

Subsidence Management Plan Approval

I, the Deputy Secretary of the Department of Planning and Environment, under the provisions of the development consent referred to in Schedule 1, approve the development set out in Schedule 2, subject to the conditions set out in Schedule 3.



Marcus Ray
Deputy Secretary
Planning Services
as nominee of the Secretary

Sydney 16 December 2016

SCHEDULE 1

Condition 7 of Schedule 3 of the development consent granted by the Minister for Urban Affairs and Planning on 20 November 2001 for the development of the Dendrobium Coal Mine and the construction and operation of associated surface facilities (DA 60-03-2001).

SCHEDULE 2

Underground mining operations, and associated monitoring, management and remediation, in Area 3B of the Dendrobium Coal Mine.

SCHEDULE 3

Definitions

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|----|-----------------------------------|--|
| 1. | Department | Department of Planning and Environment |
| | DRE | Division of Resources and Energy within the Department of Industry |
| | DSC | Dam Safety Committee |
| | Minor | Not very large, important or serious |
| | Mitigation | Activities associated with reducing the impacts of mining operations prior to or during those impacts occurring |
| | Negligible | Small and unimportant, such as to be not worth considering |
| | NSWET | NSW Environmental Trust |
| | OEH | Office of Environment and Heritage |
| | Remediation | Activities associated with partially or fully repairing or rehabilitating the impacts of mining operations or controlling the environmental consequences of these impacts |
| | Secretary | Secretary of the Department, or nominee |
| | Subsidence Management Plan (2012) | The Subsidence Management Plan prepared by BHP Billiton Illawarra Coal Holdings Pty Limited, Review B; including the attached Watercourse Management Plan, Swamp Management Plan, Groundwater Management Plan and SCA Asset Management Plan; as amended until 1 December 2012. |
| | Subsidence Management Plan (2016) | The Subsidence Management Plan prepared by Illawarra Coal South32 dated 4 March 2016, including Attachments A-U and the Response to Submissions dated 25 August 2016, as amended by the letter and attachments dated 9 November 2016, including the plans DEN-01-6151 Rev 6 and DEN-01-6154 Rev 4. |
| | Water NSW | State Water Corporation of NSW |
2. Subject to the definitions above, the definitions in the development consent DA 60-03-2001 apply to this approval.

Terms of Approval

3. The Applicant must carry out the development generally in accordance with the:
- conditions of consent (DA 60-03-2001);
 - conditions of this approval;
 - Subsidence Management Plan (2012);
 - Subsidence Management Plan (2016); and
 - the Mining Layout Plan.

Note: The Mining Layout Plan is shown in Appendix 1. The plan is a revised version of the initially proposed mining layout. It includes increased setbacks for Longwalls 13 and 14 from Avon Reservoir of 300 and 320m, respectively, and an increased setback for Longwall 14 to avoid directly undermining the downstream section of WC15.

4. If there is any inconsistency with the Subsidence Management Plans, then the conditions of this approval and/or the development consent (DA 60-03-2001) must prevail to the extent of the inconsistency.

Limits on Approval

5. The Applicant must obtain the endorsement of DSC prior to the commencement of the extraction of Longwalls 14 and 15.

Note: DSC may require that the commencement of extraction is set back further from Avon Reservoir.

6. The Applicant must not extract a height of greater than 3.9 metres from the coal seam.
7. The Applicant must obtain the approval of the Secretary prior to the commencement of gateroad development for Longwalls 16 to 18 or the extraction of Longwalls 16 to 18. The Secretary's approval will take into account the:
- documents required to be reviewed or prepared and other measures required to be developed or implemented under the conditions of this approval; and
 - Applicant's performance under the Subsidence Management Plans, the conditions of this approval and the development consent (DA 60-03-2001).

The Secretary's approval under this condition may vary the conditions of this approval or impose additional conditions on this approval.

