

**DENDROBIUM AREA 3C
LONGWALLS 22 & 23 SUBSIDENCE MANAGEMENT PLAN
Reasons for Approval**

DEVELOPMENT CONSENT

- The Dendrobium Coal Mine was approved by the then Minister for Planning in 2001 following a Commission of Inquiry and was subsequently modified by a later Minister for Planning in December 2008.
- The existing development consent expressly allows longwall coal mining in mining Areas 1, 2, 3A, 3B and 3C. Longwall mining has already occurred in Areas 1, 2, 3A and 3B. Longwall mining has not yet commenced in Area 3C.
- While mining in Area 3C (including the area covered by Longwalls (LWs) 22 and 23) is already approved, the development consent requires a Subsidence Management Plan (SMP) to be submitted and approved before any longwall mining can occur.

BACKGROUND

- The mine layout proposed by South32 Illawarra Coal (South32) for Area 3C to date includes four longwalls (i.e. LWs 20, 21, 22 and 23).
- The Department approved a SMP for LW 21 on 19 December 2019. In approving the SMP for LW 21, the Department specified performance measures that apply to all of Area 3C.
- The Department did not approve LW 20 due to the elevated risks associated with longwall mining immediately adjacent and parallel to Wongawilli Creek. For any approval of LW 20, additional information and independent expert advice is to be provided.

SMP APPLICATION

- South32 applied for approval of a SMP for Area 3C LWs 22 and 23 on 8 September 2021.
- In addition to the SMP itself, conditions of consent require that the SMP integrates two other more detailed plans, including a Watercourse Impact Monitoring, Management and Contingency Plan (WIMMCP) and a Swamp Impact Monitoring, Management and Contingency Plan (SIMMCP). Each of these plans also contains a Trigger, Action, Response Plan (TARP). Most of the detailed monitoring, management, remediation and contingency measures applicable under the SMP are contained within the WIMMCP and SIMMCP and their associated TARPs. The WIMMCP and SIMMCP contained in the LWs 22 and 23 SMP apply to mining in all of Area 3C.

KEY MINING PARAMETERS

- Both LWs 22 and 23 would be orientated generally east-west between Lake Cordeaux and Wongawilli Creek, north of LW 21 (see **Figure 1**).
- The proposed total void length for LW 22 is 2,561 metres (m) and for LW 23 is 2,283 m. The proposed maximum void width (including first workings) is 305 m for both longwalls, with maximum extraction heights of 3.9 m. The depths of cover to the Wongawilli Seam vary between 290 m along a tributary to Lake Cordeaux above the commencing (i.e.. eastern) end of LW 23, and 390 m along the ridgeline above the LW 23 maingate.

KEY LIMITS UNDER EXISTING CONSENT

- The key matters for consideration by the Department in determining whether to approve the SMP application are whether South32 can meet the following conditions of consent (DA 60-03-2001):
 - *underground mining operations do not cause subsidence impacts at ... Wongawilli Creek other than "minor impacts" (such as minor fracturing, gas release, iron staining and minor impacts on water flows, water levels and water quality) (condition 2, Schedule 3); and*
 - *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 surface water inflow to the Cordeaux River at its confluence with Wongawilli Creek (condition 3, Schedule 3).*

CONSIDERATION BY AGENCIES

- The Department sought review of the SMP application and advice from WaterNSW; the Department's Biodiversity, Conservation and Science Directorate (BCS); the Resources Regulator (RR); Dams Safety NSW; and Mine Exploration and Geoscience (MEG).
- Detailed advice was received from WaterNSW, BCS and the Resources Regulator and short responses indicating limited or no interest from the other two agencies. These were forwarded to South32 for review and response. Residual comments were received from BCS and WaterNSW.
- The Department also held meetings and other discussions with both South32 and WaterNSW.

INDEPENDENT ADVISORY PANEL FOR UNDERGROUND MINING

- On the 26 November 2021, the Department requested that the Independent Advisory Panel for Underground Mining (the Panel) provide advice on the SMP.
- The Panel provided the Department with its advice on 8 March 2022. The Panel's advice included sixteen conclusions and seven recommendations.

