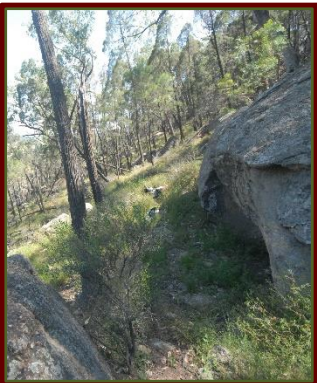
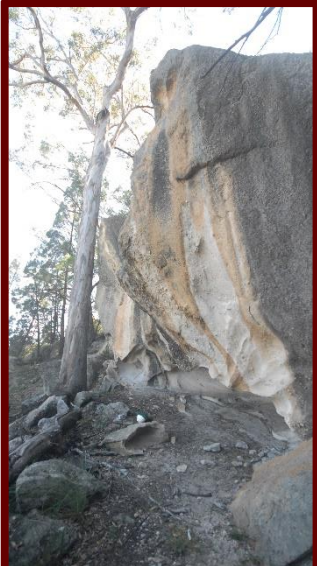


APPENDIX 4
HERITAGE

Heritage Reports

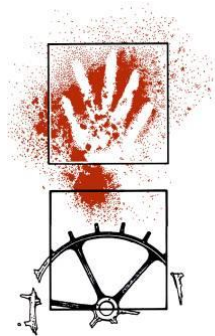


Wilpinjong Coal Mine Aboriginal Rock Art Monitoring and Assessment Program

Report on Nov 2020 site inspections WCP152 and WCP153

Wilpinjong, NSW

March 2021



**Navin
Officer**

*heritage
consultants Pty Ltd*

www.nohc.com.au

Number 4
Kingston Warehouse
71 Leichhardt St.
Kingston ACT 2604
www.nohc.com.au

Author
Kelvin Officer

LGA: Mudgee

Client: Wilpinjong Coal Mine

Proponent: Peabody Energy Australia

ph 02 6282 9415

fx 02 6282 9416



Figure 1 This monitoring assessment occurs at the completion of mining, backfilling and the restoration of surface contouring and topsoil adjacent to the WCP152 and 153 art sites. Looking northwest from basal slopes adjacent to WCP153 (image: Nov 2020).

Report Register

The following register documents the development and issue of this document.

Issue No.	Notes/Description	Issue Date
v 1	Draft for client comment	22 March 2021
v 2	Final version following client comment	26 March 2021

EXECUTIVE SUMMARY

As part of an ongoing monitoring program of Aboriginal rock art sites within the Wilpinjong Coal mine lease, NOHC conducted a field assessment in November 2020 of two sites (WCP152 and WCP153) next to which coal extraction, and land-surface rehabilitation has been completed. This report documents the results of that inspection and condition assessment.

The current condition of each site was compared with a baseline recording compiled in 2006, and where relevant, with monitoring observations made in 2014 and 2017.

Summary of inspection results

WCP152

- Detachment has occurred of a small section of the undercut lower edge of the 'trident' rock art panel. The detached piece was identified and recovered from the shelter floor and awaits a decision by stakeholders on an appropriate course of action.

A small hairline crack was noted in the area of detachment in 2017 and relates to a natural erosion process. It appears likely that dislodgement was due to impact from an animal.

There is a new hairline crack immediately left of the previous panel loss, indicating another semi-detached portion of the panel edge.

- An accumulation of combustible material is noted close to the shelter entrance. This includes a fallen canopy limb from the large Eucalypt tree near the shelter entrance
- A small fig tree continues to grow on a cleft above the shelter. In the longer term, roots from this tree may de-stabilise the shelter and allow water into the interior.
- Other fragile areas of exfoliation and semi-detached fragments on the shelter ceiling are unchanged since the 2006 baseline recording. This suggests that the detachment of the fragment was due to animal impact and not mining vibration.
- Allowing for variation in natural lighting and humidity, no difference between the 2017 record and the appearance of the current (2020) dust deposits could be discerned.

WCP153

- There is combustible material in the form of fallen and standing dead trees situated to either side of, downslope, and on top of the shelter.
- With the exception of some continuing minor exfoliation of small spalls associated with the ceiling dripline, the rock surfaces and art panels within this site are stable. Other areas of past spalling across the back wall are unchanged since the 2006 baseline recording.
- There is no discernible change (since 2017), in the appearance of the dark-hued, grey dust deposits on the upward facing rock surfaces along the base of the back wall (excepting colour variations due to varying natural light and humidity). The dust does not impact upon the art panels.
- Lichen growth continues to be associated with moist areas. This process is not affecting the rock art and does not pose a risk to the stability of the rock art panels.

Management Recommendations

WCP152

Detached and semi-detached fragments at base of 'trident' motif panel

The recovered detached panel edge-fragment should continue to be securely stored until an appropriate management response is determined through consultation with the project's Registered Aboriginal Parties. Potential options for consideration include:

- a) Permanent curation/storage at an off-site facility,
- b) Restoration by re-attaching the fragment using a suitable adhesive,
- c) Conducting microscopic inspection and non-impactive pigment analysis, prior to initiating a) or b), and
- d) Investigating the feasibility of preventing or discouraging animal use of the shelter space around the fragile lower edge of the art panel.

The condition and nature of the hairline crack and remaining semi-dislodged panel-edge fragment should continue to be monitored. In the event that a portion of the art panel becomes dislodged, the piece(s) should be collected and an appropriate management action followed, (if and when determined through consultation as previously outlined).

Combustible material

The combustible material in the form of fallen branches and forest litter within approximately 10 m of the shelter entrance should be removed.

Dust

The condition of the dust deposits across the shelter should continue to be monitored.

Consideration should be given to removing the dark-hued dust across the upward facing shelter surfaces as part of the same program and using the same methodology as the planned removal of dust from WCP72. The possible benefits should be balanced with the risk of accidental damage to the fragile lower edge of the art panel in this shelter, and the fact that no dust deposits are obscuring art pigments in this shelter.

Former seismometer pad

The resin pad from a former seismometer mounting should be removed from the shelter floor.

Fig tree

A small fig tree continues to grow on a rock ledge above the rock shelter. In the short and medium term, its small size precludes a significant risk to the stability of the rock shelter. In the long term however, the growth of its root system may cause rock displacement and cracking which could destabilise the underlying shelter and/or allow water to enter the shelter through enlarged fractures and bedding plains.

The growth of the fig tree should continue to be monitored.

WCP153

Combustible material

The combustible material in the form of fallen and standing dead trees, and forest litter within approximately 10 m of the shelter entrance should be removed.

Dust

The condition of the dust deposits across the shelter should continue to be monitored.

Consideration should be given to removing the dark-hued dust across the upward facing shelter surfaces as part of the same program and using the same methodology as the planned removal of dust from WCP72.

