure you make the Extraction Plan documentation publicly available on the company website as soon as possible.

If you wish to discuss the matter further, please contact Nagindar Singh on 8289 6873 or via email at nagindar.singh@planning.nsw.gov.au.

Yours sincerely

Director
Resource Assessments

As nominee of the Planning Secretary

BULLI SEAM OPERATIONS PROJECT (MP 08_0150)
APPIN MINE EXTRACTION PLAN: LWs 709 – 711 & LW 905
Reasons for Approval

1. PROJECT STATUS AND DEVELOPMENT CONSENT

Illawarra Metallurgical Coal Holdings Pty Ltd (IMC) owns and operates the Bulli Seam Operations Project under development consent MP 08_0150. Appin Mine is one of two mines that operates under this consent.

The consent allows mining from several mining domains including Areas 7 and 9. While extraction within the mining domains is permitted, condition 5 of Schedule 3 of the consent requires it to occur under an approved Extraction Plan.

2. EXTRACTION PLAN APPLICATION

In October 2021, IMC submitted an Extraction Plan for longwalls (LWs) 709 – 711 & 905 (**Figure 1, Attachment 1**). The Extraction Plan is supported by associated management plans (MPs) and technical assessments.

The Department notes that IMC has mostly shortened the longwalls to increase setbacks from the Nepean River and the cliffs. LW711 has been extended in length and joined with an approved but shorter longwall from Area 9 to optimise resource recovery.

3. ENGAGEMENT WITH GOVERNMENT AGENCIES AND ADVICE FROM INDEPENDENT ADVISORY PANEL FOR UNDERGROUND MINING

Comments on the Extraction Plan were sought from government agencies in November 2021. The Department also sought advice from the Independent Advisory Panel for Underground Mining (the Panel) in March 2022.

Key issues raised by the agencies include:

- subsidence impacts to residential properties on Razorback Range or in close proximity (within 25 m) of steep slopes;
- the associated robustness of subsidence monitoring at these residential properties;
- groundwater modelling and predictions of groundwater impacts; and
- inadequate baseline data and water monitoring programs for:
    - third-order watercourses and pools; and
    - alluvial and deeper aquifers to be directly undermined.

The Department requested the Panel provide advice on subsidence-related slope instability impacts of mining under the Razorback Range on residential properties located on the range or within 25 m of steep slopes.

The Department requested that IMC provide responses to issues raised agencies. It also requested that IMC respond to the Panel's advice. IMC provided additional information in a series of responses between 12 January and 21 July 2022.

4. CONSIDERATION OF KEY ISSUES

5.1 Subsidence Effects and Impacts, and Reliability of Predictions for Structures

Subsidence Advisory NSW (SA NSW) raised concerns that the method used for predicting damage categories to structures may not be accurate for houses on Razorback Range. SA NSW also requested clarification on whether predictions were inclusive of non-conventional subsidence risks.

The Panel concluded that an adequate database to support the pre-mining predictions for Razorback Range homes does not exist. However, it advised that MSEC's predictions of conventional and non-conventional subsidence effects could be relied on.

IMC advised that since 2009 it had mined 11 longwalls in Area 7 and 9 under steep slopes analogous to those associated with Razorback Range and the observed impacts had been within or less than approved impacts. Notwithstanding, it committed to increasing monitoring for slope instability using a wide range of monitoring methods and would adopt an adaptive management approach in managing potential impacts.

The Panel accepted IMC's proposed adaptive management and monitoring approaches and recommended that:

- individual Property Subsidence Management Plans (PSMPs) describe management controls in technical detail; and
- IMC's utilise its Structural Review Group (SRG) for implementation of PSMPs and regular review of monitoring results to determine if additional monitoring, management or mitigation measures are required.

IMC committed to preparing individual PSMPs on a longwall-by-longwall basis but noted that PSMPs for LW905 are unlikely to be completed prior to extraction. The Department is satisfied that any potential impacts can be managed appropriately until the PSMPs are completed, given IMC's previous experience mining under houses. It has recommended a condition requiring PSMPs for LW905 be completed within one month of the Extraction Plan approval.

5.2 Slope Instability Impacts and Landslide Risks on Residences on Razorback Range

SA NSW considered GHD's Landslide Risk Assessment (LRA) inadequate for assessing slope stability impacts to potentially impacted residences on Razorback Range.

The Panel concluded that mining-induced changes in the slope of hillsides are very unlikely to change the risk profile for land instability. Similarly, it concluded that mining-induced rockfalls from the escarpment are unlikely to present a risk to structures. However, it considered that a very low (but finite) likelihood of irreversible damage could not be excluded.

The Panel made several recommendations relating to monitoring of potential subsidence induced slope instability impacts and mitigation measures. The Department has recommended conditions in line with these recommendations (see below).

