

Attachment A- Illawarra Coals response to the recommendations from the Dendrobium IEA

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Sch.2, C1	The Applicant shall implement all reasonable and feasible measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the development.	Some exceedances of monitoring criteria for noise and water quality have been reported during the audit period, but are not considered by the auditor to be as a result of any systematic inadequacy of measures or effort. Stakeholders are claiming Area 3B longwalls may causing significant biodiversity impact to swamps, creeks and catchment yield losses from Special Areas due to inadequacy of the approved TARPs. The suitability of offsets secured by the mine is also being questioned. Refer Subsidence Impact Management	0	Review of Environmental TARPs in full consultation with WaterNSW and DP&E. CMA - Layout for LW13 - 19 may need to be reviewed after TARP review if necessary.	<p>In its advice to the Department of Planning and Environment, the Independent Expert Panel for Mining in the Catchment (27 April 2018) made the following conclusions:</p> <ul style="list-style-type: none"> • The Panel does not have any evidence relating to loss of water that constitutes an exceedance of approval conditions • Modelling of water flows for Longwalls 16 - 18 do not provide strong evidence that there would be a breach of approval conditions <p>Conditions 11 and 12 of the Longwall 16 SMP Approval requires the Swamp and Watercourse Management Plans be revised prior to the extraction of Longwall 15, including updating the TARPs taking into account advice from the Independent Expert Panel.</p>

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Sch.2, C9	The Applicant shall ensure that monitoring programs, management plans and the Environmental Management Strategy, as in existence at the date of modification of consent in November 2008, continue to be implemented (to the satisfaction of the Secretary) until replaced by monitoring programs and management plans approved in accordance with the conditions of this consent.	Monitoring programs, management plans and the Environmental Management Strategy were reviewed following the 2014 IEA and updated as required and continue to be implemented as further discussed against relevant conditions of this approval. However, some areas for review have been suggested in relation to the adequacy of monitoring programs and management plans have been raised by the auditor particularly in relation to Subsidence Management.	0	Refer to ANCs and observations provided against several conditions below.	Noted
Sch.3, C3	The Applicant shall 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.	FY17: Flow and catchment yield modelling assessment indicates that the headwater catchments at sites within DC13, Donald Castle Creek and WC21 have been affected by undermining. Effects are not clearly observed in downstream catchments of both Donald Castle Creek and Wongawilli Creek. The FY17 AR reports a discernible loss of flows along the watercourse LA4, which is a tributary of Lake Avon. The previously determined TARPs have not been triggered, however flow behaviour during Longwall 12 was anomalous, including the occurrence of cease-to-flow conditions, indicative of a mining effect.	0	Review level of impacts to receiving watercourses from impacts to headwater catchments and any need for corrective actions. CMA - review of modelled groundwater leakage losses from Avon & Cordeaux Dams (refer to WaterNSW letter dated 11/9/17) based on time lag analysis between underground water make and rainfall + GW chemistry/age & source analysis to resolve this. CMA Layout for LW13 & 19 may need be reviewed after TARP review if necessary.	Dendrobium Mine has a mature, peer reviewed regional-scale numerical groundwater flow model. Modelled maximum annualised take from Wongawilli Creek is 0.03 ML/d and 0.01 ML/d from Donalds Castle Creek. These are relatively small takes; partly this is due to the distance to Donalds Castle Creek (to the north, beyond Longwall 15) and because of the longwall being set-back from Wongawilli Creek to the east. Incremental surface water take due to

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					<p>Longwall 16, totalled across all watercourses, is approximately 23 ML/yr or 0.06 ML/d.</p> <p>The DPE's independent groundwater expert, Dr Col Mackie, has found that there has been some loss of water, approximately 830 ML per year, into the Dendrobium Mine workings, which may have otherwise reported into catchment dams.</p> <p>The DPE considers that a loss of up to 830ML of rainfall per year into the mine is negligible in comparison to the total capacity of the catchment dams (0.03%) and annual losses from evaporation and environmental flows (0.19%).</p> <p>In December 2015, the DPE published a report on an interagency investigation into the environmental impacts of mining in Area 3B. It concluded that there had been no breach of the</p>

