

10 May 2016

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Dear Kim

Re: Dendrobium 3B, Longwall 11 End of Panel Report: Cultural Heritage
Project no. 21819

This end of panel report details Aboriginal heritage monitoring results following mining of Longwall 11 in Dendrobium Area 3B. Coal was extracted from Longwall 11 between 18 February 2015 and 26 January 2016. This report includes an impact assessment of Aboriginal archaeological sites within 400 metres of Longwall 11, undertaken three to six months after the subsidence movement at the site, i.e. within three to six months following mining; and compares the impact assessment with the predicted impacts.

This report includes:

- An outline of monitoring programs conducted to date.
- Observed impacts to cultural heritage sites.
- Descriptions of any triggers resulting from Longwall 10 and then the required actions and responses, including relevant sections of the Monitoring Actions and Trigger Action Response Plan (TARP) in the Subsidence Management Plan (SMP).
- Recommendations for any improvements to the monitoring program or Corrective Management Actions (CMAs).

This assessment is based on observations made during the cultural heritage monitoring programs.

Monitoring to date

Biosis Pty Ltd has been commissioned by South 32 to undertake monitoring of cultural heritage sites for Dendrobium Area 3B, Longwalls 11. Section 21 of the SMP describes the program to monitor impacts of subsidence on cultural heritage values in Dendrobium Area 3B. Table 1 provides a summary of the cultural heritage monitoring undertaken for Dendrobium Area 3B.

Table 1: Cultural Heritage Monitoring Program – Dendrobium Area 3B.

AHIMS site number	Site name	Site type	Subject to baseline recording	Monitoring to occur (general schedule only – exact timing may be influenced by site access etc)	Monitoring complete	Monitoring outcomes
52-2-1562	Donald Castle Creek Site 1; Cordeaux Catchment area	Shelter with Art	Yes - Complete	3-6 months following extraction of Longwall 9	-	-
				12 months following extraction of Longwall 9	-	
52-2-1623	Browns Road Site 8	Shelter with Deposit	Yes - Complete	3-6 months following extraction of Longwall 15 and 16	-	-
				12 months following extraction of Longwall 15 and 16	-	
52-2-1626	Browns Road Site 11	Shelter with Art	Yes - Complete	3-6 months following extraction of Longwall 14 and 15	-	-
				12 month following extraction of Longwall 14 and 15	-	
52-2-1627	Browns Road Site 12	Shelter with Art	Yes - Complete	3-6 months following extraction of Longwall 11 and 12	Complete	No impacts observed
				12 months following extraction of Longwall 11 and 12	-	
52-2-1628	Browns Road Site 13	Shelter with Art	Yes - Complete	3-6 months following extraction of Longwall 9	-	-
				12 months following extraction of Longwall 9	-	
52-2-1771	Upper Avon 35	Shelter with Deposit	Yes - Complete	3-6 months following extraction of Longwall 15 and 16	-	-
				12 months following extraction of Longwall 15 and 16	-	
52-2-1772	Upper Avon 36	Shelter with Art	Yes - Complete	3-6 months following extraction of Longwall 18	-	-
				12 months following extraction of Longwall 18	-	
52-2-1773	Upper Avon 37	Shelter with Deposit	Yes - Complete	3-6 months following extraction of Longwall 15	-	-
				12 months following extraction of Longwall 15	-	

AHIMS site number	Site name	Site type	Subject to baseline recording	Monitoring to occur (general schedule only – exact timing may be influenced by site access etc)	Monitoring complete	Monitoring outcomes
52-2-1774	Upper Avon 38	Shelter with Art	Yes - Complete	3-6 months following extraction of Longwall 15	-	-
				12 month following extraction of Longwall 15	-	
52-2-1775	Upper Avon 39	Shelter with Deposit	Yes - Complete	3-6 months following extraction of Longwall 12	-	-
				12 month following extraction of Longwall 12	-	
52-2-1776	Upper Avon 40	Shelter with Art, Shelter with Deposit	Yes - Complete	3-6 months following extraction of Longwall 12	-	-
				12 month following extraction of Longwall 12	-	
52-2-1778	Upper Avon 41	Shelter with Deposit	Yes - Complete	3-6 months following extraction of Longwall 12	-	-
				12 month following extraction of Longwall 12	-	
52-2-2208	Dendrobium 1	Shelter with Deposit	Yes - Complete	3-6 months following extraction of Longwall 9 and 10	Complete	Low impacts observed
				12 month following extraction of Longwall 9 and 10	-	
52-2-2209	Dendrobium 2	Shelter with Art	Yes - Complete	3-6 months following extraction of Longwall 11 and 12	Complete	No impacts observed
				12 month following extraction of Longwall 11 and 12	-	
52-2-2229	SITE 1 - DB1	Shelter with Art	Yes - Complete	3-6 months following extraction of Longwall 13 and 14	-	-
				12 month following extraction of Longwall 13 and 14	-	
52-2-2246	Dendrobium 6	Isolated Artefact	Yes - Complete	3-6 months following extraction of Longwall 16 and 17	-	-
				12 month following extraction of Longwall 16 and 17	-	
52-2-2248	Dendrobium 7	Shelter with Art	Yes - Complete	3-6 months following extraction of Longwall 17 and 18	-	-
				12 month following extraction of Longwall 17 and 18	-	
52-2-3068	Dendrobium 8	Shelter with Art; Grinding Grooves	Yes - Complete	3-6 months following extraction of Longwall 17 and 18	-	-
				12 month following extraction of Longwall 17 and 18	-	