KEY ISSUES

Mine Design

- WaterNSW and BSC recommended mine design changes to minimise or avoid subsidence-related impacts to swamps (Swamp 7) and tributaries (LC5 and LC6) located directly above the proposed LWs 22 and 23. The agencies suggested greater setbacks, narrower longwalls, shorter longwalls and/or the adoption of different mining methods (i.e. bord and pillar).
- Both the Department and the Panel have considered these recommendations in detail as part of their assessments of the Dendrobium Extension Project. It has been generally agreed that it was very likely that the narrower panel widths required to achieve significant reductions impacts are too small to make the operation economically viable. Similarly, shortening longwalls or utilising different mining methods are likely to result in an unviable longwall operation.
- The Panel therefore concluded that it "*has no reason for suggesting that the dimensions of LW22 & 23 should be reduced for the purpose of managing impacts on LC5, LC6 and Swamp 7.*"
- The Department agrees with this conclusion.

Setback from Cordeaux Reservoir

- To protect the stored waters within the Cordeaux Reservoir, South32 proposes to setback LWs 22 and 23 by at least 300 m from the full supply level (FSL) of the reservoir.
- The Panel indicated that the primary factors that could potentially enhance permeability or increase hydraulic gradients between the mine workings and stored waters are geological structures and mining-induced fracturing.
- The Groundwater Assessment prepared by Watershed HydroGeo Pty Ltd (Watershed) (Attachment B of the SMP) and the Subsidence Assessment prepared by Mine Subsidence Engineering Consultants (MSEC) (Attachment C of the SMP) describe and map the geological structures in the areas over LWs 22 and 23.
- BCS and WaterNSW considered that the mapping of geological structures in the vicinity of the proposed longwalls was misleading and that the consideration of the impacts of such structures was inadequate. The Panel disagreed with this view stating that it "*does not believe the mapping to be misleading or deficient*".
- Watershed indicated that the mapping was based on a range of databases and substantial historic and recent exploration by South32 geologists. Watershed confirmed that there is no strong evidence suggesting that there are any major lineaments or other geological structures within the extents of the proposed longwalls that would be considered a significant risk pathway for LWs 22 and 23.
- The Panel accepted this outcome, stating that "*the potential for hydraulic connections associated with geological structures to extend from the stored waters to the mine workings is very low*".
- The Department agrees and notes that this has been the case for mining in Areas 3A and 3B. The Department considers it is in South32's interest to continue to identify and assess any geological structures that may impact mining.
- In relation to mining-induced fracturing, MSEC has confirmed that there is potential for fracturing to extend to the surface above LWs 22 and 23 that could result in free drainage directly over the longwall workings. Minor and isolated fracturing is also predicted within a distance of approximately 400 m from the proposed mining, however this is considered highly unlikely to be connective fracturing that would result in free drainage.

- The Panel is of the view that *“in the case of a 300 m setback distance for LW22 and 23, mining-induced fracturing is extremely unlikely to result in direct hydraulic connections to the stored waters”*.
- Based on previous experience at Dendrobium, Watershed predicted that subsidence would only result in small increases in the permeability of the strata beyond the immediate mining area. The predicted incremental rate of leakage from the Cordeaux Reservoir is 0.13 ML/d, which is lower than Dams Safety NSW’s prescribed tolerable limit for Lake Cordeaux (1 ML/d).
- The Panel accepted that the modelled reduction in ground water flows to Lake Cordeaux is *“not large”*.
- On the basis of this information on geological structures and mining-induced fracturing, the Panel concluded that *“a minimum set back distance from Cordeaux Reservoir of 300 m is reasonable”*.
- The Department accepts this conclusion.
- The Department notes that South32 has been conducting extensive field studies in the vicinity of the Area 3B longwalls to further validate predictions of permeability and seepage from Avon Reservoir, which is also located 300m from the closest Area 3B longwall. To provide further confidence in the Area 3C predictions, the Panel recommended that *“any approval of the SMP for LW22 & 23 should be conditioned on mining not commencing until predictions of seepage from Avon Reservoir due to mining in Area 3B have been validated to the satisfaction of the Department Secretary and found not to provide a basis for increasing the setback distance of 300 m”*.
- The Department agrees with the Panel and has recommended that South32 be required to prepare a Seepage Validation Report to give it effect.

