

15 December 2020

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c/o: Stephen Barry via [REDACTED]

Dear Commissioner,

**RE: Dendrobium Extension Project (SSD 8194)**

Thank you for the opportunity to provide clarifying information following the Public Hearings for the Dendrobium Extension Project (the Project) held by the Independent Planning Commission (IPC) via videoconference from 2-4 December 2020.

Please find enclosed responses to the following questions that South32 took on notice during the Public Hearing (Enclosure 1):

1. What evidence is available to South32 that the Dendrobium Mine could be effectively sealed at the end of the Project?
2. What is the basis for the setback distances that are set out for the key stream features?

South32 would also like to take the opportunity to clarify the following aspects raised during the Public Hearing or in the IPC meeting with WaterNSW (on 26 November 2020) (Enclosure 2):

1. Consideration of the effects of climate change in the assessment of the Project.
2. Consideration of catchment water losses post-mining.
3. Consideration of alternative mine plans.
4. Consideration of post-mining impacts on water quality and the Neutral or Beneficial Effects ('NorBE') Test.

If the IPC requires further information regarding these or other matters, particularly for matters that may be determinative for the IPC's decision regarding the Project, then in the interests of procedural fairness it is kindly requested that the IPC makes South32 aware of any additional queries so that a response can be provided accordingly.

If you have any queries please don't hesitate to contact me at [REDACTED] or [REDACTED].

Yours sincerely



**Gary Brassington**  
Manager Approvals  
Illawarra Metallurgical Coal – South32

ENCLOSURE 1

SOUTH32 RESPONSE – IPC QUESTIONS

## South32's Response – IPC Questions

### 1. **What evidence is available to South32 that the Dendrobium Mine could be effectively sealed at the end of the Project?**

- South32's current closure concept for the Dendrobium Mine is to seal the mine entrances as per the currently approved Closure Plan for the Dendrobium Mine. Preliminary engineering studies have been undertaken in consultation with Dams Safety NSW to investigate the preferred approach to hydraulically seal the mine, which includes water retention bulkheads located underground in the main headings as well as seals at surface openings (also required for safety purposes).
- Detailed engineering studies would be completed in consultation with Government and other stakeholders as part of the formal Closure Plan for the approved Dendrobium Mine.
- Under the current Dendrobium Mine consent, the Closure Plan is not required to be prepared until two years prior to the cessation of mining operations in 2030.
- DPIE noted on Day 1 of the Public Hearings that mine sealing is a relevant consideration for South32, Government and other operators regardless of whether the Project is approved or not:

*... you would still have those mine sealing issues regardless of whether the project's approved or not because obviously there's a lot of historical workings in there, and whilst the project may exacerbate that or increase that – that issue in terms of a management matter, it's going to be a management matter for both government and South32 and, indeed, other operators in the catchment areas in – in – in the longer term.*

*And that's why one of the recommendations of the Chief Scientist Catchment Panel was that government needs to look at this in consultation with the industry as a longer term issue.*

...

*... one of the key recommendations of the panel post any determination was to prepare a relevant management plan and details and options about sealing or partial sealing of both the current operations but also some of the legacy issues that are existing already, regardless of whether the project's approved.*

- Similarly, the Independent Advisory Panel for Underground Mining (IAP) concluded (Conclusion 45) that the Project would not likely change the requirements related to sealing the Dendrobium Mine:

*The extraction of Areas 5 and/or 6 is unlikely to change the existing legacy of past mining operations at Dendrobium Mine and in surrounding mines in respect of sealing Dendrobium Mine at the end of mining operations and how this impacts on managing mine water inflow in perpetuity. It could increase the scale of the legacy impacts that will need to be managed after mine closure.*

- The Project does not change the closure concept for the approved Dendrobium Mine, however, the recommended conditions of approval would bring forward the timing of the Closure Plan (i.e. to “*within three years of commencing development under this consent*”, which would be prior to Q1 2024 if the Project was approved in Q1 2021).
- This is consistent with Recommendation 6 of the IAP, which recommends preparation of a Mine Rehabilitation and Closure Plan well in advance of the cessation of mining (i.e. 2048 for the Project).
- The recommended conditions of approval for the Project (i.e. condition B60) specifically require consideration of sealing the mine as part of the closure strategy for the Dendrobium Mine:

