

28 August 2023

Mr Josh Carlon
South 32 Illawarra Metallurgical Coal
Cordeaux Colliery
Cordeaux NSW 2526
Via email: josh.carlon@south32.net

Dear Mr Carlon,

**Re: Dendrobium Colliery Longwall 19 End of Panel Report – Aboriginal Cultural Heritage Assessment
(Niche ref #8040)**

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 19 at Dendrobium Colliery. This assessment was developed for inclusion in the South32 - Illawarra Metallurgical Coal (IMC) End of Panel Report (EoP) for Longwall 19.

There are eight (8) Aboriginal cultural heritage sites located within the Longwall 19 Study Area. All of these Aboriginal archaeological sites are of high cultural significance:

- Browns Road Site 31 (52-2-1645), Shelter with Art, Low Archaeological Significance, High Cultural Significance
- Browns Road Site 32 (52-2-1646), Shelter with Art, High Archaeological Significance, High Cultural Significance
- DM 15 (52-2-3639), Shelter with Art, Low Archaeological Significance, High Cultural Significance
- DM 16 (52-2-3640), Shelter with Art, High Archaeological Significance, High Cultural Significance
- Sandy Creek Road 21 (52-5-0273), Shelter with Art and Deposit, Moderate Archaeological Significance, High Cultural Significance
- DM 13 (48-2-0056), Shelter with Deposit, Low Archaeological Significance, High Cultural Significance
- DM 17 (52-2-3641), Shelter with Deposit, Low Archaeological Significance, High Cultural Significance
- DM 20 (52-2-3644), Shelter with Art and Potential Archaeological Deposit, Low Archaeological Significance, High Cultural Significance

There were changes to two Aboriginal cultural heritage sites observed during the field inspection for this report, assessed to be impacts due to subsidence resulting from the extraction of Longwall 19::

- DM 15 (AHIMS ID#52-2-3639) has vertical cracking of between 1 mm – 2 mm in width which partially runs through Art Panel 1 and Motif 1. Prior to this the panel and motif had been in a well-preserved condition. An area of fresh spalling and exfoliation was identified approximately 1 m above Art Panel 1 Motif 1, separation of an existing joint/fissure below the art panel, and minor new block fall from the eastern lip of the shelter overhang (associated with the upper termination of the vertical cracking). This minor block fall has not impacted the art or the structural integrity of the shelter. There was also previously unrecorded water seepage (including partially across the art panel, which may affect future preservation of the motif) observed at this site.
- Sandy Creek Road 21 (AHIMS ID#52-5-0273) has separation of pre-existing horizontal bedding planes and fissures along the inner lower lip and lower back wall of the shelter measuring 10 m in length and between 1 mm and 20 mm in width, stretching from the southern end of the shelter and terminating 30 cm below Art Panel 2. No direct impacts to the art panels or art motifs were

observed. An area of fresh spalling was observed associated with the northern end of the horizontal plane separation described above. The shelter interior was dry at the time of recording

As a result of this assessment the following is recommended:

Recommendations	
1.	This End of Panel inspection report was provided to RAPs for their review and comment. The comments received have been incorporated into this report, and will be applied to future management plans and monitoring programs.
2.	<p>Level 2 Corrective Management Actions (CMA's) from the Trigger Action Response Plan (TARP) are to be completed for Sandy Creek Road 21 (AHIMS ID#52-5-0273) and DM 15 (AHIMS ID#52-2-3639), as per the Longwall 19 Aboriginal Cultural Heritage Management Plan (ACHMP):</p> <ul style="list-style-type: none">• Actions as stated for Level 1 CMAs, which this report meets.• Modify monitoring program if necessary.• Develop a site management plan to mitigate effects in consultation with Registered Aboriginal Parties and Landowner (WaterNSW).• Notify RAPs of impacts caused from mining. <p>Notify Heritage NSW and complete Aboriginal Site Impact Recording Forms (ASIRF) for impacted sites Sandy Creek Road 21 (AHIMS ID#52-5-0273) and DM 15 (AHIMS ID#52-2-3639).</p>
3.	As per the Longwall 19 ACHMP, further monitoring is to be undertaken six (6) months and twelve (12) months from the completion of Longwall 19 in April 2023. This report meets the initial requirement in the Longwall 19 ACHMP for End of Panel Aboriginal Cultural Heritage Site monitoring.
4.	South32 IMC should continue community consultation as per the Longwall 19 ACHMP, in regard to any Aboriginal Cultural heritage sites within the Longwall 19 Study Area.
5.	The AHIMS site card for Browns Road Site 32 (AHIMS ID# 52-2-1646) should be updated with the corrected coordinates.

Please note that, as requested by Registered Aboriginal Parties, information has been redacted from this version of the report. The Registered Aboriginal Parties and the NSW Department of Planning and Environment are in receipt of full versions of the report.

Please do not hesitate to contact me on 0488 774 888 or jreeves@niche-eh.com should you require any further information.

Yours sincerely,



Jamie Reeves
Director / Heritage Consultant
Niche Environment and Heritage

Dendrobium Colliery Longwall 19
End of Panel Report
Aboriginal Cultural Heritage Assessment
Lake Cordeaux Catchment LGA: Wollongong City Council

Prepared for South32 – Illawarra Metallurgical Coal
Prepared by Niche Environment and Heritage | 21 August 2023



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.

Document control

Project number	Client	Project manager	LGA
8040	South32 – Illawarra Metallurgical Coal	Chelsea Freeman	Wollongong City Council

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1. Aboriginal Cultural Heritage End of Panel 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 Longwall 19 Study Area at their Dendrobium Colliery. This area has been defined as the 'Study Area' and is shown in Figure 1.

This EoP Aboriginal heritage assessment report includes a summary of:

- previous monitoring of all sites in Dendrobium Area 3;
- previous monitoring of Longwall 19 sites (Biosis, 2007, 2013; Comur Consulting Pty Ltd, 2011, Niche, 2018, 2021);
- the results of the Subsidence Report prepared by MSEC (2020);
- the results of a site inspection;
- a discussion; and
- conclusions and recommendations.

Monitoring of Aboriginal archaeological sites of Longwall 19 at Dendrobium Colliery to-date has been carried out as recommended by Biosis Research (2007), and the ACHMP (Niche, 2021). The site monitoring results presented in this report are in line with the required actions and recommendations presented in the ACHMP.

1.2 Previous subsidence monitoring results Dendrobium Area 3 summary

As part of South32 IMC management of Dendrobium Area 3, previous EoP reports have been produced for Area 3A, Longwall 6 – Longwall 8 (Comur Consulting Pty Ltd, 2011, 2012 and Biosis Pty Ltd, 2013), and Area 3B, Longwall 9 – Longwall 18 (Biosis Pty Ltd 2016, BHP Billiton 2015 and Niche 2014, 2017, 2018, 2019, 2020, 2021b, 2022a, 2022b). Collectively, these reports provide subsidence monitoring results for 31 Aboriginal cultural heritage sites (Appendix 2). The 31 previously monitored sites include 5 sites within the Longwall 19 area that have been previously monitored. There are three (3) sites within the Longwall 19 area that have not been previously monitored.

Including the results of this End of Panel Report there have now been a total of 34 sites monitored in the Dendrobium Mine area.

Of the 34 sites monitored for the Dendrobium Mine area there have been five Aboriginal cultural heritage sites impacted by mine subsidence:

- Dendrobium 4 [52-2-2252]
- Browns Road Site 11 [52-2-1626]
- Sandy Creek Road 21 [52-5-0273]
- DM 21 [52-2-3645] and
- DM15 [52-2-3639]

This results in a cumulative impact of 14.7 % of monitored sites having impacts due to subsidence in the Dendrobium Mine area, and one site (DM15 [52-2-3639]) or 2.9 % of sites having direct impact to art and associated adverse impacts to cultural heritage values. The numbers of sites impacted at Dendrobium are reflective of the overall results observed in the Southern Coalfields over the last 30 years of monitoring and remain within the predicted parameters and performance measures that are expected.

1.3 Subsidence monitoring results summary

The EoP Subsidence Report for Longwall 19 has been prepared by Mine Subsidence Engineering Consultants (MSEC) (2020). This assessment includes a comprehensive report, which addresses all aspects of the recorded subsidence parameters resulting from longwall extraction. For this assessment, the MSEC predictions (MSEC, 2020) 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 (2020) (Section 6.4 Aboriginal heritage sites) provides maximum predicted total vertical subsidence, tilt and curvature for the archaeological sites resulting from the extraction of the proposed longwalls (MSEC). The predictions are outlined in Table 1.