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					<p>conditions or performance criteria in the consent or SMP approval. The vast majority of impacts align with predictions and were expected when mining was approved. For the limited number of impacts that were greater than predicted, DPE has determined it does not consider these to have breached the development consent or SMP conditions. For these impacts, DPE has directed South32 to undertake remediation in accordance with plans approved in consultation with agencies. South32 has committed to doing so, and a Rehabilitation Plan for WC21 and Donalds Castle Creek has been submitted to DPE.</p>
Sch.3, C4	<p>Prior to carrying out any underground mining operations that could cause subsidence in either Area 3A, Area 3B or Area 3C, the Applicant shall prepare a Watercourse Impact Monitoring, Management and Contingency Plan to the</p>	<p>The current approved WIMMCP addresses the requirements of this condition and is applicable to the mining activities undertaken during the reporting period for Longwalls 11 - 13. The results of the Watercourse Impact Monitoring program are reported in detail in the End of Panel Reports and summarised in the Annual Environmental Monitoring Report.</p>	O	<p>CMA – Consider revision of SIMMCP and WIMMCP TARPs with reference to WaterNSW requests (letter to ERM dated 11/09/17) and review against Performance Measures (PM) for Swamps, Watercourses & Water Storages. CMA - Layout for LW13 & 19 may</p>	<p>In its advice to the Department of Planning and Environment, the Independent Expert Panel for Mining in the Catchment (27 April 2018) made the following conclusions:</p> <ul style="list-style-type: none"> • The Panel does not have any evidence

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	<p>satisfaction of the Secretary. Each such Plan must:</p> <p>(a) demonstrate how the subsidence impact limits in conditions 1 - 3 are to be met;</p> <p>(b) include a monitoring program and reporting mechanisms to enable close and ongoing review by the Department and DRE DPI of the subsidence effects and impacts (individual and cumulative) on Wongawilli Creek, Sandy Creek and Sandy Creek Waterfall;</p> <p>(c) include a general monitoring and reporting program addressing surface water levels, water flows, water quality, surface slope and gradient, erodibility, aquatic flora and fauna (including Macquarie Perch, any other threatened aquatic species and their habitats) and ecosystem function;</p> <p>(d) include a management plan for avoiding, minimising, mitigating and remediating impacts on watercourses, which includes a tabular</p>	<p>The Audit team observed examples of subsidence monitoring locations in the field.</p> <p>The Auditor is satisfied that DMD is implementing the approved WIMMCP.</p> <p>Several Corrective Management Actions (CMAs) were triggered during the current audit period by the Dendrobium WIMMCP and TARP which required back filling of surface cracks across fire trails and review of surface water groundwater impacts associated with rock bar cracking, flow path diversion and water quality and storage loss impacts to Avon reservoir and its feeder tributaries.</p> <p>Overall, the approved SMP/SIMMCP/WIMMCPs do not appear to be performing reasonably well in regard to the predicted subsidence and management of impacts. The auditor notes that although the proposed Swamp Research and Rehabilitation Plan (SRRP) and on-going monitoring of impacted features is occurring, it would appear that the approved Swamp and Watercourse TARPS are likely too aggressive to allow a reasonable assessment of actual impacts that allow appropriate responses to occur in a timely manner.</p>		<p>need to be reviewed after TARP review if necessary.</p>	<p>relating to loss of water that constitutes an exceedance of approval conditions</p> <ul style="list-style-type: none"> • Modelling of water flows for Longwalls 16 - 18 do not provide strong evidence that there would be a breach of approval conditions <p>Conditions 11 and 12 of the Longwall 16 SMP Approval requires the Swamp and Watercourse Management Plans be revised prior to the extraction of Longwall 15, including updating the TARPs taking into account advice from the Independent Expert Panel.</p>

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	<p>contingency plan (based on the Trigger Action Response Plan structure) focusing on measures for remediating both predicted and unpredicted impacts;</p> <p>(e) address third and higher order streams individually but address first and second order streams collectively;</p> <p>(f) be prepared in consultation with OEH DECC, SCA and DRE DPI;</p> <p>(g) incorporate means of updating the plan</p>				
Sch.3, C6	<p>Prior to carrying out any underground mining operations that could cause subsidence in either Area 3A, Area 3B or Area 3C, the Applicant shall prepare a Swamp Impact Monitoring, Management and Contingency Plan to the satisfaction of the Secretary. Each such Plan must:</p> <p>(a) demonstrate how the subsidence impact limits in condition 5 are to be met;</p> <p>(b) include a monitoring program and reporting mechanisms to enable close and ongoing review by the Department and DRE DPI of</p>	<p>Refer to Watercourse Impact Management - Condition 4 Subsidence Impact Management Compliance Assessment in Annex B.</p>	O	<p>Refer to Watercourse Impact Management - Condition 4 Recommendations above.</p>	As above

