

APPENDIX 4 – HERITAGE

Aboriginal Cultural Heritage

This section explains the results of archaeological survey and surface salvage work carried out within the Project Approval area during the 2015 Review Period.

1. Background

In 2006 Project Approval was granted to the Wilpinjong Coal Project (the Project Area) under *Section 75J of the Environmental Planning and Assessment Act 1979* (Project Approval 05-0021). The conditions of the Project Approval included the requirement to develop an Aboriginal Cultural Heritage Management Plan (ACHMP).

The ACHMP includes a Protocol for in situ preservation as well as for unavoidable impacts to Aboriginal cultural heritage. For unavoidable impacts the Protocol involves:

1. Consultation with the Aboriginal groups.
2. Pre-clearance archaeological survey (conducted with the assistance of Aboriginal representatives and an archaeologist) for the purposes of salvaging identified and unknown sites.
3. Surface salvage (and subsurface salvage if deemed necessary).
4. Storing salvaged artefacts in the “Keeping Place”.
5. Post-rehabilitation, which involves replacing artefacts from Keeping Place onto the rehabilitated landform.

2. Artefact Material

During the 2015 Review Period archaeological surveys and surface salvage worked occurred on 49.1 hectares (ha) of land within the Project Approval Area. From this survey work:

- 99 artefacts (mostly unretouched flakes); and
- 3 scarred trees, were salvaged.

With regards to the recovered artefactual material the following details were recorded: location, technological traits, and stone type. A qualified lithic specialist analysed all artefactual material collected.

3. Scarred Trees

Three probable Aboriginal scarred trees were also salvaged during the reporting period. The methodology for salvaging scarred trees is included in the ACHMP. However, two trees were in poor condition from termites and so the methodology for salvage was discussed with the Aboriginal representatives and in addition to the methodology outlined in the ACHMP the following precautions were also taken.

i 3D Scan

A 3D scan was completed for each scar, to record the scar prior to the tree removal. This information was provided to the Aboriginal groups and documented in an archival report.



ii Dismantling Trees

The crown and any superfluous limbs were then removed from the tree and the main tree trunk dismantled in sections so as to leave the scarred section of the tree intact and reduce the weight on the scar.



iii Bracing Scar

The tree around the scar was braced using fabric, wooden braces and strapping. A crane supported the tree in direction of fall while tree cut from root base



iv Storing in Keeping Place

The salvaged Aboriginal scarred trees are stored in a Keeping Place to be re-placed onto rehabilitated landforms.



4. Rock Art

The ACHMP states that the rock art monitoring program for each site will include:

‘Completion of a base-line’ recording of the site and its rock art prior to mining within 1 km of those sites. The baseline recording will involve systematic photographic coverage of all of the rock art, development of a floor plan of the rock shelter and completion of a condition report (e.g. the state of the rock art surfaces, presence of existing damage, dust, graffiti, plant or animal damage).’ (ACHMP 2006: Section 4.7, p.20)



In accordance with the ACHMP requirements, Navin Officer Heritage Consultants (NOHC) completed a baseline assessment of the three rock art sites in 2006.

As part of ongoing monitoring of these three sites, NOHC conducted a field assessment in late December 2014.

From this field assessment NOHC reported no significant changes to rock art panels or rock shelters other than caused by natural and pre-existing processes.

A copy of NOHC’s report is included in the Annual Review.

5. Proposed Improvements

Wilpinjong Coal proposes to progress the recommendations made in the Aboriginal Rock Art Monitoring Report during the next review period.

Rock Art Assessment Report

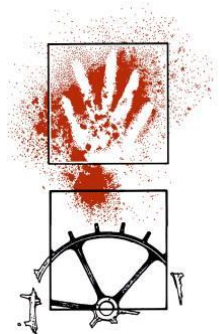


Wilpinjong Coal Mine Aboriginal Rock Art Monitoring and Assessment Program

Report on December 2014 site inspection

Wilpinjong, NSW

July 2015



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Report Register

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v1	Draft for client comment	9 March 2015
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EXECUTIVE SUMMARY

As part of an ongoing monitoring program of three Aboriginal rock art sites within the Wilpinjong Coal mine lease, NOHC conducted a field assessment in December, 2014, with representatives of the registered Aboriginal stakeholders and of Peabody Energy. 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.