Table 1. Maximum predicted subsidence movements for Aboriginal cultural heritage sites relevant to Longwall 19.

Aboriginal cultural heritage site name (AHIMS ID#)	Maximum predicted total vertical subsidence (mm)	Maximum predicted total tilt (mm/m)	Maximum predicted total hogging curvature (km-1)	Maximum predicted total sagging curvature (km-1)
DM 13 (AHIMS ID#48-2-0056)	1850	25	0.75	0.60
Browns Road Site 31 (AHIMS ID#52-2-1645)	<20	<0.5	<0.01	<0.01
Browns Road Site 32 (AHIMS ID#52-2-1646)	<20	<0.5	<0.01	<0.01
DM 15 (AHIMS ID#52-2-3639)	1600	30	0.60	0.20
DM 16 (AHIMS ID#52-2-3640)	<20	<0.5	<0.01	<0.01
DM 17 (AHIMS ID#52-2-3641)	<20	<0.5	<0.01	<0.01
DM 20 (AHIMS ID#52-2-3644)	1350	4	0.10	0.09
Sandy Creek Road 21 (AHIMS ID#52-5-0273)	900	25	0.5	0.06

1.4 Site Inspection and results

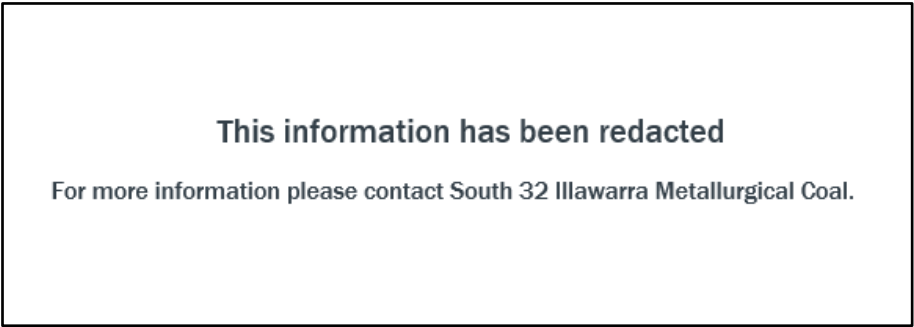
The eight (8) Aboriginal cultural heritage sites addressed in this assessment are listed in Table 2 below and shown in Figure 1. The site inspection and results presented are in compliance with the recommended monitoring requirements of the ACHMP (Niche 2021).

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

Site name	AHIMS ID	Site Type	Date Surveyed
DM 13	48-2-0056	Shelter with Deposit	27 April 2023
Browns Road Site 31	52-2-1645	Shelter with Art	27 April 2023
Browns Road Site 32	52-2-1646	Shelter with Art	27 April 2023
DM 15	52-2-3639	Shelter with Art	26 April 2023
DM 16	52-2-3640	Shelter with Art	28 April 2023
DM 17	52-2-3641	Shelter with Deposit	28 April 2023
DM 20	52-2-3644	Shelter with Art and Potential Archaeological Deposit (PAD)	26 April 2023
Sandy Creek Road 21	52-5-0273	Shelter with Art and Deposit	26 April 2023

The site inspection was carried out between the 26 April 2023 – 28 April 2023 by Stella Quast (Niche, Heritage Consultant), Jamie Reeves (Niche, Founding Partner), Josh Carlon (South32), Nicola Curtis (South32), Antony Leone (South32) and Aboriginal community representatives, Joel Tubbs (Warra Bingi Nunda Gurri), James Davis (NTS Corp), Aara Welz (Illawarra Local Aboriginal Land Council), Trystan Treloar (Murrabidgee) and Shanece Ardler (Illawarra Local Aboriginal Land Council). A summary of the findings of the site visit are outlined in Sections 1.4.1 to 1.4.8.

Figure 1. Map of AHIMS sites located within the Longwall 19 Study Area (Source: South32-IMC and AHIMS)



1.4.1 DM 15 (AHIMS ID# 52-2-3639) – Impacts Observed

This Shelter with Art is situated on the first ridgeline above WC14, a tributary of Wongawilli Creek. The small sandstone shelter is located in a discontinuous sandstone outcrop and has been formed by cavernous weathering. The shelter faces south within open woodland vegetation. The overhang measures 6.5 x 1.5 x 1.9 m, and the limited floor area measures 2 x 2 m. The overhang is approximately 150 m west of Wongawilli Creek, located within the broader landform of the eastern slope of Wongawilli Creek.

The art comprises of a single outline with infill charcoal male anthropomorphic (or possibly bat) figure measuring 30 x 50cm, which is situated on a small panel towards the eastern end of the shelter. The Art has been well preserved by case hardening (thin silica skin).

DM 15 (AHIMS ID# 52-2-3639) was recorded as a part of survey works conducted by Biosis in 2007 and re-recorded by Niche in 2020 for the Longwall 19 ACHA (report dated 2021) for the purpose of updating site cards and data relevant to the ACHMP.

DM15 was assessed as being of Low scientific (archaeological) value and High cultural value. The changes observed have a deleterious effect to the archaeological values present as the art motif is directly impacted, and changes to seepage at the site will potentially affect future preservation of the motif.

The results of the monitoring inspection completed on 26 April 2023 for DM 15 (AHIMS ID# 52-2-3639) are detailed in Table 3 below, and Plate 2 to Plate 12 shows the monitoring photographs and comparison images for the site.

Table 3: Results of DM 15 (AHIMS ID# 52-2-3639) monitoring inspection

AHIMS number	Site name	Results of monitoring inspection
52-2-3639	DM 15	<p>This Shelter with Art was baseline recorded by Niche in 2020 during the Longwall 19 ACHA (report is dated 2021). DM 15 (AHIMS ID# 52-2-3639) was inspected on 26 April 2023, and the following impacts to the site were observed:</p> <ul style="list-style-type: none">• A new long, fine (1 mm – 2 mm width) vertical crack measuring 3.5 m in length extends from the base of the shelter to the overhang lip, and runs through the lower eastern area of Art Panel 1 Motif 1 (i.e. across the right sided leg of the anthropomorphic charcoal figure).• New water seepage and water wash, especially associated with the long vertical crack described above, and including seepage and water wash across Art Panel 1 Motif 1.• Fresh spalling and exfoliation measuring 40 cm x 30 cm, located approximately 1 m above Art Panel 1 Motif 1.• Minor new block fall from the eastern lip of the shelter overhang, associated with the upper termination of the new long vertical crack described above. This minor block fall has not impacted the art or the structural integrity of the shelter at DM 15 (AHIMS ID# 52-2-3639). <p>Although these types of impacts occur naturally in sandstone overhangs, the new impacts observed at DM 15 (AHIMS ID# 52-2-3639) are indicative of mining subsidence as a result of the extraction of Longwall 19. This conclusion is supported by the MSEC subsidence predictions for DM 15 AHIMS ID#52-2-3639 (2020; see Table 1 for details); coupled with the nature, extent and timing of the impacts to DM 15 (AHIMS ID#52-2-3639); as well as the contextual presence of landscape subsidence impacts (e.g. Plate 1). These landscape subsidence impacts were observed on the eastern slope of the</p>

Wongawilli Creek valley (towards the western extent of the Longwall 19 Study Area), which is the landform within which DM 15 AHIMS ID#52-2-3639 is situated.

RAP comments recorded during DM 15 (AHIMS ID# 52-2-3639) site inspection:

The RAP field representatives present during the monitoring inspection of DM 15 (AHIMS ID# 52-2-3639) indicated the following:

- Further monitoring of DM 15 (AHIMS ID# 52-2-3639) should be undertaken at regular intervals as per the Longwall 19 and 19A Aboriginal Cultural Heritage Management Plan (ACHMP).
- In addition, monitoring ideally should extend beyond the standard 12-month post-extraction mark (i.e., in the Longwall 19 and 19A ACHMP), in order to gain a better understanding of the long-term subsidence impacts to DM 15 (AHIMS ID# 52-2-3639). It was suggested by the RAPs to the South32-IMC representatives present that this could be incorporated into the long-term site monitoring program that the Illawarra Local Aboriginal Land Council is currently planning with South32 IMC.
- The implementation of potential remedial measures such as an artificial silica dripline would not be beneficial at DM 15 (AHIMS ID# 52-2-3639), as the water wash present is a result of new water seepage points located within the shelter interior (instead of changes to the dripline of the overhang).
- That the recent wet weather event would have increased the impacts of mining subsidence at DM 15 (AHIMS ID# 52-2-3639), and within the broader Longwall 19 Study Area.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 1: Photo of a surface impact caused by subsidence from Longwall 19. Facing southeast, located approximately 350m east of DM 15 (52-2-3639) on the closed access track that runs westwards towards the site.