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	<p>the subsidence effects and impacts (individual and cumulative) of each Area 3A longwall on Swamp 15a;</p> <p>(c) include a general monitoring and reporting program addressing surface water levels, near- surface groundwater levels, water quality, surface slope and gradient, erodibility, flora and ecosystem function;</p> <p>(d) include a management plan for avoiding, minimising, mitigating and remediating impacts on swamps, which includes a tabular contingency plan (based on the Trigger Action Response Plan structure) focusing on measures for remediating both predicted and unpredicted impacts;</p> <p>(e) address headwater and valley infill swamps separately and address each swamp individually;</p> <p>(f) be prepared in consultation with OEH DECC, SCA and DRE DPI;</p> <p>(g) incorporate means of updating the plan based on experience gained as mining progresses;</p>				

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	<p>(h) be approved prior to the carrying out of any underground mining operations that could cause subsidence impacts on swamps in the relevant Area; and</p> <p>(i) be implemented to the satisfaction of the Secretary.</p>				
Sch.3, C8	<p>The SMPs prepared under condition 7 for Areas 3B and 3C must:</p> <p>(a) include a mine plan for the relevant Area;</p> <p>(b) include a detailed subsidence impact assessment, clearly setting out all predicted subsidence effects, subsidence impacts and environmental consequences;</p> <p>(c) include a minimum of 2 years of baseline data, collected at appropriate frequency and scale, for all significant natural features;</p> <p>(d) identify and assess the significance of all natural features located within 600 m of the edge of secondary extraction;</p> <p>(e) distinguish between, clearly describe and adequately quantify all</p>	<p>As discussed in the main body of this IEA report, WaterNSW provided some very detailed and specific feedback to the audit process with regard to aspects of SMP and adequacy of TARPs. These were provided to South32 for consideration and considered further in review of relevant compliance conditions.</p>	O	<p>Consider WaterNSW feedback and preparation of a response. Make any necessary changes to current and future SMP and TARPs where deemed appropriate.</p>	<p>Conditions 11 and 12 of the Longwall 16 SMP Approval requires the Swamp and Watercourse Management Plans be revised prior to the extraction of Longwall 15, including updating the TARPs taking into account advice from the Independent Expert Panel.</p> <p>WaterNSW feedback will be considered in the revisions of the SMP and TARPs.</p>

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	<p>subsidence effects, subsidence impacts and environmental consequences; (f) propose limits on subsidence impacts and environmental consequences to be applied within the relevant Area; (g) be otherwise prepared in accordance with any guidelines for SMPs developed by the Department and/or DPI DRE; (h) be approved prior to the carrying out of any underground mining operations that could cause subsidence in the relevant Area; and (i) be implemented to the satisfaction of the Secretary and the DRE Director-General of DPI.</p>				
Sch.3, C10	<p>The Applicant shall include a comprehensive summary, analysis and discussion of the results of monitoring of subsidence effects, subsidence impacts and environmental consequences in each AEMR.</p>	<p>During the document review, it became apparent that that current status of proposed CMAs and SSRP for the Swamps was not clearly described in the AEMR/AR.</p>	O	<p>Include a section in the AEMR/AR providing the status of subsidence impact CMAs (complete or proposed), noting this could be tabulated. A remediation and CMA works register on the website would also assist future auditors.</p>	<p>Noted-In future the AR will include CMA in the subsidence section. AR are available on the website.</p>
Sch.4, C1	<p>The Applicant shall ensure that the noise generated at</p>	FY15:	NC	<p>Continue to implement all reasonable and feasible noise</p>	<p>Noted noise mitigations measures will continue to</p>