Completion of Outstanding Objectives in the Landslide Risk Assessment (GHD, 2021)

The Department notes the three outstanding objectives in the LRA relate to the development of a monitoring program for areas at risk of landslide instability, corrective management actions and assessments of potential cumulative effects. IMC commits to completing these on a longwall-by-longwall basis, however advised the objectives would not be completed for LW905 prior to extraction. The Department has recommended a condition that the objectives for LW905 must be completed within one month of the date of this approval.

Effects of Groundwater Modification due to Mining-Induced Subsidence on Slope Instability

The Panel recommended that IMC provide the expected range of effects associated with mine-induced modification of groundwater on slope instability and how these may be mitigated. IMC accepted that change in groundwater flow (and therefore change in permeability and pore pressure) due to mine-induced subsidence could influence slope instability. However, it noted that extensive experience of subsidence monitoring and groundwater impacts in the general Appin Mine area to date has demonstrated that draining of overlying strata, with a resulting reduction in pore pressure or lowering of groundwater levels is more likely from mine subsidence than an increase in pore pressure.

IMC further noted that an increase in pore pressure in the surface cracks due to seepage into the strata through surface cracks during significant rainfall events is more likely to initiate new landslides or increase landslide activity than subsidence. Given that tension cracks are possible from both natural and mine-induced processes discriminating the two processes for individual contributions is challenging.

IMC highlighted that previous observations of surface cracking in the Southern Coalfield have not been attributed to increases in slope instability. Additionally, the LRA concluded, based on the outcomes of a previous geotechnical study investigating landslide risk from Appin Area 9 and Razorback Range, that mine subsidence is a minor modifying impact. The Panel accepts this point, however, advises even a minor impact can be significant locally and cause significant costs to individual landholders.

IMC has committed to:

- undertaking geotechnical assessments in individual PSMPs for potentially impacted residences on the Razorback Range;
- providing groundwater monitoring data to the geotechnical engineers for a detailed pore pressure and slope instability study in areas identified in the individual PSMPs;
- undertaking weekly visual inspections of surface cracking in the vicinity of the residences and providing this information to geotechnical engineers and IMC's SRG for management planning; and
- providing local real-time rainfall data and rainfall forecasts to the geotechnical engineers and the SRG for evaluation of landslide risks.

The Department accepts IMC's commitments, however, considers that they do not entirely satisfy the Panel's recommendation. The Department has recommended that IMC prepare and submit a report examining the potential expected range of effects associated with mine-induced modification of groundwater on slope instability. The report must be supported by monitoring results and inform measures for mitigation.

5.3 Groundwater model, monitoring bores and impact assessment

BCD noted that the updated groundwater model (dated January 2022) was not robust and requested an improved groundwater model. The Department required IMC to provide:

- an independent review of the updated groundwater model;
- a justification for the selection and exclusion of monitoring bores used in the model;
- a justification for the use of the Ditton-Merrick Height of Connected Fracturing (HoCF) Model instead of the more conservative Tammetta HoCF Model by providing a comparison of the two models and a discussion of the potential surface impacts.

The Department has included a condition requiring an updated groundwater impact assessment report, supported by a peer-reviewed updated groundwater model, within

three months of the date of this approval. The Department has also included a condition requiring the update of the Water Management Plan within three months of this approval.

5.4 Surface and Groundwater Monitoring Network

BCD considers the existing water monitoring program inadequate to assess against performance measures in the consent. Specifically, the monitoring program could benefit from additional monitoring of:

- surface pool levels in the undermined third order sections overlying watercourses;
- water levels in alluvial aquifers associated with these creeks; and
- water levels in the upper Hawkesbury Sandstone or Wiannamatta shale layers likely to interact with the overlying third order sections of creeks to reduce baseflows.

The Department required IMC to expand its existing water monitoring network. In response, IMC noted that:

- no suitable sites for pool water level or flow monitoring are available for third-order creeks however an existing water quality monitoring site (HC10 on Harris Creek) would be a suitable water level monitoring benchmark for LW905 impacts; and
- two additional bores for monitoring alluvial aquifers are proposed to be installed.

The Department considers that IMC has in part addressed BCD's concerns. To address residual concerns, the Department has recommended the conditions requiring:

- installation of a multilevel piezometer above LW711 prior to extraction of LW710A; and
- development of a program for monitoring and acquiring sufficient baseline data for flows and water quality on third order and higher watercourses

5. EVALUATION AND CONCLUSIONS

The Department has assessed the Extraction Plan in accordance with the consent and in consultation with agencies and the Panel. The longwalls are already approved under the consent subject to performance measures and approval of an Extraction Plan.

Potential mine-induced slope instability and impacts on residential properties and the adequacy of groundwater impacts were identified as key matters of concern.