~ ooo ~

TABLE OF CONTENTS

1. INTRODUCTION.....	1
1.1 ABORIGINAL ROCK ART MONITORING PROGRAM.....	1
1.2 STUDY AIMS.....	1
1.3 THIS REPORT.....	1
1.3.1 <i>Outline</i>	2
1.3.2 <i>Copyright</i>	2
1.3.3 <i>Restricted Information</i>	2
1.3.4 <i>Confidentiality</i>	2
2. STUDY METHODOLOGY.....	3
2.1 CONTRIBUTORS.....	3
2.2 METHODOLOGY.....	3
2.3 ABORIGINAL PARTICIPATION.....	3
2.4 IMAGE CAPTURE AND LOCATION	3
3. RESULTS.....	5
3.1 WCP152.....	5
3.1.1 <i>Shelter Context</i>	5
3.1.2 <i>Shelter Stability (cracks and bedding plains)</i>	7
3.1.3 <i>Rock Surface Water Flow</i>	7
3.1.4 <i>Rock Surface Stability</i>	7
3.1.5 <i>Rock Surface Organics</i>	11
3.1.6 <i>Rock Art Pigments</i>	11
3.1.7 <i>Insect Activity</i>	11
3.1.8 <i>Bird and Other Animal Activity</i>	11
3.1.9 <i>Dust</i>	11
3.1.10 <i>Shelter Deposit</i>	11
3.1.11 <i>Summary</i>	14
3.2 WCP153.....	15
3.2.1 <i>Shelter Context</i>	15
3.2.2 <i>Shelter Stability (cracks and bedding plains)</i>	16
3.2.3 <i>Rock Surface Water Flow</i>	16
3.2.4 <i>Rock Surface Stability</i>	17
3.2.5 <i>Rock Surface Organics</i>	18
3.2.6 <i>Rock Art Pigments</i>	18
3.2.7 <i>Insect Activity</i>	19
3.2.8 <i>Bird and Other Animal Activity</i>	19
3.2.9 <i>Dust</i>	20
3.2.10 <i>Shelter Deposit</i>	22
3.2.11 <i>Summary</i>	22
4. MANAGEMENT RECOMMENDATIONS	23
4.1 WCP152.....	23
4.2 WCP153.....	23
5. REFERENCES	25

LIST OF FIGURES

Figure 1 This monitoring assessment occurs at the completion of mining, backfilling and the restoration of surface contouring and topsoil adjacent to the WCP152 and 153 art sites. Looking northwest from basal slopes adjacent to WCP153 (image: Nov 2020).i	
Figure 2 A welcome feature of the 2020 inspection was the return of green ground-storey vegetation in the forests surrounding the sites. 3	
Figure 3 Views looking north (top) and south (right) across the build-up of combustible material on the slopes adjacent to the WCP152 shelter entrance (DSC_0294, & 0295). 5	
Figure 4 The former location of the WCP152 seismometer in 2014 (top left) (NOHC 2015: Fig 4.32), in 2017 (top right) (NOHC 2020: Fig 38) and during the present inspection (bottom, DSC_0315). 6	
Figure 5 Images of a small fig tree growing within a ledge above the WCP152 shelter in 2017 (DSC_0304) and a close-up view during the present inspection (DSC_0344). 6	
Figure 6 Diagram modified from (NOHC 2006:66, Fig.5.6) showing an indicative cross section through the lower portion of the WCP152 art panel. 7	
Figure 7 The lower edge of the art panel in WCP 152 consists of a narrow undercut edge which has been undercut by an actively eroding lower concave surface (top images). A portion of this edge, (shown in 2006, 2014, 2017 and in 2020), was noted as semi-detached in 2017 (bottom left), and has now detached and fallen to the shelter floor in 2020 (bottom right). 8	
Figure 8 The position of the detached portion of art panel on the shelter floor, as found at the time of inspection (top), and the fragment held next to its original position. Note that a small spall from the middle of the fracture interval is missing. 9	
Figure 9 Detail of a newly noted hairline crack located immediately to the left of the recent detachment. 9	
Figure 10 Comparative images of a fragile area of rock surface exfoliation on an art panel on the ceiling of WCP152, showing no changes since 2017. 10	
Figure 11 Comparative images of old Fairy Martin mud bottle nests in the ceiling alcoves of WCP152. No new nests were observed, together with further loss of wall fragments. 12	
Figure 12 Comparative images showing the colour of dust deposits across the rock floor of WCP152. No difference from the 2017 record, which could not be related to natural lighting conditions, was discernable. 13	
Figure 13 General context of shelter WCP153, showing the marked increase in green groundstorey vegetation compared to 2017 (top). 15	
Figure 14 General context of the WCP153 shelter showing the number of uprooted and fallen Callitris pines on the surrounding slopes (IMG_4432). 16	
Figure 15 General view of WCP153 shelter, looking east. Note fallen tree debris above shelter (DSC_0349). 16	
Figure 16 Comparative images showing small areas of minor exfoliation (circled) and changes in surface colour/mineralisation across moisture zones associated with the WCP153 ceiling dripline. 17	
Figure 17 There are no visually discernible differences in the art pigments or supporting rock matrix since the baseline record in 2006. 18	
Figure 18 Images and location of a new mud-daubing wasp nest in a back wall alcove of WCP153. 19	
Figure 19 A contemporary comparison of darker-hued dust deposits on the floors of WCP153 (top) and WCP152 (bottom). The deposits in WCP153 appear to be darker and denser and this may be due to the shallower nature of the overhang, the shorter distance to the mining pit (around 100m), and the narrower band of intervening (filtering) vegetation. ... 20	

- Figure 20** Comparative images of dust deposits across the WCP153 back wall. Note the distinct change in hue from light yellow-brown to dark grey noted in 2017 and no discernible change (apart from lighting and humidity changes) between 2017 and 2020. Airborne dust from the formerly nearby open cut pit is the likely source of this material..... 21
- Figure 21** General view of the WCP153 floor, growth of herbs and grasses, and previously noted loose tabular surface rock, sourced from adjacent side slopes (DSC_0353). 22



1. INTRODUCTION

1.1 Aboriginal Rock Art Monitoring Program

The Wilpinjong Coal Mine is located approximately 40 kilometres north-east of Mudgee, near the village of Wollar within the Mid-West Regional local government area, in central New South Wales. The mine comprises an open cut mining operation, together with a Coal Handling and Preparation Plant (CHPP); raw and product handling facilities; and rail and train loading infrastructure.

In 2006 Project Approval was granted to the Project under Section 75J of the *Environmental Planning and Assessment Act 1979* (Project Approval 05-0021). In the same year, the mine was purchased by Peabody Energy. The conditions of the Project Approval included the development of an Aboriginal Cultural Heritage Management Plan (ACHMP) and a range of specified requirements in relation to identified heritage sites (WCPL 2006). Section 48(b) of the Approval specified the conduct of 'a detailed monitoring program for Aboriginal sites WCP72, WCP152 and WCP153, including the creation of a pre-development baseline recording of these sites.

All Aboriginal cultural heritage management actions to be conducted as part of the Wilpinjong Coal Mine project are outlined in the Wilpinjong Coal Mine Aboriginal Cultural Heritage Management Plan (ACHMP) (WCPL 2006, and as revised by PEA 2017).

In accordance with the ACHMP requirements, NOHC completed a baseline recording and assessment of sites WCP72, WCP152 and WCP153 in 2006 (Peabody Energy 2017, NOHC 2006).

