

20 September 2019

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Planning & Assessments
Department of Planning Industry & Environment
GPO Box 39 SYDNEY NSW 2001

Dear Ms Evans

Re: Dendrobium Mine Extension Project (SSD 16_8194)

I refer to your letter dated 25 July 2019 inviting WaterNSW to provide advice on the Dendrobium Mine Extension Project (the project). WaterNSW appreciates this opportunity and has undertaken a comprehensive assessment of the Environmental Impact Statement (EIS) to inform its advice.

Background

Both the existing mine and the project are located within Sydney's declared drinking water catchment and the Metropolitan Special Area. This project is the first new development application lodged for coal mining in the Special Areas in almost a decade. Over this period, there have been multiple independent reviews that have led to significant improvements in our scientific understanding of mining impacts in this area.

Project Design

WaterNSW considers that there is a fundamental problem in the project design as it does not sufficiently take into account a 'paradigm shift' in scientific understanding and policy settings that has occurred since the last mine was approved in the Special Areas. In particular, the project has not been designed to reduce the height of fracturing and associated groundwater depressurisation.

Recommendations

WaterNSW recommends that the Department:

1. Requests the mining company provide information about alternative mine designs that have been considered that would avoid or reduce environmental impacts, including:
 - reducing the mining dimensions (e.g. narrower longwalls with wider pillars) in order to prevent 'surface-to-seam fracturing', and
 - increasing the setbacks from key infrastructure and environmental features.
2. Refers the project to the Independent Expert Panel on Mining in the Catchment (IEPMC) or a similar technical panel of experts (including a mine subsidence expert, groundwater expert, surface water expert and dams engineer) for advice on the mine design and potential impacts.

Summary of Assessment

WaterNSW provides the following high-level summary of its assessment. Additional detail is provided in **Attachment 1**.

- Predicted environmental impacts: the project is predicted to cause subsidence that would be higher than recorded figures at any other mine in the Southern Coalfield. WaterNSW considers that the project would cause an unprecedented level of surface-to-seam fracturing and groundwater depressurisation, which would result in a range of significant predicted impacts.

For example, the Environmental Impact Statement (EIS) predicts the following impacts:

- Water quantity: up to 3.3 gegalitres (GL) per year of catchment water loss
- Water quality: increases in metals within streams overlying the proposed mining area, and
- Ecology: impacts on 26 endangered Coastal Upland Swamps.

The EIS also predicts that in a dry year, there would be a 100% reduction in stream flow to Avon Reservoir within the catchments overlying the proposed mining area. WaterNSW has calculated that this may reduce the catchment yield of the Avon Reservoir by up to 3.9%.

- Potential infrastructure impacts: there is the potential for differential far field horizontal movements on the existing Avon and Cordeaux Dam walls, which could cause cracking in the walls. This has not been adequately addressed in the EIS. The project also overlaps with an area that WaterNSW has proposed for a future dam.
- Methodology and uncertainties: WaterNSW notes that many previous predictions of mining impacts at the current Dendrobium mine have proved to be underestimates. Based on various methodological issues and uncertainties associated with the impacts of the project, WaterNSW is concerned that key predictions about water impacts may also be underestimates.

Conclusion

WaterNSW strongly objects to the project (as currently proposed) for the following reasons:

- The predicted impacts of the project on water resources and ecology are unacceptable to WaterNSW, as they would:
 - affect WaterNSW's ability to deliver one of its core statutory functions to protect and enhance the quality and quantity of water in the declared Sydney catchment area (under section 7(1)(g) of the *Water NSW Act 2014*), and
 - be inconsistent with the one of the key purposes for declaring the Metropolitan Special Area, which is to maintain the ecological integrity of the land (under section 47(2)(b) of the *Water NSW Act 2014*).
- WaterNSW has serious concerns that the project would not meet the neutral or beneficial effect (NorBE) test as required under the *State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011*. This is the first mining project in the Special Areas that is subject to the NorBE test. The NorBE assessment in the EIS is inadequate.
- The project is inconsistent with WaterNSW's 'Principles for Managing Mining and Coal Seam Gas Impacts in Declared Catchment Areas', which underpin WaterNSW's decision making in relation to managing mining impacts within Sydney's declared drinking water catchment.

If you wish to discuss this letter further, please contact Clay Preshaw on 9865 2515 or e-mail at environmental.assessments@waternsw.com.au.

Yours sincerely

A handwritten signature in black ink, appearing to read "Fiona Smith".