Summary of results

Site WCP72: Those rock surfaces throughout the rock shelter subject to dust accumulation appear to be darker in colour and hue. This is apparently due to the presence of dust material which is darker than that present during the 2006 baseline recording. The cause of the darker appearance had not been determined;

During the field inspection a small number of fine cracks were provisionally identified as possibly new, or more visually prominent. A detailed, post fieldwork, comparison with the baseline record however revealed no evidence for new or enlarged cracks in these instances;

A small number of new animal impacts were noted including animal rubbing and associated deposition of dirt, and the creation of mud daubing wasp nests; and

Additional areas of lichen growth were noted, however these are likely to be indicative of pre-2006 instances which are now more visually apparent, or were not noted during the baseline recording.

Site WCP152: New cracks to some rock panel surfaces/edges, due to natural and pre-existing processes;

New areas of animal rubbing noted; and

A build-up of dead wood at the northern end of the shelter poses a fire risk.

Site WCP153: No significant changes to rock art panels or rock shelter; and

A tree situated just outside of and leaning across the shelter entrance has died since 2006.

Recommendations

The following recommendations are made on the basis of the site inspection findings presented in this report, the consensus positions arrived at in stakeholder discussions during this assessment, and consideration of the information still required to understand some of the processes posing a risk to the conservation of these sites.

1. A program of research be conducted with the objective of identifying:
 - a. The composition and source of the dust deposits present on rock art panels within WCP72;
 - b. The cause of the change in colour and hue in the dust deposits, noted since 2006;
 - c. The vectors involved in the generation and deposition of dust within WCP72 (for example wind, or animal treadage of the dung deposit);

- d. An effective method which could be used to remove loose dust deposits with no or minimal impact to the rock surface and rock art pigments.
- 2. Based on the findings of the program in recommendation one, and in consultation with the Aboriginal stakeholders, develop and conduct a management strategy with the objectives of managing dust deposition in WCP72, and minimising any associated risk to the site's rock art.
- 3. Continue regular monitoring and recording of dust and vibration levels at each of the three rock art sites.
- 4. Dismantle and remove the east-west fenceline which extends to the east of the WCP72 rock shelter.
- 5. Remove combustible material within or near the entrances to WCP72, WCP152 and 153.
- 6. Regularly monitor and remove any substantial build-up of combustible materials within or near each of the three rock art sites.

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1. INTRODUCTION

1.1 Project Description

The Wilpinjong Coal Project (the Project) 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 Project consists of an open cut mining operation, together with the operation of 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 72, 152 and 153, including the creation of a pre-development baseline recording of these sites (see Figure 1.1).

The ACHMP states that the rock art monitoring program for each site will include:

'Completion of a base-line' recording of the site and its rock art prior to mining within 1 km of those sites. The baseline recording will involve systematic photographic coverage of all of the rock art, development of a floor plan of the rock shelter and completion of a condition report (e.g. the state of the rock art surfaces, presence of existing damage, dust, graffiti, plant or animal damage).' (WCPL 2006: Section 4.7, p.20)

In accordance with the ACHMP requirements, NOHC completed a baseline assessment of sites WCP72, 152 and 153 in 2006 (NOHC 2006).

As part of ongoing monitoring of these three sites, NOHC conducted a field assessment in December 2014 with representatives of the registered Aboriginal stakeholders and of Peabody Energy. This report documents the results of that inspection and condition assessment.

The report was commissioned by Peabody Energy Australia.

1.2 Study Framework and Aims

This assessment forms part of a broader rock art management study with the following aims:

- Conduct an assessment of any changes at sites WCP72 ('Castle Rock'), WCP152 and WCP153 (adjacent to Pit 5), since the 2006 baseline recording;
- Develop a monitoring strategy (including a routine inspection form);
- Provide training to a Wilpinjong Coal Project Native Title Liaison Officer in the conduct of this strategy;
- Develop a plan of possible conservation (impact mitigation and/or precautionary) strategies for consideration by Wilpinjong Coal, with the aim of assisting the conservation of the art sites;
- Conduct appropriate levels of Aboriginal community representative consultation in the conduct and development of all the above components.



