
Name: Julie Marlow

Post code: 2506

Your enquiry is about: Major development proposals

Enquiry details:

DENDROBIUM MINE EXTENSION PROJECT: ENVIRONMENT IMPACT STUDY 2019 (EIS) SUBMISSION Julie Marlow (Berkeley, NSW) I ask that Illawarra Coal's proposed Dendrobium Mine Extension Project (the Project) – involving substantial expansions of its longwall mining of coal seams within the Metropolitan Special Area of the Greater Sydney drinking water catchment—is rejected. The case for rejection is strong, indeed urgent. After appealing to two certainties, I concentrate on the many uncertainties that add up make the Project far too risky to be approved. Two Certainties The world is in climate crisis. Australia's contribution to the carbon emissions burden causing the crisis would be substantially reduced if it were to phase out coal mining. Our nation is the fourth largest coal producer (6.9%) and the biggest exporter (2016 data). In 2015, the Climate Council warned "For Australia to play its role in preventing a 2°C rise in temperature requires over 90% of Australia's coal reserves to be left in the ground, unburned". Since then, scientists have alerted the world to the high probability that we cannot afford a 2°C rise: the goal should be no more than 1.5°C. See the Climate Cloak <https://climateclock.net> GHG emissions from the actual burning of the Project's total coal product by end users (237 Mt CO2-e) is, by any comparison, considerable, not only in terms of actual emissions but also because the Project is playing its part in the perpetuation of an industry that the world cannot afford. These emissions are a cost to the whole globe, a cost for which South 32 takes no responsibility. Responsibility for these emissions, in the eyes of South32, lies with the end-using nations and managed in accordance with each nation's Paris Agreement (ES, Table ES-3). Similarly, South 32 takes no responsibility for the many opportunity costs of the Project, not least the lost opportunity to invest in alternative energy sources and excelerate the transition, at local, state, national and global levels, to climate-safe fuels and indeed to climate-safe steel production. South32 estimates its total direct GHG emissions (Scope 1) over the life of the Project to be 17-22 Mt CO2-e (EIS 6.21.2). The company is eager to compare this amount to

NSW and national emissions totals, claiming its contribution to be “relatively small”. This claim looks lame if the comparison is made with regional or local emissions totals. For example, the estimate of the Project's Scope 1 emissions is roughly a little less than half of the total carbon budget estimated for the Wollongong LGA for the next 30 years (49.2 Mt CO₂-e). The Project's emissions will be a hefty burden for our LGA. If total emissions from electricity usage over the life of the Project (Scope 2, 1.7 Mt CO₂-e) are added to Scope 1 emissions, the Project's emissions will equal half Wollongong's budget. ‘Water is ‘life’: it is life for human populations and the natural environment. The value of coal is simply nowhere near comparable to the value of water. [It is physically destructive, inevitably leaving environments with irremediable damage; it pollutes ground, water, air and is a major source of CO₂-e; it has serious adverse occupational and public health impacts.] The Project will inevitably divert water from both the natural environment and the two dams. Most pertinently, there is arguably high risk of those losses being significant, especially in the context of i) climate change; ii) increased demand from population growth; and, iii) the cumulative damage of past and current mining to Greater Sydney's drinking water catchments. Many uncertainties and the need for the precautionary principle South32's own predictions. For the benefit of lay people, WaterNSW diagrammatically depicts three mechanisms of water “yield loss” brought about by mining

https://www.waternsw.com.au/_data/assets/image/0005/129893/WTR7003_Mining-Impact-Diagram_AFTER_v6.jpg 1.