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	the surface facilities does not exceed the noise impact assessment criteria in Table 1 at any residence on privately-owned land, or on more than 25% of any privately-owned land. The applicable criteria for any residence not listed in Table 1 shall be the criteria applying at the nearest listed residence.	Four exceedances of the LAeq, 15 minute noise criteria during this period at R39a (two during the day and two during the evening). The source of the exceedances were due to rail movements within KVCLF (train idling) and vehicles working on the stockpile. FY16: There were two exceedances of the LAeq, 15 minute noise criteria during the reporting period at R39a, however the mine noise level remained below the dominant noise (insects, birds and bats).		mitigation measures with a view to ongoing improvement.	be implemented and reviewed.
Sch.4, C12	The Applicant shall ensure all surface water discharges from the surface facilities: (a) meet the relevant ANZECC water quality objectives for the protection of aquatic ecosystems and water quality of existing receiving waters; and (b) comply with the discharge limits (both volume and quality) set for the development in any EPL.	An Oil & Grease exceedance of EPL Water Quality Criteria was appropriately reported during the audit period. The source of the recorded levels was not able to be identified.	NC	No further action required.	Noted
Sch.4, C13	The Applicant shall prepare and implement a Water Management Plan for the surface facilities to the satisfaction of the Secretary. This plan must: (a) be submitted to the Secretary for approval by 30 April 2009;	Inspection of the Dendrobium Pit Top Site identified instances where oil cans / waste oil cans were not being stored in bunded areas. Surface staining was observed in numerous locations on the concrete apron, noting the significant amount of cracking of the apron providing a potential pathway for contamination of underlying soils.	NC	Ensure all oils and chemicals are appropriately stored in contained and covered areas in accordance with the WMP.	Noted – oils to only be stored in designated oily areas. Damaged concrete areas are progressively being resealed.

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	<p>(b) be prepared in consultation with EPA DECC, SCA and NOW DWE by suitably qualified expert/s whose appointment/s have been approved by the Secretary; and</p> <p>(c) include a: Site Water Balance; Erosion and Sediment Control Plan; Surface Water Monitoring Program; and Surface and Ground Water Response Plan.</p>				
Sch.4, C14	<p>The Site Water Balance must:</p> <p>(a) include details of: sources and security of water supply; water use on site; water intercepted by mining operations; water management on site; off-site water transfers and water stored or disposed of underground; reporting procedures; and</p> <p>(b) describe measures to minimise water use by the development.</p>	<p>WaterNSW provided some very detailed and specific feedback to the audit process with regard to the site water balance and associated modelling. This feedback was provided to South32 for consideration.</p>	O	<p>Consider the WaterNSW feedback and preparation of a response. Make any necessary changes to current and future site water balance modelling if deemed necessary.</p>	<p>Dendrobium Mine has a mature, peer reviewed regional-scale numerical groundwater flow model and Total Mine Water Budget.</p> <p>Condition 13 of the Longwall 16 SMP Approval requires the Dendrobium Regional Groundwater Model be revised prior to the extraction of Longwall 15, taking into account advice from the Independent Expert Panel.</p> <p>WaterNSW feedback will be considered in the revisions</p>

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					of the Dendrobium Regional Groundwater Model.
Sch.4, C15	The Erosion and Sediment Control Plan must: (a) be consistent with the requirements of the Managing Urban Stormwater: Soils and Construction Manual (Landcom 2004, or its latest version); (b) identify activities that could cause soil erosion and generate sediment; (c) describe measures to minimise soil erosion and the potential for transport of sediment to downstream waters; (d) describe the location, function, and capacity of erosion and sediment control structures; and (e) describe what measures would be implemented to monitor and maintain the structures over time.	The Erosion and Sediment Control Plan (ESCP) is generally consistent with Landcom 2004, and meets the other requirements of this condition. The ESCP contained in the WMP does not specifically reference or direct requirements for ERSED controls to be in accordance with Landcom, 2004.	O	Ensure any updated ESCP specifically directs that controls are to be designed in accordance with the requirements of Landcom, 2004, or its latest version.	Specific reference to the Urban Stormwater Soils and Construction Manual has been included in the management plan to be resubmitted in July 2018.
Sch.4, C17	The Surface and Ground Water Response Plan must describe what measures and/or procedures would be implemented to: (a) respond to any exceedances of the surface	Trigger Action Response Plans (TARP) updated in Watercourse Impact Monitoring management and Contingency Plan (May 2015); Swamp Remediation and Research Program for Area 3A and 3B still pending approval. The SRRP was updated in August 2016 based on DP&E feedback (dated 29-June 16) and further discussion.	O	Confirm status of SRRP Approval.	To address the Longwall 14-15 SMP Conditions, Revision 1.6 of the Swamp Impact Monitoring Management and Contingency Plan was submitted to the Department of Planning and