1.3 This Report

1.3.1 Outline

This report:

- Describes the study framework and aims (Section 1);
- Describes the methodology employed in the study (Section 2);
- Provides information relevant to the Aboriginal consultation for this project (Section 3);
- Describes the results of the assessment (Section 4); and
- Provides management recommendations based on the results of the investigation (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;
- 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 the NSW Office of Environment and Heritage, Heritage Division: <http://www.environment.nsw.gov.au/contact/>

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 classified as confidential.



2. STUDY METHODOLOGY

2.1 Contributors

This report was written by Ms Sam Harper (BA (Hons.), ANU) and Kelvin Officer (BA (Hons.), PhD ANU).

Fieldwork was undertaken by NOHC archaeologists Sam Harper and Kelvin Officer. Field assistance was provided by Wilpinjong Coal Mine representatives Kieren Bennetts, Clark Potter and Craig Spencer, and Aboriginal Representatives Tanietta de Launey (Native Title Liaison Officer) Coral Williams (Warrabinga Native Title Claimants Aboriginal Group), Robert Stewart (Wellington Valley Wiradjuri Aboriginal Corporation), Shannon Foley (Murong Gailinga Aboriginal and Torres Strait Island Corporation) Larry Foley (Mudgee Local Aboriginal Land Council), Eric Hill (North East Wiradjuri Company Ltd), and Christine Maynard (Mudgee Local Aboriginal Land Council).

2.2 Research Methodology

A review of baseline data and specialist reports was undertaken. This consisted primarily of original recordings and photography made by NOHC (NOHC 2006). Monitoring data collected by Wilpinjong Coal Mine, including vibration and dust monitoring adjacent to the sites, was provided and made available for this study. This included dust deposition data, with historic dust data through to November 2014, and blast data up to January 2014.

Consultation with rock art conservation specialist Bruce Ford was undertaken following the site visit, and some initial considerations arising from this consultation have been incorporated into this assessment.

2.3 Field Methodology

Three previously identified rock art sites (WCP72, WCP152 and WCP153) were visited over the course of two days, on the 19th and 20th of December 2014, by a team of archaeologists and representatives of registered Aboriginal stakeholders. Each site was visited and subject to a close visual inspection. A hardcopy of the baseline recordings (NOHC 2006) was used to compare the current rock art panel condition and identify any possible changes. Areas of suspected change or post-2006 impact were photographed for later comparison and confirmation with the 2006 digital baseline record.

High resolution digital photography was taken with a Canon EOS 6D, with and without a ring flash to provide flat even lighting of rock surfaces and associated rock art. Representative photographs were taken of key aspects of each site, with detailed photography of any areas requiring further assessment or suspected areas of impact/change.

At each site, discussions were held between the archaeologist and Aboriginal stakeholders (also known as 'registered Aboriginal parties' or RAPs) to assess perceived and physical changes and impacts at these sites, and potential actions to take as a result of changes. These discussions are documented in this report.

Following the field inspection, the resulting 2014 photography of identified areas of possible impact or condition change were subject to a detailed comparison with the 2006 digital photographic record.



3. ABORIGINAL CONSULTATION

3.1 Aboriginal Consultation

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 eight organisations or individuals registered as Aboriginal stakeholders (also known as RAPs). The registration process is a standard protocol defined by the NSW Office of Environment and Heritage (OEH). NOHC contacted each stakeholder to invite a representative of each group to be involved in the site visits for this assessment. This was done via postal mail on the 5 December 2014. Five stakeholders responded to the invitation and attended the fieldwork (refer Section 3.2).

In addition to the consultation program, Wilpinjong Coal Mine directly employs Tanietta de Laney as a Native Title Claimant Liaison Officer. Tanietta is involved in all Aboriginal heritage aspects of the Wilpinjong Coal mining operation. Tanietta participated in the site visits for this assessment and was able to provide information on previous periodic inspections of the subject art sites conducted by her during her engagement as liaison officer.

3.2 Field Participation

The following representatives from five registered stakeholder groups responded to invitations and participated in the fieldwork program conducted over the 19th and 20th of December, 2014:

Coral Williams	Warrabinga Native Title Claimants Aboriginal Group;
Robert Stewart	Wellington Valley Wiradjuri Aboriginal Corporation;
Larry Foley and Christine Maynard	Mudgee Local Aboriginal Land Council;
Shannon Foley and Larry Foley	Murong Gailinga Aboriginal and Torres Strait Island Corporation; and
Eric Hill	North East Wiradjuri Company Ltd.