Following the baseline study, each site has been the subject of an on-going monitoring program directed at the following factors:

- Ground vibration
- Atmospheric dust
- Art pigments and rock supports

As part of the monitoring program, periodic inspection of the art pigments and their supporting rock surfaces is conducted at each site. This report documents the results of an inspection of two sites, WCP152 and WCP153, conducted in November 2020 by NOHC. It is the third inspection of these sites since the conduct of the baseline recording and coincides with the completion of in-filling and restoration of the former land-surface across nearby adjacent coal pits. The previous monitoring inspections were conducted in December 2014 (NOHC 2015), and May 2017 (NOHC 2020b).

The report was commissioned by Peabody Energy Australia.

1.2 Study Aims

- Conduct an assessment of any changes to the art pigments, rock supports or contexts at sites WCP152 and WCP153 (adjacent to Pit 5), since the 2006 baseline recording or the 2014 and 2017 monitoring inspections;
- Conduct appropriate levels of Aboriginal community representative consultation in the conduct of the inspection and the communication of inspection results; and
- Provide recommendations on any matters arising from the inspection results.

1.3 This Report

This report provides a record of any condition changes noted since the previous inspection conducted in 2017. A description of factors for which there was no discernible change has not been provided. Readers seeking this detail are directed to the 2014 and 2017 monitoring reports.



1.3.1 Outline

This report:

- Describes the monitoring program and its aims (Section 1);
- Describes the methodology employed in the inspection (Section 2);
- Provides information relevant to the Aboriginal consultation for this project (Section 3);
- Describes the results of the inspection (Section 4); and
- Provides management recommendations based on the inspection results (Section 5).

1.3.2 Copyright

Copyright to this report rests with Peabody Energy except for the following:

- The Navin Officer Heritage Consultants logo and business name (copyright to this rests with Navin Officer Heritage Consultants Pty Ltd);
- Generic content and formatting which is not specific to this project or its results (copyright to this material rests with Navin Officer Heritage Consultants Pty Ltd);
- Descriptive text and data relating to Aboriginal objects which must, by law, be provided to OEH for its purposes and use;
- Information which, under Australian law, can be identified as belonging to Indigenous intellectual property; and
- Content which was sourced from and remains part of the public domain.

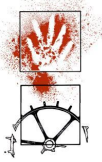
1.3.3 Restricted Information

Information which relates to the exact location of the subject rock art sites has been excluded from this report. This is consistent with current management policy to minimise the potential of impact to the rock art resulting from unauthorised visitation. Further inquiries may be directed to Heritage NSW, Community Engagement Group, Department of Premier and Cabinet heritagemailbox@environment.nsw.gov.au

No information provided by Aboriginal stakeholders in this report has been specifically identified as requiring access restrictions due to its cultural sensitivity.

1.3.4 Confidentiality

No information in this report has been classed as confidential.



2. STUDY METHODOLOGY

2.1 Contributors

This report was written by NOHC director and archaeologist Kelvin Officer.

Fieldwork was undertaken by Kelvin Officer and Wilpinjong Coal Mine representative Clark Potter who also provided logistical assistance.

2.2 Methodology

Comparative reference was made to the descriptions and the photographic record from the 2006 baseline recording (NOHC 2006) and 2014 and 2017 inspection reports (NOHC 2015, 2020b), prior to and during the inspection, and as part of the subsequent inspection analysis and report writing.

The two rock art sites (WCP152 and WCP153) were visited over the course of one day, on the 26th of November 2020. Each site was visited and subject to a close visual inspection. Hardcopies of the baseline and previous monitoring recordings was used to compare the current rock art panel condition and identify any possible changes. Areas of suspected change or post-2017 impact were photographed for later comparison and confirmation with the digital record and inspection reports.

2.3 Aboriginal Participation

Wilpinjong Coal Mine and Peabody Energy conduct an ongoing consultation program with Aboriginal stakeholders with regard to cultural heritage management within the Wilpinjong mining lease. There are currently nine organisations or individuals registered as Aboriginal stakeholders (also known as Registered Aboriginal Parties).

An invitation was extended via the internal Wilpinjong Mine protocol to all registered Aboriginal stakeholders to participate in the site inspection. Unfortunately no field representatives were available to participate in the inspection, with some already engaged in salvage excavation at another site in the coal lease.

2.4 Image capture and location

High resolution digital photography (2592 x 3872 pixels) was taken with a Nikon D200 Digital SLR camera. Supplementary images (640 x 480 pixels) were captured with a Panasonic DMC-FT2 compact digital camera.

All images of rock surfaces within the rock shelters are identified with an image number and cross referenced where appropriate with a 2006 baseline image. The location of the image within the shelter space can be determined by using 2006 image number with the spatial key presented in volume 2 of the 2006 baseline recording report (NOHC 2006).



Figure 2 A welcome feature of the 2020 inspection was the return of green ground-storey vegetation in the forests surrounding the sites.



Comparative images in this report are presented with the following colour coding:

- dark blue border** March/April 2006 baseline image
- light blue border** December 2014 image
- orange border** May 2017 image
- dark brown** Nov 2020 image

Unless otherwise referenced, all images in this report were captured in Nov 2020.



3. RESULTS

3.1 WCP152

3.1.1 Shelter Context

No human footprints or litter was noted on the shelter floor.

The following observations were made of the shelter and its context since the 2017 inspection:

- A large canopy limb has fallen from the tree in front of the shelter entrance and constitutes a significant source of combustible material (**Figure 3**).
- There is a low to moderate build-up of combustible ground litter on the near-by slope adjacent to the shelter entrance (**Figure 3**).
- A previously noted resin footing for a former seismometer placement remains attached to the rock floor of the shelter at its southern end (**Figure 4**).
- A small fig tree, noted in 2006 and which may pose a long-term threat to the stability of the shelter, continues to grow on a high ledge above the shelter (**Figure 5**). The identified threat would be the introduction of water onto the shelter walls as a result of future root incursion widening rock fissures and bedding planes. The tree does not pose an immediate or short term threat to the shelter.

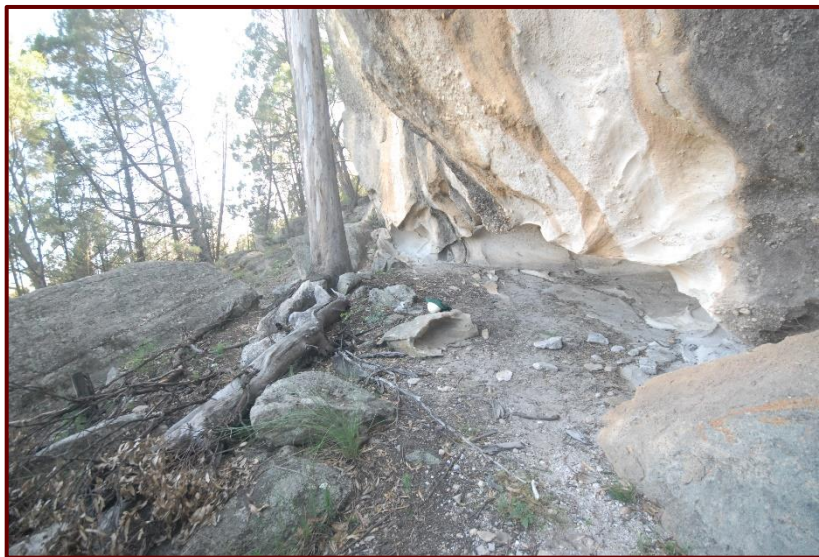


Figure 3 Views looking north (top) and south (right) across the build-up of combustible material on the slopes adjacent to the WCP152 shelter entrance (DSC_0294, & 0295).





