

17 January 2022

Mr Billy Agland
Specialist Environment
South32 - Illawarra Metallurgical Coal
Cordeaux Colliery
Picton Road, Mount Keira West NSW 2500

Via email: billy.agland@south32.net

Dear Mr Agland,

Re: Dendrobium Colliery Longwall 17 End of Panel Report – Aboriginal Cultural Heritage Assessment (Niche ref #7073)

Niche Environment and Heritage (Niche) has undertaken a site assessment and review of the predicted and observed impacts on Aboriginal cultural heritage sites and their associated values resulting from the extraction of Longwall 17 at Dendrobium Colliery. This assessment was developed for inclusion in the South32 - Illawarra Metallurgical Coal (IMC) End of Panel Report (EoP) for Longwall 17.

There were no impacts recorded at Browns Road Site 8 (AHIMS ID#52-2-1623) and Upper Avon 35 (AHIMS ID#52-2-1771).

Dendrobium 6 (AHIMS ID#52-2-2246) was not inspected as it is an Isolated Artefact and would likely not have been able to be relocated, due to the nature of isolation in a disturbed context. Dendrobium 7 (AHIMS ID#52-2-2248) and Dendrobium 8 (AHIMS ID#52-2-3068) were not inspected during this round of monitoring due to safety concerns as both sites are situated in the Longwall 18 active mining area.

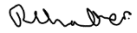
Dendrobium 7 (AHIMS ID#52-2-2248) and Dendrobium 8 (AHIMS ID#52-2-3068) were not inspected during the last assessment conducted for the EoP report for Longwall 16 on the 20 January 2021 due to active mining of Longwall 17.

As a result of this assessment the following is recommended:

Recommendations	
	General
1.	A copy of this report is to be sent to the Registered Aboriginal Parties.
2.	Assessment of Dendrobium 7 (AHIMS ID#52-2-2248) and Dendrobium 8 (AHIMS ID#52-2-3068) to be undertaken during the Longwall 18 End of Panel Aboriginal Cultural Heritage Assessment (ACHA).
3.	Continue monitoring program for remaining longwalls with condition assessment and photographic records as per the Trigger Action Response Plan.

Please do not hesitate to contact me on 0488 744 006 or rchalker@niche-eh.com should you require any further information.

Yours sincerely,



Rebecca Chalker
Heritage Consultant
Niche Environment and Heritage

Important information about this report

Information relating to Aboriginal cultural heritage sites, including some details, images and maps showing the locations of sites, has been redacted from this report at the request of Registered Aboriginal Parties.

1. Aboriginal heritage assessment

1.1 Background and introduction

South32-Illawarra Metallurgical Coal (IMC) commissioned Niche Environment and Heritage (Niche) to conduct an End of Panel (EoP) assessment of the Aboriginal cultural heritage sites within the limit of predicted subsidence effects of Longwall 17 at their Dendrobium Colliery. This area has been defined as the 'Subject Area' and is shown in Figure 1.

This EoP Aboriginal heritage assessment report includes a summary of:

- previous monitoring;
- the results of the Subsidence Report prepared by MSEC;
- the results of a site inspection;
- a discussion; and
- conclusions and recommendations.

Monitoring of Aboriginal archaeological sites at Dendrobium Colliery to-date has been carried out as recommended by Biosis Research (2007 and 2012).

1.2 Subsidence monitoring results summary (MSEC, 2012)

The EoP Subsidence Report for Area 3B, Longwalls 9 - 18 has been prepared by Mine Subsidence Engineering Consultants (MSEC). This assessment includes a comprehensive report which addresses all aspects of the recorded subsidence parameters resulting from longwall extraction. For this assessment, the initial MSEC predictions have been referred to in order to address any potential impacts at the sites.

Specifically, in relation to matters that may affect Aboriginal cultural heritage values, MSEC (Section 5.23.1 Archaeological sites) provides maximum predicted total conventional subsidence, tilt and curvature for the archaeological sites resulting from the extraction of the proposed longwalls (MSEC459). The predictions are outlined in Table 1.

