



Department of Primary Industries

OUT14/14683

Mr Brendan Liew
Mining Projects
NSW Department of Planning and Environment
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10 JUN 2014

Dear Mr Liew,

Russell Vale Colliery (MP10_0046 Mod 2) Proposed Modification

I refer to your email dated 17 April 2014 requesting advice from the Department of Primary Industries (DPI) in respect to the above matter.

Comment by Fisheries NSW

Fisheries NSW advise concerns with this mine due to potential impacts on Cataract Creek, a known spawning habitat for the endangered Macquarie Perch. The identified spawning area is downstream of the proposed longwalls and there is a risk that any significant impact on the creek and the base flow in the creek could cause irreparable damage to the spawning sites and interfere with the spawning activities of the Macquarie Perch.

However, the proponent has identified that Longwall 5 has been mined closer to Cataract Creek and has caused no significant impacts or detectable changes to base flows in the creek, and as the proposed works in longwall 6 are significantly more distant from the creek it is expected that there will be lesser impacts.

Accordingly, Fisheries NSW has no objections to the proposed modification.

For further information please contact Scott Carter, Senior Conservation Manager, (Port Stephens Office) on 4916 3931, or at scott.carter@dpi.nsw.gov.au

Comment by NSW Office of Water

The NSW Office of Water has reviewed the EIS for the proposed Russell Vale Colliery modification 2 and provides the following advice for consideration. Detailed comments on hydrogeological aspects are provided in Attachment A and NSW Office of Water Licence Requirements are provided in Attachment B.

Aquifer Interference

The methods used to estimate the volume of groundwater and surface take, and other considerations of groundwater impact, do not meet the degree of rigour

required by the NSW Aquifer Interference Policy. According to the EIS, a numerical model is under development but has not been used in this assessment.

There is reasonable risk to two coastal upland swamps listed under the *Threatened Species Conservation Act 1995*, which may be dependent on groundwater.

Accordingly, additional studies should be provided to assess the long-term viability of these assets.

The mitigation and management measures should be commensurate to this risk and should include a carefully designed and complete groundwater monitoring network with more expansive shallow monitoring bores.

No details are given for what options there might be for a Trigger Action Response Plan (TARP), apart from suggesting changes to how future mining takes place. Given the possible risk of adverse groundwater and related ecosystem impacts, the proponent should provide a detailed TARP so that the feasibility and adequacy of any proposed actions can be assessed.

As a consequence of aquifer depressurisation there is an estimated 0.6 to 0.7 ML/day volume of take from the surface water features that contribute flow within the Upper Nepean and Upstream Warragamba Water Source of the *Water Sharing Plan for the Greater Metropolitan Region Unregulated and Alluvial Water Sources 2011*.

Water licensing

As has been advised in relation to previous proposals at this site, licensing the take of this water requires further assessment. The volume of take from the surface water features would need to be re-evaluated once the updated numerical model is completed. The Office of Water notes that the proponent's 2012 Water Management Plan acknowledges the requirement to hold surface water licences.

The proponent should provide details on short term and long term requirements for both surface and groundwater licensing for each relevant water source, and a strategy to obtain these licences.

Prior to taking water, the proponent must hold sufficient licences within each water source.

An impact assessment of net loss of water to Cataract Dam under different climatic scenarios should be considered (e.g. normal, dry, very dry), including the economic impact of that loss.

Groundwater modelling

The proponent should include modelling objectives and uncertainty analysis within the description of predictive groundwater modelling.

The table of commitments should include periodic audits of actual impacts against modelling predictions against observed groundwater and surface water impacts to confirm that modelling predictions for verification and validation of modelled predictions.

Management plans & monitoring

The proposed surface water and groundwater management plans should identify critical impact thresholds in groundwater levels and quality and surface water flows and water quality to enable adaptive response and management of operations within the proposed Surface and Groundwater Management Plan. A mechanism for identifying and reporting variations from predictions should be clearly stated within the Plan.

Mining works should not be permitted to commence until the Department is satisfied that sufficient monitoring is in place to ensure that impacts can be adequately measured.

Note: To improve the coverage of baseline characterisation data, it is recommended data loggers be installed in at least four key monitoring wells to enable continuous monitoring of groundwater levels in response to rainfall events.

For further information please contact Hemantha Desilva, Senior Water Regulation Officer (Newcastle Office) on 4904 2525 or at hemantha.desilva@water.nsw.gov.au.