Longwall 19 EoP Monitoring Images, DM 15 (AHIMS ID# 52-2-3639)

Previous Image from Niche Baseline recording 2021, DM 15 (AHIMS ID# 52-2-3639)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 2: General photo of DM 15 (52-2-3639) looking northwest. Photo taken on 26 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 3: Comparison general photo of DM 15 (52-2-3639) looking northwest. Taken during Longwall 19 baseline recording by Niche (2021).

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 4: General photo of DM 15 (52-2-3639) looking northeast. Photo taken on 26 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 5: Comparison general photo of DM 15 (52-2-3639) facing northeast. Taken during baseline recording by Niche (2021).

Longwall 19 EoP Monitoring Images, DM 15 (AHIMS ID# 52-2-3639)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 6: Photo of DM 15 (52-2-3639) Art Panel 1 Motif 1, showing a new fine vertical crack across the lower right area of the art, and increased water seepage. Photo taken on 26 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 8: Photo of DM 15 (52-2-3639). Art Panel 1 Motif 1 is located in the recess below the scale, and a continuation of the new fine vertical crack that intersects the art panel can be seen to the righthand side of the image. Fresh spalling and exfoliation can also be seen to the right (i.e., the lighter coloured rock). Photo taken on 26 April 2023.

Previous Image from Niche Baseline recording 2021, DM 15 (AHIMS ID# 52-2-3639)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 7: Comparison photo of DM 15 (52-2-3639), Art Panel 1 Motif 1. Note the existing horizontal fracture present through the lower section of art panel. Taken during Longwall 19 baseline recording by Niche (2021).

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 9: Comparison photo of DM 15 (52-2-3639) exfoliation and fissuring within the shelter. Taken during baseline recording by Niche (2021).

Longwall 19 EoP Monitoring Images, DM 15 (AHIMS ID# 52-2-3639)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 10: Photo of DM 15 (52-2-3639), displaying areas of fresh spalling and water seepage. Photo taken on 26 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 12: Additional photo of DM 15 (52-2-3639) showing new minor block fall observed below the eastern lip of the shelter, for comparison with future monitoring at the site. Photo taken on 26 April 2023, facing north.

Previous Image from Niche Baseline recording 2021, DM 15 (AHIMS ID# 52-2-3639)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 11: Comparison general photo of DM 15 (52-2-3639) grey sandy loam deposit within the shelter. Taken during baseline recording by Niche (2021).

N/A.

1.4.2 DM 20 (AHIMS ID# 52-2-3644)

This Shelter with Art and PAD is situated on the mid slopes of a moderate ridgeline 300 m east of Fire Trail 6F. The small sandstone overhang has been formed by block fall and cavernous weathering and is situated in a small continuous cliff line. The shelter faces north towards Sandy Creek and comprised a small flat ground area approximately 3 x 2 m in size.

DM 20 (AHIMS ID#52-2-3644) was originally recorded by Biosis Research during 2007 for the Dendrobium Area 3 ACHA and was re-recorded by Niche in 2020 for the Longwall 19 ACHA (report dated 2021). The Art identified comprises a charcoal outline and infill indeterminate motifs across the rear wall of the small cavern. One partial anthropomorphic figure is located on the edge of the cavern area. The three indeterminate motifs were hardly distinguishable due to excessive natural water seepage, mineral leeching and micro-vegetal growth affecting the art. The small, cavernous internal area of the shelter has previously been recorded as experiencing continuous weathering resulting in exfoliation prior to mining.

The results of the monitoring inspection completed on 26 April 2023 for DM 20 (AHIMS ID#52-2-3644) are detailed in Table 4 below, and the monitoring photographs and comparison images for the site are shown in Plate 13 to Plate 18.

Table 4: Results of DM 20 (AHIMS ID#52-2-3644) monitoring inspection

AHIMS number	Site name	Results of inspections
52-2-3644	DM 20	<p>This Shelter with Art and PAD was baseline recorded by Niche in 2020 during the Longwall 19 ACHA (report is dated 2021). During the recent monitoring of the site on 26 April 2023, no changes to the site were observed.</p> <p>The shelter has a mostly dry interior, with gradual granular loss, exfoliation and microvegetation observed in its interior. The art panels remain difficult to distinguish due to patches of water seepage and accompanying mineral leeching and micro-vegetal growth obscuring them.</p>

Longwall 19 EoP Monitoring Images, DM 20 (AHIMS ID#52-2-3644)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 13: General photograph of DM 20 (AHIMS ID#52-2-3644) facing southeast.
Taken on 26 April 2023.

Previous images from Niche Baseline recording 2021, DM 20 (AHIMS ID#52-2-3644)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 14: Comparison general photograph of DM 20 (AHIMS ID#52-2-3644) facing southeast, taken during baseline recording by Niche (2021).

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 15: General photograph of DM 20 (AHIMS ID#52-2-3644) facing southwest.
Taken on 26 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 16: Comparison general photograph of DM 20 (AHIMS ID#52-2-3644) facing southwest. Taken during baseline recording by Niche (2021).

Longwall 19 EoP Monitoring Images, DM 20 (AHIMS ID#52-2-3644)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 17: General photo of DM 20 (AHIMS ID#52-2-3644), Art Panel 2. Taken on 26 April 2023.

Previous images from Niche Baseline recording 2021, DM 20 (AHIMS ID#52-2-3644)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 18: Comparison general photo of DM 20 (AHIMS ID#52-2-3644), Art Panel 2, flash on. Taken during baseline recording by Niche (2021).

1.4.3 Sandy Creek Road 21 (AHIMS ID# 52-5-0273) – Impacts Observed

This Shelter with Art and Deposit site is located on a long narrow sandstone cliff line east of Fire Trail 6F, in an overhang measuring 20 m x 2.4 m. Formed through blockfall and cavernous weathering, this shelter is situated on the eastern facing overhang on the upper ridge cliff line and is located 150 m southeast of Sandy Creek. The site was previously recorded by the Illawarra Prehistory Group in September 1978, revisited in 1993 by the Illawarra Prehistory Group, and assessed again for the Longwall 19 ACHA (report dated 2021).

Art recorded within the shelter at Sandy Creek Road 21 (AHIMS ID# 52-5-0273) is located on the rear wall and comprises two Art Panels consisting of one charcoal outline and infill indeterminate, one charcoal outline frontal human figure with eyes, and two charcoal indeterminates. In addition, seven artefacts were previously recorded by Niche (2021) toward the northern end of the shelter on the floor deposit. The artefacts consist of two silcrete flakes (one complete), one chert flake, one chert core, one complete petrified wood flake, one broken quartz flake, and one silcrete core fragment.

The shelter interior has previously been recorded as being mostly dry; however, there was water seepage over the lip of the shelter recorded by Niche (2021), which has resulted in slight erosion and micro-vegetal growth on the roof area. The art is slightly faded, and some natural surface exfoliation has occurred.

Sandy Creek Road 21 was assessed as being of Moderate scientific (archaeological) value and High cultural value. The changes observed do not directly impact the art motifs and therefore do not affect the archaeological values, however the changes at the site have a deleterious effect on the cultural values of the site and context.

The results of the monitoring inspection completed on 26 April 2023 for Sandy Creek Road 21 (AHIMS ID# 52-5-0273) are detailed in Table 5 below, and the monitoring photographs and comparison images for the site are shown in Plate 19 to Plate 30, with additional photographs from the recent monitoring inspection shown in Plate 31 to Plate 35.