3.3 Cultural Knowledge and Values

A major component of this investigation was the identification and discussion of issues identified by the stakeholder representatives in relation to the three rock art sites (WCP 72, 152 and 153). These discussions focussed on:

- Cultural values associated with the sites and their conservation;
- Comparisons of the current condition of the art panels with their condition recorded in 2006; and
- Any detected, suspected or potential future impacts to the sites.

These discussions resulted in the identification of issues of concern and in some cases also potential solutions. A summary of these discussions are reported in separate site specific sections in Chapter 4.



4. RESULTS

4.1 Summary

Three rock art sites were visited and comprehensively visually inspected. The following is a summary of the condition and impact assessment of each site, relative to the 2006 baseline recordings:

- WCP72: Those rock surfaces throughout the rock shelter subject to dust accumulation appear to be darker in colour and hue. This is apparently due to the presence of dust material which is darker than that present during the 2006 baseline recording. The cause of the darker appearance had not been determined;

During the field inspection a small number of fine cracks were provisionally identified as possibly new, or more visually prominent. A detailed, post fieldwork, comparison with the baseline record however revealed no evidence for new or enlarged cracks in these instances;

A small number of new animal impacts were noted including animal rubbing and associated deposition of dirt, and the creation of mud daubing wasp nests; and

Additional areas of lichen growth were noted, however these are likely to be indicative of pre-2006 instances which are now more visually apparent, or were not noted during the baseline recording.

- WCP152: New cracks to some rock panel surfaces/edges, due to natural and pre-existing processes;

New areas of animal rubbing noted; and

A build-up of dead wood at the northern end of the shelter poses a fire risk.

- WCP153: No significant changes to rock art panels or rock shelter; and

A tree situated just outside of and leaning across the shelter entrance has died since 2006.

A representative sample of digital photographs were taken firstly to record identified impacts, and secondly to provide general representative shots to compare with the baseline recording and future monitoring work. These photos are provided as a catalogue in Appendix 1.

4.2 WCP72

4.2.1 Impact Assessment

Visual inspection at WCP72, in reference to the 2006 baseline recording, identified a number of physical changes to the site.

Changes recorded at this site are:

1. Darkening in colour and hue of dust deposits on upward sloping walls and surfaces throughout the rock shelter;
2. Two new mud daubing wasp nests were noted on art panels;
3. Animal rubbing and associated surface deposits; and



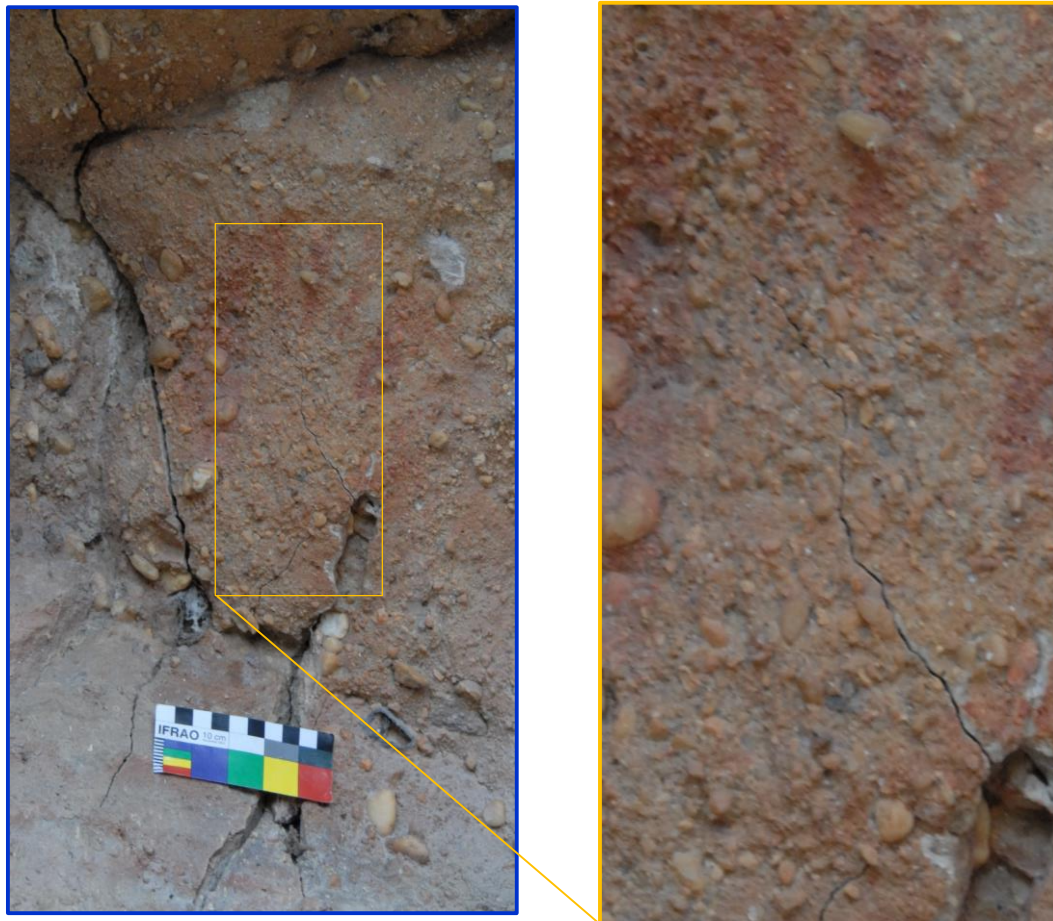
4. Some additional areas of lichen growth were noted, however these are likely to be indicative of pre-2006 instances which are now more visually apparent, or were not noted during the baseline recording.