Yours sincerely



Kristian Holz
Director Policy, Legislation and Innovation

Attachment A

Russell Vale Colliery (MP10_0046 Mod 2) Proposed Modification Detailed Hydrogeological Comments by NSW Office of Water

1. Purpose

To review the Russell Vale Colliery "Groundwater Assessment" against the elements of the Aquifer Interference Policy (AIP) and any limitations in the data that supports the assessment. This Environmental Assessment has been prepared to support an application under section 75W of the *Environmental Planning and Assessment Act 1979*.

2. Background to the Project as provided by the Proponent

Wollongong Coal Limited operates the Russell Vale Colliery (formerly known as NRE No1 Colliery). The Proponent seeks approval to extract coal from the first 400 metres of long wall 6 (LW6) within the Wonga East Area 2 and to extend the duration of the existing project approval until 30 June 2015 to allow this extraction to occur. This will allow the colliery to continue to operate until a determination of the larger Underground Expansion Project (which includes all of LW6 plus other long wall panels) is made. The environmental impact assessment for the Underground Expansion Project has been protracted based on the complex environment of the Russell Vale Colliery in proximity to the Cataract Reservoir and sensitive upland swamps, and the high level of community and stakeholder interest in the project.

The Russell Vale Colliery is located to the west of the suburb of Russell Vale approximately eight kilometres north of Wollongong and 70 kilometres south of Sydney. The site is approximately 6,673 hectares in area comprising three leases located between the BHP Billiton Appin and Dendrobium collieries in the Southern Coalfields. Surface land uses surrounding the site consist predominantly of the Water Catchment Special Area declared under the *Sydney Water Catchment Management Act 1998* and managed by the Sydney Catchment Authority. The proposed section of long wall would not require mining under the Cataract River. The land above and around the 400-metre section of LW6 is relatively undisturbed natural bushland, and includes several Coastal Upland Swamps listed under the *Threatened Species Conservation Act 1995*.

Previous underground mining in and adjacent to the Study area has been conducted through long-walling the Bulli Seam in the Gujarat lease area to the west, east and beneath Cataract reservoir, as well as in the adjoining southern BHP Billiton's (BHPB) Cordeaux lease area. Multi seam mining has been conducted at Wonga East (Area 2) where the Bulli Seam was mined by bord and pillar as well as pillar extraction methods, along with the underlying Balgownie Seam narrow long walls.

3. NOW Review and Comment

3.1 Summary of Groundwater Effects

A considerable volume of material relating to groundwater effects has been provided by the proponent in support for this application. A summary of these effects is provided below.

- (i) Falling within the LW6 Modification Area footprint there are two Upland Swamps of Special Significance listed under the *Threatened Species Conservation Act 1995*. These consist of CRUS1 and CCUS4. Mine subsidence due to extraction within the LW6 Modification area is likely to result in fracturing of the base of small sections of upland swamps, CRUS1 and CCUS4, in areas undermined by or in proximity the extraction.
- (ii) All the piezometers show a downward hydraulic gradient towards the mining horizons, past and present, consistent with downward flow of low magnitude. The piezometer monitoring results from the Wonga East area are consistent with the presence of horizontal shear

planes with higher hydraulic conductivity than the surrounding strata. These shear planes are inferred to be associated with creek closure both natural and mining induced and have been confirmed to exist at other sites. These shear horizons are most likely to be present at a level just below the base of the valleys.

- (iii) A zone of depressurisation is evident in piezometer GW-1 at a height consistent with the method formulated by Tametta (2012) for the mining geometry of the most recently mined panel and the combined thickness of all the seams that have been mined.
- (iv) The observed ingress of groundwater into the mine workings, from monitoring undertaken as part of the water balance for extraction of LW4 and LW5, is approximately 1.1 ML per day. Ingress of groundwater is considered to be primarily attributed to subsidence movements and tension cracks observed on a section of the ridge south of Cataract Creek, which is likely to be the primary source of seepage of surface flows into the mine workings. The proponent holds an aquifer water access licence (WAL36488) which has a share component equal to 365 ML per year. The expected increase in groundwater ingress due to mining of the LW6 Modification Area is therefore anticipated to exceed the limits of the current groundwater licence for the site. On this basis, the proponent will be required to secure additional groundwater entitlement. The proponent hasn't considered the licensing implications with respect to loss/reduction in baseflow/surface water and how these could be appropriately licensed consistent the relevant Water Sharing Plan.
- (v) LW 6 and 7 are expected to contribute similar inflow increases as LW 5 (i.e. 0.5ML/day) with this additional flow coming mainly from the higher conductivity recharge zones along the ridgeline between Cataract Creek and Cataract River. Some additional flow may also come from Cataract Creek and Cataract Reservoir via the horizontal shear planes that are likely to be mobilised by mining LW 6 and 7.
- (vi) As the area is within the Sydney Catchment Authority controlled Metropolitan Special Area, groundwater development is generally not permitted as it is a protected area and there are no private bores.