Diversion of stream flow and overland flow into reduced water table 2. Increased leakage from reservoirs due to increased fracturing, reduced water tables and possible connection between Basal Shear Planes [which underlie the water table] and zones of highly connective fracturing [which extend upwards from mine workings] 3. Base flows to streams and groundwater dependent ecosystems reduced due to lowering of regional water tables For the sake of accessibility by the public, the EIS needs to give a detailed credible account of the extent to which these three mechanisms impact on the catchments. What we are presented with is a fragmented, confusing but alarming picture, built on uncertain predictions. Nonetheless, on the bases of uncertain predictions, very confident conclusions are drawn. Areas 5 and 6 longwalls are likely to cause, according to South32's predictions and after mitigation measures have been put in place (EA Pt 1), vertical subsidence up to 2cm at the catchment's major rivers, Avon River, Cordeaux River, and Donalds Castle Creek. Damage to major rivers' “pools and channels” is also predicted. For Avon River, “approximately 7% of pools and channels along the 400m section of the river located within 400m of proposed longwalls are predicted to be affected by Type 3 impacts (i.e. impact rate of 10%)”. Similar predictions are made for the other two rivers (5% for Cordeaux River, 9% for Donald Castle Crk). Secondly, the major rivers' many tributaries that directly overlay the proposed longwalls, including permanent streams as well as ephemeral streams, will likely exhibit subsidence impacts such as “increased levels of ponding, flooding and scouring due to mining induced tilt ...[also] ... cracking, fracturing and dilation of bedrock in the creek beds, leading to surface water diversion and reduced pool water levels” (p6-9). Thirdly, the ‘connective fracturing and associated groundwater depressurisation’ of the undermined streams will cause loss of surface water, dismissively described by South32 as, “less than 1% of the Avon and Cordeaux catchment yields” (Executive Summary [ES] p21). For waterways overlying Area 5 longwalls, modelling suggests a 3% to 11% reduction in streamflow at times of high rainfall, and a 63% to 100% reduction for times of low rainfall (ES, Hydro Engineering&Consulting's Surface Water Assessment). No mention is made of what this surely means: if the Project is in production during a time of drought, the surface of Area 5 would be close to a waterless state or indeed totally without water. Upland swamps would be dead and wildlife habitat destroyed. For Area 6, flow reductions in overlying waterways are predicted to be 19% to 51% in low rainfall and 1% to 2% in high rainfall. Another consequence of surface damage caused by the longwalls is the generation of contaminated sediment, described in the ES (p21) as “localised, episodic pulses in iron, manganese and electrical conductivity in surface water systems”. This surely is an understatement of the problem of water pollution resulting from coal mining. (See Ian Wright, Nakia Belmer Regional Comparison of Impacts from Seven Australian Coal Mine Wastewater Discharges on Downstream River Sediment Chemistry, Sydney Basin, New South Wales Australia in American Journal of Water Science and Engineering 2019; 5(2): 37-46

file:///C:/Users/Administ/Documents/My%20Documents/politics/POWA/2019_Ian%20Wright_10.11648.1.jajwse.20190502.11.pdf