Setback from Wongawilli Creek

- Under its existing consent, South32 is required to ensure that underground mining operations do not cause subsidence impacts at Wongawilli Creek other than “minor impacts”.
- Wongawilli Creek is located at minimum distances of 345 m and 320 m from the finishing ends of LWs 22 and 23, respectively.
- The Department requested that the Mining Panel provide advice on the appropriateness of these setbacks in relation to the consent condition of “minor impacts”.
- Wongawilli Creek is a 3rd order perennial stream with a small base flow and increased flows for short periods of time after significant rain events. A large number of stream features have been mapped along the section of the creek within 600 m of the proposed longwalls, including 21 rockbars and 22 pools.
- MSEC developed a rock bar model to predict the impact of mining LWs 22 and 23 on Wongawilli Creek. The model has been developed using extensive experience of longwall mining in the Southern Coalfields, including at Dendrobium Coal Mine. The model is based on the potential for “Type 3” impacts, defined as *“fracturing in a rockbar or upstream pool resulting in reduction in standing water level based on current rainfall and surface water flow”*.
- MSEC predicted that the maximum valley closure that would be experienced along Wongawilli Creek would be 190 mm. Based on this level of closure, the rock bar model predicted rate of impact for rockbars along this creek after the extraction of the proposed longwalls is in the order of 6 % (i.e. approximately 1 rockbar). This prediction assumed the future mining of Longwall 20 on the opposite, western, side of Wongawilli Creek. As noted above, mining of LW 20 is not currently approved.
- MSEC’s predictions of valley closure excluding extraction of LW 20 indicate that valley closure associated with extraction of LWs 22 and 23 would be in the order of 80 mm, which is predicted to result in impact to approximately 2% of rockbars. MSEC therefore considered that the likelihood of fracturing resulting in surface water flow diversions along Wongawilli Creek, due to the extraction of the proposed LWs 22 and 23, is low.
- The Panel agrees, indicating that without the extraction of LW 20, the risk of Type 3 impact is *“very low”*.
- The key matter for consideration by the Department is whether this level of impact constitutes “minor impact” as required by the existing development consent. The existing consent defines the minor impact trigger as *“temporary reduction in pool water level in any of the pools being monitored (>20% decline in any pools monitored at similar flows by comparing pre-mining data with post mining data)”*¹.
- The Department agrees with the Panel that a Type 3 impact cannot automatically be classified as a “minor impact” as defined by the development consent. This is illustrated by monitoring results from Pool 43a which is located 200 m from the closest longwall in Area 3A and considered the most impacted of observed pools along Wongawilli Creek at Dendrobium Mine. Even though mining has

¹ As defined in Table 23.2 of the draft SMP for Area 3A.

resulted in cracking of the creek bed (therefore Type 3 impact) the loss in water levels were initially approximately 14% and have subsequently recovered, therefore resulting in no exceedance of the minor impact water level reduction or “temporary” triggers. The Panel state that this example “shows the lack of strong, objective evidence that the relevant approval conditions have been breached”. However, it also illustrates the difficulties interpreting and applying what constitutes “minor impacts”.

- Based on previous experience of mining impacts at Dendrobium and the results of the rock bar model, the Department considers that there is a very low risk of the impacts of mining in LWs 22 and 23 resulting in a breach of the consent condition if LW 20 is not mined.
- The proposed LW 20 is oriented roughly parallel to and located relatively close (125 m) to Wongawilli Creek and is predicted to be the major contributor to predicted valley closure across the creek system. The Department therefore considers there is a greater risk of impacts to Wongawilli Creek from LW 22 and 23 mining if Longwall 20 is also mined. The Panel advised that this “risk includes a significant probability of breach of consent conditions related to pool water levels if impacts cannot be successfully remediated”.
- The Department agrees and therefore considers that the LW 22 and 23 SMP should only be approved if LW 20 is excluded from the Area 3C mine plan.
- The Department considers that the performance indicators for Wongawilli Creek contained in the WIMMCP are extensive and linked to maintaining achievement of the development consent and Area 3C LW 21 SMP approval performance measures. The Panel provided advice on improving the performance indicators, including incorporating pool water loss due to baseflow loss; clarification regarding the primary monitoring sites; and specifying appropriate thresholds for changes in cease-to-flow days, pool water and flow loss. The Department considers these should be addressed in a revised WIMMCP for the LW 22 and 23 SMP approval.