Figure 4 The former location of the WCP152 seismometer in 2014 (top left) (NOHC 2015: Fig 4.32), in 2017 (top right) (NOHC 2020: Fig 38) and during the present inspection (bottom, DSC_0315).

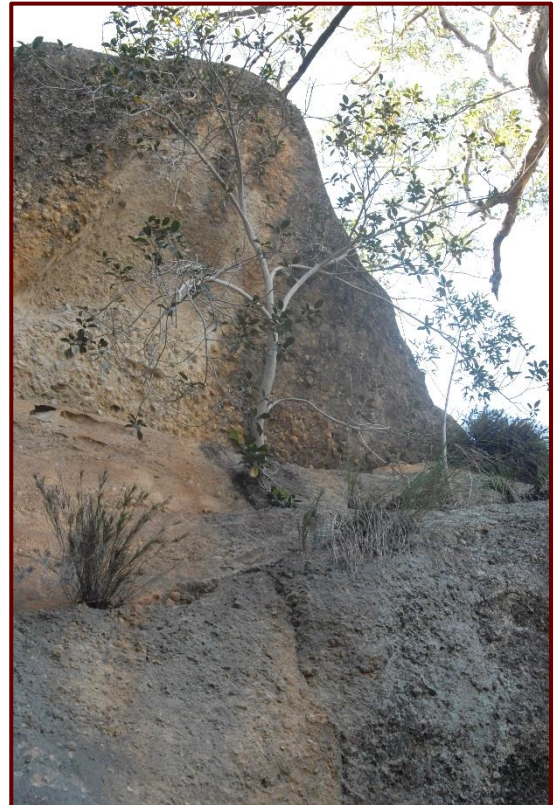


Figure 5 Images of a small fig tree growing within a ledge above the WCP152 shelter in 2017 (DSC_0304) and a close-up view during the present inspection (DSC_0344).



3.1.2 Shelter Stability (cracks and bedding plains)

There was no observed difference in the state of major cracks and bedding plains which could potentially indicate overall shelter instability.

3.1.3 Rock Surface Water Flow

There was no observed evidence for surface water flow across the art panels since the last inspection in 2017.

3.1.4 Rock Surface Stability

A large proportion of the back wall and rock floor of this shelter is subject to active granular surface decay. This is a natural, long-standing erosional process, which was noted in the baseline recording. This process, possibly prompted by the precipitation of salts at the rock surface, results in the rock surface becoming crumbly and shedding small sand and matrix grains. This fallen material forms loose white sandy deposits directly underneath the active surfaces, and in this case contribute to the overall light grey to white colour of the shelter deposit. No change to the location and extent of these active surfaces was noted during the inspection.

Given their actively eroding character, these surfaces are comparatively young and contain no art pigments. By contrast, the art pigments in this shelter are situated on much older surfaces which are case-hardened from mineralisation and are comparatively stable. Where the stable and actively eroding surfaces meet, there is a fragile undercut 'lip' where the erosion has eroded the underlying substrate behind the older case hardened surface (**Figure 6**). The entire lower edge of the remaining back-wall art panel has an edge of this type and is vulnerable to fracturing and dislodgement from impacts by animal and human visitors.

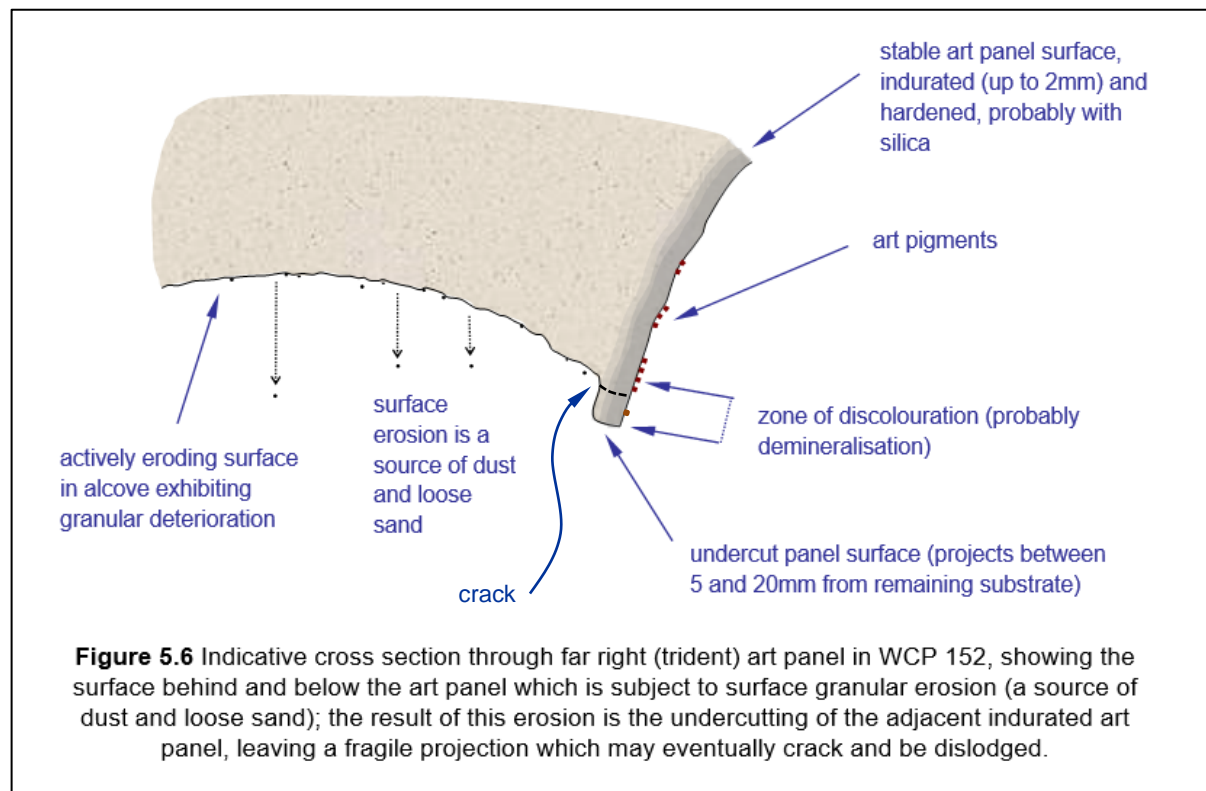


Figure 6 Diagram modified from (NOHC 2006:66, Fig.5.6) showing an indicative cross section through the lower portion of the WCP152 art panel.



2014 (DSC_0008)



2020 (DSC_312)



2006 (WCP 152:118)



2014 (NOHC 2015: Fig 4.35)



2017 (DSC_0295)



2020 (DSC_0316)

Figure 7 The lower edge of the art panel in WCP 152 consists of a narrow undercut edge which has been undercut by an actively eroding lower concave surface (top images). A portion of this edge, (shown in 2006, 2014, 2017 and in 2020), was noted as semi-detached in 2017 (bottom left), and has now detached and fallen to the shelter floor in 2020 (bottom right).