) According to the ES of the Surface Water Assessment, water at Areas 5 and 6 are already slightly acidic. Also, Area 5 waters show elevated levels of dissolved copper and zinc, and spikes in total aluminium, total nitrogen and total phosphorus. Similar contaminants have been recorded in the Cordeaux River and its tributaries. In the EIS, in Table ES-2, it is confidently stated that the Project would have a “net beneficial effect on water quality in the Special Catchment Areas” on the basis that water quality improvement activities “such as fire management and maintenance of sealed roads” are proposed. This is an incongruous statement, given that one would think good fire management and road maintenance are matters of basic safety and not available as a means to improve water quality. And surely, optimal sediment control in a drinking catchment is mandatory? Areas 5 and 6 will also undermine upland swamps. It is stated in the ES of the Surface Water Assessment, that seepage from these swamps is predicted “...to increase from between 1.4 and 19.8 m³/m width of swamp per annum, to between 42.7 and 125.5 m³/m width per annum”. Drainage of upland swamps is an inevitable consequence of mining beneath or close to these precious irreplaceable features of the catchment. Watershed HydroGeo's 2019 report ‘Dendrobium – distance to swamp impacts’ confirms an earlier finding by PSM (2017): “a consistent pattern of rapid drawdown of shallow groundwater within all swamps as they have been undermined, with a piezometer above or closely adjacent to a piezometer to a longwall having a response that was considered ‘normal or unchanged’” While Watershed did not report any observed effects on water tables in mapped upland swamps “at distances greater than 60m from a longwall panel”, the controversy surrounding what is a safe distance from mining for upland swamps was not resolved to Watershed's satisfaction because, it seems to me, of sloppy monitoring practices by South32. According to the EIS, limiting environmental damage to the above predictions depends on the setbacks from dams, ‘named’ rivers and ‘key stream features’ that are to be incorporated into designed layout of the new longwalls. The confidence South32 puts in these setbacks and resulting predictions seems poorly justified. In discussions of predictions, the EIS proliferates with hedging words such as ‘may’, ‘might’, ‘likely’, ‘not expected’. This tentativeness disappears only when conclusions are made, e.g. “...the Project would not have a significant adverse impact on the quality or yield of the water in the Metropolitan Special Areas ..” p6-17. Further, government agencies (e.g. WaterNSW, DamsNSW) and many independent experts have seriously questioned the quality of data generally available for assessing catchment conditions in the southern coalfields and, in particular, data used by mining proponents. Given what is at stake, South32's predictions are not reliable enough, and its conclusions are over-confident. ‘Minimisation of impacts’, ‘partial mitigation of impacts’ and operational ‘adaptive management’ of predicted imminent impacts are simply not good enough. Longwall mining is putting at risk the very basis of our lives—water and the natural environment. If the proponent cannot reliably guarantee no damage to waterways and water bodies and the wetlands on which water quantity and quality depends, their Project must be rejected. Precautionary principle An obvious failure of the Dendrobium Mine EIS is its failure to embrace a genuinely precautionary approach in the

