SYDNEY CATCHMENT AUTHORITY

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Our Ref: D2014/47778

Mr David Kitto
Director Mining Projects
Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

Attention: Jessie Giblett

Dear Mr Kitto

ENVIRONMENTAL ASSESSMENT OF WOLLONGONG COAL RUSSELL VALE COLLIERY
PRELIMINARY WORKS PROJECT MODIFICATION 2 NO. MP 10_0046

I refer to your Department's e-mail dated 17 April 2014 inviting comments on the Wollongong Coal Russell Vale Colliery modification application 2.

The SCA has reviewed the Environmental Assessment and accompanying documents and its submission is attached. In summary the SCA considers that there are significant issues that need to be addressed. **We object to the proposal as it currently stands, particularly with regard to its incursion into the Dams Safety Committee Notification Area surrounding Cataract Reservoir.**

The SCA has adopted a set of principles that underpin its decision making in relation to mining activities in the Special Areas. These have been communicated to representatives of Wollongong Coal and to Department of Planning and Environment on previous occasions and are repeated in the attached submission. The SCA has also developed performance measures for natural and built features of interest to the SCA for this project that are included in our submission. The SCA has assessed the proposed mining proposal and associated information contained in the Environmental Assessment against its mining and coal seam gas principles and performance measures.

Notwithstanding the SCA's objection to the proposal, the Authority has as a number of concerns as outlined in this submission. Of particular concern is:

- The lack of specificity of the subsidence predictions with respect to the section of Longwall 6 (the subject of this modification application) and having regard for measurements of subsidence reported for Longwall 5.
- Incomplete knowledge of key geological structures known to occur in the area proposed to be mined.
- The potential loss of stored waters from Cataract Reservoir to underground mine workings at the upper arm of Cataract Reservoir as a result of mining induced leakage.
- The impact on upland swamps due to a reduction in shallow water tables.

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In light of our objection to the proposal, **the SCA recommends:**

1. **The DSC Notification Area around Cataract Reservoir be adopted as an Exclusion Zone where no longwall mining is permitted.**
2. **The proposed adaptive management approach proposed for mining activities not be used due to the lag time for mining-related impacts to manifest and changes required to be implemented.**
3. **The SCA's impact performance measures developed for the proposed mining area be adopted.**
4. **The Department seek expert advice on the substantive issues raised in this submission prior to making a recommendation on the proposal.**

Given the SCA's objection to the proposal and the need to resolve the issues raised in our submission we have no recommended approval conditions at this stage. We would welcome the opportunity to provide suggested conditions at an appropriate time.

The SCA requests the opportunity to continue to be involved in any ongoing assessment of the application.

I would like to meet with the Department to further discuss the SCA's objection to the proposal and our specific concerns as highlighted in our submission. Further queries about our submission can be directed to Malcolm Hughes, Senior Manager Planning and Environment, who can be contacted on 4724 2452 or via e-mail malcolm.hughes@sca.nsw.gov.au.

Yours sincerely

16/5/19

GRAHAM BEGG
General Manager Catchments

Encl. *SCA submission - Wollongong Coal Russell Vale Colliery modification application 2*

SYDNEY CATCHMENT AUTHORITY - SUBMISSION

PRELIMINARY WORKS PROJECT

WOLLONGONG COAL RUSSELL VALE COLLIERY
for
MODIFICATION APPLICATION 2

MAY 2014

1. LOCATION OF MINING AREA AND RELATIONSHIPS TO SCA AREAS OF INTEREST

The areas of interest to the SCA and the reasons for its interest are summarised below:

- The entire proposed mining area is located under land managed as Schedule 1 Special Area.
- Longwall 6 is located under land owned by the SCA.
- Longwall 6 is located within the Dams Safety Committee (DSC) Cataract Notification Area, and has the potential to induce leakage from the reservoir with the possible significant loss of stored water.

2. THE SCA'S PRINCIPLES FOR MANAGING MINING AND COAL SEAM GAS IMPACTS

The SCA has a set of principles that underpin its decision making in relation to mining and coal seam activities in the Special Areas. These principles establish the outcomes the SCA considers as essential to protect the drinking water supplies to the four and half million people of Sydney and the surrounding region.

1. ***Protection of water quantity***
   Mining and coal seam gas activities must not result in a reduction in the quantity of surface and groundwater inflows to storages or loss of water from storages or their catchments.
2. ***Protection of water quality***
   Mining and coal seam gas activities must not result in a reduction in the quality of surface and groundwater inflows to storages.
3. ***Protection of human health***
   Mining and coal seam gas activities must not pose increased risks to human health as a result of using water from the drinking water catchments.
4. ***Protection of water supply infrastructure***
   The integrity of the SCA's water supply infrastructure must not be compromised.
5. ***Protection of ecological integrity***
   The ecological integrity of the Special Areas must be maintained and protected.
6. ***Sound and robust evidence regarding environmental impacts***
   Information provided by proponents, including environmental impact assessments for proposed mining and coal seam gas activities must be detailed, thorough, scientifically robust and holistic. The potential cumulative impacts must be comprehensively addressed.