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	<p>water, stream health, and groundwater assessment criteria; and (b) mitigate and/or offset any adverse impacts on groundwater dependent ecosystems, aquatic ecosystems or riparian vegetation.</p>				<p>Environment (DPE) as part of the Longwall 16 SMP in October 2017.</p> <p>To address the Longwall 14-15 SMP Conditions, Revision 1.6 of the Watercourse Impact Monitoring Management and Contingency Plan was submitted to DPE as part of the Longwall 16 SMP in October 2017.</p> <p>The Dendrobium Swamp Rehabilitation Research Program (SRRP) was submitted to DPE in July 2015. The DPE wrote to Illawarra Coal June 2016 indicating that the SRRP generally satisfies condition 15 of the SMP approval. A revised SRRP was submitted to DPE August 2016.</p>
Environmental Protection Licence 3241					
L2.1	<p>For each monitoring/discharge point or utilisation area specified in the table\ below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must</p>	<p>Exceedance at Point 5, FY16 AER, oil and grease result over EPL 100 percentile limit. 23 July 2015 – oil and grease of 12mg/L reported through annual return to the EPL and also via the 14 day monitoring report. DRM reported as an unknown source of high reading, no further action required.</p>	NC	No further action required	Noted

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	not exceed the concentration limits specified for that pollutant in the table.				
L2.4	Water and/or Land Concentration Limits [Table]	Exceedance reported at Point 5, FY16 AER as discussed at L2.1 above.	NC	No further action required	Noted
O1.1	Licensed activities must be carried out in a competent manner. This includes: a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.	The auditor observed an area for improvement in relation to housekeeping and storage of waste hydrocarbons at the Dendrobium Mine Pit Top yard and laydown. One example included a skip with oil drums not provided with secondary containment and observed staining in this area. Other oil cans were also seen discarded in an uncontrolled manner. Monitoring reports reviewed reference the relevant conditions.	NC	The auditor observed an area for improvement in relation to housekeeping and storage of waste hydrocarbons at the Dendrobium Mine Pit Top yard and laydown. One example included a skip with oil drums not provided with secondary containment and observed staining in this area. Other oil cans were also seen discarded in an uncontrolled manner.	A project is currently underway to review Dendrobiums storage and laydown areas, this includes removing materials that are non-longer required or could be stored at a more appropriate location (This includes hydrocarbons). A secondary Skip for waste oil cans has been provide adjacent to the workshop (located in an area that drains to an oil separator).
O4.1	All liquid and non-liquid wastes resulting from activities and processes at the Dendrobium Coal Mine must be assessed, classified and managed in accordance with the EPA's Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes (2008), or any other EPA document superseding this guideline.	Refer finding and recommendation for improvement at condition O1.1.	NC	As above	As above

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M2.1	For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified in the other columns:	Non-compliance in AR FY16, monthly sampling of point 6 and point 18 required 12 sampling events, but only 11 samples collected for the year. Missed one monthly sample at each point due to faulty equipment.	NC	No further action required, noting the mine self-reported this as an NC.	Noted
M6.1	For each discharge point or utilisation area specified below, the licensee must monitor: a) the volume of liquids discharged to water or applied to the area; b) the mass of solids applied to the area; c) the mass of pollutants emitted to the air; at the frequency and using the method and units of measure, specified below.	Continuous monitoring of the volume of liquids discharged was undertaken throughout the audit period. The only exception was during some periods of flow monitoring equipment failure.	ANC	No further action is required.	Noted
SMP Approval Compliance Table (Area 3B 2013)					
C6	The Applicant shall prepare and implement a Biodiversity Offset Strategy to the satisfaction of the	No reporting is evident that describes how the remedial actions (CMAs) from the TARP in the previous year are being measured and are the actions succeeding in mitigating the impacts	O	Consider reporting on the performance of CMA in the Annual Reviews.	Noted CMA's will be reported in the AR.