face of scientific uncertainty. The Greater Sydney catchment is in itself and in every way a scientific challenge – geologically, hydrogeologically, ecologically. Its history of more than 100 years of underground coal mining compounds the complexity, especially the intensive poorly regulated longwall mining of the past 40 years and ongoing. And, now, the uncertainties around the severity of the impacts of climate change need urgent factoring in. In the lap of all this uncertainty rests the fate of our drinking water, an essential for the lives of millions of people now and into the future. The health of many of the catchment's precious, ecologically invaluable vegetation communities, including Upland Swamps, are also on the line. My overwhelming impression is that the pool of data relating to coal mining in the Greater Sydney catchment is in a riven state, with a significant amount of expert opinion questioning the analyses used by miners to justify their proposals for mining expansion. Proponents of mining projects seem wilfully blind to serious problems in the evidence they rely on: inadequate data collection; incompatibility of methods of data collection; gaps in current knowledge; unreliable assessment technologies; controversy; selective use of data by proponents. The tendency of proponents not to make their data available to public science is a further barrier to meeting the need for a solid knowledge base. The two reports that are among the stated reasons for the NSW Chief Scientist's establishment of the Independent Expert Panel on Mining in the Catchment (IEPMC)—PSM's 2017 Height of Cracking – Area 3B and Alluvium's 2016 Audit of the Sydney Drinking Water Catchment—are just two of several analyses that have long elicited deep community and expert concern about the reliability of data collection and interpretation on which mining approvals have rested. I believe the IEPMC's Initial Report (Nov 2018) itself is further confirmation of the uncertainties and gaps in knowledge surrounding catchment science. The report strongly implies an acute need for caution. According to the IEPMC, "controversy and confusion" beleaguers the two equation methods used to predict height of complete groundwater drainage. Inadequacies in "geomechanical modelling of rock fracturing and fluid flow" exist. South32's investigation, modelling and monitoring have been "insufficient for the scale and complexity of the technical issues in relation to groundwater" and quantity of data and monitoring in relation to surface water has been inadequate. Reiterated in the IEPMC report is the need for further research, analysis and assessment, e.g. "Further research, analysis and assessment are required before the Panel can conclude an opinion on the extent of any leakage from Cordeaux Reservoir into mine workings" adding "Alternative interpretations of data and/or the influence of geological structures in future mining panels could produce larger estimates of leakage from water storages". 4.5.1 (i, k). It is disingenuous of South32 to take quotes from the IEPMC report that, out of context, sound uncritical of mining in the catchment (e.g. 3rd bullet point ES5.4). South32 glosses over the problem of environmental and storage water losses resulting from its proposed expansion. It claims surface loss will be less than 1% of Avon and Cordeaux 'catchment yields' and implies this is insignificant; it also claims it will adequately compensate for the loss by paying for the megalitres lost and pursuing "opportunities for industrial re-use ... such that the re-use volume matches or exceeds the predicted Project surface water take". Losses cannot be compensated for with dollars nor promises of industrial re-use, especially at this time of global warming and long dry periods. Further, the estimate of less than 1% of catchment waters is not convincing. Questions arise about the reliability of methods used to reach this estimate. As stated in the IEPMC's Executive Summary of its initial report (2018): "The insufficiency, variability and limitations of information restrict the scope and accuracy of calculations of groundwater and surface water diversion from the catchment into mine workings and other storages". About previous water losses caused by the Dendrobium, IEPMC Initial Report (Section 4 'Groundwater Impacts ...') states, "The Panel estimates that the total mine water ingress at Dendrobium Mine from January 2010 to March 2018 totals about 18 GL of which about 6 GL is attributed to rainfall percolation. This volume may be regarded as diverted surface runoff that would otherwise have reported to Wongawilli Creek or directly to either Cordeaux or Avon reservoirs." (4.5.1.(e)) South32's EIS is premature. Many of its own investigations (e.g. of the Elouera Fault) and strategies remain incomplete. Furthermore, its failure to wait until the work of the IEPMC is completed before releasing its draft EIS suggests complacency towards ensuring the science it relies on is the soundest available and to embrace the "evolving knowledge base" to which IEPMC is endeavouring to contribute. An implication of the IEPMC report is that there is deep reason for concern that the 2008 approval under which Dendrobium currently operates and which provides for the mine to maximise its operations is redundant. The IEPMC report includes many recommendations and conclusions that demonstrate the uncertainty that afflicts the EIS. It is extraordinary that for 20 years the Dendrobium has been allowed to operate irrespective of such uncertainty. IEPMC recommendations unreconciled South32, in its EIS, claims to have reconciled its EIS with IEPMC recommendations (Table 8.3). While my lay status limits my ability to judge, my commonsense tells me reconciliation with the recommendations is superficial and demonstrates continuing uncertainty around EIS claims. In its IEPMC submission (Attachment 1), South32's objections to four key IEPMC conclusions and recommendations exemplify its failure to address IEPMC's concern: 1) Potential for IEP to Overstate Surface Water Losses: South32 disputes IEP estimate of losses of surface water to groundwater, stating that it is unclear how IEP arrived at its "2.1 to 3ML/day" estimate and insisting on the reliability of its own modelling of "0.9ML/day, peaking at 1.6ML". If South32 finds IEP's means of estimation unclear, one would think they would be eager to seek clarification before claiming reliability for its own figures, particularly as it itself admits to "some uncertainty" with its "water fingerprinting science", that is, with the means the sources of water are measured. South32 also fails to mention IEP's concern that the plausible '3ML/day' current diversion "could increase to the order of 3.5 ML/day after LW 16 is extracted" (4.5.1 (j)). 2) Reconsideration of target of 200 mm closure: IEP raises questions about South32's long held subsidence target of 200mm valley closure in watercourses as a means to avoid significant environmental consequences, and recommends a reconsideration. South32's grounds for challenging the recommendation are based on the claim that South32's closure impact model can be applied on a case-by-case basis and duly refined. However, the likelihood of South32 actually undertaking refinement is undermined by its statement that to reduce its "long accepted target of 200mm predicted closure for designing setbacks for named streams ... would have material implications for South32". Profits take priority over avoidance of environmental damage. It is also relevant to note that "the "Target value of 200mm closure represents a low-likelihood of impact (i.e about 10%) rather than avoidance of impact or negligible impact" (EIS Table 8.3). 3) References to Springvale Mine: South32 challenges IEP's concern aroused by a 2009 finding in relation to the Springvale Mine—added risk of mining-induced subsidence to watercourses and swamps hosted by major lineaments and up to 700m away from the longwall being extracted, especially in light of a faulty prediction in relation to subsidence caused by mining in Area 3B. South32 dismisses the concern with an exercise in reductive logic: it hasn't yet been observed to happen in the Southern Coalfields so it is unlikely to happen in the future, attempting to shore-up its point by appealing to differences in geology between Western and Southern Coalfields and the likelihood that the faulty prediction for Area 3B was associated with mining geometry, not lineaments. 4) Recommendation for Incremental Approval of Longwall Management Plans: South32 opposes IEP's endorsement of the DPE's support for incremental approval of longwall management plans on the basis of delay and the risk to " ...significant capital expenditure and time required to develop mining areas". Again, South32 reveals the higher priority it gives to its financial