During the field inspection a small number of fine cracks were provisionally identified as possibly new, or more visually prominent. A detailed, post fieldwork, comparison with the baseline record however revealed no evidence for new or enlarged cracks in these instances. Many cracks within the shelter have been partially covered with mud daubing wasp nests. These nests were carefully inspected for evidence of cracking - an indication of differential movement across the underlying crack. No such cracking was observed.

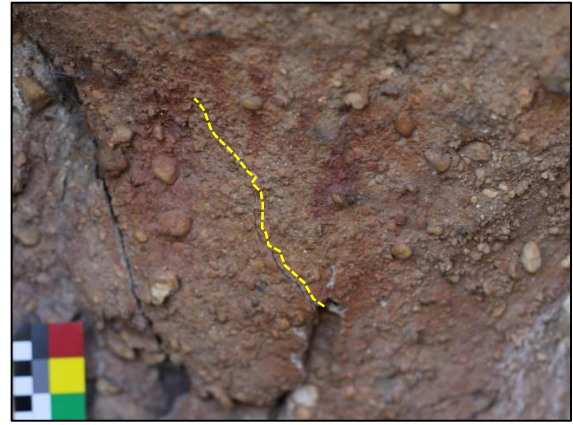
4.2.2 Photo inventory

4.2.2.1 Cracks, lichen animal rubbing and wasp nests

A photographic record of these impacts is presented below. Where available, the 2006 baseline recording of the same area is provided for reference (blue bordered image). Consistent with the baseline record, all instances are presented in order of occurrence from south to north (left to right) across the internal shelter space.