Tributaries

- There are no conditions of consent or performance measures that apply to 1st or 2nd order tributaries located in the vicinity of the approved mining areas.
- Several unnamed 1st and 2nd order tributaries are located directly above and adjacent to the proposed LWs 22 and 23, including two which drain east into Lake Cordeaux (LC5 and LC6) and three which drain west into Wongawilli Creek (WC24A, WC26 and WC26A).
- MSEC predicted that a large portion of these tributaries could experience the full range of subsidence impacts and consequences, including fracturing, flow losses and diversions. The Surface Water Assessment prepared by HGEO Pty Ltd (Attachment E of the SMP) predicted incremental average stream flow losses in LC5 and LC6 due to LW 22 and 23 mining of 6-19% and 6-17% of average flow, respectively.
- WaterNSW considers that performance measures should be set for LC5 and LC6.
- The Panel considered that stream flow performance measures are implicit in the Lake Cordeaux condition requiring no more than negligible losses of flow into or water quality of the lake. On this basis, the Panel advised that it “is not aware of any reason for additional performance measures for LC5 and LC6”.
- South32 has not proposed any measures to protect 1st or 2nd order streams. Instead, its approach has been to recognise the subsidence impacts (particularly streambed cracking) that would result from longwall mining and to offset the surface water lost from the catchment.
- As discussed above, the Department considers that it is a given that any economic mine plan within Area 3C would impact 1st and 2nd order streams, just as it would impact upland swamps.
- The Department therefore considers that the existing condition in the SMP Approval for LW 21, which requires South32 to offset any reduction of surface water reporting to WaterNSW storages or weirs caused by the extraction of Area 3C, should be included in the SMP Approval for LWs 22 and 23.
- The Department can confirm that the NSW Government has endorsed a new surface water licensing and offsetting regime for mines operating in Special Areas, and that it will apply to Area 3C.

Surface Water Losses and Quality

- Under its existing consent, South32 is required to ensure that 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.
- The Groundwater Assessment modelled the predicted surface water losses (including leakages from the reservoirs and baseflow losses across all nearby watercourses) associated with the whole of the mine, as well as incremental losses associated with extraction of LWs 22 and 23. The Panel advised

that the groundwater assessment “provides an adequate basis for assessing the likely groundwater related impacts to the surface water courses, the swamps and the flows to the surface reservoirs”.

- Watershed’s predicted surface water losses are up to 430 ML/yr from all surface water sources and catchments, while the incremental losses due to LWs 22 and 23 across all nearby watercourses is up to approximately 90 ML/yr for each longwall. When comparing these losses on a catchment scale to the operating capacity of Cordeaux Reservoir (93,640 ML), they are very low and likely to be indistinguishable from natural variability in catchment conditions (ie. 0.46% and 0.19%, respectively).
- Based on previous observations, HGEO predicted that subsidence induced fracturing of bedrock within and around watercourses can be likely to result in isolated, episodic pulses in pH, electrical conductivity, iron and other constituents as a result of mining in LWs 22 and 23. However, HGEO concluded that these localised and temporary changes to water quality impacts are likely to result in negligible impacts to water quality of Cordeaux River.
- The Department notes that the Panel agreed with this position in its advice on a previous Dendrobium application², stating that “there is no evidence to date of deterioration of water quality due to the Dendrobium Mine that is significant at catchment scale or detected in reservoirs, except visual impacts due to staining that are expected to reduce over time.”
- On this basis, the Department considers that extraction of LWs 22 and 23 would not compromise South32’s ability to meet the existing consent condition requiring no more than negligible reduction in the water quantity or quality of Lake Cordeaux.