Biodiversity Offset Strategy

8. The Applicant must prepare a Biodiversity Offset Strategy to the satisfaction of the Secretary. The Strategy must compensate for the impacts of any longwalls in Area 3B on upland swamps and must:
- be prepared in consultation with OEH and Water NSW;
 - be submitted by 31 October 2013 to the Secretary for approval;
 - provide a suitable offset for all predicted impacts of the project on upland swamps;
 - give priority to like-for-like physical environmental offsets, but also consider:
 - measures that result in beneficial effect on water quality, water quantity, aquatic ecosystems and/or the ecological integrity of Water NSW's special areas or water catchments;
 - other potential physical environmental offsets; and
 - potential financial environmental offset contributions payable to a relevant public trust or authority (e.g. the NSWET, OEH or Water NSW), where physical offsets or other measures are unavailable or insufficient to provide a suitable offset;
 - 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:
 - predictions in the Subsidence Management Plans;
 - performance measures in Table 1;
 - monitoring results;
 - application, success and predicted success of measures to mitigate or remediate subsidence impacts and/or associated environmental consequences;
 - predicted and actual long-term impacts; and
 - views of OEH and Water NSW; and
 - propose a process whereby a suitable residual environmental offset is provided where the actual impacts on upland swamps exceed those predicted in the Subsidence Management Plans.

Following approval, the Applicant must implement the strategy.

Strategic Biodiversity Offset

9. The requirements under 6(c), (d) and (f) above can be met through the provision of a Strategic Biodiversity Offset pursuant to condition 15 of Schedule 2 of the development consent (DA 60-03-2001).

Note: The Applicant has proposed to transfer the 'Maddens Plains' site into the National Parks estate as a Strategic Biodiversity Offset for both the Dendrobium Mine and Bulli Seam Operations Project. Following consultation with OEH and Water NSW, the Department has certified the conservation values of the land in the Maddens Plains site.

Security of Offsets

10. Prior to the extraction of Longwall 14, unless otherwise agreed by the Secretary, the Applicant must provide long-term security for any approved offset, to the satisfaction of the Secretary.

Performance Measures for Area 3B

11. The Applicant must ensure that the development does not cause any exceedance of the performance measures in Table 1, to the satisfaction of the Secretary.

Table 1: Subsidence Impact Performance Measures

Swamps	
Swamps 1a, 1b, 5, 8, 11, 14 and 23	Minor environmental consequences including: <ul style="list-style-type: none"> • <i>negligible</i> erosion of the surface of the swamps; • <i>minor</i> changes in the size of the swamps; • <i>minor</i> changes in the ecosystem functionality of the swamp; • <i>no significant</i> change to the composition or distribution of species within the swamp; and • <i>maintenance or restoration</i> of the structural integrity of the bedrock base of any significant permanent pool or controlling rockbar within the swamp.
Swamps 3, 4, 10, 13, 35a and 35b	No significant environmental consequences beyond predictions in the Subsidence Management Plan (2012).
Watercourses	
Waterfall WC-WF54	Negligible environmental consequences including: <ul style="list-style-type: none"> • <i>no</i> rock fall occurs at the waterfall or from its overhang; • <i>no</i> impacts on the structural integrity of the waterfall, its overhang and its pool; • <i>negligible</i> cracking in Wongawilli Creek within 30 m of the waterfall; and • <i>negligible</i> diversion of water from the lip of the waterfall.
Wongawilli Creek Donalds Castle Creek	Minor environmental consequences including: <ul style="list-style-type: none"> • <i>minor</i> fracturing, gas release and iron staining; and • <i>minor</i> impacts on water flows, water levels and water quality.
Water storages	
Avon Reservoir	Negligible environmental consequences including: <ul style="list-style-type: none"> • <i>negligible</i> reduction in the quality or quantity of surface water inflows to the reservoir; • <i>negligible</i> reduction in the quality or quantity of groundwater inflows to the reservoir; and • <i>negligible</i> leakage from the reservoir to underground mine workings.