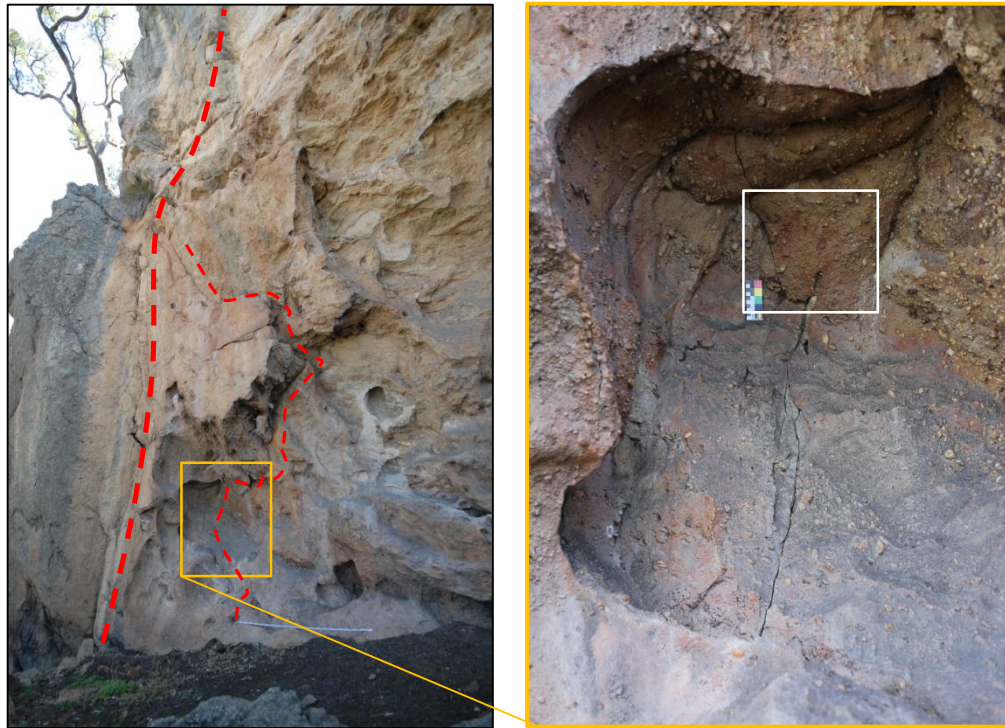
Figures 4.1 and 4.2 2006 baseline image and enlargement (WCP72:126).



Figures 4.3 and 4.4 2014 image – a fine crack through a rock panel with a hand stencil. During the field inspection, this crack (indicated by the yellow dashed line), was provisionally identified as possibly post 2006 in origin. However close inspection of the baseline record indicates no discernible change in either the extent or width of the crack.



Figure 4.5 2006 baseline image, showing area of Figure 4.3 image (white rectangle) (WCP72:119).



Figures 4.6 and 4.7 2014 images – showing the wider context of the cracks illustrated in Figure 4.3 (area indicated by white rectangle). The affected art panel is situated within a complex of cracks associated with a near vertical natural joint or fault line which extends the full height of the exposed rock escarpment near the southern end of the rock shelter (red dashed lines). The observed cracks across the art panel were evident in 2006 and are the result of (pre-mining) differential movement on either side of the rock joint.



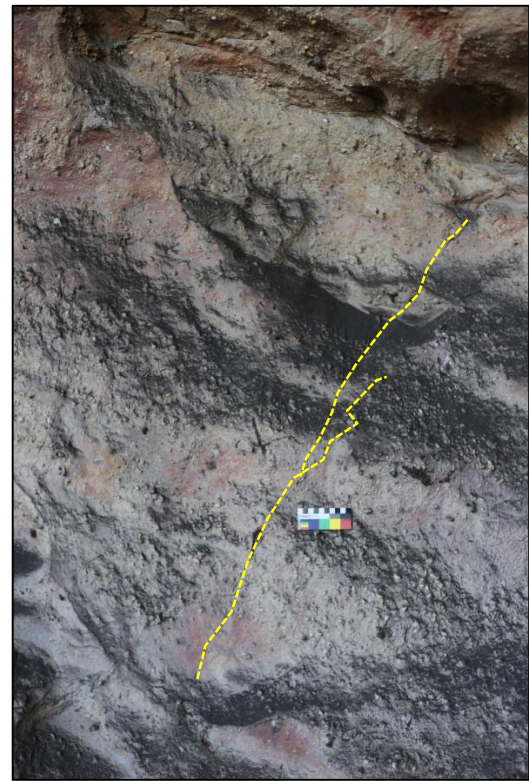
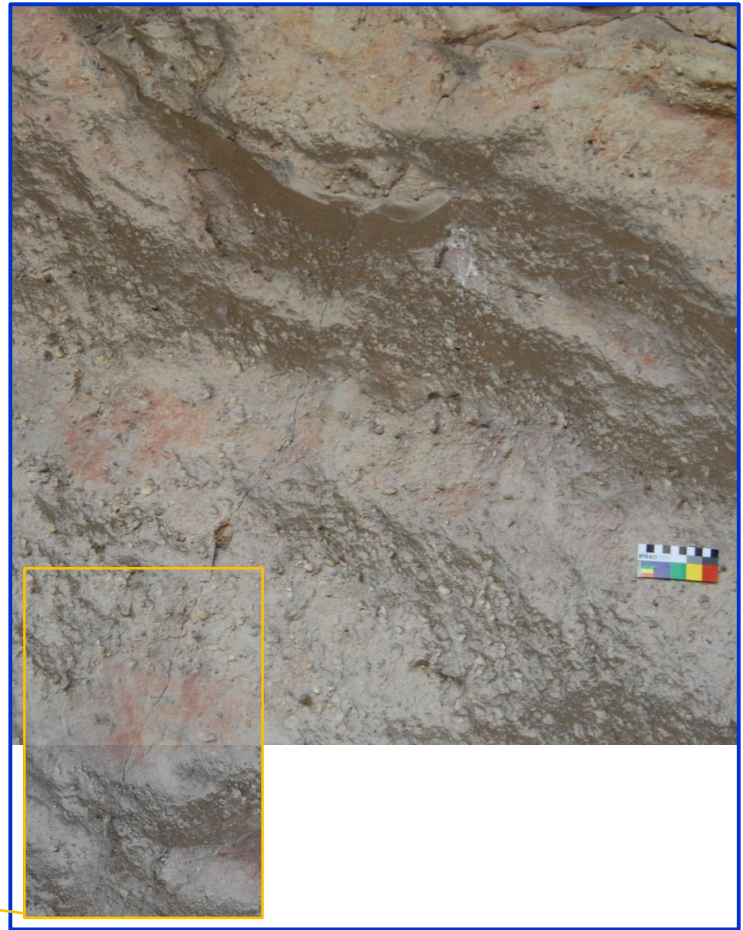
Figure 4.8 2006 baseline image (enlarged extract) (WCP72:177).