3.2 Fracturing, Subsidence and Depressurisation

The proponent concludes that vertical cracking of deeper strata is unlikely to result in increased hydraulic connectivity due to the presence of the Bald Hill Claystone layer and a constrained vertical flow zone in the upper Bulgo Sandstone. These confining layers are considered to provide a barrier to free drainage, preventing the loss of water into the proposed mine workings. Monitoring has indicated that CCUS4 has experienced subsidence of up to 0.9 m due to previous underground mining with no observed adverse impacts. In the vicinity of LW6 and LW7, the naturally low vertical hydraulic conductivity of the overburden strata and depth of mining is expected to restrict inflows from basal shear planes at the base of Cataract Creek into the mine to low levels provided the zone of depressurisation does not reach high enough to interact with the basal shear planes. Consequently, the monitoring data from LW5 indicates that extraction of LW6 is unlikely to create drawdown that will significantly affect baseflow in Cataract Creek.

Additionally if the conceptual model is true then the anticipated stream flow losses would have little impact on the Cataract Reservoir water storage volume. In addition, the impacts would be restricted to short reaches where flow infiltrates into cracks in the bed, then reemerges further downstream, as opposed to contributing to groundwater inflows into the underground mine. The predicted stream baseflow changes to Cataract Creek are 0.06 – 0.07 ML/day (Geoterra, 2012a).

However, there a number of competing statements implying a more significant connection exists. For example:

- *A section of the ridge south of Cataract Creek where the ground is stretched by subsidence movements and there are large tension cracks evident on the surface appears likely to be a significant source for this inflow. The hydraulic conductivity of the overburden strata appears to be significantly enhanced to a depth of at least 140m below surface and there is a downward gradient evident in the piezometer results indicating the potential for elevated downward flow in this area. Mining activity including longwall*

mining in the Balgownie Seam and more recently Longwalls 4 and 5 in the Wongawilli Seam is likely to have contributed to the increased vertical hydraulic conductivity along the ridge and the volume of the fracture network is estimated to be sufficient to produce the inflows observed underground' (Appendix D, Page i).

- A shear plane is considered likely to be the pathway by which NRE D, some 540m from Cataract Reservoir, responds to changes in reservoir pressure. A shear plane is also the likely pathway for the upper perched water table in GW-1 to be maintained at close to the level of Cataract Creek some 175m away and for the pressure in NRE B to be drawn to zero at the level of Cataract Creek.
- Several large cracks observed during routine subsidence monitoring on the ridge above Longwalls 4 and 5 soon after the start of mining Longwall 5 have an estimated volume sufficient to account for the increased inflows observed underground soon after the start of Longwall 5.

The proponent has estimated the height of groundwater depressurisation above the mining horizon by applying the empirically-derived formula based on mine geometry (Tametta, 2012). This is considered reasonable as a preliminary estimate. The Bulli and Balgownie seams have been mined in places above the Wongawilli seams which affect the height of estimated depressurisation, as follows:

Seams mined	Seam Thickness (m)	Seam width (m)	Depth of cover (m)	Height of depressurisation (m)
Wongawilli	3.2	150	330	146
Wongawilli + Bulli	4.4	150	330	222
Wongawilli + Balgownie	4.6	150	330	235
Wongawilli + Bulli + Balgownie	5.8	150	330	316

The depth of cover ranges from 267 - 320m in Wonga East Area 2. The proponent has applied the maximum depth of cover in the calculations above. If the minimum depth of cover (267 m) for LW6 is applied, the height of complete depressurisation, for the three scenarios where mining has occurred above the Wongawilli seam, extends well into the shallow aquifers. Thus, direct drainage from surface aquifers to mine workings, along with any shear zones connected to surface water features is predicted. This risk is exacerbated when combined with the surface tensile cracking that is estimated to be up to 20m depth from the surface. Therefore there is a moderate risk that the zone of depressurisation would reach high enough to interact with both the basal shear planes and the delamination zone according to the method applied above.