Table 5: Results of Sandy Creek Road 21 (AHIMS ID# 52-5-0273) monitoring inspection

AHIMS number	Site name	Results of inspections
52-5-0273	Sandy Creek Road 21	<p>This Shelter with Art and Deposit was baseline recorded by Niche in 2020 during the Longwall 19 ACHA (report is dated 2021). Sandy Creek Road 21 (AHIMS ID# 52-5-0273) was inspected on 26 April 2023, and the following new impacts to the site were observed:</p> <ul style="list-style-type: none">• Separation of pre-existing horizontal bedding planes and fissures along the inner lower lip and lower back wall of the shelter measuring 10 m in length, stretching from the southern end of the shelter and terminating 30 cm below Art Panel 2. The separations of strata measure between 1 mm and 20 mm in width.• No direct impacts to the art within this shelter was observed.• New spalling associated with the northern end of the horizontal strata separation described above, measuring 40 cm x 20 cm.• The shelter interior remains dry despite changes and opening of fissures. <p>Although these types of impacts can occur naturally in sandstone overhangs, the new impacts observed at Sandy Creek Road 21 (AHIMS ID# 52-5-0273) are indicative of mining subsidence as a result of the extraction of Longwall 19. This is supported by the MSEC subsidence predictions for Sandy Creek Road 21 AHIMS ID# 52-5-0273</p>

(2020; see Table 1 for details), and the extent and timing of the impacts to DM 15 AHIMS ID#52-2-3639.

RAP comments recorded during Sandy Creek Road 21 (AHIMS ID# 52-5-0273) site inspection:

The RAP field representatives present during the monitoring inspection of Sandy Creek Road 21 (AHIMS ID# 52-5-0273) indicated the following:

- Further monitoring of Sandy Creek Road 21 (AHIMS ID# 52-5-0273) should be undertaken at regular intervals as per the Longwall 19 ACHMP.
- In addition, monitoring ideally should extend beyond the standard 12-month post-extraction mark (i.e., in the Longwall 19 ACHMP), in order to gain a better understanding of the long-term subsidence impacts to Sandy Creek Road 21 (AHIMS ID# 52-5-0273). The RAPs suggested that this could be incorporated into the long-term site monitoring program that the Illawarra Local Aboriginal Land Council is currently planning with South32-IMC.
- The implementation of potential remedial measures such as an artificial silica dripline would not be beneficial at Sandy Creek Road 21 (AHIMS ID# 52-5-0273), as the interior of the shelter has remained dry in spite of the new horizontal cracking present.
- It was again noted that the recent wet weather event would have increased the impacts of mining subsidence at Sandy Creek Road 21 (AHIMS ID# 52-5-0273), and within the broader Longwall 19 Study Area.

Longwall 19 EoP Monitoring Images, Sandy Creek Road 21 (AHIMS ID# 52-5-0273)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 19: Photo of old blockfall within Sandy Creek Road 21 (AHIMS ID# 52-5-0273) looking north east. Taken on 26 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 21: Photo of Sandy Creek Road 21 (AHIMS ID# 52-5-0273), Art Panel 1, Motif 1 located within the southern half of the shelter. Taken on 26 April 2023.

Previous images from Niche Baseline recording 2021, Sandy Creek Road 21 (AHIMS ID# 52-5-0273)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 20: Comparison general photo of old blockfall within Sandy Creek Road 21 (AHIMS ID# 52-5-0273) looking northeast. Taken during baseline recording by Niche (2021).

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 22: Comparison photo of Sandy Creek Road 21 (AHIMS ID# 52-5-0273), Art Panel 1, Motif 1 located to the south of the shelter. Taken during Longwall 19 baseline recording by Niche (2021).

Longwall 19 EoP Monitoring Images, Sandy Creek Road 21 (AHIMS ID# 52-5-0273)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 23: Photo of Sandy Creek Road 21 (AHIMS ID# 52-5-0273), Art Panel 1 Motif 2 located within the southern half of the shelter. Taken on 26 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 25: Photo of Sandy Creek Road 21 (AHIMS ID# 52-5-0273) Art Panel 1, Motif 3 located within the southern half of the shelter. Taken on 26 April 2023.

Previous images from Niche Baseline recording 2021, Sandy Creek Road 21 (AHIMS ID# 52-5-0273)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 24: Comparison general photo of Sandy Creek Road 21 (AHIMS ID# 52-5-0273), Art Panel 1 Motif 2 located to the south of the shelter. Taken during baseline recording by Niche (2021).

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 26: Comparison general photo of Sandy Creek Road 21 (AHIMS ID# 52-5-0273) Art Panel 1, Motif 3 located to the south of the shelter. Taken during baseline recording by Niche (2021).

Longwall 19 EoP Monitoring Images, Sandy Creek Road 21 (AHIMS ID# 52-5-0273)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 27: Photo of Sandy Creek Road 21 (AHIMS ID# 52-5-0273) Art Panel 2, Motif 2 located at the north of the shelter. Taken on 26 April 2023.

Previous images from Niche Baseline recording 2021, Sandy Creek Road 21 (AHIMS ID# 52-5-0273)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 28: Comparison general photo of Sandy Creek Road 21 (AHIMS ID# 52-5-0273) Art Panel 2, Motif 2 located at the north of the shelter. Taken during baseline recording by Niche (2021).

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 29: Photo of five of the seven artefacts located at Sandy Creek 21 (AHIMS ID# 52-5-0273). Taken on 26 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 30: Comparison image of four of the seven artefacts located at Sandy Creek 21 (AHIMS ID# 52-5-0273). Taken during baseline recording by Niche (2021).

Additional Photos from Longwall 19 EoP Monitoring, Sandy Creek Road 21 (AHIMS ID# 52-5-0273)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 31: General photo of Sandy Creek 21 (AHIMS ID# 52-5-0273) facing southeast. Photo taken on 26 April 2023. The horizontal cracking visible from this viewpoint is outlined in red.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 32: Photo of Sandy Creek 21 (AHIMS ID# 52-5-0273), showing horizontal cracking along the back of the shelter, outlined in red. Photo taken on 26 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 33: Photo of Sandy Creek 21 (AHIMS ID# 52-5-0273), showing horizontal cracking (continued) along the back interior lip of the shelter, and the new area of spalling (both outlined in red). Photo taken on 26 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 34: Photo of Sandy Creek 21 (AHIMS ID# 52-5-0273), facing southeast, showing horizontal cracking (continued) along the back interior lip of the shelter, and the new area of spalling (both outlined in red). Photo taken on 26 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 35: Photo of Sandy Creek 21 (AHIMS ID# 52-5-0273), showing horizontal cracking (continued) along the back interior lip of the shelter (outlined in red). Photo taken on 26 April 2023.

1.4.4 Browns Road Site 31 (AHIMS ID# 52-2-1645)

This Shelter with Art is located under the second ridgeline up from the eastern tributary (WC13) to Wongawilli Creek on the northern side, and approximately 150m up from the junction of two smaller drainage lines. The sandstone overhang measures 20 m wide, 2 m high, and up to 5 m deep, and was formed through cavernous weathering and block fall in antiquity. The art in the shelter consists of one charcoal infill macropod head and one charcoal indeterminate.

This site was originally recorded by the Illawarra Prehistory Group in 1991, then was re-recorded by Biosis in 2007 as part of the Dendrobium Mine Area 3 ACHA. The site was subsequently unable to be relocated during fieldwork for the Longwall 19 ACHA (Niche 2021a) and the Longwall 19A ACHA (Niche 2022c) due to incorrect AHIMS coordinates placing it on the southern side of the WC13 valley (which also placed it outside the Longwall 19 Study Area). The site was relocated on the northern side of the WC13 valley during the recent fieldwork on 27 April 2023 for this report, and correct updated coordinates recorded for the site on a handheld Garmin GPS (Zone 56 Easting 291529, Northing 6191852). The shelter faces southeast, and is located at an elevation of 387 m above sea level. The corrected coordinates place Browns Road Site 31 (AHIMS ID# 52-2-1645) within Longwall 19 Study Area.

The updated site recording information for Browns Road Site 31 (AHIMS ID# 52-2-1645) is detailed in Table 6 and Table 7 below.