*(c) contain a detailed mine closure strategy for Dendrobium Mine, which includes:*

*(i) detailed consideration of all issues associated with sealing or not sealing mine entrances, with particular reference to groundwater re-pressurisation, developing hydraulic pressure heads within main headings and long-term emergence of mine waters within the Metropolitan Special Area and/or the Illawarra Escarpment;*

- In summary, approval of the Project would increase certainty regarding closure, as although the Project would not change the current closure concepts, approval of the Project would bring forward the timing of the preparation of the detailed closure strategy (in line with the NSW Resource Regulator requirements) for the Dendrobium Mine.

## **2. *What is the basis for the setback distances that are set out for the key stream features?***

- The setback distances from the key stream features proposed for the Project have been derived based on analysis of Dendrobium Mine monitoring data undertaken by Mine Subsidence Engineering Consultants Pty Ltd (MSEC) (2019) (refer to Section 3.8.2 of the Subsidence Assessment [Appendix A of the Project EIS]).
- This analysis showed that the impacts (i.e. Type 3 impacts) at key stream features within mining areas generally occurred after they have been directly mined under, and were not observed prior to longwalls approaching within 50 m of the feature (MSEC, 2019).
- Therefore, the proposed longwalls in Area 5 and Area 6 have been setback from the key stream features by a minimum distance of 50 m to reduce the likelihood of subsidence-related impacts (MSEC, 2019).
- When longwall mining is proposed on two or more sides, these setbacks have been conservatively increased to 100 m on each side to provide an additional factor of safety due to the cumulative effects of subsidence.

ENCLOSURE 2

SOUTH32 RESPONSE – CLARIFICATION OF QUERIES  
RAISED DURING PUBLIC HEARINGS AND WATERNSW MEETING

## **South32's Response – Clarification of Queries Raised During Public Hearings and WaterNSW Meeting**

### **1. Consideration of climate change in the Project EIS**

- The potential effects of climate change on the nature and extent of the Project potential impacts have been considered in the following specialist assessments:
  - Groundwater Assessment (refer to Section 8.1.1 of Appendix B of the EIS);
  - Surface Water Assessment (refer to Section 5.2.6 of Appendix C of the EIS);
  - Biodiversity Assessment (Appendix D of the EIS); and
  - Aquatic Ecology Assessment (Appendix E of the EIS).
- Potential environmental costs associated with Project greenhouse gas emissions have been considered in the Economic Assessment (Appendix L of the EIS).
- The method to calculate costs associated with the greenhouse gas emissions by Cadence Economics follows the requirements of the *Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (Department of Planning and Environment, 2015) and the *Technical Notes supporting the guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (DPE, 2018) (refer to page 43, "Technical Note 9").
- In addition, Sections 9.3.4 and 9.3.5 of the Project EIS describe the potential implications of climate change to NSW and the region.
- In summary, the predicted effects of climate change are described in the EIS, the potential implications of climate change to local groundwater and surface water have been considered, and costs associated with relevant greenhouse gas emissions likely to be generated by the Project have been considered in the net benefits of the Project (\$1,070 million in net present value terms) in accordance with the current NSW Government methodology.