3. SCA's POSITION ON LONGWALL MINING

The SCA's policy on longwall mining is that it opposes any longwall mining:

- within the Dams Safety Committee notification areas applying to prescribed dams managed by the Authority, or
- that is predicted to damage water supply infrastructure.

4. PERFORMANCE MEASURES

The SCA has adopted a risk management approach to assess this mining proposal and developed specific performance measures required for key aspects of interest to the SCA for mining in the Wonga East domain. These performance measures are generally consistent with those included in consents for other longwall mining projects approved over the last few years for mining within the Special Areas. The SCA therefore recommends that the proponent should ensure to the satisfaction of the Director-General of the Department of Planning & Environment that the project does not cause any exceedance of the performance measures identified in Table 1.

Table 1: Subsidence Impact Performance Measures

Water Storages	
Cataract Dam	Zero subsidence and zero impact Always safe and serviceable
Cataract Reservoir	Negligible environmental consequences including: • negligible reduction in the quantity or quality of surface water inflows to the reservoir, • negligible reduction in the quantity or quality of groundwater inflows to the reservoir, • negligible increase in the quantity of water entering the groundwater system from the reservoir, and • negligible leakage from the reservoir to underground mine workings. No connective cracking between the reservoir floor and the mine.
Watercourses	
Cataract Creek Cataract River	Negligible environmental consequences including: • negligible diversion of flows or changes in the natural drainage behaviour of pools, • negligible gas releases and iron staining, • negligible increase in water cloudiness, • negligible increase in bank erosion, and • negligible increase in sediment load.
Swamps	
Swamps identified in the PPR as being of "*Special Significance*"	Negligible environmental consequences including: • negligible change in the size of swamps • negligible erosion of the surface of swamps • negligible change in the functioning of swamps • negligible change to the composition or distribution of species within swamps, and • negligible drainage of water from swamps, or redistribution of water within swamps.
All other swamps mapped in the PPR	No significant environmental consequences beyond predictions in the EA.

Land	
Cliffs	Minor environmental consequences (that is occasional rockfalls, displacement or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 3% of the total face of such cliffs within any longwall mining domain).
Biodiversity	
Threatened species, threatened populations, or endangered ecological communities	Negligible environmental consequences

5. SCA's ASSESSMENT

In carrying out its assessment of this proposal the SCA has taken into consideration:

- the Environmental Assessment and accompanying documents
- Longwall 5 End of Panel report
- peer review reports prepared for the Department by Coffey Geotechnics Pty Ltd, Professor Hebblewhite, and Evans and Peck
- various public documents available on the Underground Expansion Project (MP 09_0013)
- preliminary views of the Dams Safety Committee on the proposal
- information presented at the recent 9th Triennial Mine Subsidence Technological Society Conference
- outcomes from site inspections.

It is disappointing that the Environmental Assessment report is mainly comprised of information which has been previously provided more generally for the Underground Expansion project or which relates directly to Longwalls 4 and 5. The key issues are accuracy of the subsidence modelling, knowledge of geological structures, the potential for a hydraulic connection between Lake Cataract and Longwall 6, impacts on upland swamps, and impacts on catchment yield.

It is considered that there are sufficient uncertainties about the impacts of the proposal that warrant the need for further, more detailed assessments before the proposal should be considered for approval (notwithstanding the SCA's position on opposing any longwall mining within the Dams Safety Committee Cataract Notification Area).

Subsidence Predictions

As stated above the Environmental Assessment report is based on subsidence modelling carried out on the assumption that complete mining of Longwall 6 and the adjacent Longwall 7 occurs. The report therefore does not contain information on subsidence modelling if there is only extraction of 400 metres of Longwall 6. Verbal advice from Wollongong Coal is that if only 400 metres is extracted the maximum subsidence would be approximately 1.4 metres (Nathan Garvey – 8 May 2014). However there is no information on the likely subsidence characteristics at the end of the 400 metre section which overlaps with an upland swamp and a low point from which water drains from part of the swamp. At the end of longwalls there is typically maximum strain (and therefore resulting surface cracks) and this could significantly impact this part of the swamp.