AHIMS site number	Site name	Site type	Subject to baseline recording	Monitoring to occur (general schedule only – exact timing may be influenced by site access etc)	Monitoring complete	Monitoring outcomes
52-2-3640	DM 16	Shelter with Art	Yes - Complete	3-6 months following extraction of Longwall 13 and 14	-	-
				12 month following extraction of Longwall 13 and 14	-	
52-2-3641	DM 17	Shelter with Deposit	Yes - Complete	3-6 months following extraction of Longwall 13	-	-
				12 month following extraction of Longwall 13	-	
52-2-3645	DM 21	Shelter with Art; Shelter with Deposit	Yes - Complete	3-6 months following extraction of Longwall 15 and 16	-	-
				12 month following extraction of Longwall 15 and 16	-	
52-2-3646	DM 22	Shelter with Art	Yes	3-6 months following extraction of Longwall 14	-	-
				12 month following extraction of Longwall 14	-	
52-2-3878	DM 2	Shelter with Deposit	Yes	3-6 months following extraction of Longwall 9 and 10	Complete	No impacts observed
				12 month following extraction of Longwall 9 and 10	-	

The sites included in this assessment are summarised in Table 2.

Table 2: Aboriginal archaeological sites in relation to Longwall 11.

AHIMS number	Site name	Site type	Significance (Biosis Research 2012)
52-2-1627	Browns Road Site 12	Shelter with Art	Moderate
52-2-2209	Dendrobium 2	Shelter with Art	Low

As part of the ongoing monitoring for those sites, inspections have been carried out between March and May 2016 as outlined in Table 3 below.

Table 3: Dates of site inspections for ongoing monitoring of Aboriginal archaeological sites in relation to Longwall 11.

AHIMS Number	Site Name	Monitoring date – Baseline Recording	Monitoring date – Impact Assessment (Longwall11)	Monitoring Date – Impact Assessment (Longwall12)	Monitoring Date – 12 Months Following Mining
52-2-1627	Browns Road Site 12	October 2011	11 March 2016	To be completed	To be completed
52-2-2209	Dendrobium 2	October 2011	6 May 2016	To be completed	To be completed

Observed Impacts – Cultural Heritage

A summary of site inspection and results for Longwall 11 is provided in Table 4 below.

Table 4: Overview of site inspection results for ongoing monitoring of Aboriginal archaeological sites for Longwall 10.

AHIMS #	Site Name	Site Type	Date of Inspection for Longwall 10	Changes Observed
52-2-1627	Browns Road Site 12	Shelter with Art	11 March 2016	None
52-2-2209	Dendrobium 2	Shelter with Art	6 May 2016	None

Summary of Predicted Versus Observed Impacts

A summary of predicted versus observed impacts is provided in Table 5 below.

Table 5: Summary of predicted versus observed impacts.

Site	Predicted Impacts	Observed Impacts
52-2-1627	Possible fracturing and shear movement of strata and rock falls. Impacts to heritage values are unlikely as the shelter has a volume larger than 50 cubic metres and maximum predicted	No observed impacts

Site	Predicted Impacts	Observed Impacts
	subsidence of greater than 300mm. Overall risk of impact is Low.	
52-2-2208	Possible fracturing and shear movement of strata and rock falls. Impacts to heritage values are unlikely as the shelter has a volume larger than 50 cubic metres and maximum predicted subsidence of greater than 300mm. Overall risk of impact is Very Low.	No observed impacts

A review of the predicted subsidence movements and the observed movements has shown that the subsidence resulting from the extraction of Longwall 11 are generally greater than the MSEC predictions (MSEC 2007 and 2012). The reasons for the increased levels of subsidence and updated predictions are provided in MSEC 792 (2015).

No impacts to Browns Road Site 12 (52-2-1627) and Dendrobium 2 (52-2-2209) were observed.

Trigger Action Response Plan (TARPs)

The Trigger Action Response Plan for Dendrobium Area 3B has been used throughout the mining of Longwall 11 to identify and address any issues as they have arisen. The TARPs for cultural heritage are detailed below in Table 6.