Figure 4.9 2014 image – area of lichen growth not specifically identified in 2006 record, and now visually more prominent (area outlined).



Figures 4.10 and 4.11
2006 baseline images showing fine crack through hand stencil (left enlarged extract from WCP72:258; right extract from WCP72:257).



Figures 4.12 and 4.13 2014 image – fine crack through stencil panel (yellow dotted line on right). Comparison with the baseline record shows no change in the extent of the crack or its discernible width. Enlargements of the stencil area are present in Appendix 1.



Figure 4.14 2006 baseline image including an area of previously recorded animal rubbing and associated surface deposits (outlined), (WCP72:347).

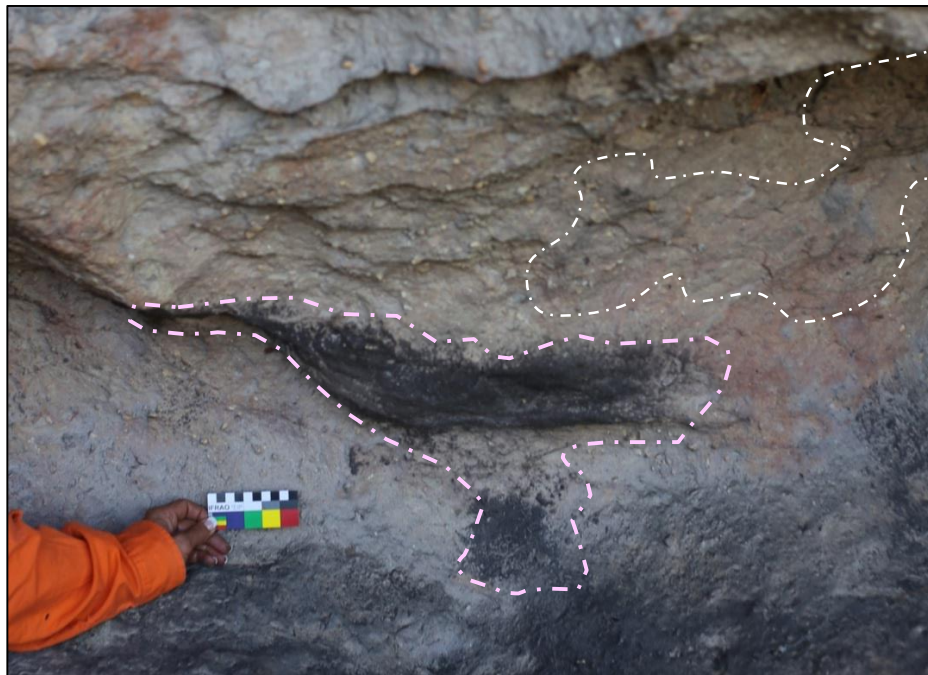


Figure 4.15 2014 image of same area shown in Figure 4.13, showing pre and post-2006 areas of animal rubbing with an associated dark grey/black surface residue including animal hair (outlined).