Swamps

- Two swamps (Swamps 7 and 153) are located directly above the proposed LWs 22 and 23 (see **Figure 1**). An additional four swamps (Swamps 9, 154, 155 and 156) are located wholly or partially within the 35° angle of draw line. The largest and most significant of these swamps is Swamp 7 which is located directly over Longwall 23 and covers an area of 4.9 hectares (ha).
- MSEC predicted that Swamps 7 and 153 would experience the full range of subsidence impacts and consequences, including increased ponding, fracturing of the bedrock of the swamps, surface water flow diversions and flow losses. Swamp 9 may also experience fracturing of the bedrock of the swamp due to valley closure.
- The Terrestrial Ecological Assessment prepared by Niche Environment & Heritage Pty Ltd (Niche) (Attachment F of the SMP) predicted that mining of LWs 22 and 23 may result in changes to upland swamp sub-community patterns, swamp boundaries, vegetation communities and threatened species habitat (predominantly for Littlejohn’s Tree Frog), particularly for Swamp 7 and possibly Swamps 9 and 153.
- BCS indicated that it did not support the direct undermining of upland swamp Endangered Ecological Communities.
- The Department notes that the development consent for Dendrobium Mine was modified in April 2015 to allow South32 to provide a Strategic Biodiversity Offset (SBO) having conservation values exceeding those required to meet immediate offsetting requirements prescribed in a condition of an approval (such as an SMP) (condition 15, Schedule 2). In 2016, South32 provided an SBO in the form of 598 ha of land at Maddens Plains to satisfy existing and future offsetting requirements required under the consents for both Dendrobium Mine and its Bulli Seam Operations mines. This large parcel of land contained 140 ha of coastal upland swamp equivalent to those being impacted at Dendrobium. The SBO was secured in perpetuity by transfer to the National Parks Estate.
- The Department has had ongoing discussions and correspondence with South32 regarding precisely what swamp offsets are satisfied by the SBO. The Department confirms that the SBO satisfies offsetting requirements for the swamps in:
 - Areas 3B and 3C identified in Table 3-1 of the SBO; and
 - Areas 3A, 3B and 3C mapped on Figure 1 of the SBO (which cover swamps mapped at the time the SBO was prepared in 2016).
- The Department also confirms that the SBO satisfies impacts to the vegetation communities of the upland swamps, as well as other environmental attributes such as 1st and 2nd order stream and threatened fauna species (including the Littlejohn’s Tree Frog and Red-crowned Toadlet)³.
- The Department notes that Swamps 7 and 9 are listed in Table 3-1 of the SBO and Swamp 153 is shown (although not labelled) on Figure 1 of the SBO. On this basis, the Department considers that the SBO satisfies the offsetting requirements for these swamps.

² Refer to advice on the Dendrobium Mine Extension Project (SSD 8194) dated 20 October 2020.

³ Refer to Tables 3-6 and 3-7 of the SBO.

- The Panel agreed that *“as impacts on Swamp 7 have been offset by the Maddens Plains Strategic Biodiversity Offset, performance measures for Swamp 7 per se are now largely irrelevant”*.
- Three other swamps (Swamps 154, 155 and 156) are located wholly or partially within the 35° angle of draw line and may experience subsidence related impacts. Two of these swamps (Swamps 155 and 156) are shown on Figure 1 of the SBO and, therefore, any impacts to these would be considered to be already offset. However, Swamp 154 is not listed in Table 3-1 or shown on Figure 1 of the SBO, and is therefore not currently offset. The Department has recommended that a subsidence performance measures requiring *“minor environmental consequences”* for this swamp, including:
 - negligible erosion of the surface of the swamp;
 - minor changes to the hydrology of the swamp;
 - minor changes in the size of the swamp;
 - minor change in the ecosystem functionality of the swamp; and
 - maintenance or restoration of the structural integrity of the bedrock base of any significant permanent pool or controlling rockbar within the swamp.
- Consistent with the SMP approval for LW 21, if mining causes an exceedance of this performance measure, South32 would be required to either avoid, remediate or offset (or any combination of these measures) in order to meet the condition requirement.
- The Department notes that this performance measure is already included in the SMP LW 21 approval for Area 3C Swamps 9, 144 and 145. However, as noted by the Panel for Swamp 7, as these swamps are already offset by the SBO (as they are shown on Figure 1), the performance measure is largely irrelevant for these swamps.
- The Department notes that the above approach to offsetting for swamps in Areas 3A, 3B and 3C will apply to existing approved and future proposed mining in Area 3. Therefore, additional swamps offsets, beyond that provided by the land at Maddens Plains, may be required in future.