The 2017 monitoring assessment noted that, at that time, there was no discernible difference in the profile of the undercut edge and the 2006 baseline record. However, it was noted that a hairline fracture along the bottom edge of the 'trident' panel, (first recorded in 2014), had enlarged to a point where a small elongate section of the edge could be termed semi-detached. It was predicted that this section could detach in the foreseeable future. This section was noted to include a portion of a 'trident' motif (**Figure 7**).

During the current inspection this formerly semi-detached section was noted to be missing from the panel and was identified on the shelter floor below the subject back-wall panel (**Figure 8**).

A new hairline crack situated immediately to the left of the previous panel loss is noted, indicating the development of a further semi-detached portion of the panel edge (**Figure 9**).



Figure 8 The position of the detached portion of art panel on the shelter floor, as found at the time of inspection (top), and the fragment held next to its original position. Note that a small spall from the middle of the fracture interval is missing.

DSC_0320



DSC_0326



Figure 9 Detail of a newly noted hairline crack located immediately to the left of the recent detachment.

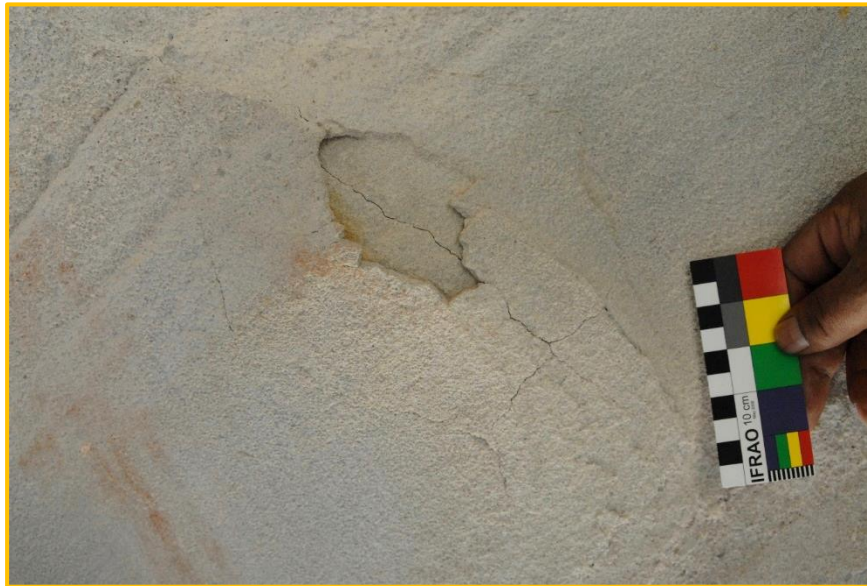
DSC_0316



Consistent with Registered Aboriginal Party comments during the 2017 monitoring program, (NOHC 2020:50), the detached spall was collected and is currently stored at the NOHC laboratory pending a stakeholder decision on a preferred course of action.

An inspection of other areas of fragile rock surface on the back wall and ceiling of the shelter revealed no change from 2017 records (**Figure 10**).

The absence of disturbance to these and semi-detached surfaces elsewhere across the shelter, strongly suggests that the detachment of the portion along the bottom edge of the 'trident' art panel was due to direct impact, such as from an animal, rather than mine-generated ground vibration which should impact more evenly across all vulnerable areas. The likelihood of animal impact as a cause is also supported by the location of the effected panel edge which is low down and situated towards the back of the shelter where animals such as wallabies would seek cover.



2017
(DSC_0299)



2020
(DSC_0324)

Figure 10 Comparative images of a fragile area of rock surface exfoliation on an art panel on the ceiling of WCP152, showing no changes since 2017.



3.1.5 Rock Surface Organics

No significant or substantial areas of organic growth were noted on the art panel surfaces.

3.1.6 Rock Art Pigments

Apart from the loss of an edge-portion from the 'trident' art panel noted above, there was no other definitive deterioration in the condition of the pigments and their rock supports noted.

3.1.7 Insect Activity

No new (post-2017) mud-daubing wasp nests were noted on or near the WCP152 art panels.

3.1.8 Bird and Other Animal Activity

No new Fairy Martin mud bottle-nests were noted in the shelter. Some of the existing nests have deteriorated further since 2017 photography (**Figure 11**). No nest impact upon art pigments.

The loss of a semi-detached edge-panel fragment from the 'trident' art panel is interpreted as a result of incidental animal impact.

3.1.9 Dust

In 2017, it was noted that there was a noticeable darker grey hue to the dust deposits on upward facing surfaces across the shelter, notably the sloping rock back-floor. None of these areas support art pigments (**Figure 11**). Given the timing of these observations and the results of an analysis of similar dust deposits in WCP72 (NOHC 2016b), it was concluded that the darker hue was the result of recent deposition of airborne coal dust, generated from the adjacent coal mining. It was noted that the darker coloured was not bonded to the underlying rock surface and could be easily dislodged by blowing.

Allowing for variation in natural lighting and humidity, no difference between the 2017 record and the appearance of the current (2020) dust deposits could be discerned (**Figure 11**).

The cumulative monitoring record of dark-hued dust accumulation in this shelter, suggests that deposition rates peaked during the time of closest mining activity (which occurred within 150 m of the shelter). This allows the drafting of a model proposing that the visually obtrusive dark-hued dust noted in the rock shelter is a consequence of a larger-sized fraction of quarry-generated airborne particles which fall out of air-suspension within a relatively small radius (within at least 200m) of their point of projection into the air. If a smaller size fraction was responsible, (which presumably would remain airborne longer and travel further), the deposition of dust would be expected to be more gradual and related to the overall life of the mine, rather than periods of close mining activity.

3.1.10 Shelter Deposit

There was no noted significant impact to the shelter deposit.



2017 (DSC_0270)



DSC_0306

Figure 11 Comparative images of old Fairy Martin mud bottle nests in the ceiling alcoves of WCP152. No new nests were observed, together with further loss of wall fragments.



2017
(DSC_0308)



DSC_0337

Figure 12 Comparative images showing the colour of dust deposits across the rock floor of WCP152. No difference from the 2017 record, which could not be related to natural lighting conditions, was discernible.



3.1.11 Summary

The following conclusions can be made regarding the condition of the WCP152 rock shelter and its art panels, with particular reference to comparisons with the previous 2017 inspection record:

- Detachment has occurred of a small section of the undercut lower edge of the 'trident' rock art panel. The detached piece was identified and recovered from the shelter floor and awaits a decision by stakeholders on an appropriate course of action.

A small hairline crack was noted in the area of detachment in 2017 and relates to a natural erosion process. It appears likely that dislodgement was due to impact from an animal.

There is a new hairline crack immediately left of the previous panel loss, indicating another semi-detached portion of the panel edge.

- An accumulation of combustible material is noted close to the shelter entrance. This includes a fallen canopy limb from the large Eucalypt tree near the shelter entrance
- A small fig tree continues to grow on a cleft above the shelter. In the longer term, roots from this tree may de-stabilise the shelter and allow water into the interior.
- Other fragile areas of exfoliation and semi-detached fragments on the shelter ceiling are unchanged since the 2006 baseline recording. This suggests that the detachment of the fragment was due to animal impact and not mining vibration.
- Allowing for variation in natural lighting and humidity, no difference between the 2017 record and the appearance of the current (2020) dust deposits could be discerned.