FIONA SMITH
Executive Manager, Water and Catchment Protection

ATTACHMENT 1 – Detailed Comments

1. Context

- Existing mining: there is now strong evidence that the impacts from existing mining at Dendrobium are greater than predicted when the mining was proposed and approved.
- Location: the project is located within sensitive protected areas including:
 - the declared Sydney catchment area and Schedule 1 Metropolitan Special Area (under sections 40 and 47 of the *Water NSW Act 2014*)
 - the declared Sydney drinking water catchment (under clause 7 of *State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011*), and
 - within close proximity of the prescribed Avon and Cordeaux Dams (under schedule 1 of the *Dams Safety Act 1978*).
- New project: this extension proposal is the first new development application lodged for coal mining in the Special Areas of Sydney's drinking water catchment in almost a decade. It must be assessed in line with contemporary scientific understanding and policy settings.
- Scientific understanding: over the last decade, there have been multiple reviews and reports by independent bodies and government that have led to significant improvements in our scientific understanding of mining impacts in this area (see **Attachment 2**).
- Policy settings: since the last mine was approved in the Special Areas, the policy settings for new mining applications have also been made stricter (see **Attachment 2**).
- Project design: the mine design is not aimed at minimising the height of fracturing and associated surface water impacts from groundwater depressurisation. Instead, it places too much emphasis on minimising localised impacts in certain streams.
- Alternatives considered: importantly, the mining company has not provided adequate information about alternative mine design options with less environmental impacts. In contrast, the recently amended Russell Vale project proposes a mine design based on first workings only, which would result in negligible subsidence impacts.

2. Predicted environmental impacts

- Subsidence: the project is predicted to cause significant subsidence with predictions of up to 2.45 metres (m) of vertical movement, 25 mm/m of tilts, and 15 mm/m of strains. These predictions are higher than recorded figures at any other mine in the Southern Coalfield.
- Height of fracturing: this is the first project in the Southern Coalfield to predict full surface-to-seam connectivity (i.e. a fracture network that extends from the coal seam up to the surface) across the entire mining area. This 'surface-to-seam fracturing' results in a range of significant predicted impacts on environmental features at the surface, including:
 - Catchment water loss: up to 3.3 GL/year of surface water 'take' from the drinking water catchment. WaterNSW has calculated that in a dry year this may reduce the yield of the Avon Reservoir catchment by 3.9% and the Pheasant's Nest Weir catchment by 2.9%.
 - Stream impacts: water loss in nine major watercourses (3rd order or above) and over 100 smaller tributaries. In a dry year, within the catchments overlying the proposed mining area, the EIS predicts a 100% reduction in stream flow to the Avon Reservoir and a 67% reduction in stream flow to Pheasants Nest Weir.
 - Water quality: mobilisation of metals (e.g. iron) due to extensive fracturing, which would likely lead to an increase in metals within streams across the catchments of the reservoirs. WaterNSW considers this to be a significant concern post-mining, as groundwater pressure recovers. There has not been an adequate assessment against the NorBE test in terms of loads or concentration of metals in streams or reservoirs.
 - Swamps: impacts to 26 endangered Coastal Upland Swamps located above the mine workings due to fracturing of the bedrock beneath the swamps, which WaterNSW considers would make them more fire-prone and change their ecological functioning.

3. Methodology and uncertainties

- a. Previous predictions: previous predictions of mining effects and impacts at Dendrobium have often proved to be underestimates, which reduces confidence in the ability of the mining company to reliably predict the likely impacts of its mining activities.
- b. Potential underestimates: WaterNSW has identified a number of methodological issues and uncertainties associated with the subsidence and groundwater models for this project. Consequently, WaterNSW considers that the predictions of mine inflows, surface water losses, water quality impacts, and swamp impacts may be underestimates.
- c. Subsidence impact assessment:
 - Geological structures: the extent and possible impacts of geological structures, including faults, dykes, and basal shear planes, have not been fully investigated and simulated in the subsidence predictions, particularly faults trending northeast-southwest.
 - Local calibration: in the past, the observed subsidence movements in Dendrobium Area 3B substantially exceeded predictions, which led to a recalibration (i.e. 30% increase) of the model. The exceedances of subsidence predictions for Area 3B have been attributed to greater depths of cover, wider longwalls and possibly differences in geology, however there is still residual uncertainty about this. Importantly, the 30% increase has not been applied to the proposed Area 5 on the basis that this would result in overly conservative estimates for the extraction of the Bulli Seam.
- d. Groundwater model:
 - Increasing predictions in updated models: in recent years, the model has substantially increased its predictions of surface water losses at the existing mine, from 272 ML/year in 2014, to 330 ML/year in 2016, to 683 ML/year in 2018 and now to 1,372 ML/year.
 - Proportion of surface water in mine inflows: in 2016, Dr Col Mackie calculated that the proportion of surface water in Dendrobium's mine inflows between 2010 and 2015 (i.e. average climatic conditions) was approximately 44%. However, the mining company's model assumes that surface water only accounts for on average 15 to 25% of predicted mine inflows during average climatic conditions.
 - Leakage from reservoirs: a local groundwater model has previously estimated leakage from Avon Reservoir of up to 1.3 ML/day from Area 3B alone. However, the current predictions of leakage for the whole mine (including Areas 5 and 6) from Avon and Cordeaux Reservoirs are based on the regional groundwater model and are much lower (0.58 and of 0.38 ML/day respectively).