Notes: These performance measures apply to Longwalls 9 to 15. The Applicant may meet the requirements of this condition either by avoidance, mitigation or remediation. Most swamps and watercourse features are shown on the site and key natural features plan (see Appendix 1).

Rehabilitation

12. If the Applicant does not meet the performance measures in Table 1, then following consultation with OEH, DSC, Water NSW and DRE, the Secretary may issue the Applicant with a direction in writing to undertake actions or measures to mitigate or remediate subsidence impacts and/or associated environmental consequences. The Applicant must implement the direction in accordance with its terms and requirements, in consultation with the Secretary and relevant agencies.

13. The Applicant must undertake remediation programs for WC21 and Donalds Castle Creek, to the satisfaction of the Secretary.

Note: Following consultation with OEH, Water NSW and DRE, the Department has approved a Remediation Program for WC21. The Department has also requested that the Applicant prepare a remediation program for Donalds Castle Creek in consultation with these agencies.

Watercourse Impact Monitoring, Management and Contingency Plan

14. Prior to the extraction of Longwall 14, the Applicant must review the Watercourse Impact Monitoring, Management and Contingency Plan for Area 3B prepared under condition 4 of Schedule 3 of the development consent (DA 60-03-2001) to provide for achievement of the performance measures listed in Table 1 in consultation with Water NSW, to the satisfaction of the Secretary .

Swamp Impact Monitoring, Management and Contingency Plan

15. Prior to the extraction of Longwall 14, the Applicant must review the Swamp Impact Monitoring, Management and Contingency Plan for Area 3B prepared under condition 6 of Schedule 3 of the development consent (DA 60-03-2001) to provide for achievement of the performance measures listed in Table 1 in consultation with Water NSW, to the satisfaction of the Secretary.

Groundwater Model

16. By 31 October 2013, the Applicant must review the Area 3B Groundwater Model to the satisfaction of the Secretary. The revised model must:
 - (a) include detailed consideration of surficial aquifers, swamps and watercourses;
 - (b) include all available data on groundwater levels; and
 - (c) model baseflow contributions for all sub-catchments from baseline (i.e. prior to the extraction of Longwall 9) until 30 years post-mining, using 5-yearly increments.
17. Prior to the extraction of Longwall 14, unless otherwise agreed by the Secretary, the Applicant must review and update the groundwater model to the satisfaction of the Secretary. The updated model must:
 - (a) provide adequate water table contour plots, drawdown plots and pore pressure vertical section plots for predicted and observed conditions;
 - (b) take into consideration the findings of any independent report on groundwater commissioned by the Department, and the report required under condition 18(c) of this approval; and
 - (c) be peer reviewed by a suitably qualified, experienced and independent expert, who is approved by the Secretary.

Groundwater Monitoring and Height of Cracking

18. The Applicant must undertake a comprehensive program of groundwater monitoring and assessment, including:
 - (a) undertaking detailed geotechnical and hydrological investigations of the height of connective cracking in Longwalls 6 to 12, prior to the extraction of Longwall 14;
 - (b) installing a combination of extensometers and multi-level piezometers directly above Longwalls 14 and 15, in consultation with Water NSW and OEH, prior to the extraction of Longwall 14;
 - (c) engaging a suitably qualified, experienced and independent expert, who is approved by the Secretary, to prepare and submit a report to the Department prior to the extraction of Longwall 14, unless otherwise agreed by the Secretary, which includes:
 - a model describing the measured height of connective cracking across Longwalls 6 to 12;
 - detailed predictions of the height of cracking for Longwalls 14 to 18, and associated impacts on sensitive surface features, including watercourses, swamps and Avon Reservoir;
 - an analysis of the extent of surface cracking and potential connections with horizontal partings; and
 - consideration of the findings and recommendations of any independent report on groundwater commissioned by the Department; and
 - (d) undertaking an assessment of the height of connective fracturing and the extent of surface cracking before and after the extraction of Longwalls 14 and 15;to the satisfaction of the Secretary.