3.2 WCP153

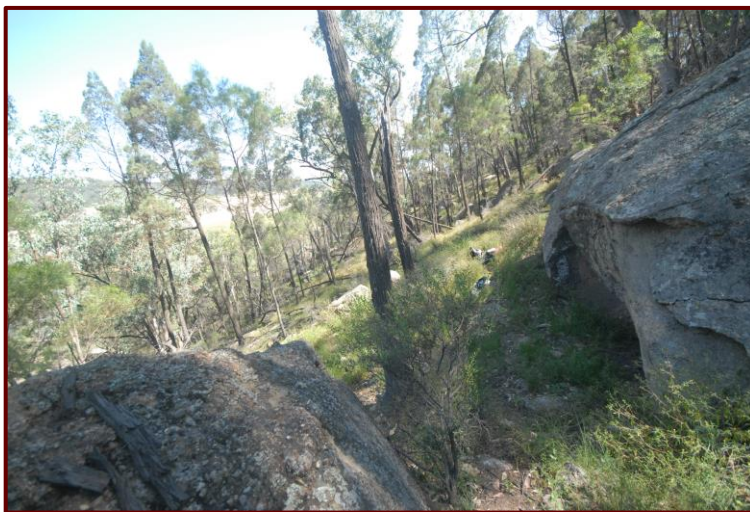
3.2.1 Shelter Context

At the time of inspection, the shelter context was characterised by a considerable degree of green, ground storey grasses and shrubs (**Figure 13**). No human footprints were noted prior to the inspection.

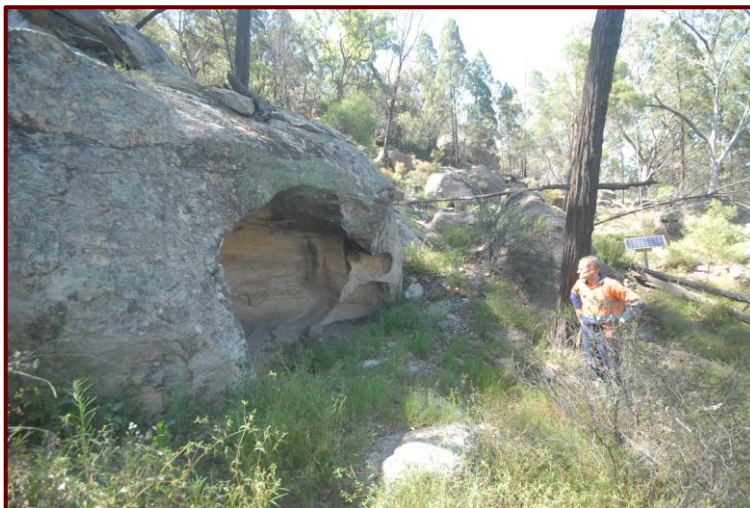
A dead and still standing Callitris pine just downslope of the shelter, uprooted and fallen trees on adjacent slopes, and a fallen trunk and standing stump, above the shelter, all pose a combustion hazard to the art site in the event of a wildfire (**Figure 15 & Figure 15**).



2017 (DSC_0319)
looking northwest



2020 (DSC_0347)
looking northwest



2020 (DSC_0348)
looking southeast

Figure 13 General context of shelter WCP153, showing the marked increase in green ground storey vegetation compared to 2017 (top).

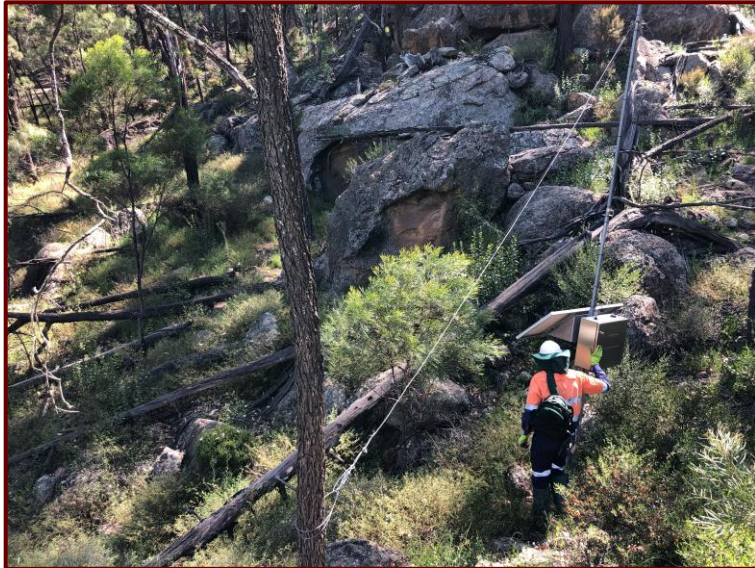


Figure 14 General context of the WCP153 shelter showing the number of uprooted and fallen *Callitris* pines on the surrounding slopes (IMG_4432).



Figure 15 General view of WCP153 shelter, looking east. Note fallen tree debris above shelter (DSC_0349).

3.2.2 Shelter Stability (cracks and bedding plains)

No evidence for movement across cracks and bedding plains across the overhang was noted since the last inspection in 2017.

3.2.3 Rock Surface Water Flow

There was no observed evidence for surface water flow across the art panels since the last inspection in 2017.



3.2.4 Rock Surface Stability

All of the rock surfaces supporting art pigments appear to be stable.

Further loss of small, formerly semi-detached exfoliation spalls was noted from an area where similar loss was noted in 2017 (**Figure 16**). This area is characterised by changes in surface colour/mineralisation around moisture zones associated with the ceiling dripline were noted. These changes do not impact any art pigments and relate to natural erosion processes.

Other areas of past exfoliation and instability were inspected and no-changes were noted since the 2006 baseline recordings.



2006 (WCP153:26) (above and to the right of main art panel)



Areas of exfoliation noted in 2017 (DSC_0331)



Areas of exfoliation noted in 2020 (DSC_0358)

Figure 16 Comparative images showing small areas of minor exfoliation (circled) and changes in surface colour/mineralisation across moisture zones associated with the WCP153 ceiling dripline.