The Environmental Assessment report states the following - *Experience with extraction from Longwalls 4 and 5 suggests that modelled subsidence significantly overestimates what is observed in the field.* This statement is not substantiated by the recently received Longwall 5 End of Panel report which states:

> *Monitoring indicates maximum subsidence over Longwall 5 has been 1.8 metres with 0.64 metres over the chin pillar between the two panels. Maximum subsidence has been higher that the 1.4 metres of subsidence predicted in the SMP but less than the 1.9 metres predicted in the Preferred Project Report (for the Underground Expansion Project).*
>
> *Maximum measured tilt of 30mm/m was greater than the 25mm/m predicted in the SMP but less than the 36mm/m predicted in the Preferred Project Report. Maximum strains of 12mm/m (and generally less than 6mm/m) are equal to and less than the 12mm/m predicted in the SMP and the 22mm/m strains predicted in the Preferred Project Report.*

It is also noted that the independent expert review report on subsidence commissioned by the Department of Planning and Environment on the Underground Expansion Project states that the subsidence predictions should be interpreted with caution as they are based on a very limited dataset and the full knowledge of the nature of the overlying workings and subsequent subsidence is based on estimates only (at least in the case of the Bulli Seam).

Consequently it is difficult for the SCA to predict the likely impacts of the proposal. The SCA therefore considers the subsidence modelling to be unsatisfactory.

Knowledge of Geological Structures

The SCA has previously raised concerns about the knowledge of the extent of faulting and the presence of dykes within the vicinity of Longwall 6. This concern remains and is shared by the Dams Safety Committee. The particular concerns are that:

- The Corrimal Fault has been intersected by the Longwall 6 gateroads and the fault does not appear to be petering out (as claimed by Wollongong Coal).
- A dyke (D8) is present in the Longwall 6 gateroad workings and is exposed in the sides of the reservoir.

The SCA is aware that the zone where the Corrimal Fault is associated with small sub parallel faults this has caused significant roof deterioration of the Longwall 6 gate road. The implications of this needs to be better understood.

It is critical that the understanding of the extent of the Corrimal Fault and the implications of dyke D8 is fully understood prior to a decision to approve mining.

Potential for a hydraulic connection between Lake Cataract and Longwall 6

The Environmental Assessment report does not include a groundwater model that addresses the possibility of losses from the reservoir as a result of mining. The current modelling does not consider the presence of pathways for loss of reservoir waters or the impact of mining on hydraulic connectivity.

The Environmental Assessment report estimates that the height of the zone of depressurisation above a Wongawilli Seam longwall where the Bulli Seam has been extracted as 222 metres. It is therefore likely that connective fracturing will extend to the Bulgo Sandstone in this area. The reservoir to the west of Longwall 6 may lie in the

Bulgo Sandstone. If a highly permeable layer or a shear zone develops in the Bulgo Sandstone, then a connection from the reservoir to the mine is present.

It is noted that the Environmental Assessment report states that mobilised shear planes are considered to be the pathways by which a piezometer, installed above the Bulli Seam workings located 540 metres from the reservoir, responds to changes in the level of the reservoir. Based on this it can be concluded that there is a potential significant risk of leakage from the reservoir as result of extraction of Longwall 6.

There is a likely chance that the Corrimal Fault will also intersect the confluence of Cataract River and Cataract Creek. In addition, the close proximity of the western end of Longwall 6 (the starting position of the 400m initial extraction proposal) to the full supply level of Cataract Reservoir and the shallow depth of cover do not provide SCA with a high level of confidence that there will be no hydrologic connection between the workings and the stored water.

It is noted that groundwater inflows into mine workings are predicted to increase from the current 1.1 ML/d to around 1.6ML/d (400ML per year to 585ML per year).

The primary mitigation option to address any uncontrolled inflows to a mine is sealing portals. In this case this option is not viable given the history of multi seam mining operations in the locality, the interconnectivity between goafs and the inaccessibility of old workings. This is acknowledged in the Preferred Project Report for the Underground Expansion Project.

A risk assessment on the potential for hydrologic connection between mine workings and stored waters as well as surface/groundwater and mine workings should be carried out with the top event assuming a fault zone associated with the Corrimal Fault given the occurrence of parallel to sub-parallel faults and dykes in the downthrown side of the Corrimal Fault. The apparent lack of surface expression of these geological structures does not mean they do not exist. It could mean these features are concealed by more recent alluvial deposits.

The SCA notes the recent findings of research on mining impacts in the catchment of Cataract Dam using data from an open borehole that while water has not drained into mine workings, data also indicates that the level of water in the borehole moves with the level of water in reservoir, suggesting a greater degree of connection exists following the occurrence of mining in the area (Ziegler and Middleton, 2014 – paper presented to the 9th Triennial Conference on Mine Subsidence: risk management in action).