Table 6: Updated site recording data for Browns Road Site 31 (AHIMS ID# 52-2-1645)

Overview					
Site type	Shelter with Art	Corrected MGAE, Zone 56	291529	Corrected MGAN, Zone 56	6191852
First recording	Illawarra Prehistory Group 1991	Most recent previous recording	Biosis Research 2007.	Elevation (m above sea level)	387 m
Site Details					
Width	20 m	Depth	5 m	Height	2 m
Orientation	SE 140°	Floor area	20 m x 4 m	Floor condition	Good
Location in Landscape	Mid-slope on steep slope under a large 8-10m tall discontinuous cliff, up from the northern side of the WC13 valley. Located 350m east of Wongawilli Creek, 70m north of WC13, and 280m northwest from Browns Road Site 30 (AHIMS ID# 52-2-1644), which sits on the southern (opposite) side of the WC13 valley.				
Shelter Exterior/formation	Shelter formed by block fall with some secondary cavernous weathering.				
Shelter interior	Sloping ‘clean’ surfaces in horizontal plane. Roof is flat with case hardening and exfoliation evident. Some seepage out of main interface between roof and wall; other than this the shelter interior is dry. The old block fall is capturing the deposit (formed of decomposed sandstone).				
Distance to water	70m north of WC13; 350m east of Wongawilli Creek	Landform	Steep mid-slope.		
Setting	Discontinuous sandstone cliff, approximately 8m to 10m high.				
Archaeological Deposit					
Deposit	Yes	Describe	Loose pale grey sand.		
Visible artefacts?	No	Where?	-	How many?	-
Art					
Art surfaces	One panel located on shelter roof.				

Art condition	Poor, partial preservation of motifs.				
Art overview	One panel, comprising 1 partial charcoal macropod, and two charcoal indeterminates.				
Damage/threats					
Waterwash	No	Graffiti	No	Macro-vegetals	Yes, minor
Animals	No	Salt/granular loss	Yes	Fissuring	No
Insects	No	Spalling/exfoliation	Yes	Other	-
Fire	No	Block fall	Yes, in antiquity		

Table 7: Recording data for art surfaces present at Browns Road Site 31 (AHIMS ID# 52-2-1645)

Motif No.	Type	Form	Media	Colour	Measurement
Panel 1					
Motif 1	Partial macropod	Outline and infill	Charcoal	Black	16cm x 16cm
Motif 2	Indeterminate	Outline and infill	Charcoal	Black	26cm x 10cm
Motif 3	Indeterminate	Line	Charcoal	Black	2cm x 2cm
Motif 4	Indeterminate (on floor)	Line	Charcoal	Black	3cm x 3cm

The results of the monitoring inspection completed on 27 April 2023 for Browns Road Site 31 (AHIMS ID# 52-2-1645) are detailed in Table 8 below, and the monitoring photographs and comparison images for the site are shown in Plate 36 to Plate 41, with additional photographs from the recent monitoring inspection seen in Plate 42 to Plate 46.

Table 8: Results of Browns Road Site 31 (AHIMS ID# 52-2-1645) monitoring inspection

AHIMS number	Site name	Results of inspections
52-2-1645	Browns Road Site 31	<p>This site was originally recorded by the Illawarra Prehistory Group in 1991, then was re-recorded by Biosis in 2007 as part of the Dendrobium Mine Area 3 ACHA. The site was subsequently unable to be relocated during fieldwork for the Longwall 19 ACHA (Niche 2021a) and the Longwall 19A ACHA (Niche 2022c) due to incorrect AHIMS coordinates placing it on the southern side of the WC13 valley. The site was relocated on the northern side of the WC13 valley during the recent fieldwork on 27 April 2023 for this report, and correct updated coordinates and site details were recorded.</p> <p>During the site's relocation on 27 April 2023, no changes were observed, and the site exhibits no changes since the Biosis 2007 and Illawarra Prehistory Group 1991 recordings.</p> <p><u>RAP comments recorded during Browns Road Site 31 (AHIMS ID# 52-2-1645) site inspection:</u></p> <p>The RAP field representatives present during the monitoring inspection of Browns Road Site 31 (AHIMS ID# 52-2-1645) indicated the following:</p> <ul style="list-style-type: none"> Further monitoring of Browns Road Site 31 (AHIMS ID# 52-2-1645) should be undertaken at regular intervals as per the Longwall 19 and 19A ACHMPs. The AHIMS site card for Browns Road Site 31 (AHIMS ID# 52-2-1645) should be updated with the correct coordinates.

Longwall 19 EoP Monitoring Images, Browns Road Site 31 (AHIMS ID# 52-2-1645)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 36: General photograph of Browns Site Road 31 (AHIMS ID# 52-2-1645) facing southwest. Photo taken on 27 April 2023.

Previous Images of Browns Road Site 31 (AHIMS ID# 52-2-1645)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 37: General comparison photograph of Browns Site Road 31 (AHIMS ID# 52-2-1645) facing southwest. Taken during Biosis Dendrobium Area 3 ACHA (2007).

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 38: Photograph of fallen art on floor of Browns Site Road 31 (AHIMS ID# 52-2-1645). Photo taken on 27 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 39: Comparison photograph of fallen artwork at Browns Site Road 31 (AHIMS ID# 52-2-5). Taken during Biosis Dendrobium Area 3 ACHA (2007).

Longwall 19 EoP Monitoring Images, Browns Road Site 31 (AHIMS ID# 52-2-1645)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 40: Photo of Browns Site Road 31 (AHIMS ID# 52-2-1645) Panel 1 Motif 1. Photo taken on 26 April 2023.

Previous Images of Browns Road Site 31 (AHIMS ID# 52-2-1645)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 41: Browns Site Road 31 (AHIMS ID# 52-2-1645) Panel 1 Motif 1. Taken from the AHIMS site card by the Illawarra Prehistory Group, photographed during their 1991 recording of the site.

Additional Photos from Longwall 19 EoP Recording, Browns Site Road 31 (AHIMS ID# 52-2-1645)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 42: General photograph of Browns Site Road 31 (AHIMS ID# 52-2-1645) facing northeast. Photo taken on 27 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 43: General photograph of Browns Site Road 31 (AHIMS ID# 52-2-1645) facing southwest. Photo taken on 27 April 2023.

Additional Photos from Longwall 19 EoP Recording, Browns Site Road 31 (AHIMS ID# 52-2-1645)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 44: General photograph of the overhang at Browns Site Road 31 (AHIMS ID# 52-2-1645) facing southwest. Photo taken on 27 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 45: General photograph of Browns Site Road 31 (AHIMS ID# 52-2-1645) facing north. Photo taken on 27 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 46: Photo of Browns Site Road 31 (AHIMS ID# 52-2-1645) Panel 1 Motif 2. Photo taken on 27 April 2023.

1.4.5 Browns Road Site 32 (AHIMS ID# 52-2-1646)

This Shelter with Art is located 200 m southeast of the junction of the eastern tributary (WC14) of Wongawilli Creek. The site is under the second ridgeline. The sandstone overhang living area measures 8 m x 2 m. The site was formed by block fall and cavernous weathering. The floor deposit is yellow orange loamy sand up to 10 cm in depth, although the floor area to the north of the shelter is rocky and the deposit is less than 2 to 3 cm due to the rocky floor surface.

The art in this shelter is located on the rear wall and consists of a high density of art motifs (31) across four panels. These feature charcoal and ochre with handprints and stencils. Art Panel 2 has some overlapping motifs, with the art overall being in moderate condition. Some fading has occurred, with the art affected by natural exfoliation, mineral leaching, with some water wash present.

This Aboriginal cultural heritage site was recorded by Illawarra Prehistory group in 1991 during systematic surveys; in 2020, this site was reassessed by Niche as a part of the Longwall 19 ACHA. During the 2020 assessment it was noted that fissuring over the art panels was present, as well as an open bedding plane along the roof in the eastern part of the shelter.

The results of the monitoring inspection completed on 27 April 2023 for Browns Road Site 32 (AHIMS ID# 52-2-1646) are detailed in Table 9 below, and the monitoring photographs and comparison images for the site are shown in Plate 47 to Plate 58.

Table 9: Results of Browns Road Site 32 (AHIMS ID# 52-2-1646) monitoring inspection

AHIMS number	Site name	Results of inspections
52-2-1646	Browns Road Site 32	This Shelter with Art was baseline recorded by Niche in 2020 during the Longwall 19 ACHA (report is dated 2021). During the recent monitoring on 27 April 2023, no changes to the site were observed from the Niche 2020 baseline recordings.

Longwall 19 EoP Monitoring Images, Browns Road Site 32 (AHIMS ID# 52-2-1646)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 47: General photograph of Browns Site Road 32 (AHIMS ID# 52-2-1646) facing southwest. Photo taken on 27 April 2023.

Previous images from Niche Baseline recording 2021, Browns Road Site 32 (AHIMS ID#52-2-1646)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 48: General photograph of Browns Site Road 32 (AHIMS ID# 52-2-1646) facing southwest. Taken during Longwall 19 baseline recording by Niche (2021).