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	<p>Director- General. Initially, the Strategy must compensate for the impacts of Longwalls 9 to 13 on upland swamps and must:</p> <p>(e) propose a process whereby the actual impacts of the development on upland swamps are regularly reviewed (at least every 2 years) against predicted impacts and reported on to all affected agencies, including detailed consideration of the:</p> <ul style="list-style-type: none"> • predictions in the SMP; • performance measures in Table 1; • monitoring results; • application, success and predicted success of measures to mitigate or remediate subsidence impacts 	<p>predicted (refer FY16 AR stating that monitoring indicated TARP actions were required, but no mention in AR FY17 of how those actions performed).</p>			
C9	<p>The Applicant shall ensure that the development does not cause any exceedance of the performance measures in Table 1, to the satisfaction of the Director-General. Table 1: Subsidence Impact Performance Measures</p>	<p>Letter from DP&E to South32 Illawarra Coal (ref: 16/08860; dated: 16/12/2016) states that the DP&E considers the Strategic Biodiversity Offset document fulfils the requirements of this condition and Condition 6 above.</p> <p>Review of detailed monitoring results has focussed on the End of Panel Reports for Longwalls 11 and 12.</p> <p>Letter from WaterNSW to ERM (11/9/17) notes previous correspondence to DP&E that several</p>	O	<p>CMA – review and where necessary consider any necessary revision of SIMMCP and WIMMCP TARPs with reference to WaterNSW requests (letter to ERM dated 11/09/17) and review against PM for Swamps, Watercourses & Water Storages.</p> <p>CMA - Layout for LW13 & 19 may</p>	As above.

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		<p>Performance Measures for Swamps, Watercourses and Water Storage losses have probably been exceeded in Area 3B regardless of TARP triggers indicated in End of Panel Reports and Annual Reviews. Conclusions based on independent expert reviews of available data.</p> <p>Reported impacts summarised below:</p> <p>Swamps Dendrobium Area 3B Longwall 12 End of Panel Report (May 2017) (South32) states that terrestrial ecology monitoring is undertaken at swamps 1, 15B, 15A, 1A, 1B and 5. It reports on page 35 that swamps 1A and 5 have observed a decline of a vegetation community type greater than the comparative data, which the report states is a Level 2 TARP observation. These impacts are reported similarly in the preceding Longwall 11 End of Panel report (page 33) and LW12 where Non-executive Level 3 TARP triggered for Swamps 1a,3,5,10. (Eco-system impact indicator only and not a breach of any Performance Measure). It is noted however, that the approved TARPs allow four consecutive monitoring periods (i.e. years after mining) of decline in swamp size & biodiversity against control swamps before the impact is considered to be > Minor.</p> <p>Watercourses Surface water quality was reported as meeting the approved TARP values for both Donalds Castle and Wongawilli Creeks (End of Panel Report-Longwall 12, page 43) (level 2 and level 1 TARP respectively).End of Panel Reports for longwalls 11 and 12 also report no surface impacts to Donalds Castle or Wongawilli Creeks.</p>		<p>need to be reviewed pending above plan reviews</p>	

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		<p>Sections of Donalds Castle Creek tributaries and WC21 have dried out since undermining. Claiming no impact on downstream creek therefore debatable and require CMA on whether the current approved TARPs adequate for Performance Measure (PM) exceedance assessment.</p> <p>Water storages The End of Panel Report-Longwall 12, page 44) discusses sub catchment approved TARP levels being met however no whole-of-creek magnitude TARPs being reached (when considering the 'overall catchment' of Donalds Castle and Wongawilli Creeks). It also states that flows into the Avon Reservoir are below significant levels (page 33). Estimates of storage losses being negligible in light of independent expert review of groundwater flows to the mine require modelling and impacts to be reviewed. Shallow VWP are considered to be not recording surface water table levels correctly and require verification around Dams.</p>			
C10	<p>Rehabilitation If the Applicant does not meet the performance measures in Table 1, then following consultation with OEH, SCA and DRE, the Director-General may issue the Applicant with a direction in writing to undertake actions or measures to mitigate or remediate subsidence</p>	<p>Two instances of Impact Performance Measure exceedances are identified in the audit against condition 9 (above) in relation to Swamp 5 and Surface water quality for both Donalds Castle and Wongawilli Creeks. However, in interview the Environment Superintendent it was identified there to have not been any exceedances of the performance criteria. Hence, it is the auditors understanding that these exceedances have not been acted upon.</p>	O	As above	As above