### **2. Consideration of catchment surface water losses post-mining**

- The post-mining surface water losses for the Project have been calculated using the EIS groundwater model with the same conservative assumptions for predicted losses during mining (e.g. seam to surface fracturing, surface losses do not re-emerge downstream [which would occur in reality]).
- For the post-mining losses, the EIS groundwater model assumes dewatering of mine workings ceases once mining is complete. The model conservatively does not consider underground hydraulic seals in the main headings (as per the current Closure Plan for the Dendrobium Mine). The model accounts for some outflow of groundwater via the Illawarra Escarpment (i.e. based on the hydraulic conductivity properties of the outcropping coal seam and other geology of the Escarpment) – as would have occurred pre-mining.
- The model predicts that groundwater levels would slowly recover post-mining and predicts ongoing surface water losses post-mining, with surface water losses decreasing as groundwater levels recover.
- This (slow recovery of groundwater) would occur even if it is agreed with Government and other stakeholders not to seal the mine (e.g. beneficial use of water stored in the underground workings by 3<sup>rd</sup> parties following the cessation of mining may be a preferred scenario), as re-pressurisation of the Hawkesbury Sandstone above Area 3 longwalls is already being recorded by groundwater monitoring bores following the completion of mining despite the ongoing dewatering of the mine workings.
- Post-mining surface water losses were predicted using the EIS groundwater model out to the year 2150. At 2150 the modelled losses are 355 ML/annum, which represents a negligible loss at the catchment scale.
- The predicted post-mining surface water losses were provided to Government, and the 2150 rate of loss was then extended for another 170 years (i.e. to the year 2319) to calculate the value of the surface water offsets for the Project based on the IPART retail price (1 in 10 years 'drought' price and 9 in 10 years 'non-drought' price).

### 3. Consideration of alternative mine layouts

- Alternative mine plans have been considered that may result in negligible surface water losses (i.e. 163 m panel width as per the Metropolitan Mine), however, these mine plans are uneconomic for the Project as confirmed by DPIE's independent mine planning report (the MineCraft Report). It is noted that:
  - The direct negative impact of the "no Project" scenario is the loss of approximately \$1,070 million (in net present value terms) in net benefits to NSW.
  - The indirect negative impacts of the "no Project" scenario are an estimated loss to the Australian economy as a whole of up to \$10.7 billion per year, with a large share of this loss falling directly on the Wollongong regional economy, as reported by DPIE's independent economic review (the BAEconomics Report).
- It is noted that adverse environmental impacts at the surface are still anticipated for reduced longwall widths down to approximately 150 m (i.e. strains due to the valley-related effects would still be sufficient to result in fracturing of rockbars, pools and bedrock above and adjacent to the longwalls).
- This is supported by the conclusions of the IAP (Conclusion 1):

*At Dendrobium Mine, longwall panel width is not the key control when considering environmental impacts on natural surface features due to mining-induced non-conventional subsidence, in particular, valley closure. This is because environmental impacts due to non-conventional surface subsidence start to plateau at longwall panel widths that are reported to be too narrow to be economic at Dendrobium Mine.*

- In regard to surface water losses, WaterNSW requested analysis of predicted surface water losses at alternative panel widths between 305 m and 150 m.
  - The MineCraft Report demonstrates significant loss of Project value for all panel widths less than 305 m, estimated in the order of \$100 million (in net present value terms) per 25 m reduction in panel width.
  - An extensive number of studies have been completed to develop methodologies to predict surface water losses, none of which provide a definitive approach.
  - Estimating surface water losses for panel widths less than 305 m will be inherently uncertain – unless a precautionary approach is adopted as per the Project modelling and seam to surface fracturing is assumed.
  - For example, investigations of the overburden above Dendrobium Area 3A Longwalls 6 and 7, which had panel widths of 249 m, indicated a fracture network developed from the seam to the surface as a result of mining.
  - Therefore, for panel widths of 250 m (and potentially lower) it is reasonable to expect that a precautionary approach to height of fracturing would be required. This would result in no material benefit with respect to surface water loss (which would require offsetting) but a negative impact of \$200 million in Project value.
- South32 has addressed the predicted surface water losses for the Project via the proposal to offset surface water losses to ensure the Project is a net contributor to the Metropolitan water supplies.
  - Based on the conservative groundwater modelling, the estimated value of South32's proposed offsets during the mine life is \$89.5 million.
  - An up-front payment of \$17.3 million (in net present value terms) is proposed for post-mining surface water losses (note this value has been updated from the \$16.7 million in the recommended conditions [Appendix 5] after DPIE advised South32 of a revised calculation of the up-front payment to account for post-mining losses). South32 has accepted this revised calculation.
  - The Government can use the funding provided by the indirect offsets to invest in water security and supply projects that will have intergenerational benefits.
- It is noted that in regard to the proposed surface water offsets, the IAP considers:

*The conservative approach by the Proponent to assume connective fracturing to surface and to utilise offsets and compensatory provisions for impacts in the Sydney Water Catchment is a pragmatic means of setting performance measures that are consistent with the recommendation of the IEPMC<sup>(1)</sup> ..."*  
(Conclusion 6)

*... [surface water loss] is not a central issue if the proposal for compensation for water loss is accepted.*  
(page 27)

- The NSW Government Minister for Water has accepted the proposed compensation for predicted surface water losses during the life of the Project and post-mining, with payments to be made under the terms of a Planning Agreement with the Planning Secretary and Minister for Water (should the Project be approved).

#### **4. Consideration of post-mining impacts on water quality and the NorBE Test**

- The *State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011* (the Sydney Drinking Water Catchment SEPP) requires the consent authority (i.e. the IPC or the Minister) for the Project to be satisfied that the carrying out of the Project would have a neutral or beneficial effect on water quality.
- As described in the EIS and Submissions Report, no material impacts to drinking water supplies are predicted as a result of localised impacts to water quality (i.e. potential increases in iron and manganese concentrations) as a result of streambed cracking.
- This conclusion is based on measurements from existing mining operations in the catchment, including Dendrobium Mine, and is supported by the findings of previous studies.
- Additionally, the IEPMC in its Part 2 Report states:

*Although surface fracturing elevates metal loads in watercourses, there is no evidence that mining in the Special Areas is currently compromising the ability of WaterNSW to meet raw water supply agreement standards.*

- It is noted that localised changes in metal concentrations have also been observed to occur naturally in the drainage lines that overlie Areas 5 and 6 (refer to Section 5.4 of the Surface Water Assessment [Appendix C of the EIS]).
- Post-mining, recovery of groundwater levels may result in upward fluxes from the deeper groundwater system with the potential for this groundwater to contribute to baseflow and associated interaction with surface water, although the rate of any upward flux is expected to be negligible compared to rainfall recharge and lateral groundwater fluxes. Therefore, the effect of any upward flux to surface water quality is expected to be negligible. This is supported by the previous observations of the lack of noticeable effects to water quality following the more than 100 years of mining that has occurred in the catchment to date.
- Professor Chris Fell (2014)<sup>1</sup> and WaterNSW and OEH (2015)<sup>2</sup> identified that sedimentation (rather than metal concentration) is a key parameter of concern to drinking water supplies.
- South32 has therefore proposed a number of additional water quality improvement actions to target sedimentation control (rather than localised increases in concentrations of metals, as these have not been observed to compromise WaterNSW's ability to meet raw water standards) (refer to Appendix 5 of the recommended approval conditions for the Project).
- Proposed actions include transfer of South32-owned land (28.5 hectares) within the Metropolitan Special Area to WaterNSW (i.e. so that public access to this land can be restricted and this area managed as part of the Special Catchment Area), and funding of water quality improvement works within the Special Catchment Area (to be included as part of the Planning Agreement with the Planning Secretary and Minister for Water).
- While the proposed offsets are not "like for like", they offset potential impacts of localised spikes in metal concentrations from Project-related subsidence (which are not identified as priority parameters by WaterNSW) with funding of works/transfer of land targeting sedimentation (which is identified as a key parameter of concern).
- It is noted clause 11A of the Sydney Drinking Water Catchment SEPP states:

*11A Neutral or beneficial effect on water quality—continuing development*

- (1) *This clause applies for the purposes of determining under this Policy whether the carrying out of continuing development on land in the Sydney drinking water catchment would have a neutral or beneficial effect on water quality.*

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<sup>1</sup> Fell, C (2014). *Water Treatment and Sydney Catchment*. Discussion Paper for Office of NSW Chief Scientist and Engineer, May 2014.

<sup>2</sup> WaterNSW and Office of Environment and Heritage (2015). *Special Areas Strategic Plan of Management 2015*.

