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Submission: Review of current coal mining in Greater Sydney Water Catchment Special Areas

Thank you for the opportunity to make a submission.

The panel is tasked with looking into the effects of current coal mining in the Greater Sydney Water Catchment Special Areas, including effects on the quantity of water available, the environmental consequences for swamps and the issue of cumulative impacts. We note that an inquiry restricted to the Special Areas misses investigating a great deal of the impact that coal mining has on the quantity and quality of water in Sydney's drinking water catchment. The Special Areas are important, but only cover approximately 25% of the catchment. In the Warragamba and Nepean catchments there are considerable areas of catchment beyond the Special Areas. In the headwaters of Warragamba's catchment there are mines operating that discharge polluted mine water into creeks that feed the Coxs River in the north and in the south, the defunct Berrima Colliery is already a pollution source and the new Hume Coal mine stands to cause considerable groundwater drawdown if it proceeds.

In the Special Areas there are four mines either operating or on care and maintenance, the Metropolitan Colliery, Russell Vale Colliery, Wongawilli Colliery and Dendrobium Colliery. Mining covers 9% of the Catchment as a whole and the Chief Scientist's review has observed that this spread is concentrated in the Special Areas. Within the Metropolitan and Woronora Special Areas, 25% of the land area is undermined.[1] At the Metropolitan mine, mining is actually occurring within the Dam Safety Notification Area, a practice that WaterNSW opposes.

One key theme that we ask the Panel to address is the failure of foresight and understanding in the various catchment inquiries and the assessments material for mining projects in the catchment. With hindsight, it is clear that these processes underestimated the damage mining has caused and was likely to cause to the catchment. This creates a strong argument against further mining development, particularly considering persistent knowledge gaps. For example, the WaterNSW Literature review identified a number of unknowns, including that, "There are no established methods for reliably predicting safe offset distance for water bodies."[2] It is also not even clear at this

[1] *On measuring the cumulative impacts of activities which impact ground and surface water in the Sydney Water Catchment*, NSW Chief Scientist & Engineer. May 2014. A-14.
[2] Advisian 2016. *Literature Review of Underground Mining Beneath Catchments and Water Bodies*. Prepared for WaterNSW. https://www.waternsw.com.au/__data/assets/pdf_file/0011/127559/20161223-WaterNSW-Literature-Review-Underground-Mining-V3.pdf

stage what volume of water is being lost from the surface and lost from baseflow as a result of cumulative mine inflow.

Myriad assessments, inquiries and reviews have been undertaken in the last 15-20 years and have repeatedly found that there is insufficient data and information to properly understand the impact of mining in the catchment, only to find later that more damage has occurred than was anticipated. From the 2001 Commission of Inquiry into Dendrobium, to the 2008 Southern Coalfields Inquiry, the 2012 Thirlmere Lakes inquiry and the 2014 Chief Scientist's review, the option of prohibiting mining in the Special Areas altogether has repeatedly been ruled out, despite findings that insufficient information is available to understand the likely impact. As WaterNSW highlights in its submission to this review, the Dendrobium mine assessment process in 2001 failed to anticipate the damage that mine has done, as has subsequent work undertaken by consultants engaged by the mining company.[3]

The NSW Government's Commission of Inquiry in 2012 found that the drying up of Thirlmere Lakes was unrelated to mining at the nearby Tahmoor colliery, but that finding has been countered by more recent research which has found that the conclusions of that inquiry that lower water levels were due to low rainfall was unfounded and it is more likely the result of the combined effects of longwall coal mining and increased groundwater extraction.[4] The Thirlmere Lakes are a part of the Greater Blue Mountains World Heritage Area and the Warragamba Special Area. A report by Philip and Steven Pells found that the "only reasonable scientific conclusion is that extraction of an average of 1200ML/year of groundwater by the mine since about 1995 has impacted on the water levels in the lakes."[5]

Similarly, the assessment process for the sprawling Dendrobium coal mine failed to accurately foresee the damage that mine has inflicted on the Metropolitan Special Area. WaterNSW's submission to this inquiry notes that recent "Height of Cracking" report confirmed that subsidence from Dendrobium mine "is causing impacts greater than were predicted and approved" and in fact these impacts are "well in excess of the predictions made in support of the mine's planning and post-approval applications." The "Height of Cracking" report commissioned by the Department and undertaken by Pells Sullivan and Meynink (PSM) found that it is feasible that there is a hydraulic connection between mine workings at Dendrobium and the Avon and Cordeaux dams themselves, though there's not enough data to know for sure. It is reckless for the Government to countenance any further longwall operations at the Dendrobium mine in such circumstances.