Transmission Line

- The Avon-to-Macarthur 330 kV transmission line owned by TransGrid crosses directly above the proposed LWs 22 and 23. Four associated transmission towers, including one tension tower (TWR17-21) are located within or adjacent to the 35° angle of draw line.
- MSEC predicts that the transmission line and towers would experience the full range of subsidence which, without mitigation or management, could risk the safety and/or serviceability of this infrastructure.
- The Department notes that there is considerable experience in NSW of successfully managing subsidence impacts on high voltage transmission lines and towers, and that there are obligations under the *Mining Act 1992*, Work Health and Safety legislation and the existing development consent (condition 7, Schedule 3) to ensure this occurs.
- The RR accepted that there are established controls/procedures that can be implemented to control the risks to these features as a result of subsidence, however advised that specific attention is required regarding the undermining of tower TWR17-21 which is considered a critical infrastructure item particularly vulnerable to subsidence. RR indicated secondary extraction is typically kept away from such towers, by leaving coal barriers to provide protection. The RR recommended that either this occurs, or that South32 provide Transgrid with written advice that the tower can be adequately protected by other risk controls (e.g. implementation of a cruciform).
- South32 proposes to follow a similar process to that being implemented for a transmission line and tower located across Longwall 19, involving ongoing consultation with Transgrid regarding the predicted subsidence, impacts, recommended upgrades, monitoring and mitigation strategies.
- Given the critical role of high-tension transmissions and the elevated risks associated with impacting tower TWR17-21, the Panel recommended a performance measure of *“safe and serviceable”* should be applied to the transmission line and that *“extraction of LW22 & 23 should not be permitted to impact the 330 kV transmission line:*
 - without the agreement of the asset owner (TransGrid),*
 - without independent verification that the required mitigation strategies have been developed and implemented, and*
 - without the development of a TARP to monitor the effectiveness of the mitigation strategies and to respond in a timely and effective manner to any adverse deviation from predicted behaviour”*.
- The Department accepts that there are mitigation and management measures that can be implemented to protect critical infrastructure such as the 330 kV transmission line and towers across proposed LWs 22 and 23. The Department largely agrees with the Mining Panel’s recommendations

and accepts they should be applied to the SMP Approval. The Department has not required independent verification as TransGrid has inhouse experts.

Post-mining Groundwater Recovery

- The Panel considered that the groundwater model included in the SMP for LWs 22 and 23 may not adequately represent the long-term groundwater conditions at Dendrobium, particularly in relation to mine roadways which can be highly transmissive connections throughout the mining area.
- South32 confirmed that since the submission of the SMP LWs 22 and 23 application, additional studies have been completed to characterising the post-closure groundwater behaviour and potential water discharge impacts. This included a Mine Closure and Water Management Concepts report prepared by SLR Consulting Australia Pty Ltd (2022) which assessed the viability, location and impacts of mine closure seals and their effects to the groundwater system.
- The Department acknowledges that the long-term management of groundwater discharge to surrounding watercourses and outflow from portals is a critical regional issue that faces all historic and current mining operations in the Southern Coalfields. The Department also notes that the situation would occur irrespective of whether Area 3C is mined.
- The Department recommends that the groundwater modelling be updated to include modelling of post-closure groundwater behaviours considering the proposed bulkhead and sealing options.

OTHER FACTORS

- The Dendrobium Coal Mine remains a significant contributor to regional employment in the Illawarra, with around 400 people working at the mine, and a further 600 people indirectly reliant on the mine.
- The coal extracted from the mine is a key component in the production of a premium coal blend that is used in steel production at the BlueScope Steelworks in Port Kembla, which employs 3,000 people.