Table 6: Revised TARP'S – Aboriginal Archaeology

Monitoring	Trigger	Action	Longwall 11 Outcomes and Actions
<p>Area 3B (23 total):</p> <ul style="list-style-type: none"> • Donald Castle Creek Site 1; Cordeaux Catchment Area (52-2-1562) • Browns Road Site 8 (52-2-1623); • Browns Road Site 11 (52-2-1626); • Browns Road Site 12 (52-2-1627); • Browns Road Site 13 (52-2-1628); • Upper Avon 35 (52-2-1771); • Upper Avon 36 (52-2-1772); • Upper Avon 37 (52-2-1773); 	<p>Level 1*</p> <ul style="list-style-type: none"> • Change in shelter conditions not attributable to natural weathering or preservation – mineral growth or micro-organism growth (as observed by comparing pre-mining photographs with post-subsidence/mining photographs). • Changes external to shelter that affect the sites context – ground cracking, boulder slumping, rock and/or tree falls. 	<ul style="list-style-type: none"> • Continue monitoring program. • Condition assessment and photographic record. • Notify relevant specialists and key stakeholders (e.g. Aboriginal community groups). • Summarise impacts and Report in the End of Panel Report and AEMR. 	<p>Outcome:</p> <ul style="list-style-type: none"> • No observed impact to Aboriginal archaeological sites 52-2-1627 or 52-2-2209. <p>Action:</p> <ul style="list-style-type: none"> • No additional action required for sites 52-2-1627 or 52-2-2209.

<ul style="list-style-type: none">• Upper Avon 38 (52-2-1774);• Upper Avon 39 (52-2-1775);• Upper Avon 40 (52-2-1776);• Upper Avon 41 (52-2-1778);• Dendrobium 1 (52-2-2208);• Dendrobium 2 (52-2-2209);• SITE 1 – DB1 (52-2-2229);• Dendrobium 6 (52-2-2246);• Dendrobium 7 (52-2-2248);• Dendrobium 8 (52-2-3068);• DM16 (52-2-3640);• DM17 (52-2-3641);• DM21 (52-2-3645);• DM22 (52-2-3646); and,• DM2 (52-2-3878). <p>Refer to Dendrobium Area</p>			
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3B SMP Figure 2.1			
	<p>Level 2*</p> <ul style="list-style-type: none"> Change in shelter conditions not attributable to natural weathering or preservation – change in drip line or seepage, cracking or exfoliation of overhang or shelter, movement or opening of existing planes and joints at panel, block fall within shelter or overhang, shelter or overhang collapse. 	<ul style="list-style-type: none"> As above. Modify monitoring program if necessary. Consider development of site management plan to mitigate effects in consultation with Registered Aboriginal Groups and the Landowner (SCA). 	
	<p>Level 3 *</p> <ul style="list-style-type: none"> Level 2 impacts at greater frequency than predicted. Level 2 impacts attributable to mining remote from the mining area. 	<ul style="list-style-type: none"> Actions as stated for Level 2. Immediately notify OEH, DoPI, DPI, SCA, other resource managers and relevant technical specialists and seek advice on any CMA required. Site visits with stakeholders if required. Review monitoring program and modify if necessary within 1 month. Implement increased monitoring if required within 2 weeks. Develop site CMA in consultation with key stakeholders within 1 month, (pending stakeholder availability) and seek approvals. Completion of works following approvals. 	

		<ul style="list-style-type: none">• Issue CMA report within 1 month of works completion.• Conduct initial follow up monitoring & reporting within 2 months of CMA completion.• Review the relevant TARP and Management Plan in consultation with key stakeholders.	
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Conclusion

The inspection of Aboriginal archaeological sites as part of the impact assessment within 400 metres of Longwall 11 (52-2-1627 and 52-2-2209) was undertaken by Biosis Pty Ltd on 11 March and 6 May 2016 to determine any subsidence impacts as a result of the longwall extraction.

The overall risk of impact to site 52-2-1627 was predicted as low, and to sites 52-2-1627 and 52-2-2209 was predicted to be very low. The predicted impacts to these sites correlate with the observed impacts. There are no observed impacts to Aboriginal archaeological site 52-2-1627 or 52-2-2209 as a result of Longwall 11 mining.

It is recommended that:

- The *Dendrobium Coal Mine - Area 3 Aboriginal Heritage Plan* (Biosis Research 2009) continues to be implemented.

Please contact us on the number below if you have any enquiries.

Yours sincerely

A handwritten signature in blue ink, appearing to read "Ana Jakovljevic".

Ana Jakovljevic
Archaeologist
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References

BHP Billiton Illawarra Coal. Dendrobium Area 3B: Subsidence Management Plan (SMP). BHP Billiton Illawarra Coal.

Biosis Research 2007. Dendrobium Area 3 Archaeological and Cultural Heritage Assessment. Unpublished report for BHP Billiton.

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