3.2.5 Rock Surface Organics

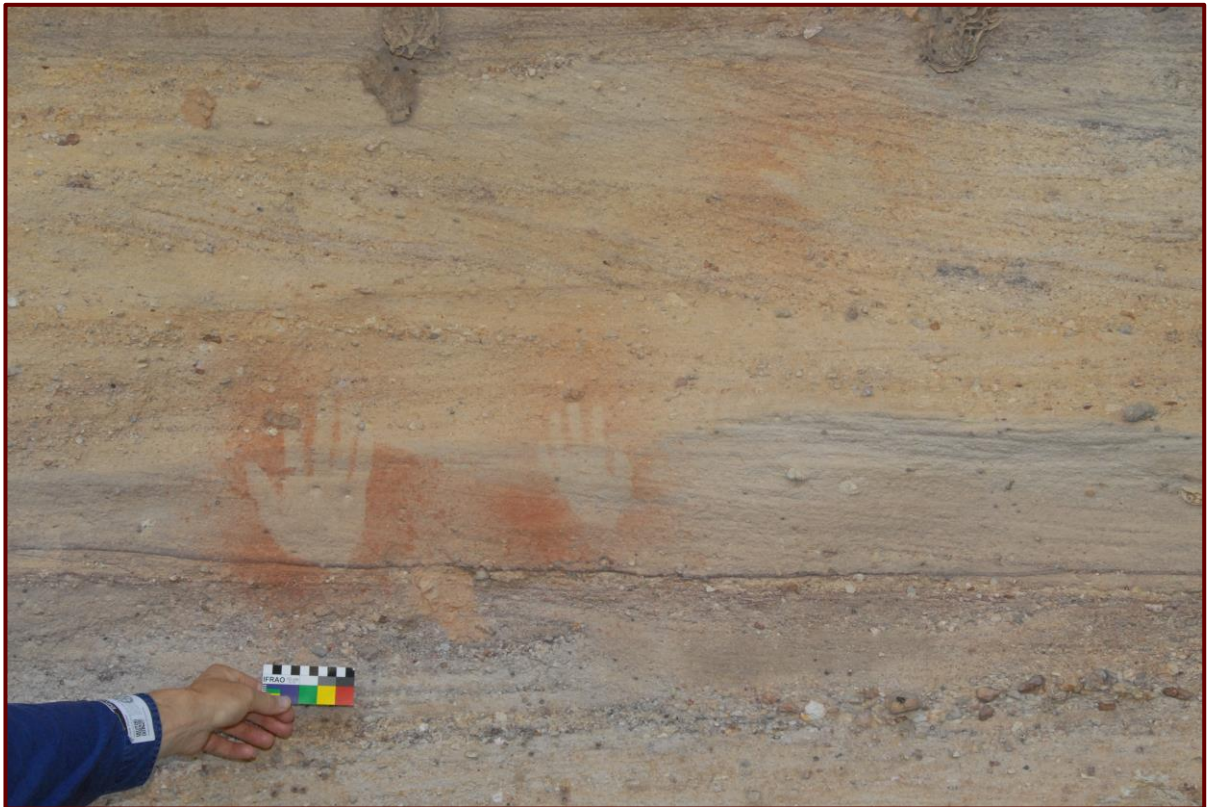
No areas of organic growth were noted on the art panel surfaces. Limited lichen growth continues to be associated with moist areas elsewhere in the shelter. This process is not affecting the rock art nor poses a risk to the stability of the rock art panels.

3.2.6 Rock Art Pigments

No visually discernible deterioration in the condition of the art pigments and their rock supports was noted (**Figure 17**).



IMG_4436



DSC_0374



Figure 17 There are no visually discernible differences in the art pigments or supporting rock matrix since the baseline record in 2006.

DSC_0369

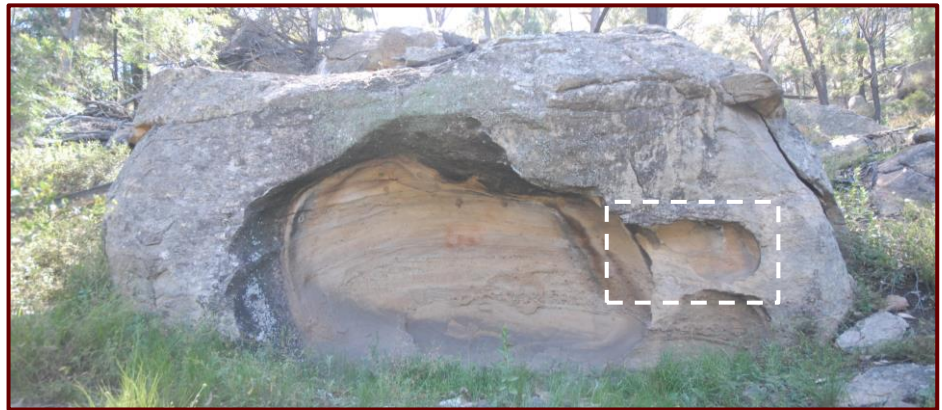


3.2.7 Insect Activity

A new mud-daubing wasp nest consisting of two chambers was noted in a small back wall alcove at the far right of the overhang. The nests are constructed from a dark grey/brown sediment, probably related to materials created as a result of mining (**Figure 18**). This nest does not impact upon art pigments.

3.2.8 Bird and Other Animal Activity

No bird or other animal impacts were noted in the shelter.



DSC_0349

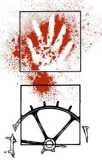


DSC_0382



Figure 18 Images and location of a new mud-daubing wasp nest in a back wall alcove of WCP153.

DSC_0366



3.2.9 Dust

Dust was not identified as an issue for the WCP152 rock shelter in the 2006 and 2014 recordings (NOHC 2006, 2015). All of the art panels are downward facing or near vertical and are unlikely to be impacted by airborne dust deposition. All of the dust affected rock surfaces are upward-facing and situated low and towards the base of the back wall.

In 2017, a markedly darker grey hue to the dust was observed across the dust affected surfaces. None of these areas support art pigments (**Figure 20**). Although also noted in WCP152, the dust evident in WCP153 appears darker and denser (**Figure 19**). A similar phase of dust deposition was noted in a larger art site within the Wilpinjong Coal lease, 'The Castle' (WCP72). A subsequent study at this site determined the origin of the dark-hued dust to be air-borne particulate matter containing coal and generated from nearby coal mining areas (NOHC 2016b). It was concluded that the darker hued dust on the WCP153 shelter floor was the result of recent deposition of airborne coal dust. It was noted that the darker coloured dust was not bonded to the underlying rock surface and earlier dust deposits and could be easily dislodged by blowing.

Allowing for variation in natural lighting and humidity, no difference between the 2017 record and the appearance of the current (2020) dust deposits could be discerned (**Figure 20**).

The cumulative monitoring record of dark-hued dust accumulation in this shelter, suggests that deposition rates peaked during the time of closest mining activity (which occurred within 100 m of the shelter). This allows the drafting of a model proposing that the visually obtrusive dark-hued dust noted in the rock shelter is a consequence of a larger-sized fraction of quarry-generated airborne particles which fall out of air-suspension within a relatively small radius (within at least 200m) from their point of projection into the air. If a smaller size fraction was responsible, (which presumably would remain airborne longer and travel further), the deposition of dust would be expected to be more gradual and related to the overall life of the mine, rather than periods of close mining activity.



DSC_0383



Figure 19 A contemporary comparison of darker-hued dust deposits on the floors of WCP153 (top) and WCP152 (bottom). The deposits in WCP153 appear to be darker and denser and this may be due to the shallower nature of the overhang, the shorter distance to the mining pit (around 100m), and the narrower band of intervening (filtering) vegetation.