Table 1: Maximum predicted subsidence movements for Aboriginal cultural heritage sites relevant to Longwall 17

Aboriginal site name (AHIMS)	Maximum predicted total conventional subsidence (mm)	Maximum predicted total conventional tilt (mm/m)	Maximum predicted total conventional hogging curvature (km ⁻¹)	Maximum predicted total conventional sagging curvature (km ⁻¹)
Browns Road Site 8 (AHIMS ID# 52-2-1623)	675	7	0.6	0.15
Upper Avon 35 (AHIMS ID# 52-2-1771)	<20	<0.5	<0.01	<0.01
Dendrobium 6 (AHIMS ID# 52-2-2246)	275	7	0.20	0.01

Aboriginal site name (AHIMS)	Maximum predicted total conventional subsidence (mm)	Maximum predicted total conventional tilt (mm/m)	Maximum predicted total conventional hogging curvature (km ⁻¹)	Maximum predicted total conventional sagging curvature (km ⁻¹)
Dendrobium 7 (AHIMS ID# 52-2-2248)	200	6	0.15	0.01
Dendrobium 8 (AHIMS ID# 52-2-3068)	750	20	0.80	0.06

1.3 Site inspection and results

The five Aboriginal cultural heritage sites addressed in this assessment are listed in Table 2 below and shown in Figure 1.

Table 2: Aboriginal cultural heritage sites addressed as part of this assessment

Site Name	AHIMS ID	Site Type	Date Surveyed
Browns Road Site 8	52-2-1623	Shelter with Deposit	23 December 2021
Upper Avon 35	52-2-1771	Shelter with Deposit	23 December 2021
Dendrobium 6	52-2-2246	Isolated Artefact	Not inspected as it is an Isolated Artefact that would not be able to be relocated
Dendrobium 7	52-2-2248	Shelter with Art	Not inspected due to safety reasons- site situated in Longwall 18 active mining area.
Dendrobium 8	52-2-3068	Shelter with Art and Grinding Grooves	Not inspected due to safety reasons- site situated in Longwall 18 active mining area.

The site inspection was carried out on the 23 December 2021 by Rebecca Chalker (Niche – Heritage Consultant), Amy Bradbury (South32) and Aboriginal community representatives, Paul Cummins (Woronora Plateau Gundungara Elders Council), Clint Davis (Wodi Wodi Traditional Owners), Robert Moylan (Coomaditchie United Aboriginal Corporation) and Kiahni Chalker (Cubbitch Barta Native Title Claimants Aboriginal Corporation). A summary of the findings of the site visit are outlined in Sections 1.3.1 to 1.3.5.

Figure 1: Map of AHIMS sites located within the Longwall 17 Subject Area (Source: South32-IMC and AHIMS)

Important information about this report

Information relating to Aboriginal cultural heritage sites, including some details, images and maps showing the locations of sites, has been redacted from this report at the request of Registered Aboriginal Parties.

1.3.1 Browns Road Site 8 (AHIMS ID# 52-2-1623)

This Shelter with Deposit site is located 150 m south of Fire Trail 6Q, approximately 1 km from the junction of Fire Trails 6A and 6Q and 70 m from tributary WC12 (Figure 1). The shelter is located outside the Longwall 17 active mining area due to Longwall 17 being shortened, however the shelter was still assessed for good measure as part of the LW17 EoP ACHA assessment. The sandstone overhang measures 8 x 4.5 x 1.8 m. The site was formed by block fall and cavernous weathering. The floor deposit is light brown loamy sand 0.1m deep. One chert flake was located in the dripline of the shelter when the site was first recorded by Sefton in 1981. This shelter does not contain art. Details are provided in Table 3 and Plates 1-4. Previous monitoring images are provided in Plates 5-6.

Table 3: Summary of the site visit to Browns Road Site 8 (AHIMS ID# 52-2-1623)

AHIMS number	Site name	Results of inspections
52-2-1623	Browns Road Site 8	This Shelter with Deposit site was previously recorded during monitoring by Niche (2020, 2021) for the Longwall 15 and 16 EoP report. During the recent monitoring, no impacts related to the extraction of Longwall 17 were observed. The shelter had a dry interior, and naturally occurring granular loss, exfoliation, mineral efflorescence and microvegetation were observed within the interior. The chert flake noted in the AHIMS site card completed by Sefton during 1981 could not be relocated at the time of the site inspection due to deep leaf litter (Plate 1).