In 2014, the Chief Scientist again reviewed the impacts of mining in the catchment, and posed the hypothetical tipping point of cumulative impacts that precipitate "a collapse in the ecosystem such that it can no longer provide the ecosystem services that we rely on to supply our drinking water." The review found that the measures in place at that time were insufficient to predict and prevent such a tipping point.

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[3] WaterNSW submission to the Independent Expert Panel on Mining in Sydney Catchment – Task 1 Matters, May 2018.

[4] Samira Schadler and Richard Kingsford "Long-term changes to water levels in Thirlmere Lakes – drivers and consequences" UNSW Centre for Ecosystem Science. May 2016.

[5] Philip Steven Pells. May 2016. *The Water Levels of Thirlmere Lakes: Where did the water go and when will it return?*

The 2016 Catchment Audit indicates that major gaps persist in data and understanding. It reiterated that "The inadequate availability and quality of data and monitoring has been raised in previous audits and remains a concern." The Audit found that no additional groundwater monitoring had commenced since the 2013 audit and found that there was not accurate accounting for lost water. As has occurred with previous reviews, inquiries and audits, the 2016 Audit also made several recommendations that have not been implemented. These included:

- Establish an independent panel to review the monitoring, analysis and reporting program relevant to mines operating in the Catchment;
- "activate" licencing under s60I of the *Water Management Act 2000* so that mines actually have licences to account for the water they take from the catchment; and
- investigate thresholds at which mining activities cause loss of surface water to mine workings, and impact the yield of individual Sydney catchment water supply systems.

We know now that rainfall that should be feeding Sydney's dams and drinking water supply is being drawn into the mining goafs, cracks and fractures beneath the surface, raising considerable strategic risk for Australia's biggest city in the context of rising populations and volatile future rainfall. The most recent Catchment Audit found there was unquantified loss of surface flows already occurring as a result if the cumulative impacts of underground coal mining activities.[6] The extent of surface water loss must be quantified. The National Parks Association has estimated that a rainfall-dependent range of 29 to 40ML a day of water is entering the mines.[7] Understanding how much of this is being lost from surface flows either through reduced baseflow or direct loss of surface flow should be the Government's highest priority.

WaterNSW stops short of recommending a moratorium in its submission, but it has recommended that the Department of Planning and Environment "not accept lodgement of an application for planning approval to mine in the Special Areas unless there is, or foreseeably will be, a minimum of two years baseline monitoring prior to mining." Certainly it appears that there are still significant gaps in data and understanding, even after 150 years of mining and years of supposedly rigourous monitoring. Given the irreversible nature of the damage inflicted by longwall mining – collapse of swamps, fracturing and cracking of aquifers and creek beds – it is imperative that we do not continue making the mistake of under-estimating the impact of mining in the catchment. There must be, at long last, a permanent ban on any further coal mining in the Special Areas and a moratorium on mining elsewhere in the catchment while further cumulative assessment is conducted and regulatory controls on pollution and hydrological damage are introduced that are clear, firm and make water security the unequivocal priority.

Recommendations

- Create a permanent ban on any further mining in the Special Areas of Sydney's drinking water catchment and the mapped catchment areas of Newcastle and the Central Coast;

[6] Alluvium Consulting Australia, 2017. *2016 Audit of the Sydney Drinking Water Catchment*.
[7] NPA NSW. December 2016. "Some Concerns Regarding Groundwater Impact Assessments for Coal Mines in NSW."