welfare than to the safety of water and the natural environment. In the table in Attachment 2 of South32's submission to the IEPMC report, the company acknowledges the incomplete state of knowledge generally, and/or its own investigations in relation to several IEP conclusions. For example, the matter of "particularly undeveloped knowledge about the contribution of swamps to water supplies" is no small concern, nor is the matter of the unreliability of using "surface water TARP triggers" for Dendrobium and Metropolitan mines. WaterNSW In its submission to the IEPMC—Initial Report 2018, WaterNSW assessed several independent studies and reports that bewailed this epistemic muddle, including a review by the NSW Chief Scientist and Engineer (May 2014); the Height of Cracking (HoC) Report (PSM 2017), described by WaterNSW as a 'landmark' document; peer reviews of the HoC Report by Galvin Associates 2016 and Mackie Research 2016; and the Catchment Audit 2016. The lack of knowledge about cumulative impacts is of particular concern for WaterNSW. As part of its 2014 review, the NSW Chief Scientist held a workshop of experts to "examine the core question of whether cumulative impacts of mining activities in the catchment could currently be determined". The experts reached a 'quick consensus': "... answering these questions with quantitative precision is impossible at present given insufficient geological, geophysical and hydrogeological data available on current activities ... In summary, the Review has found that we cannot yet build a complete model to understand the cumulative impacts of multiple activities in the catchment (or even, at precise levels, impacts from single activities." WaterNSW considers that "(i)n the southern coalfields, ... the greatest current and historic risks to the Sydney water supply are posed by mining operations beneath the Metropolitan and Woronora Special Areas" (IEPMC submission) For WaterNSW, the most important consequence highlighted by HoC is 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. The associated degradation of water quality and ecological integrity of Special Area catchments are also of concern" (p11) Mining companies should be obliged to take seriously WaterNSW's six Mining Principles for Declared Catchment Areas. https://www.waternsw.com.au/_data/assets/pdf_file/0010/119890/Mining-principles.pdf The Project may, at least technically, meet the fourth, but it is a long way from observing the other five. It is notable that Kalf and Associates' Peer Review of HydroSimulations Groundwater Modelling Assessment, 30 April 2019, Attachment 5 among the raft of documents on public exhibition for the Projects, concludes: " ...the current methodology does contain uncertainty ...". In the EIS, it is admitted that "due to limited availability of data beyond the Dendrobium Mine Area contours were not prepared for the Wongawilli Seam", yet in Area 6 coal is to be extracted from the Wongawilli seam up to the year 2048, following on from mining of Area 3C. Such a paucity in sound scientific knowledge surely demands a conservative, precautionary approach. The level of uncertainty should be a key assessment issue for the Project. Serious objective assessment of the uncertainty would in all likelihood result in a finding of a need for the imposition of moratorium on all longwall mining in the Greater Sydney catchment until independent research produces a sound understanding of historic and ongoing impacts of mining. At the very least, the findings and recommendations made by WaterNSW and the above-mentioned independent reports (WaterNSW 2018, e.g. Tables 2.1 & 2.2) and results of other recent independent research should be explicitly addressed by the EIS. As it stands, the EIS is an exercise in over-confidence in predictions and management measures and understatement of possible impacts.

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