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	impacts and/or associated environmental consequences. The Applicant must implement the direction in accordance with its terms and requirements, in consultation with the Director-General and affected agencies.				
C15	<p>The Applicant shall prepare and implement a Swamp Rehabilitation Research Program to the satisfaction of the Director-General. This program must:</p> <p>(a) be prepared in consultation with OEH, SCA and ORE;</p> <p>(b) be submitted by 31 October 2013 to the Director- General for approval;</p> <p>(c) investigate methods to rehabilitate swamps subject to subsidence impacts and environmental consequences within Areas 3A and 3B, with the aim of restoring groundwater levels and groundwater recharge response behaviour to pre-mining levels;</p> <p>(d) establish a field trial (for a 5-year duration or longer)</p>	<p>The Manager Approvals indicated that the DP&E have not yet approved the Swamp Rehabilitation Research Program – Dendrobium Area 3B (August 2016) (SRRP).</p> <p>a) section 3 of the SRRP describes consultation with NSW Government agencies.</p> <p>b) page 2 and section 3 state that a draft report was submitted to DP&E, WaterNSW, OEH and T&I.</p> <p>c) the SRRP contains description of such research activities (section 5).</p> <p>d) SRRP sections 5.8-5.11.</p> <p>e) Dollar (\$) values are quoted as per campaign or per day however a sum total is not expressed.</p> <p>f) section 5.8 only contains a statement referencing that subsequent trials may be required with no schedule outlined.</p>	ANC	<p>Consideration should be given to identifying what is actual expenditure in keeping with the assumed intent of this condition. Establish and document a schedule for subsequent trials, development of work plans and ongoing reporting.</p>	<p>Costs to April 2018:</p> <ul style="list-style-type: none"> • Longwall 9 height of fracture research applicable to swamp rehabilitation \$736k • Piezometer and soil moisture data collection and maintenance \$132k (\$4,000 per month July 2015 – April 2018) • Electrical resistivity studies (Swamp 13) \$40k • Swamp 14 paired monitoring holes \$86k • Swamp 11 paired monitoring holes \$86k • Swamp Rehabilitation Research Trial Swamp 1b: 3 characterisation holes completed to date \$150k

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	<p>for rehabilitation techniques at a swamp or swamps that have been impacted by subsidence;</p> <p>(e) provide for the expenditure of at least \$3.5 million over this period; and</p> <p>(f) include a schedule for subsequent trials, development of work plans and ongoing reporting.</p>				<p>Forecast costs next 12 months:</p> <ul style="list-style-type: none"> • Electrical resistivity studies (Swamps 14 and 1b) \$100k • Giant dragonfly study \$52k <p>Illawarra Coal has commenced research into a regional understanding of the context and cumulative impact of the Dendrobium Mine on populations of Littlejohns tree frog and Giant Dragonfly.</p> <p>A program of electrical resistivity testing was provided to DPE January 2018. The surveys have commenced and will be undertaken in Swamps 1b, 13 and 14 at Dendrobium Mine. The aim of the survey is to detect changes, if any, in subsurface conditions that may be due to changes in saturation and/or rock matrix conditions. The results of the survey will be calibrated with available data from groundwater bores and soil</p>

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					<p>moisture probes located on and near the resistivity transects.</p> <p>The following surveys are proposed:</p> <ul style="list-style-type: none"> • Pre-rehabilitation survey of Swamp 1b • Post-rehabilitation survey of Swamp 1b • 1st baseline pre-mining survey in Swamps 13 (complete) and 14 • 2nd baseline pre-mining survey in Swamps 13 and 14 • 1st post mining survey Longwall 14 • 2nd post mining survey Longwall 15
Statement of Commitments					
SOC3	Subsidence Impact – Avoidance, Mitigation and Rehabilitation If the monitoring program identifies impacts to natural features that exceed those predicted, the following contingent measures will be implemented.	Refer to Annex A3 SMP Compliance conditions above re; Swamp impacts and water quality, and Annex B Subsidence Impact Management Compliance Assessment.	O	Refer SMP Condition 9 above.	
SOC4	Swamp Contingency Plan Prior to the commencement of mining within	Swamp Research and Rehabilitation Plan (SRRP) first submitted to the DPE in May 2013 for regulatory approval, however not yet approved.	O	Confirm status of SRRP Approval.	As above

Item No	Assessment Requirement	Comment	Type	Response/Action	Illawarra Coal Response/Time Frame
	Dendrobium Area 3A, 3B and 3C, Illawarra Coal will prepare a swamp remediation contingency plan for all swamps within each area.	The SRRP was updated in August 2016 based on DP&E feedback (dated 29-June 16) and further discussion.			