In response to the Panel's recommendations on slope instability under Razorback Range and potential impacts to houses above it, IMC committed to undertaking extensive assessments using geotechnical, structural and remote sensing techniques for the monitoring and management of mine-induced impacts.

The Department is satisfied that with the implementation of these controls in combination with the trigger action response plans any residual risks associated with slope instability would be mitigated or adequately managed.

IMC has also committed to updating the groundwater model and the groundwater assessment and expanding the alluvial monitoring efforts in the vicinity of the longwalls. The Department has recommended conditions to this effect.

Extraction of the proposed longwalls would allow the recovery of valuable coal resources using existing infrastructure and would continue to underpin the wide-ranging benefits for the local and State economies that flow from the continued operation of Appin Mine.

On balance, the Department considers that the extraction of the proposed longwalls is in public interest and the application should be approved, subject to conditions.

Attachment 1: Figure 1: Extraction Plan Longwall Layout and Study Area

ATTACHMENT 1

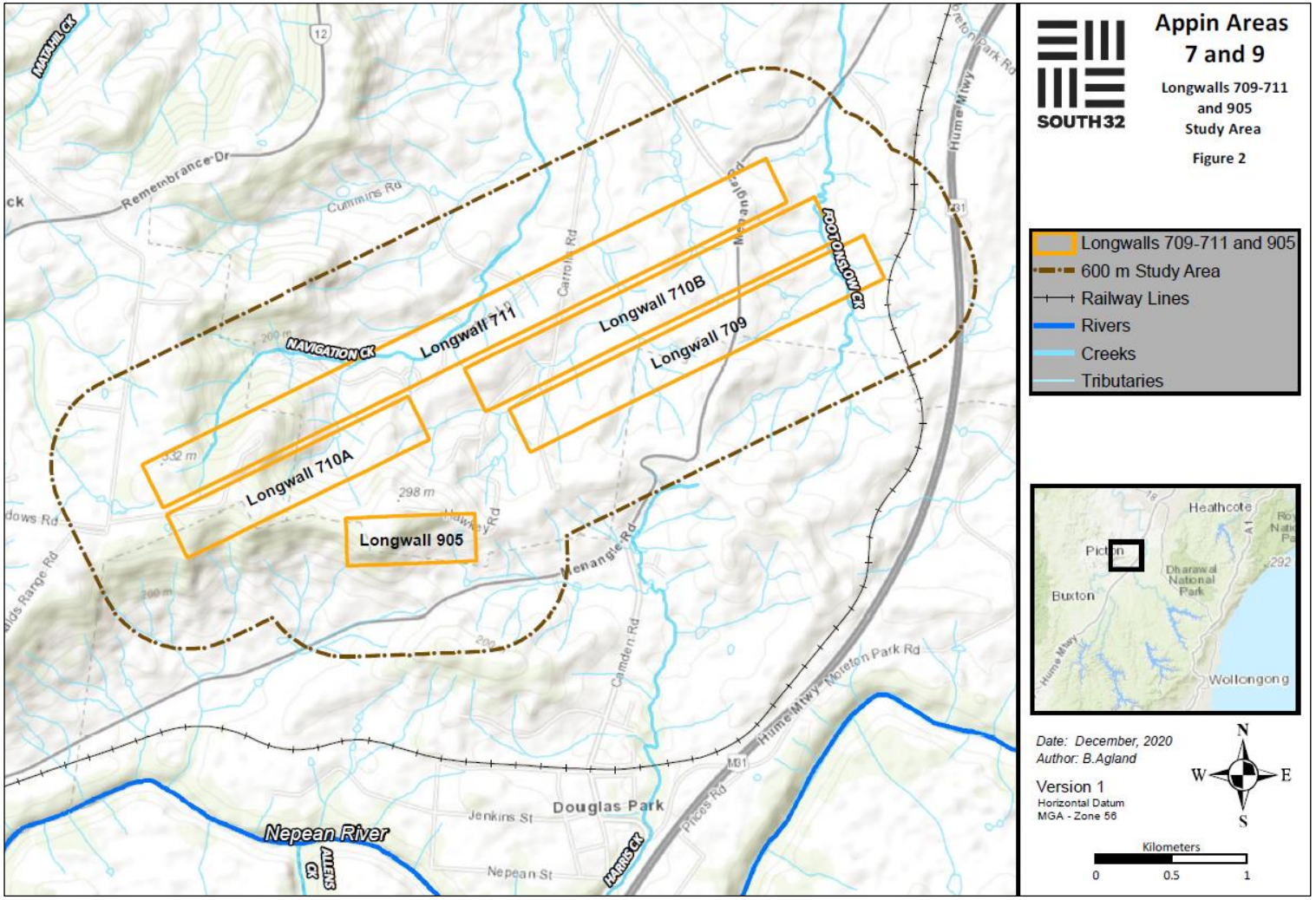

Figure 1: Extraction Plan Longwall Layout and Study Area