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 49: Photograph Browns Site Road 32 (AHIMS ID# 52-2-1646) shelter interior facing northeast. Photo taken on 27 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 50: General photograph Browns Site Road 32 (AHIMS ID# 52-2-1646) shelter interior facing northeast. Taken during baseline recording by Niche (2021).

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 51: Photo of Browns Site Road 32 (AHIMS ID# 52-2-1646) Panel 1 Motif 1. Photo taken on 27 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 52: Browns Site Road 32 (AHIMS ID# 52-2-1646) Panel 1 Motif 1. Taken during Longwall 19 baseline recording by Niche (2021).

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 53: Photo of Browns Site Road 32 (AHIMS ID# 52-2-1646) Panel 2. Photo taken on 27 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 54: Comparison photo of Browns Site Road 32 (AHIMS ID# 52-2-1646) Panel 2. Minor mineral efflorescence present. Taken during Longwall 19 baseline recording by Niche (2021).

Longwall 19 EoP Monitoring Images, Browns Road Site 32 (AHIMS ID# 52-2-1646)

Previous images from Niche Baseline recording 2021, Browns Road Site 32 (AHIMS ID#52-2-1646)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 55: Photo of Browns Site Road 32 (AHIMS ID# 52-2-1646) Panel 3 Motifs 27 and 28. Photo taken on 27 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 56: Comparison photo of Browns Site Road 32 (AHIMS ID# 52-2-1646), Panel 3 Motifs 27 and 28 effected by water wash and mineral leaching. Taken during Longwall 19 baseline recording by Niche (2021).

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 57: Photo of Browns Site Road 32 (AHIMS ID# 52-2-1646) Panel 4, Fish motifs 29 and 31. Photo taken on 27 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 58: Comparison photo of Browns Site Road 32 (AHIMS ID# 52-2-1646), Panel 4, Fish motifs 29 and 31. Taken during Longwall 19 baseline recording by Niche (2021).

1.4.6 DM 13 (AHIMS ID# 48-2-0056)

This is a Shelter with Deposit situated in the centre of a large, high sandstone cliff line, 50 m north of tributary SC10C, and 600 m west of Sandy Creek. This site was first recorded by Biosis Research in 2007; as part of the *Dendrobium Area 3 Aboriginal Cultural Heritage Assessment* (ACHA) and has been subject to AHIP# 1098243. It was then re-recorded by Niche in 2021 for the Longwall 19 ACHA.

DM 13 (AHIMS ID# 48-2-0056) is situated within a very large continuous cliff line, and the shelter has been formed by block fall. This site has a 15 m high roof and exposed internal floor that measures 3 m x 15 m. The yellow-brown sandy deposit within the shelter is estimated to be at least 50cm deep, and the floor deposit has been partially disturbed by a wombat burrow situated within the centre of the shelter. A small number of stone artefacts were exposed on the shelter floor.

No art is present at this shelter and conditions remain slightly damp. No water seepage was evident although the surface of the cliff does contain lichen and micro-vegetal growth. Small ferns are growing from stone cracks in the dripline along the front of the shelter.

The results of the monitoring inspection completed on 27 April 2023 for DM 13 (AHIMS ID# 48-2-0056) are detailed in Table 10 below, and the monitoring photographs and comparison images for the site are shown in Plate 59 to Plate 64, with additional images from the recent monitoring inspection shown in Plate 65 to Plate 68.

Table 10: Results of DM 13 (AHIMS ID# 48-2-0056) monitoring inspection

AHIMS number	Site name	Results of inspections
48-2-0056	DM 13	This Shelter with Art was baseline recorded by Niche in 2020 during the Longwall 19 ACHA (report dated 2021). During the recent monitoring on 27 April 2023, no changes to the site were observed from the Niche 2020 baseline recordings.

Longwall 19 EoP Monitoring Images, DM 13 (AHIMS ID# 48-2-0056)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 59: General photograph of DM 13 (AHIMS ID#48-2-0056) facing east. Taken on 27 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 61: Photograph of DM 13 (AHIMS ID#48-2-0056) facing northwest. Taken on 27 April 2023.

Previous Image from Niche Baseline recording 2021, DM 13 (AHIMS ID# 48-2-0056)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 60: Comparison general photograph of DM 13 (AHIMS ID#48-2-0056) facing east. Taken during Longwall 19 baseline recording by Niche (2021).

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 62: Comparison general photograph of DM 13 (AHIMS ID#48-2-0056) facing northwest. Taken during baseline recording by Niche (2021).

Longwall 19 EoP Monitoring Images, DM 13 (AHIMS ID# 48-2-0056)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 63: Photo of sandy deposit in DM 13 (AHIMS ID#48-2-0056). Taken on 27 April 2023.

Previous Image from Niche Baseline recording 2021, DM 13 (AHIMS ID# 48-2-0056)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 64: Comparison photo of sandy deposit in DM 13 (AHIMS ID#48-2-0056). Taken during Longwall 19 baseline recording by Niche (2021).

Additional Photos from Longwall 19 EoP Monitoring, DM 13 (AHIMS ID# 48-2-0056)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 65: General photograph of DM 13 (AHIMS ID#48-2-0056) facing west. Taken on 27 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 66: Photograph of artefacts identified on 27 April 2023 on the surface of the shelter deposit at DM 13 (AHIMS ID#48-2-0056).

Additional Photos from Longwall 19 EoP Monitoring, DM 13 (AHIMS ID# 48-2-0056)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

**Plate 67: General photograph of DM 13 (AHIMS ID#48-2-0056) facing northwest.
Taken on 27 April 2023.**

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 68: Photograph of the eastern half of the overhang roof at DM 13 (AHIMS ID#48-2-0056). Taken on 27 April 2023, facing north.

1.4.7 DM 16 (AHIMS ID# 52-2-3640)

This Shelter with Art is situated on the mid to upper valley slopes of a ridgeline that extends east to Wongawilli Creek and is 280 m north of Fire Trail 6Q. The sandstone cliff line on which the overhang is located is quite steep and only accessible to the east of the site. It is a large, sandstone overhang that has been formed by block fall and cavernous weathering. The shelter faces south, in relatively dry open woodland conditions. The site measures 12.5 x 2 x 4 m, with a moderate floor area of approximately 1.5 m x 10 m. The shelter faces an open, gradual slope, 250 m north to the nearest Wongawilli tributary.

DM 16 (AHIMS ID# 52-2-3640) was recorded by Biosis in 2012 for the Dendrobium Area 3B Baseline Recordings, and most recently recorded by Niche in 2018 for the Longwall 13 End of Panel Assessment. The results of the monitoring site inspection on 28 April 2023 are detailed in Table 11 below. The monitoring photographs and comparison images for the site are shown in Plate 69 to Plate 74, with additional images from the recent monitoring inspection shown in Plate 75 and Plate 76.

Table 11: Results for DM 16 (AHIMS ID# 52-2-3640) monitoring inspection

AHIMS number	Site name	Results of inspections
52-2-3640	DM 16	This Shelter with Art was baseline recorded by Biosis in 2012 for the Dendrobium Area 3A Baseline Recordings, then re-recorded for the Longwall 13 End of Panel Assessment by Niche in 2018. During the recent monitoring on 28 April 2023, no changes to the site were observed.

Longwall 19 EoP Monitoring Images, DM 16 (AHIMS ID# 52-2-3640)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 69: Photo of DM 16 (AHIMS ID# 52-2-3640), facing west. Taken on 28 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 71: Photo of the central part of Art Panel 2 at DM 16 (AHIMS ID# 52-2-3640), showing a wombat with charcoal outline and red ochre infill. Taken on 28 April 2023.

Previous images of DM 16 (AHIMS ID# 52-2-3640)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 70: Comparison general photo of DM 16 (AHIMS ID# 52-2-3640), facing west. Taken during Longwall 13 End of Panel Assessment by Niche (2018).

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 72: Comparison photo of the central part of Art Panel 2 at DM 16 (AHIMS ID# 52-2-3640), showing awombats with charcoal outline and red ochre infill. Taken during Longwall 13 End of Panel Assessment by Niche (2018).

Longwall 19 EoP Monitoring Images, DM 16 (AHIMS ID# 52-2-3640)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 73: Photo of eastern part of Panel 2, showing a charcoal wombat motif with red ochre infill along with charcoal indeterminates at DM 16 (AHIMS ID# 52-2-3640). Taken on 28 April 2023.

Previous images of DM 16 (AHIMS ID# 52-2-3640)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 74: Comparison photo of the eastern part of Panel 2, showing a charcoal wombat motif with red ochre infill along with charcoal indeterminates at DM 16 (AHIMS ID# 52-2-3640). Taken during Longwall 13 End of Panel Assessment by Niche (2018).