Longwall 17 EoP Monitoring Images	Previous Images from Longwall 16 EoP Monitoring Program
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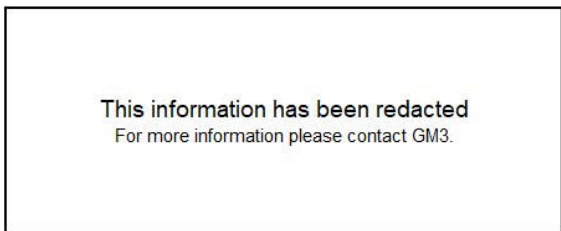
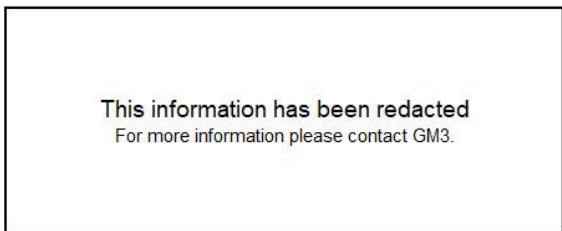


Plate 1: General photo of Browns Road Site 8 facing east, showing the leaf litter covering the interior deposit. Photo taken: 23 December 2021

Plate 2: Comparison photo of Browns Road Site 8, facing east (Niche 2021). Photo taken: 20 January 2021

Longwall 17 EoP Monitoring Images

Previous Images from Longwall 16 EoP Monitoring Program

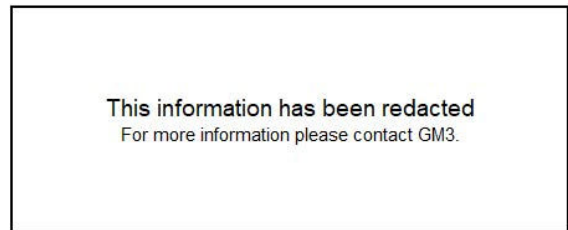
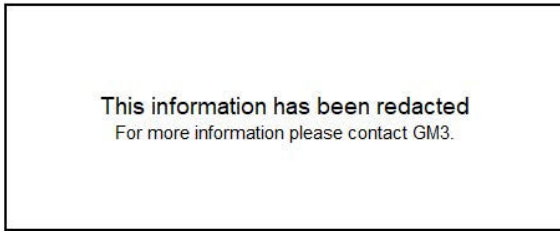
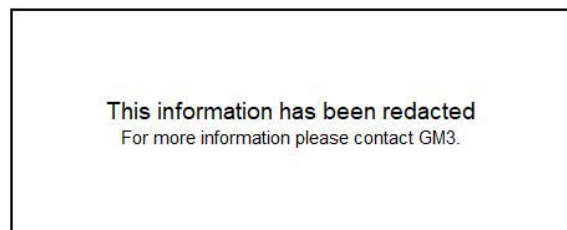
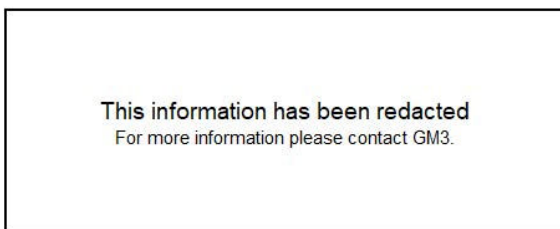


Plate 3: Close up of shelter roof and backwall facing north. Photo taken: 23 December 2021

Plate 4: Comparison photo of shelter roof and back wall, facing north. Taken during monitoring by Niche (2021) for the Longwall 16 EoP report. Photo taken: 20 January 2021



Previous Image from Longwall 15 EoP Monitoring Program

Previous Monitoring Images

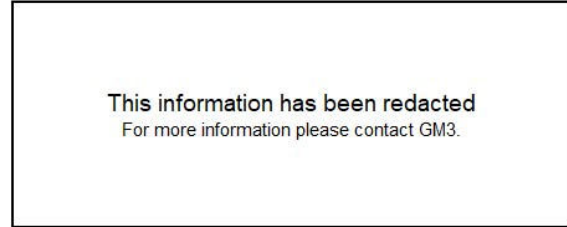
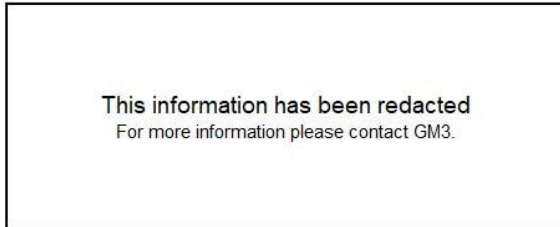


Plate 5: General photo of Browns Road Site 8 facing west showing leaf litter interior covering the deposit. Taken during monitoring by Niche (2020) for Longwall 15 EoP report. Photo taken 15th March 2020

Plate 6: Comparison photograph from the Biosis (2012) Longwall 9- 18 baseline recording showing bedding lines in the back wall of shelter that have remained unchanged.