- Cancel or buy back all exploration licences in the Special Areas and negotiate a just transition for the workforce of Dendrobium and Wongawilli mines;
- Create a 1km buffer where no mining is permitted on all upland swamps outside the Special Area no-go zones;
- Impose a moratorium on mining elsewhere in Sydney's catchment areas while further cumulative impact assessment is conducted and regulatory controls on pollution and hydrological damage are introduced;
- Refuse consent to the Russell Vale Underground Expansion Project and the Dendrobium Expansion project;
- Introduce new statutory guidance for consent authorities so that consent cannot be granted for developments that reduce the quantity of water in Sydney's drinking water catchment;
- Switch on aquifer interference approvals for aquifers at risk from mining operations, including Sydney Metropolitan and regional aquifers;
- Ensure that Annual Reviews provided by companies mining in Sydney's drinking water catchment provide consistent and accurate information about the water take at their operations;
- Augment stream monitoring in the catchment to allow evidence to be gathered about the loss of surface flows occurring as a result of current and historic mining in the Special Areas;
- Immediately dedicate resources to fund an independent team of experts, attached to a public agency or institution without any current or previous financial relationships with mining companies to build conceptual models of the catchments that feed Sydney's dams that can be used to quantify mining impacts;
- Enforce section 60I of the *Water Management Act 2000* and issue stop work orders to any mine that is passively or actively taking water from water sources in Sydney's catchment without a water access licence;
- As recommended by WaterNSW, introduce a requirement that consultants assessing the impacts of mining operations are independent and managed by the Department of Planning, rather than engaged by mining proponents;
- Implement long-outstanding recommendations by the Chief Scientist and Catchment audits: for mining companies to make public their data on water in the catchment; for a standing expert group to be established on Catchment cumulative impacts and for the establishment of an environmental rehabilitation fund.[8]

Urgent need to quantify loss and comply with *Water Management Act 2000*

The 2016 Catchment Audit made the extraordinary finding that there is unquantified loss of water from the surface of Sydney's catchment to the coal mines beneath. The Audit said found "an emerging issue of unquantified loss of surface flows associated with the cumulative impacts of underground coal mining activities. This issue requires attention and should be considered in implementation of the Metropolitan Water Plan and activation of licencing under Section 60I of the *Water Management Act 2000* and in accordance with the NSW Aquifer Interference Policy."

[8] The first two of these were recommended by the Catchment review in 2014 and the latter by the CSG review, also 2014.

This is an admission of fundamental failure of the regulatory regime: the Government does not know how much water is being taken from the water sources that feed Sydney's dams as a result of coal mining, but it admits that this take of water is not licenced under the *Water Management Act 2000*. Contrary to the phrasing chosen by the Catchment Audit authors, there is no need to "activate" section 60I of the *Water Management Act*. It is in force, and requires any coal mine that is causing a loss of surface water whether because of current or historic mining activity to hold a water access licence to account for this take. And yet, Annual Reviews of the mines in question indicate they do not hold such licences. We urge the expert review to inquire into this matter and recommend enforcement of 60I the *Water Management Act 2000* against any company taking water it is not entitled to as a result of its mining activity.

The Department of Planning's review of mining impacts in Area 3B of the Dendrobium mine, noted that "Reporting by Illawarra Coal indicates that surface water may be being diverted (ie 'taken' under the water legislation) which is not being properly accounted for. This matter needs to be further examined as Illawarra Coal is required to hold a water access licence with sufficient allocation to account for this water take. These issues are to be resolved between Illawarra Coal and DPI-Water separately."[9]

WaterNSW's submission to this inquiry warns that "subsidence induced by the Dendrobium Mine longwalls is likely to be resulting in significant diversion of surface water which would otherwise contribute to Greater Sydney's water supply." [10] The submission makes clear that the impacts from different mines has been unpredictable and concludes that "predictions of subsidence impacts on water resources cannot be reliably made using current knowledge."

That report also noted that, "DPI-Water has also advised that Illawarra Coal has not reported how much water is being taken from the surface water and groundwater sources under the relevant Water Sharing Plans as the current surface and groundwater models do not provide this information" and "WaterNSW considers that some loss of flows from Wongawilli Creek may be occurring, but that the sensitivity of Illawarra Coal's monitoring has not been able to identify such losses." That was nearly three years ago, but the issue does not appear to have been resolved.

There is also evidence that mining companies have deliberately downplayed evidence that surface water from the catchments is being lost as a result of mining activity. WaterNSW's submission to this year's expert panel inquiry notes that in 2012, modelling advice from Coffey Geotechnics *did* predict that surface to seam connective cracking was likely in some locations and that surface depressurisation would occur, but that Illawarra Coal subsequently replaced this company with a different set of consultants, from Hydrosimulations, which predicted that surface depressurisation would not occur. It's now known that at Dendrobium mine, depressurisation effects extend to the surface. As WaterNSW points out, "much of the confidence provided to the various coalfield inquiries about how underground mining effects would be separated from catchment impacts is based on the premise of effective aquitards and intact constrained zones - this confidence has

[9] Department of Planning and Environment, December 2015. "Mining Impacts at Dendrobium Coal Mining Area 3B" http://www.planning.nsw.gov.au/Assess-and-Regulate/Compliance-functions/~/media/552A59CD88EE4207BC8C791420DA63C6.ashx

[10] WaterNSW submission to the Independent Expert Panel on Mining in Sydney Catchment – Task 1 Matters, May 2018. 43.

clearly been challenged at Dendrobium and the underlying premise needs to be urgently reconsidered."