Additional Photos from Longwall 19 EoP Monitoring, DM 13 (AHIMS ID# 48-2-0056)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 75: Context photograph of Art Panel 2 at DM 16 (AHIMS ID# 52-2-3640), facing west. Taken on 28 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 76: Photograph of the exterior of DM 16 (AHIMS ID# 52-2-3640), facing west. Taken on 28 April 2023.

1.4.8 DM 17 (AHIMS ID# 52-2-3641)

This Shelter with Deposit is situated on the upper sandstone cliff line of the Wongawilli Creek valley. It is a moderate overhang located along a large, continuous cliff line that has been formed by block fall and subsequent weathering, above a very steep drop-off to the nearby creek. The overhang measures 13 m x 3.5 m x 1.5 m and has a flat open internal space of approximately 9 m x 2 m in size. No art was identified within the shelter.

The internal area deposit consists of fine yellow grey sand, estimated to be between 10 cm and 15 cm deep. No disturbance was evident across the floor of the shelter. One quartz core was identified near the centre of the internal floor area. No further stone material was identified. The deposit remains undisturbed and is in good condition.

The overhang has been subject to significant natural chemical weathering. Almost all surfaces were affected by lichen, mould, micro-organism growth and leeching. If any art is present, it is no longer visible. Some water seepage occurs over the lip of the shelter; however, no seepage was evident across the rear wall of the shelter. The shelter has two horizontal bedding planes, and no cracks were evident.

This site was first recorded by Biosis in 2007 for the Dendrobium Area 3 ACHA, recorded again by Biosis in 2012 for the Dendrobium Area 3B ACHA, and then re-recorded for the Longwall 13 End of Panel Assessment by Niche in 2018.

The results of the monitoring inspection completed on 28 April 2023 for DM 17 (AHIMS ID# 52-2-3641) are detailed in Table 12 below, and the monitoring photographs and comparison images for the site are shown in Plate 77 to Plate 80.

Table 12: Results of DM 17 (AHIMS ID# 52-2-3641) monitoring inspection

AHIMS number	Site name	Results of inspections
52-2-3641	DM 17	This Shelter with Deposit was first recorded by Biosis in 2007 for the Dendrobium Area 3 ACHA, recorded again by Biosis in 2012 for the Dendrobium Area 3B ACHA, and then re-recorded for the Longwall 13 End of Panel Assessment by Niche in 2018. No changes to the site were observed during the recent monitoring on 28 April 2023.

Longwall 19 EoP Monitoring Images, DM 17 (AHIMS ID# 52-2-3641)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 77: Photograph of shelter DM 17 (AHIMS ID# 52-2-3641), facing north. Taken on 28 April 2023.

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 79: Photograph of shelter exterior at DM 17 (AHIMS ID# 52-2-3641), facing north. Taken on 28 April 2023.

Previous images of DM 17 (AHIMS ID# 52-2-3641)

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 78: Comparison photograph of shelter DM 17 (AHIMS ID# 52-2-3641, facing north. Taken during Longwall 13 End of Panel recording by Niche (2018).

This information has been redacted

For more information please contact South 32 Illawarra Metallurgical Coal.

Plate 80: Comparison photograph of shelter exterior of DM 17 (AHIMS ID# 52-2-3641), facing north. Taken during the Dendrobium Area 3 ACHA recording by Biosis (2007).

1.5 Discussion and conclusion

Eight (8) Aboriginal cultural heritage sites were visited on 26-28 April 2023, being DM 13 (AHIMS ID#48-2-0056), Browns Road Site 31 (AHIMS ID#52-2-1645), Browns Road Site 32 (AHIMS ID#52-2-1646), DM 15 (AHIMS ID#52-2-3639), DM 16 (AHIMS ID#52-2-3640), DM 17 (AHIMS ID#52-2-3641), DM 20 (AHIMS ID#52-2-3644) and Sandy Creek Road 21 (AHIMS ID#52-5-0273).

There were new impacts from the extraction of Longwall 19 to two Aboriginal cultural heritage sites observed during the field inspection for this report:

- DM 15 (AHIMS ID#52-2-3639) has new vertical cracking which partially runs through Art Panel 1 Motif 1. There was also new water seepage and water wash (including across the art panel) observed at this site, especially associated with the long vertical crack described above. An area of fresh spalling and exfoliation located approximately 1 m above Art Panel 1 Motif 1 was observed, along with minor new block fall from the eastern lip of the shelter overhang (associated with the upper termination of the vertical cracking). This minor block fall has not impacted the art or the structural integrity of the shelter.
- Sandy Creek Road 21 (AHIMS ID#52-5-0273) has horizontal cracking along the inner lower lip and lower back wall of the shelter measuring 10 m in length, stretching from the southern end of the shelter and terminating 30 cm below Art Panel 2. No direct impacts to the art itself were observed. A new area of spalling was observed associated with the northern end of the horizontal cracking described above. The shelter interior remains dry despite the new cracking, and at the time of recording (26 April 2023) the structural integrity of the shelter overhang remains intact despite the observed cracking.

The TARP below (Table 13) contains the performance measures along with the proposed Corrective Management Actions (CMA's) for Aboriginal cultural heritage sites, as outlined in the Dendrobium Area 3A Longwall 19 ACHMP. **Sandy Creek Road 21 (AHIMS ID#52-5-0273) and DM 15 (AHIMS ID#52-2-3639) trigger Level 2 CMAs as per the TARP performance measures** (see Table 13). The RAPs, Heritage NSW and WaterNSW were notified on 31 March 2023 of these impacts, within 24 hours of South32-IMC personnel having observed the impacts to these two sites.

Table 13: Longwall 19 Aboriginal Cultural Heritage Sites Performance Measures Table - Trigger Action Response Plan (TARP)

Feature (Site)	Performance Measures	Actions as a result of performance measure rating
<ul style="list-style-type: none"> DM 13 (AHIMS ID#48-2-0056) Browns Road Site 31 (AHIMS ID#52-2-1645) Browns Road Site 32 (AHIMS ID#52-2-1646) DM 16 (AHIMS ID#52-2-3640) DM 17 (AHIMS ID#52-2-3641) DM 20 (AHIMS ID#52-2-3644) 	Observational and photographic monitoring in consultation with stakeholders (completed by this assessment).	None.
No sites	Level 1 Change in shelter conditions not attributable to natural weathering or preservation; mineral growth of micro-	Continue monitoring program. Condition assessment and photographic record. Notify RAPs and Heritage NSW within 24 hours of any confirmed changes to the conditions of Aboriginal cultural heritage sites.

	<p>organism growth (as observed by comparing pre-mining photographs with post-subsidence/ mining photographs).</p> <p>Changes external to the shelter that affect the site context (e.g. ground cracking, boulder slumping, rock and/or tree falls).</p>	Summarise impacts and report in the End of Panel report and Annual Review.
<ul style="list-style-type: none"> Sandy Creek Road 21 (AHIMS ID#52-5-0273) DM 15 (AHIMS ID#52-2-3639) 	<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>	<p>Actions as stated for Level 1.</p> <p>Modify monitoring program if necessary.</p> <p>Trigger the development of a site management plan to mitigate effects in consultation with Registered Aboriginal Parties and Landowner (WaterNSW).</p> <p>Notify RAPs of impacts caused from mining.</p> <p>Notify Heritage NSW and complete Aboriginal Site Impact Recording Forms (ASIRF) for impacted sites.</p>
No sites	<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>	<p>Actions stated for Level 2.</p> <p>Notify Heritage NSW, DPIE, WaterNSW, other resource managers and relevant technical specialists and seek advice on any Corrective Management Actions (CMA) required.</p> <p>Site visits with stakeholders if required.</p> <p>Review monitoring program and notify, if necessary, within 1 month.</p> <p>Implement increased monitoring if required within 2 weeks.</p> <p>Develop site CMA in consultation with key stakeholders within 1 month, (pending stakeholder availability) and seek approvals.</p> <p>Completion of works following approvals.</p> <p>Issue CMA report within 1 month of works completion.</p> <p>Conduct initial follow up monitoring and reporting within two months of CMA completion.</p> <p>Review the relevant TARP and Management Plan in consultation with key stakeholders.</p>

1.5.1 Recommendations

The recommendations resulting from this assessment are outlined in Table 14 below.