The SCA considers it has not been demonstrated that the proposal would result in negligible leakage from the reservoir to mine workings nor that there would be no connective cracking between the reservoir and the mine.

Adequacy of setback of mining from Cataract Reservoir

The Environmental Assessment report predicts that Cataract Reservoir is not expected to be impacted by the proposed mining. The full supply level (FSL) for the reservoir, including the section that extends up Cataract Creek, is reported to be protected by a horizontal distance of greater than an angle of draw of 35° (equivalent to 0.7 times overburden depth) from the nearest longwall goaf. Vertical subsidence at the FSL is predicted to be less than 20 mm. The 0.7 times depth (nominally 203 m) stand-off from the FSL is proposed as a primary control for protecting the stored waters of Cataract Reservoir and the Environmental Assessment report states that this barrier is expected to provide a high level of protection to the stored water.

Furthermore, the Environmental Assessment report states that there are also a number of small pre-existing Bulli seam goaf areas that are located within the 0.7 times depth protection zone around FSL. These goaf areas are located in close proximity of the FSL. The Environmental Assessment report considers it unlikely that the proposed mining will interact with these pre-existing goaf areas and does not consider there will be any connection between the reservoir and the mining horizon. On the other hand, the Subsidence assessment report states that the Wongawilli seam, the Balgownie seam, and the Bulli seam are all hydraulically connected near the proposed Longwalls 7 and 9 through the interconnected goafs and that is why the 0.7 times depth offset between the longwall panels and the FSL has been designed as the primary control, and is predicted to be effective to control potential inflow from Cataract Reservoir into the mine. The Environmental Assessment report also states that the presence of these goafs reduces the effectiveness of the 0.7 times depth barrier between the FSL and the proposed mining of Longwalls 7 and 9. The SCA is concerned this could also apply to Longwall 6 given its close proximity to Longwall 7.

These statements are of significant concern to the SCA and do not provide confidence that the 0.7 times depth stand-off from the full supply level of Cataract Reservoir can be used as an effective primary control for protecting the stored waters of Cataract Reservoir in this complex mining environment.

Impacts on upland swamps

As stated above there are two swamps located partially above the 400 metre section of Longwall 6 proposed to be extracted. These swamps are of "special significance". There are no watercourses directly overlying the 400 metre section of Longwall 6.

The Environmental Assessment report states that potential impacts on upland swamps are expected to be minimal and that there is potential for bed cracking beneath the swamps.

The Environmental Assessment report discusses the swamps which have been subject to subsidence from previous mining and argues that the swamps are thriving and that impacts have not been significant on their long term condition. This claim is difficult to substantiate due to the lack of baseline data. It is also noted that remediation of impacted swamps has not been demonstrated in the Southern Coalfields and there is doubt that remediation would be successful given the difficulty of locating cracks beneath swamps. It is also widely accepted that an adaptive management approach is not feasible for mitigating impacts on swamps. The likely high strain levels at the end of the proposed 400m section of Longwall 6 are a particular concern.

It is concluded that the proposal is unlikely to have negligible environmental consequences for the two swamps located above the 400 metre section of Longwall 6. More than negligible consequences for these "special significance" swamps is considered to be unacceptable.

Other issues

The proponent considers the adaptive management approach is appropriate to mitigate impacts of the proposal. Such an approach is not appropriate where the goal is to protect a reservoir and mining commences adjacent to the reservoir and moves away.

There are indications that old goaf areas seemingly protected by barrier pillars and main road pillars are not immune to impacts resulting from mining activity over a kilometre away. These findings have implications for the duration of monitoring regimes and on the level of subsidence impacts, particularly where this involves goaf

reactivation due to multi seam mining especially near dam notification areas or restricted zones.

The SCA remains concerned by the piecemeal longwall by longwall assessment and planning approval process being adopted with regards to longwall mining in the Wonga east area. Other agencies have also expressed similar concerns.

As the proposal is predicted to have an impact on water quality it will not have a neutral or beneficial effect on water quality.

CONCLUSION

The SCA's assessment has identified that the mining proposal has the potential to impact on water quantity and water quality of Cataract Reservoir. Considering the SCA's mining and coal seam gas principles and the SCA's performance measures for mining in the this locality, the SCA objects to the proposal in its current form.

In light of this objection, the SCA recommends that:

1. **The DSC Notification Area around Cataract Reservoir be adopted as an Exclusion Zone where no mining is permitted.**
2. **The proposed adaptive management approach for mining activities not be used due to the lag time for mining-related impacts to manifest and changes required to be implemented.**
3. **The SCA's performance criteria developed for the proposed mining area be adopted.**
4. **The Department seek expert advice on the substantive issues raised in this submission prior to making a recommendation on the proposal.**