1.3.2 Upper Avon 35 (AHIMS ID#52-2-1771)

This Shelter with Deposit is located on the eastern side of Lake Avon, 5 m north of LA3 Tributary. The site is approximately 10 m above the stored water of Avon Dam (Figure 1). The sandstone overhang is 15 x 4.5 x 3.5m and the living area is 4 x 1 m. The shelter was formed by block fall, and the floor deposit consists of yellow grey loamy sand, approximately 0.3m deep. During monitoring for the Longwall 15 and 16 End of Panel Reports, nine artefacts were located: one quartzite scraper, one quartz core, two mudstone flakes, one quartzite flake, one mudstone core, one petrified wood flake, one quartz flake and red ochre. The recording noted that this site was in good condition despite continued cavernous weathering with additional disturbance from a wombat burrow. Details are provided in Table 4 and Plates 7-10. Previous monitoring images are provided in Plates 11-12.

Table 4: Summary of the site visit to Upper Avon 35 (AHIMS ID # 52-2-1771)

AHIMS number	Site name	Results of inspections
52-2-1771	Upper Avon 35	This Shelter with Deposit site was previously recorded during the Longwall 9 -18 baseline recording report completed by Biosis (2012) and the Longwall 15 and 16 EoP report completed by Niche (2020,2021). During the recent monitoring, no impacts related to the extraction of Longwall 17 were observed. The shelter had a dry interior, with granular loss, exfoliation and microvegetation observed in its interior. All of the eight (8) artefacts noted in the AHIMS site card recording completed by Biosis (2007) were relocated. Plate 7 to Plate 10 provide a comparison of the Aboriginal cultural heritage site as observed during the previous Longwall 16 EoP Monitoring program and the current Longwall 17 EoP undertaken in Dec 2021.

Longwall 17 EoP Monitoring Images	Previous Image from Longwall 16 EoP Monitoring Program
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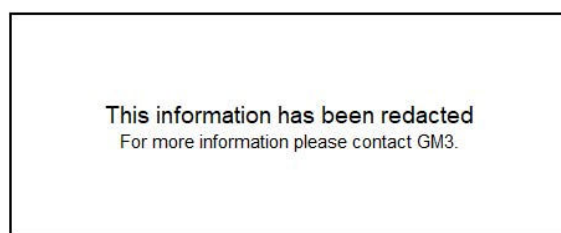
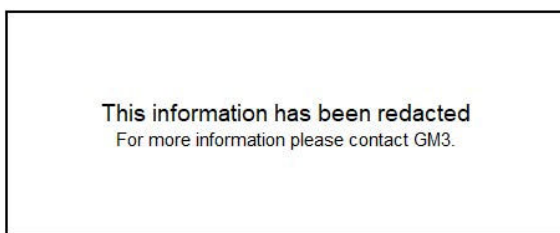


Plate 7: General photo of shelter facing north. Photo taken: 23 December 2021.

Plate 8: Comparison general photo of shelter facing north east, taken during monitoring by Niche (2021) End of Panel 16 reporting. Photo taken: 20 January 2021.

Longwall 17 EoP Monitoring Images

Previous Image from Longwall 16 EoP Monitoring Program

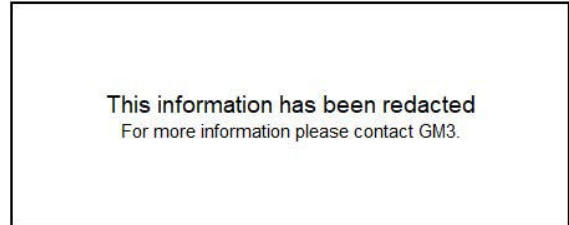
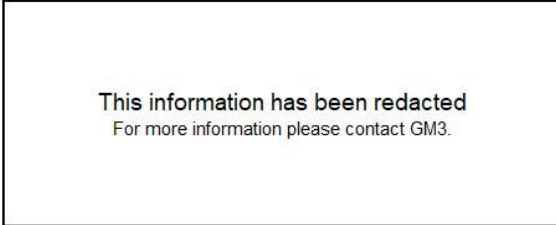