EVALUATION AND CONCLUSIONS

- The Department has assessed the application for approval of the SMP in accordance with the relevant requirements of the approved consent and has carefully considered the potential impacts of the extraction of LWs 22 and 23 on the surrounding environment. The Department has carefully considered the matters summarised in the foregoing sections of this report.
- Extraction of coal in LWs 22 and 23 using longwall methods is already approved under the existing development consent, as modified in 2008. This extraction is subject to the performance measures listed in the consent and to the preparation and approval of an SMP.
- The key matters for consideration by the Department in determining whether to approve the SMP application are whether South32 can meet the two relevant conditions contained in the development consent. These are that South32 must ensure, to the satisfaction of the Secretary, that:
 - *underground mining operations do not cause subsidence impacts at ... Wongawilli Creek other than "minor impacts" (such as minor fracturing, gas release, iron staining and minor impacts on water flows, water levels and water quality); and*
 - *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 surface water inflow to the Cordeaux River at its confluence with Wongawilli Creek⁴.*
- The Department considers that LWs 22 and 23 can be extracted, as proposed under the SMP, without exceeding these conditions if LW 20 is not mined in the future.
- Extraction of LWs 22 and 23 would allow recovery of valuable coal resources, using existing infrastructure and without significantly increasing the existing disturbance footprint within the approved project boundary.
- Extraction of LWs 22 and 23 would continue to underpin the wide-ranging benefits for the local and State economies that derive from the continued operation of the Dendrobium Coal Mine and the part that it plays in supporting the wider coal mining and preparation operations of South32 in the Illawarra Region and the coking coal which it provides for consumption at BlueScope's Port Kembla Steelworks and for export via the Port Kembla Coal Terminal.
- On balance, the Department considers that the extraction of LWs 22 and 23 is in the public interest and that the SMP application should be approved, subject to strict conditions as discussed below.

⁴ See conditions 2 and 3, Schedule 3 of consent DA-60-03-2001, as modified.

RECOMMENDED CONDITIONS

- The consent notes that the Secretary may “*impose conditions containing subsidence impact limits, subsidence management mechanisms or other conditions*” on an SMP (condition 8 of Schedule 3).
- The development consent and previous SMP approvals have established a strict regulatory framework, including stringent performance measures and comprehensive monitoring requirements.
- In a similar manner to the SMP approval for LW 21, the proposed SMP approval for LWs 22 and 23 has been divided into two schedules. The first applies to all mining in Area 3C and the second applies to specific longwalls (ie. LWs 21, 22 and 23).
- A key element of the proposed condition which reflects the LW 21 SMP approval is a requirement for South32 to submit revised WIMMCP and SIMMCP documents for Area C which address the Panel’s additional recommendations for monitoring and improvements to performance measures for watercourses and swamps.
- The Department has recommended that the groundwater modelling for the whole of Dendrobium incorporate the recent post-mine closure bulkhead and sealing options proposed to characterise the long-term groundwater behaviour and potential water discharge impacts.
- Consistent with the existing consent and SMP approval for LW 20, the Department has also recommended that South32 be required to “*provide suitable offsets for loss of water quality or loss of water flows to WaterNSW storages*”.
- Specific longwall conditions recommended by the Department include requiring South32:
 - to ensure that no extraction of LW 20, as presented in the LW 20 and 21 SMP 2019 application, occurs;
 - prepare and implement a Seepage Validation Report to present the results of the field studies and permeability/seepage modelling of the strata between Area 3B and the Avon Reservoir, and to confirmation of the appropriateness of the setback of Longwalls 22 and 23 from the Cordeaux Reservoir;
 - prepare and implement a Transmission Line Management Plan to manage potential impacts of mining LWs 22 and 23 on the Avon-to-Macarthur 330 kV transmission line and associated transmission towers.

ONGOING MANAGEMENT

- The Department considers that the additional conditions to be imposed through the SMP approval provide effective safeguards against any significant impacts as a result of the extraction of LWs 22 and 23.
- Mining of LWs 22 and 23 is contingent on no future mining of LW 20.
- The Department also has a role under the *Environmental Planning and Assessment Act 1979* (EP&A Act) to ensure compliance with the existing development consent and subsequent approvals under the consent.
- In undertaking this role, the Department has a range of enforcement powers available to it if it considers that there may have been or may potentially be a breach of the development consent or subsequent approvals under the consent, including but not limited to, requiring further setbacks from key features or the cessation of mining operations if considered necessary.