(2) *Continuing development is any development (such as mining) for which development consent was limited to the carrying out of the development for a particular time or to a particular area or intensity, but which was likely to be the subject of future applications for consent for its extension or expansion.*

(3) *If:*

a) *development consent was granted for continuing development ("the existing development consent"), and*

b) *a development application is made for consent to extend or expand the carrying out of the development ("the proposed development"), and*

c) *the development application is made before the authority conferred by the existing development consent expires or is exhausted,*

*the carrying out of the proposed development will have a neutral or beneficial effect on water quality if it will have the same or a lesser adverse impact on water quality when compared to the adverse impact that the continuing development would have if it were extended or expanded under similar conditions as the existing development consent.*

(4) *Subclause (3) extends to an existing development consent that is to be surrendered if consent is granted on the determination of the development application.*

(5) *In this clause, a reference to an existing development consent includes a reference to a project approved under Part 3A of the Act before its repeal (or granted after its repeal pursuant to Schedule 6A to the Act).*

- Continuing development is "any development (such as mining) for which development consent was limited to the carrying out of the development for a particular time or to a particular area or intensity, but which was likely to be the subject of future applications for consent for its extension or expansion". Dendrobium is clearly a development for which consent was granted for the mining of an area for a particular time and for which a development consent is now being sort for its extension and expansion.
- This is supported by South32's confirmation that there has long been an intention to pursue approval to extract coal from Areas 5 and 6 (including prior to the approval of the Dendrobium Mine in 2001), noting:
  - Exploration drilling of the areas was originally undertaken in the 1960s and 1970s and demonstrated the metallurgical coal resources in Areas 5 and 6.
  - Consolidated Coal Lease (CCL) 768 has been held since 29 October 1991 (which covers the approved Areas 1, 2, 3A and 3B as well as proposed Area 5 and Area 6 for the Project).
  - BHP Group (South32's predecessor) publicly reported coal resources and reserves in Areas 5 and 6 in its Annual Report in 2004 (and within internal resource reports prior to this).
  - BHP Group re-commenced exploration activities in Areas 5 and 6 in 2009, with these exploration activities continuing to the present day.
  - South32 (and formerly BHP Group) has entered into long-term agreements (including agreements which extend beyond the current Dendrobium Mine approval) regarding the supply of coal to BlueScope and the ongoing use of the Kemira Valley Railway, which necessitates the need for the Project to maintain continuity of supply from the Dendrobium Mine.
  - Public consultation specific to the Project commenced in 2016, some 14 years before the end of approved mining operations of the Dendrobium Mine.
- Schedule 3, Condition 3 of the existing Dendrobium Mine Development Consent (DA 60-03-2001) states in regard to water quality:

*The Applicant must ensure the development does not result in reduction (other than negligible reduction) in the quality or quantity of surface water or groundwater inflows to Lake Cordeaux or Lake Avon or surface water inflow to the Cordeaux River at its confluence with Wongawilli Creek, to the satisfaction of the Secretary.*

- It is noted that a similar condition has been imposed in the recommended Development Consent for the Project (Condition C1), therefore, the Project would be expected to continue to comply with such a condition given:
  - Studies and audits to date indicate the Dendrobium Mine complies with this condition.
  - Studies conducted for the Project indicate there would continue to be no greater than negligible reduction in the water quality in the Avon and Cordeaux Reservoirs.

- Notwithstanding the above, given the proposed water quality offsets, the Project would satisfy the NorBE test even in the absence of clause 11A of the Sydney Drinking Water Catchment SEPP applying to it (i.e. if the view was taken that it was not "continuing development").
- This is supported by the Surface Water Assessment (Appendix C of the EIS), which concluded (with no reference to the Project being "continuing development" and that clause 11A applied to it) that the Project would have a net neutral or beneficial effect on surface water quality.
- In summary, the NorBE test is considered satisfied, regardless of whether or not the project is "continuing development", given:
  - The Project subsidence-related impacts to water quality can be considered environmentally neutral, given spikes in metal concentrations occur naturally in the catchment, and the lack of evidence that localised effects to date have resulted in adverse impacts to drinking water supplies.
  - The proposed Project water quality offsets will be beneficial to water quality in the catchment.