Plate 9: General photo of shelter floor deposit, facing north east. Photo taken: 23 December 2021

Plate 10: General photo of shelter floor, facing north from Niche (2021) monitoring survey for the Longwall 16 End of Panel report. Photo taken: 20 January 2021

Previous Image from Longwall 15 EoP Monitoring Program

Previous Monitoring Images

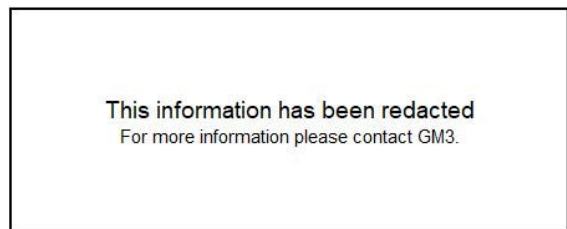
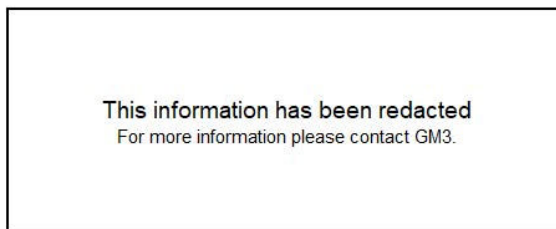


Plate 11: General photo of shelter facing south. Taken during monitoring by Niche (2020) for Longwall 15 EoP report. Photo taken 15th March 2020

Plate 12 Comparison general photo of shelter from Biosis (2012) Longwall 9-18 baseline recording.

1.3.3 Dendrobium 6 (AHIMS #52-2-2246)

Dendrobium 6 is an Isolated Artefact site located on the surface of a vehicle track (Figure 1). The site has experienced some disturbance from the vehicle track and contains a single artefact. This site has little representational rarity value as the isolated artefacts can and do occur virtually anywhere in any landform (Biosis 2012). Details are provided in Table 5.

Table 5: Summary of the site visit to Dendrobium 6 (AHIMS ID# 52-2-2246)

AHIMS number	Site name	Results of inspection
52-2-2246	Dendrobium 6	This Isolated Artefact is a surface find that has a negligible chance of impact from subsidence related effects (Biosis 2012). This site was not inspected during this survey and is not expected to be impacted by the extraction of Longwall 17.

1.3.4 Dendrobium 7 (AHIMS ID#52-2-2248)

This Shelter with Art is situated approximately 19 m south of Longwall 17 and 35 m north of Longwall 18. (Figure 1). Formed by blockfall and cavernous weathering on the mid to lower cliff line outcrop, the shelter comprises a long, narrow sandstone overhang measuring 18 x 1.9 x 1.98 m (Biosis 2012). As Longwall 18 is currently being extracted, this site was unable to be safely visited for the Longwall 17 End of Panel monitoring. Details are provided in Table 6.

Table 6: Summary of the site visit to Dendrobium 7 (AHIMS ID# 52-2-2248)

AHIMS number	Site name	Results of inspections
52-2-2248	Dendrobium 7	This Shelter with Art was unable to be safely visited for the Longwall 17 EoP monitoring, due to the current extraction of Longwall 18.

1.3.5 Dendrobium 8 (AHIMS ID#52-2-3068)

This Shelter with Art is situated approximately 4 m south of Longwall 17 and 50 m north of Longwall 18 (Figure 1). The shelter was formed by blockfall and cavernous weathering on the mid to lower cliff line outcrop. The art within the shelter comprises one indeterminate charcoal with infill motif (Biosis 2012). As Longwall 18 is currently being extracted, this site was unable to be safely visited for the Longwall 17 End of Panel monitoring. Details are provided in Table 7.

Table 7: Summary of the site visit to Dendrobium 8 (AHIMS ID# 52-2-3068)

AHIMS number	Site name	Results of inspections
52-2-3068	Dendrobium 8	This Shelter with Art was unable to be visited safely for the Longwall 17 EoP monitoring, due to the current extraction of Longwall 18.

1.4 Discussion and conclusion

Two (2) out of the five (5) Aboriginal cultural heritage sites were visited during the December 2021 site inspection including Browns Road Site 8 (AHIMS ID# 52-2-1623) and Upper Avon 35 (AHIMS ID#52-2-1771). No impacts were observed at Browns Road Site 8 (AHIMS ID#52-2-1623) or Upper Avon 35 (AHIMS ID#52-2-1771).