Some attempt has been made to quantify the loss of water caused by Dendrobium mine. WaterNSW's submission to the current expert panel inquiry into mining in the catchment reports that, "The volume of diverted surface runoff into the mine that would otherwise have reported to either Cordeaux or Avon dams or to Wongawilli Creek was estimated by Dr Mackie to be in the order of 5 GL for the six year mining period from January 2010 to January 2016. WaterNSW estimates that over the period analysed by Dr Mackie, the surface contribution of 5 GL accounts for about 44% of total Dendrobium mine water ingress (11.4 GL)"

The latest Annual Review for Dendrobium mine indicates that impacts have been occurring beyond nominated triggers including for pollution in creeks, water loss below upland swamps and a water course that feeds Lake Avon that has suffered "discernable loss of flows." And yet, Dendrobium mine's Annual Review does not supply information about surface water take by the mine. Table 34 of that Annual Review "Water Take Dendrobium Mine" lists only two Water Access Licences, both of which are for the Sydney Basin Nepean Groundwater Source.[11]

In Budget Estimates hearings in August, the Chief Executive Officer of WaterNSW, David Harris, said about inflows to Sydney's dams,

> The inflows into the system over the past 15 months have been worse than the lowest on record. Let me give you some figures to illustrate what that means. The previous lowest annual inflows were in 1944 and they were 136 gigalitres. The second lowest inflows were in 2004 during the Millennium Drought at 234 gigalitres. So 136 gigalitres was the worst and 234 gigalitres was the second worst. By the way, it is a big gap which shows that it is a long tail. If the inflows continue along the path they have been going in the past few months, this year's inflows in total will be 83 gigalitres. So 99 per cent lowest was 136 gigalitres; this year's will be 83.[12]

In this context, any loss of flow caused by mining may be putting Sydney's water security in jeopardy.

Upland Swamps

There are more than 1,400 upland swamps located in the Special Areas, covering nearly 3,600 hectares.[13] The available data indicates that there has been a decline in the extent and condition of wetlands in some areas of the Catchment and efforts to rehabilitate wetlands that were impacted by longwall mining have been unsuccessful to date. Approximately 78% of swamps on the Woronora Plateau are located wholly, or partially, over current mining leases.[14]

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[11] Dendrobium and Cordeaux Annual Review FY2017 page 48.
[12] Transcript, Friday 31 August 2018. Estimates hearings of Portfolio Committee No. 6 Planning and Environment.
[13] Worley Parsons *Literature Review of Underground Mining Beneath Catchments and Water Bodies.* Prepared for Water NSW. December 2016.
[14] EPBC Act Conservation Advice: Coastal Upland Swamps in the Sydney Basin Bioregion. http://www.environment.gov.au/biodiversity/threatened/communities/pubs/140-conservation-advice.pdf

The Dendrobium Height of Cracking report found that damage to the upland swamps that filter and release clean fresh water to the catchment is occurring well beyond the longwall panels themselves, as much as 900m away, so a precautionary boundary around swamps must be imposed that is at least this distance. The 2017 Annual Review for Dendrobium and Cordeaux admits that average soil moisture has fallen below baseline levels in all swamp monitoring sites that have been mined under or are within 400m of the most recent longwall operations.

Remediation activities are not able to successfully restore the hydraulic and ecological functions of these ecological communities once they have been affected by mine subsidence.

Dendrobium Extension Project

The Dendrobium mine is located in the Metropolitan Special Area, between and very close to the Avon and Cordeaux Reservoirs.

The history of this project is illustrative of a broader failure to prioritise water security and robust scientific understanding in the management of coal mining in Sydney's catchment. There was a serious failure of the assessment and determination process to foresee the damage the mine would do and prevent it. Water NSW's submission to this panel highlight the lack of data and information about the consequences of catchment mining and the "disparities between the results from mining-engaged consultants and independently engaged experts" arguing that "consideration should be given to alternative models of assessment such as engagement of consultants by regulators at proponent expense."