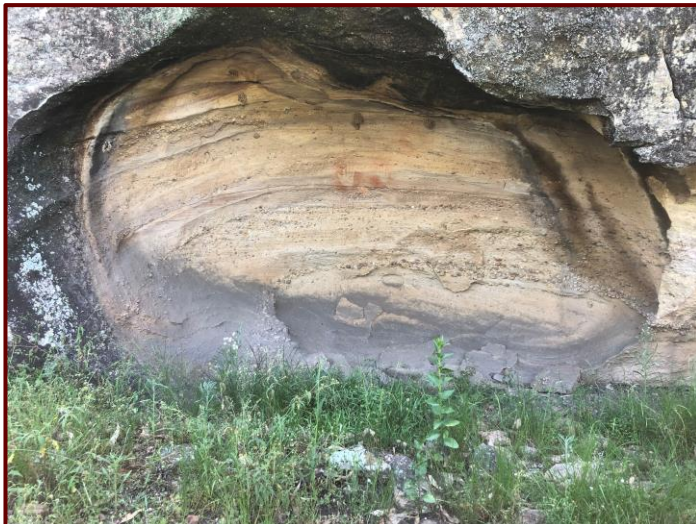
DSC_0337



2006 (WCP153:0003) (flash)



2017 (DSC_0313) (flash)



2020 (IMG_4436)

Figure 20 Comparative images of dust deposits across the WCP153 back wall. Note the distinct change in hue from light yellow-brown to dark grey noted in 2017 and no discernible change (apart from lighting and humidity changes) between 2017 and 2020. Airborne dust from the formerly nearby open cut pit is the likely source of this material.



3.2.10 Shelter Deposit

The shelter deposit remains in a similar condition to that recorded in 2017 except for the growth of herbs and grasses across approximately 50% of the sedimentary deposit under the overhang.

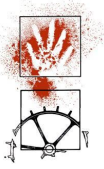


Figure 21 General view of the WCP153 floor, growth of herbs and grasses, and previously noted loose tabular surface rock, sourced from adjacent side slopes (DSC_0353).

3.2.11 Summary

The following conclusions can be made regarding the condition of the WCP153 rock shelter and its art panels, with particular reference to comparisons with the 2017 inspection record:

- There is combustible material in the form of fallen and standing dead trees situated to either side of, downslope, and on top of the shelter.
- With the exception of some continuing minor exfoliation of small spalls associated with the ceiling dripline, the rock surfaces and art panels within this site are stable. Other areas of past spalling across the back wall are unchanged since the 2006 baseline recording.
- There is no discernible change (since 2017), in the appearance of the dark-hued, grey dust deposits on the upward facing rock surfaces along the base of the back wall (excepting colour variations due to varying natural light and humidity). The dust does not impact upon the art panels.
- Lichen growth continues to be associated with moist areas. This process is not affecting the rock art and does not pose a risk to the stability of the rock art panels.



4. MANAGEMENT RECOMMENDATIONS

The following actions are recommended in response to the changes and impacts noted in this inspection.

4.1 WCP152

Detached and semi-detached fragments at base of 'trident' motif panel

The recovered detached panel edge-fragment should continue to be securely stored until an appropriate management response is determined through consultation with the project's Registered Aboriginal Parties. Potential options for consideration include:

- e) Permanent curation/storage at an off-site facility,
- f) Restoration by re-attaching the fragment using a suitable adhesive,
- g) Conducting microscopic inspection and non-impactive pigment analysis, prior to initiating a) or b), and
- h) Investigating the feasibility of preventing or discouraging animal use of the shelter space around the fragile lower edge of the art panel.

The condition and nature of the hairline crack and remaining semi-dislodged panel-edge fragment should continue to be monitored. In the event that a portion of the art panel becomes dislodged, the piece(s) should be collected and an appropriate management action followed, (if and when determined through consultation as previously outlined).

Combustible material

The combustible material in the form of fallen branches and forest litter within approximately 10 m of the shelter entrance should be removed.

Dust

The condition of the dust deposits across the shelter should continue to be monitored.

Consideration should be given to removing the dark-hued dust across the upward facing shelter surfaces as part of the same program and using the same methodology as the planned removal of dust from WCP72. The possible benefits should be balanced with the risk of accidental damage to the fragile lower edge of the art panel in this shelter, and the fact that no dust deposits are obscuring art pigments in this shelter.

Former seismometer pad

The resin pad from a former seismometer mounting should be removed from the shelter floor.

Fig tree

A small fig tree continues to grow on a rock ledge above the rock shelter. In the short and medium term, its small size precludes a significant risk to the stability of the rock shelter. In the long term however, the growth of its root system may cause rock displacement and cracking which could destabilise the underlying shelter and/or allow water to enter the shelter through enlarged fractures and bedding plains.

The growth of the fig tree should continue to be monitored.

4.2 WCP153

Combustible material

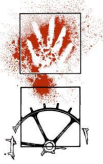
The combustible material in the form of fallen and standing dead trees, and forest litter within approximately 10 m of the shelter entrance should be removed.

Dust

The condition of the dust deposits across the shelter should continue to be monitored.



Consideration should be given to removing the dark-hued dust across the upward facing shelter surfaces as part of the same program and using the same methodology as the planned removal of dust from WCP72.



5. REFERENCES

- Wilpinjong Coal Pty Ltd. 2005 Wilpinjong Coal Project, Appendix F. Aboriginal Cultural Heritage Assessment. Prepared by Navin Officer Heritage Consultants Pty Ltd.
- Wilpinjong Coal Pty Ltd. 2006 Wilpinjong Coal Project Aboriginal Cultural Heritage Management Plan and North Eastern Wiradjuri Cultural Heritage Management Plan. Prepared by Wilpinjong Coal Pty Ltd.
- Navin Officer Heritage Consultants 2006 Baseline Recording of three Aboriginal Rock Art sites, WCP72, 152 and 153, at Wilpinjong, NSW. Wilpinjong Coal Project Aboriginal Cultural Heritage Management Program. Volumes 1: Main Report; and Volume 2: Inventory and Key to the Photographic Record. Report to Wilpinjong Coal Pty Ltd.
- Navin Officer Heritage Consultants 2015 Wilpinjong Coal Mine Aboriginal Rock Art Monitoring and Assessment Program, Report on December 2014 site inspection, Wilpinjong, NSW. Report to Wilpinjong Coal Mine, Peabody Energy Australia.
- Navin Officer Heritage Consultants 2016a Wilpinjong Coal Mine Aboriginal Rock Art Monitoring and Assessment Program, Report on October 2015 fire hazard management works and fence removal, WCP 72, 152 & 153, Wilpinjong, NSW. Report to Wilpinjong Coal Mine, Peabody Energy Australia.
- Navin Officer Heritage Consultants 2016b Analysis of Dust and Other Surface Deposits within Aboriginal Rock Art Site WCP72, Wilpinjong NSW. Wilpinjong Coal Mine Aboriginal rock art monitoring and assessment program. Report to Peabody Energy Australia.
- Peabody Energy August 2017 Peabody Wilpinjong Coal Aboriginal Cultural Heritage Management Plan WI-ENV-MNP-0034. Version 5. Peabody Energy Australia.
- Navin Officer Heritage Consultants 2020a Pilot Study. Trial of Methods for Removal of Surface Dust Deposits from 'The Castle' Aboriginal Rock Art Site WCP72, Wilpinjong NSW. Wilpinjong Coal Mine Aboriginal rock art monitoring and assessment program. Report to Wilpinjong Coal Mine, Peabody Energy Australia.
- Navin Officer Heritage Consultants 2020b Wilpinjong Coal Mine Aboriginal Rock Art Monitoring and Assessment Program. Report on May 2017 site inspections WCP72, WCP152 and WCP153, Wilpinjong, NSW. Report to Wilpinjong Coal Mine, Peabody Energy Australia.

~ oOo ~