4. Other Issues

- Water licensing: there is no mechanism available to the mining company to acquire a licence for its predicted surface water take (under the relevant Water Sharing Plan), which means the project cannot currently comply with the Aquifer Interference Policy.
- Catchment loss 'offsets': WaterNSW was not previously consulted about any compensatory payments for surface water take and does not believe such a payment should be considered as an 'offset' for the substantial predicted loss of surface water (3.3 GL/year) and associated impacts on stream functioning in Sydney's drinking water catchment.
- Existing dam infrastructure: while the proposed longwalls are setback at least 1 kilometre from both Avon and Cordeaux Dam walls, the mining company has not adequately considered the potential for differential far field horizontal movements. The structural integrity of the dam walls is critical to the ongoing reliability of water supply to the people of Sydney and the Illawarra and the safety of people living downstream of the dams.
- Future dam infrastructure: the proposed mining area overlaps with an area that WaterNSW has proposed for a future dam and associated reservoir and would likely cause substantial leakage from this reservoir, if constructed.
- NorBE at surface facilities site: vegetation clearing associated with the construction of proposed surface infrastructure facilities would increase sedimentation in waterways and increases the likelihood of bushfire and erosion. This has not been adequately assessed.

ATTACHMENT 2 – Contemporary Scientific Understanding and Policy Settings

Scientific Understanding

There have been multiple reviews and reports by independent bodies and government agencies on the impacts of coal mining in the Sydney's drinking water catchment, including:

- NSW Chief Scientist & Engineer (2014) Measuring the cumulative impacts of all activities which impact ground and surface water in the Sydney Water Catchment
- Department of Planning and Environment (2015) Mining Impacts at Dendrobium Coal Mine Area 3B
- Planning Assessment Commission (PAC) (2015) Russell Vale Mine Underground Expansion Project – Review Report
- PAC (2015) Springvale Mine Extension Project – Review Report
- PAC (2016) Russell Vale Mine Underground Expansion Project – Second Review Report
- Alluvium & Ecological (2017) 2016 Audit of the Sydney Drinking Water Catchment
- PSM (2017) Height of Cracking – Dendrobium Area 3B (and associated Peer Review Reports by Prof. Jim Galvin and Dr Col Mackie)
- Prof. Jim Galvin and Dr Col Mackie (2016) Advice on Dendrobium Longwalls 14-15 Subsidence Management Plan (SMP)
- Prof. Jim Galvin (2017) Summary and Explanation of Height of Fracturing Issues at Dendrobium Mine,
- IEPMC (2018) Initial Report, and
- IEPMC (2018-2019) Various advice on Dendrobium Mine SMPs and Metropolitan Mine Extraction Plans.

These reviews and reports have led to significant improvements in knowledge and understanding of longwall mining effects, impacts and environmental consequences, particularly in relation to:

- methods to predict height of fracturing
- the potential for height of fracturing to extend to the surface and associated groundwater depressurisation impacts
- non-conventional subsidence e.g. valley closure and far-field movements
- the increased likelihood of swamp impacts overlying longwall mining
- the difficulty of remediating mining-related damage to watercourses and swamps
- the relationship between geological structures (i.e. faulting, basal shear planes and lineaments) and mining-related impacts on water resources and swamps
- the validity (or otherwise) of certain performance criteria or 'rules of thumb', including:
 - the use of the Strahler order of streams to categorise the significance of watercourses, and
 - the application of a 200 mm of valley closure to prevent impacts on watercourses, and
- the need for robust, independent peer reviews of complex technical issues.

Policy settings

Significant changes have occurred to government policy and legislative requirements since the last mining project in the Special Areas of the catchment was approved, including:

- the *2012 NSW Aquifer Interference Policy (AIP)* and its requirements for obtaining a water access licence (WAL) for aquifer interference activities.
- the application of Clause 11 (4)(b) of *State Environmental Planning Policy (Drinking Water Catchment) 2011* to State Significant Development projects, which requires the consent authority to be satisfied that the proposed development meets the NorBE test, and
- updated biodiversity legislation and policies, including the:
 - *NSW Biodiversity Conservation Act 2016*
 - NSW Biodiversity Offsets Policy for Major Projects, and
 - Addendum to NSW Biodiversity Offsets Policy for Major Projects (Upland swamps).