Swamp Rehabilitation Research Program

19. The Applicant must prepare and implement a Swamp Rehabilitation Research Program to the satisfaction of the Secretary. This program must:
- (a) be prepared in consultation with OEH, Water NSW and DRE;
 - (b) be submitted by 31 October 2013 to the Secretary for approval;
 - (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;
 - (d) establish a staged field trial (for a 5-year duration or longer) for rehabilitation techniques at swamps that have been impacted by subsidence, commencing with Swamp 1b, including:
 - drilling a series of piezometers adjacent to targeted swamps to characterise groundwater levels and the bedrock fracture network;
 - implementing a trial of directional drilling and grouting underneath targeted swamps;
 - undertaking electrical resistivity tomography surveys before and after rehabilitation attempts at targeted swamps; and
 - undertaking a detailed evaluation of the success of the first stage of the trial, prior to the commencement of further stages;
 - (e) include the engagement of a suitably qualified, experienced and independent expert, who is approved by the Secretary in consultation with OEH, to prepare and submit a report to the Department and OEH on the local and regional impacts of mining at the mine on the Giant Dragonfly and the Littlejohns Tree Frog;
 - (f) include a trial of electrical resistivity tomography before and after the extraction of Longwalls 14 and 15 to detect changes in groundwater near the surface (including Swamps 13 and 14) and at deeper levels, with calibration against piezometer data over time;
 - (g) provide for the expenditure of at least \$3.5 million over the duration of the program; and
 - (h) include a schedule for subsequent trials, development of work plans and ongoing reporting.

Area 3C Mine Layout and Monitoring Program

20. By 30 June 2018, and prior to the commencement of any longwall gateroad development in Area 3C, the Applicant must submit the:
- (a) proposed mine layout and mining geometry for Area 3C; and
 - (b) proposed baseline monitoring program for Area 3C, for approval by the Secretary and DRE.

Independent Environmental Audit

21. The Applicant must ensure that the audit team for the Independent Environmental Audit, required under Condition 6 of Schedule 8 of the development consent (DA 60-03-2001), includes suitable experts in the fields of mine subsidence impacts and remediation, upland swamps, and stream hydrology and water quality; and carries out an extensive audit of the impacts of mining in Area 3B, and the efficacy of the Biodiversity Offset Strategy.

Revision of Environmental Management Strategy

22. Prior to the extraction of Longwall 14, the Applicant must review and revise the Environmental Management Strategy required under condition 1 of Schedule 8 of the development consent (DA 60-03-2001).

Appendix 1: Mining Layout Plan



LEGEND

- EXISTING WORKINGS
- PROPOSED WORKINGS FROM APPROVED PLAN (AS-4101-2012)
- PROPOSED WORKING FOR THIS APPLICATION
- OTHER PROPOSED WORKINGS
- DATA - Based on PRTS Automated Laser Scanner and 1:27 MVSLE Plan
- NOTIFICATION AREA
- SURFACE CONTOUR AND - Based on 2003 Aerial Laser Scanner
- POWER LINES
- ROAD TRACK
- CREEK ORDER - FROM 1 TO 4
- STEEP SLOPES
- CLIFFS
- ARCHAEOLOGICAL SITES
- PROPOSED EXHAUSTION
- TITLE STATUTE RESERVATION
- SHIP LINES
- SWAMP

SCALE IN METRES

Dendrobium Mine
ILLAWARRA COAL
 Cordaxus Road Mount Kembla NSW 2526 Australia
 AHN 85 018 744 088

Drawn	Rev
C. Baker	01/29/18
REV	
APP	
SCALE	

Title	Dendrobium Mine Plan 2 - Surface Features Area 3B Variation for LW's 12 & 13 & Approval LW's 14 to 18 Development Roadways & Extraction
Project No.	DEN-01-6153