Aboriginal cultural heritage sites Dendrobium 7 (AHIMS ID#52-2-2248) and Dendrobium 8 (AHIMS ID#52-2-3068) were not inspected due to safety concerns related to the ongoing extraction of Longwall 18.

Dendrobium 6 (AHIMS ID#52-2-2246) consists of an Isolated Artefact. Its isolated nature in a disturbed context means that relocation during the current site inspection was not considered likely and the site was therefore not inspected during the current assessment.

The Trigger Action Response Plan (TARP) (Table 8) contains the Performance Measures along with the proposed Corrective Management Actions (CMA) for Aboriginal cultural heritage sites, as outlined in the Dendrobium Area 3B Subsidence Management Plan (SMP). As per the TARP performance measures, Browns Road Site 8 (AHIMS ID#52-2-1623), Upper Avon 35 (AHIMS ID#52-2-1771), Dendrobium 6 (AHIMS ID#52-2-2246), Dendrobium7 (AHIMS ID#52-2-2248), Dendrobium 8 (AHIMS ID#52-2-3068) do not trigger CMAs.

Table 8: Dendrobium Approval Performance Measures Table - Trigger Action Response Plan (TARP)

Feature	Performance Measures	Observations	Actions as a result of performance measure rating
Browns Road Site 8 (AHIMS ID#52-2-1623) Upper Avon 35 (AHIMS ID#52-2-1771) Dendrobium 6 (AHIMS ID#52-2-2246) Dendrobium7* (AHIMS ID#52-2-2248) Dendrobium 8* (AHIMS ID#52-2-3068) <i>* Sites not visited due to safety reasons</i>	Observational and photographic monitoring in consultation with stakeholders (completed by this assessment).	Any changes attributable to natural weathering such as macro vegetation growth and exfoliation.	None.
None identified	Level 1 Change in shelter conditions not attributable to natural weathering or preservation- mineral growth of micro-organism growth (as observed by comparing pre-mining photographs with post-subsidence/ mining photographs). Changes external to the shelter that affect the site context (e.g. ground cracking, boulder slumping, rock and/or tree falls).	N/A.	N/A.

Feature	Performance Measures	Observations	Actions as a result of performance measure rating
<i>None identified</i>	<p>Level 2</p> <p>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 in panel, block fall within shelter or overhang, shelter or overhang collapse.</p>	N/A.	N/A.
<i>None identified</i>	<p>Level 3</p> <p>Level 2 impacts at greater frequency than predicted.</p> <p>Level 2 impacts attributable to mining remote from the mining area.</p>	N/A.	N/A.

As a result of this assessment, the recommendations are outlined in Table 9:

Table 9: Recommendations for Aboriginal sites within the Subject Area.

Recommendations	
	General
1.	A copy of this report is to be sent to the Registered Aboriginal Parties.
2.	Assessment of Dendrobium 7 (AHIMS ID#52-2-2248) and Dendrobium 8 (AHIMS ID#52-2-3068) to be undertaken during the Longwall 18 End of Panel ACHA assessment.
3.	South32 IMC should continue the monitoring program for the remaining longwalls with condition assessment and photographic records as per the TARP.

References

BHP Billiton Illawarra Coal (2007), *Dendrobium Area 3B: Subsidence Management Plan*. An unpublished report for DPI.

Biosis Research (2007), *Dendrobium Area 3 Archaeological and Cultural Heritage Assessment*. An unpublished report for BHP Billiton Illawarra Coal.

Biosis Research (2012), *Dendrobium Area 3B Longwalls 9 to 18: Aboriginal Cultural Heritage Assessment Report*. An unpublished report for BHP Billiton Illawarra Coal.

MSEC (2012). *Dendrobium Area 3B – Longwalls 9 to 18 –Subsidence Predictions and Impact Assessments for Natural Features and Surface Infrastructure in Support of the SMP Application*.

Niche Environment and Heritage (2020), *Dendrobium Colliery Longwall 15 End of Panel Report - Aboriginal Heritage Assessment*. An unpublished report for South 32 Illawarra Coal.

Niche Environment and Heritage (2021), *Dendrobium Colliery Longwall 16 End of Panel Report - Aboriginal Heritage Assessment*. An unpublished report for South 32 Illawarra Coal.