3.3 Methods of Prediction

The proponent advises that they are in the process of developing a revised numerical groundwater model to predict impacts of the broader project and address the requirements of the Aquifer Interference Policy. A numerical model is not used to assess the groundwater impacts for the LW6. The proponent has instead drawn upon interpretations based on an updated conceptual model along with measured mine dewatering extraction figures, bore hydrographs and some earlier technical reports.

The report states "The conceptual model developed and presented in this report is not considered suitable to provide a quantitative basis to calculate inflows from further mining activity in the Wonga East mining area. However, some indications of potential for inflow can be provided based on the data available". Therefore the rigour of the prediction of water take likely falls short of the requirements of the NSW Aquifer Interference Policy (AIP).

In the absence of a peer reviewed numerical model, the proponent offers that "*More work is required to determine the relationship between mining subsidence and the long term health of swamps. The proposed extraction of the LW6 Modification Area below CRUS1 and CCUS4*

provides the opportunity to monitor ground movements, groundwater impacts and any ecological changes in response to longwall extraction to provide evidence to guide the management of longwall mining in proximity to these upland swamps. The development of a monitoring and review strategy involving relevant experts is proposed to manage mining impacts on these swamps and will include a review of the recovery of these features from previous impacts and the implication of this recovery for future swamp protection strategies. This method would be incorporated into the abovementioned adaptive management approach to provide a risk-based operational assessment of actual impacts with appropriate responses given effect through amendments to extraction activities where required to protect swamp health and associated ecological values."

3.4 Mitigation and Management Measures

The proponent outlines the following Mitigation and Management Measures:

'Mitigation measures for managing the impacts of extracting the first 400 metres of LW6 on groundwater include:

- application of an adaptive management approach to extraction of LW6, based on amended on mining activities in response to observed groundwater effects identified through surface and groundwater monitoring;*
- quantitative and qualitative monitoring of shallow and deep groundwater before, during and after the extraction of LW6;*
- undertaking additional monitoring that may be required in accordance with a LW6 Water Management Plan (or existing Water Management Plan updated to reflect extraction of the first 400 metres of LW6);*
- manage of impacts in accordance with the Trigger Action Response Plan (TARP) and triggers;*
- development and implementation of adaptive management contingency measures in the event that elevated impacts are detected; and*
- provision for additional groundwater monitoring if subsidence is detected in areas beyond current predictions.'*

Besides implementing a bore monitoring network and having a subsidence valley closure trigger, it is unclear as to what measures above actually mitigate and manage potential impacts to upland swamps and surface water features.

End Attachment A

Attachment B

Russell Vale Colliery (MP10_0046 Mod 2) Proposed Modification Licence Requirements - NSW Office of Water

Water Act 1912

- Monitoring bores require licensing under Part 5 of the *Water Act 1912* unless the bores meet the criteria for exempt monitoring bores as defined in the *Water Management (General) Regulation 2011*.
- Flood control works require licensing under Part 8 of the *Water Act 1912*.

Application forms for licences and approvals are available on the intranet at www.water.nsw.gov.au/Water-licensing/Applications-and-fees/Applications/default.aspx

Water Management Act 2000

- An access licence nominated to a water supply work is required to take from any water source managed under the *Water Management Act 2000* (WMA).
- Exemptions for access licences are provided in Clause 18 and the Schedule 5 of the *Water Management (General) Regulation 2011*.
www.legislation.nsw.gov.au/maintop/view/inforce/subordleg+469+2011+cd+0+N
- Section 54 of the WMA provides details on harvestable rights.
- Requirements for access licence dealings are provided in the following documents:
 - Section 71 of WMA
 - Access Licence Dealing Principles
www.legislation.nsw.gov.au/maintop/view/inforce/subordleg+433+2004+cd+0+N
 - Access licence dealing rules of the relevant water sharing plan

Application forms for access licence and access licence dealings are available on the intranet at www.water.nsw.gov.au/Water-licensing/Applications-and-fees/Applications/default.aspx

End Attachment B