Table 14: Recommendations

Recommendations	
	General
1.	This End of Panel inspection report was provided to RAPs for their review and comment. The comments received have been incorporated into this report, and will be applied to future management plans and monitoring programs.
2.	<p>Level 2 Corrective Management Actions (CMA's) from the Trigger Action Response Plan (TARP) are to be completed for Sandy Creek Road 21 (AHIMS ID#52-5-0273) and DM 15 (AHIMS ID#52-2-3639), as per the Longwall 19 ACHMP:</p> <ul style="list-style-type: none">• Actions as stated for Level 1 CMAs, which this report meets.• Modify monitoring program if necessary.• Develop a site management plan to mitigate effects in consultation with Registered Aboriginal Parties and Landowner (WaterNSW).• Notify RAPs of impacts caused from mining.• Notify Heritage NSW and complete Aboriginal Site Impact Recording Forms (ASIRF) for impacted sites Sandy Creek Road 21 (AHIMS ID#52-5-0273) and DM 15 (AHIMS ID#52-2-3639).
3.	As per the Longwall 19 ACHMP, further monitoring is to be undertaken six (6) months and twelve (12) months from the completion of Longwall 19 in April 2023. This report meets the initial requirement in the Longwall 19 ACHMP for End of Panel Aboriginal Cultural Heritage Site monitoring.
4.	South32 IMC should continue community consultation as per the Longwall 19 ACHMP, in regard to any Aboriginal Cultural heritage sites within the Longwall 19 Study Area.
5.	The AHIMS site card for Browns Road Site 32 (AHIMS ID# 52-2-1646) should be updated with the corrected coordinates.

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Appendix 1 - Previous subsidence monitoring for Dendrobium Area 3.

Area	Site Name	AHIMS Number	Site Type	Relevant longwall End of Panel Report	Observed Impacts	Impact Type	Significance	Located over longwall
3A	Browns Road Site 33	52-2-0458	Shelter with Art	Longwall 6	No observed impacts	-	-	
				Longwall 7	No observed impacts	-	-	
3A	Browns Road Site 32	52-2-1646	Shelter with Art	Longwall 6	No observed impacts	-	-	-
3A	Sandy Creek Road 22	52-2-0274	Shelter with Art	Longwall 6	No observed impacts	-	-	
				Longwall 7	No observed impacts	-	-	
3A	Sandy Creek Road 25	52-2-0277	Shelter with Art	Longwall 6	Observable impacts	Expansion of jointing.	Low	LW6
				Longwall 7	Observable impacts	Closure of previously expanded jointing.	Low	
3A	Sandy Creek Road 26	52-2-0278	Shelter with Art	Longwall 6	No observed impacts	-	-	
				Longwall 7	No observed impacts	-	-	
3A	SCA Special Area Fire Trail 6C	52-2-3052	Open Camp Site	Longwall 6	No observed impacts	-	-	-
3A	DM 13	48-2-0056	Shelter with Deposit	Longwall 7	No observed impacts	-	-	LW8
				Longwall 8	No observed impacts	-	-	
3A	DM 23	52-2-3651	Shelter with Deposit	Longwall 7	Not inspected due to safety concerns	-	-	-
3A	DM 20	52-2-3644	Shelter with Art	Longwall 8	No observed impacts	-	-	-
3B	Donald Castle Creek Site 1	52-2-1562	Shelter with Art	Longwall 9	No observed impacts	-	-	LW9

Area	Site Name	AHIMS Number	Site Type	Relevant longwall End of Panel Report	Observed Impacts	Impact Type	Significance	Located over longwall
3B	Browns Road Site 13	52-2-1628		Longwall 9	No observed impacts	-	-	LW9
3B	Dendrobium 1	52-2-2208	Shelter with Deposit	Longwall 9	Observable impacts	Expansion of pre-existing vertical cracking adjoining the horizontal bedding plane as well as the extension of this cracking horizontally	Low	LW9
				Longwall 10	No further impacts	No observed impacts since the minor expansion and extension of vertical cracking in horizontal bedding plane during Longwall 9 extraction	Low	
3B	DM 2	52-2-3878	Shelter with Deposit	Longwall 9	No observed impacts	-	-	LW9
				Longwall 10	No observed impacts	-	-	
3B	Browns Road Site 12	52-2-1627	Shelter with Art	Longwall 11	No observed impacts	-	-	-
				Longwall 12	No observed impacts	-	-	
				Longwall 13	No observed impacts	-	-	
3B	Dendrobium 2	52-2-2209	Shelter with Art	Longwall 11	No observed impacts	-	-	LW12
				Longwall 12	No observed impacts	-	-	
3B	Upper Avon 39	52-2-1775	Shelter with Deposit	Longwall 12	No observed impacts	-	-	-
3B	Upper Avon 40	52-2-1776	Shelter with Art and Deposit	Longwall 12	No observed impacts	-	-	-
3B	Upper Avon 41	52-2-1778	Shelter with Deposit	Longwall 12	No observed impacts	-	-	-

Area	Site Name	AHIMS Number	Site Type	Relevant longwall End of Panel Report	Observed Impacts	Impact Type	Significance	Located over longwall
3B	Browns Road Site 11	52-2-1626	Shelter with Art	Longwall 13	No observed impacts	-	-	LW14
				Longwall 14	Observable impacts	Diagonal and vertical cracking with possible block fall and exfoliation expediated by subsidence.	Low	
				Longwall 15	Observable impacts	Diagonal and vertical cracking with minor block fall.	Low	
3B	Site 1-DB1	52-2-2229	Shelter with Art	Longwall 13	No observed impacts	-	-	LW14
				Longwall 14	Observable impacts	Diagonal and vertical cracking with possible block fall and exfoliation expediated by subsidence.	Low	
				Longwall 15	No observed impacts	-	-	
3B	DM 17	52-2-3641	Shelter with Deposit	Longwall 13	No observed impacts	-	-	
3B	DM 16	52-2-3640	Shelter with Art	Longwall 13	No observed impacts	-	-	
3B	DM 21	52-2-3645	Shelter with Art and Deposit	Longwall 14	No observed impacts	-	-	LW15
				Longwall 15	Observable impacts	Diagonal and vertical cracking at the northern exterior end of the shelter.	Low	
				Longwall 16	Observable impacts	Previous subsidence movements related to extraction of Longwall 15; no further impacts were observed because of the extraction of Longwall 16.	Low	
3B	DM 22	52-2-3646	Shelter with Art	Longwall 14	No observed impacts	-	-	-

Area	Site Name	AHIMS Number	Site Type	Relevant longwall End of Panel Report	Observed Impacts	Impact Type	Significance	Located over longwall
3B	Upper Avon 37	52-2-1773	Shelter with Art	Longwall 14	No observed impacts	-	-	-
3B	Browns Road Site 8	52-2-1623	Shelter with Deposit	Longwall 15	No observed impacts	-	-	-
				Longwall 16	No observed impacts	-	-	
				Longwall 17	No observed impacts	-	-	
3B	Upper Avon 35	52-2-1771	Shelter with Deposit	Longwall 15	No observed impacts	-	-	-
				Longwall 16	No observed impacts	-	-	
				Longwall 17	No observed impacts	-	-	
3B	Dendrobium 6	52-2-2246	Isolated Artefact	Longwall 15	No observed impacts	-	-	Longwall 16
				Longwall 16	Not inspected as it is an Isolated Artefact that would not be able to be relocated.	-	-	
				Longwall 17	Not inspected as it is an Isolated Artefact that would not be able to be relocated.			
3B	Dendrobium 7	52-2-2248	Shelter with Art	Longwall 16	Not inspected due to safety reasons- active mining within close proximity	-	-	-
				Longwall 17	Not inspected due to safety reasons- site situated in Longwall 18 active mining area.	-	-	

Area	Site Name	AHIMS Number	Site Type	Relevant longwall End of Panel Report	Observed Impacts	Impact Type	Significance	Located over longwall
				Longwall 18	No observed impacts	-	-	
3B	Dendrobium 8	52-2-3068	Shelter with Art and Grinding Grooves	Longwall 16	Not inspected due to safety reasons- active mining within close proximity	-	-	-
				Longwall 17	Not inspected due to safety reasons- site situated in Longwall 18 active mining area.	-	-	
				Longwall 18	No observed impacts	-	-	
3B	Upper Avon 36	52-2-1772	Shelter with Art	Longwall 18	No observed impacts	-	-	-

Contact Us

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