Indeed, WaterNSW's submission notes that in 2012, modelling advice from Coffey Geotechnics did predict that surface to seam connective cracking was likely in some locations and that surface depressurisation would occur, but that Illawarra Coal subsequently replaced this company with a different set of consultants, from Hydrosimulations, which predicted that surface depressurisation would not occur.

As outlined above, it is now known that depressurisation effects at Dendrobium extend right to the surface, which has implications for the entire industry, since, as WaterNSW points out, "much of the confidence provided to the various coalfield inquiries about how underground mining effects would be separated from catchment impacts is based on the premise of effective aquitards and intact constrained zones - this confidence has clearly been challenged at Dendrobium and the underlying premise needs to be urgently reconsidered."

Last year's "Height of Cracking" report confirmed seam to surface connected fracturing at Dendrobium, groundwater diversion and drainage, landscape slippage and valley bulging causing fracture pathways for leakage from below the reservoirs. Damage to the upland swamps that filter and release clean fresh water to the catchment is occurring well beyond the longwall panels themselves, as much as 900m away.

As WaterNSW identifies in its submission to this inquiry, the performance measures identified in the mine's planning approvals have largely failed to identify or prevent the excessive consequences which have since occurred. Some of the worst damage has occurred as a result of longwalls 9 and 10

which has damaged upland swamps and severely harmed a creek known as WC21. According to the 2016 Catchment Audit, "complete loss of flow has been observed in this watercourse in the area overlying the mined panels, this length being some 600 m. The bed of the stream is sufficiently cracked that it seems incapable of containing significant runoff flows for more than a few days."

Russell Vale Underground Expansion Project.

The Russell Vale Underground Expansion Project has been languishing in the planning assessment process ever since a review of the project by the then-Planning Assessment Commission found it posed major risks to Sydney's catchment. Approximately 4.7% of swamps on the Woronora Plateau are located within the proposed Russell Vale Underground Expansion Area.[15]

WaterNSW made clear in the assessment process for this project that it considered the estimated water loss of 7.3ML/day that would be caused by the mine unacceptable, particularly during dry periods. In its March 2016 Review report, the Commission agreed that the "potential loss of about 10% flow in the Cataract catchment would be a significant loss."

NSW regulation appears to have no mechanism to prohibit a mine of this scale of damage. The State Environmental Planning Policy for Sydney's drinking water catchment has recently been reviewed and submissions were made that the SEPP must include a clause that prohibits development that was likely to reduce the quantity of water flowing into the catchment, to complement the existing provisions of the SEPP that protect water quality.

The project has been stalled in the planning process waiting for a response from the mine proponent since the Planning Commission's review in 2015 which found there was insufficient confidence the risks the mine poses to the catchment could be managed. The project has passed the time limit for deemed refusal under the *Environmental Planning and Assessment Act 1979*, and yet it remains an active state significant project. The proponent has had over three years to respond to the Commission – an ample opportunity by any measure. The proponent should be informed that the project has been refused consent, as it has passed the time required for deemed refusal since the Commission's review without a response being provided.

Conclusion

There are two major problems that must be addressed decisively by the Government. There is damage to the catchment that was not accurately predicted, but there is also significant impact that is occurring with the implicit concurrence of the Government, because it is within predictions.
In our view, both of these problems need to be addressed by the panel. The Dendrobium mine is the clearest illustration of this. The Department of Planning and Environment's review of damage from mining operations at Dendrobium in December 2015 found that "The majority of impacts have been in accordance with predictions and have not led to breaches of the mine's performance measures"[16]

[15] IESC 2014-057. Advice to the decision maker on the Russell Vale Colliery Underground Expansion Project.
[16] Mining Impacts at Dendrobium Coal Mine Area 3B December 2015.

The previous approach to this issue, of allowing mining to continue expanding under the catchment, while monitoring the damage that occurs with insufficient data and oversight to accurately determine cause and effect, has failed. For the responsible agencies to still not know how much water is being diverted from feeding Sydney's storages as a result of longwall mining is a situation that cannot continue.

We condemn the NSW Government's lassitude on this crucial issue and ongoing failure over many years to fill considerable knowledge gaps and ensure data collection and hydrological modelling are sufficient to understand the scale and nature of water loss and hydrological change wrought by longwall mining under Sydney's drinking water catchment.

We urge the panel to finally take the action long recommended and needed, to permanently ban further mining in the Special Areas and to impose a moratorium on mining elsewhere in the catchment while adequate data is collected and assessment undertaken and a strict regulatory regime imposed that prioritises the long-term security of Sydney's drinking water.