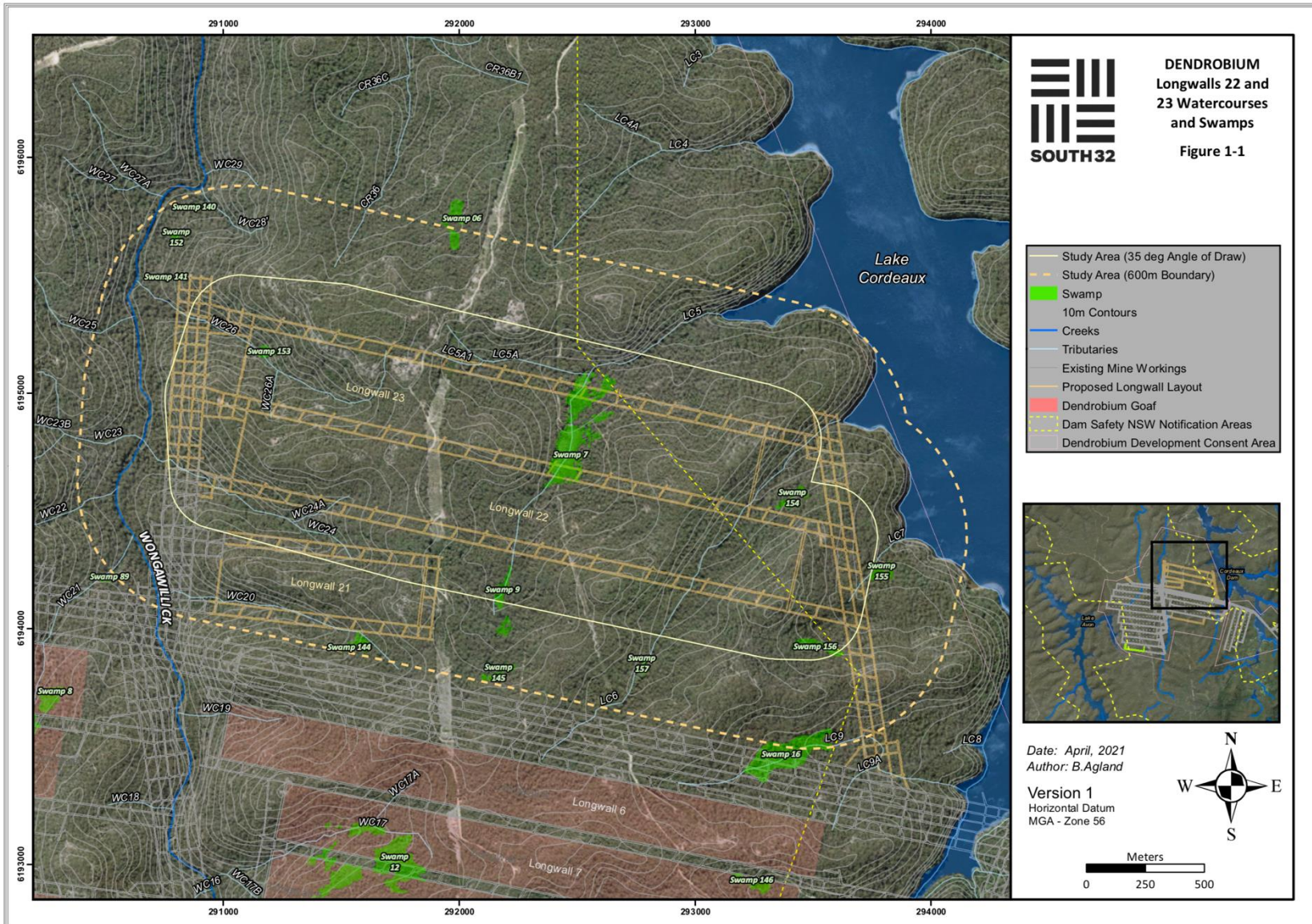


Figure 1: Proposed Longwalls 22 and 23 in Area 3C