Figures 4.16 and 4.17 2006 baseline images (top image using flash lighting), of remnant stencil panel situated under a ledge next to the shelter floor (top WCP72:346f; above WCP72:346).



Figure 4.18 2014 image – post 2006 area of surface deposition. Although this feature looks similar to lichen growth found elsewhere in the shelter, it is more likely to be material deposited by animal rubbing (area outlined).



Figure 4.19 2006 baseline image (with flash lighting) of stencil panel on rock shelter ceiling (WCP72:426).



Figure 4.20 2014 image – post 2006 mud-daubing wasp nest (outlined) situated over hand stencil pictured in Figure 4.19.



4.2.2.2 Dust deposits

The deposition of dust on all upward facing and angled surfaces within the WCP72 rock is a process which has evidently been occurring for a long period of time. Most of the effected rock surfaces display both an upper layer of loose particles which are easily dislodged by a light gust of air, and a basal, firmly bonded layer, which fully or partly obscures the underlying rock substrate (and also any associated art pigments). The strong bonding of the lower dust layer suggests considerable age and possibly the impact of secondary mineralisation.

At the time of the 2006 baseline recording, the rock panel dust deposits were noted to be extensive and to have a predominantly yellow-brown colour. At the time it was conjectured that a deep deposit of animal dung (mostly sheep and cattle), which was noted to occur across most of the internal floor of the shelter, may have been a predominant source of the dust (NOHC 2006).

Tanietta de Laney, Native Title Liaison Officer, has advised that during the course of her periodic visits to the site, her impression is that the dust has become worse and visually more obtrusive.

Inspection for the current assessment revealed that:

- The dust affected rock surfaces are visually darker in hue and colour than in 2006. The apparent change in colour is from a yellow-brown to a brown-grey. This creates a visually obtrusive effect, making it harder to see or appreciate the remaining visible rock art within the shelter;
- The spatial extent of the dust appears to be the same as in 2006.



Figure 4.21 2006 baseline image (using flash light source) - general view towards the southern end of the shelter (WCP72: 57f). Scale is 2m.



Figure 4.22 2014 image (using flash light source) – showing same area as shown in Figure 4.21. Note that the pattern and extent of dust affected rock surfaces is the same as shown in the baseline, but are now darker in colour and hue.



Figure 4.23 2006 baseline image (using flash light source) - general view towards the middle portion of the shelter (WCP72: 61f). Scale is 2 m.



Figure 4.24 2014 image (using flash light source) – showing same area as shown in Figure 4.23. Note that the pattern and extent of dust affected rock surfaces is the same as shown in the baseline, but are now darker in colour and hue.



Figure 4.25 2006 baseline image - general view towards the northern end of the shelter (WCP72: 65 and 67). Scale is 2 m.



Figure 4.26 2014 image – showing same area as shown in Figure 4.25. Note that the area of dung on the shelter floor has receded on the right hand (eastern), and upslope end of the shelter. Also the area of dust affected rock floor appears to be greater on the left hand (western) side. The pattern and extent of dust affected rock surfaces across the back wall is the same as shown in the baseline. The areas of dust deposition are now darker in colour and hue, and as a result are more visually intrusive.



Figures 4.27 and 4.28 Comparison of 2006 baseline (left) and 2014 (2015) (natural light) images of the same dust affected rock surface, showing the change in colour and hue, from yellow-brown to brown-grey (WCP72:256, 257 and 258).

4.2.3 Stakeholder comments and discussion

Issues raised at this site included the existing fencing, dust and sheep dung, and are presented below.

Existing Fencing



Figures 4.29 and 4.30 The shelter end of the stock fence in 2006 (left), compared with the current partially deconstructed condition (WCP72:56).



A well-built, wooden post and wire stock fence extends eastwards and downslope from near the northern end of the rock shelter (Figure 4.30). The section of fence closest to the shelter consists of five wooden rails and has been partially dismantled to make human access easier. This fenceline bisects the east facing slopes adjacent to the rock shelter but no longer serves any purpose because the whole of the knoll, on which the WCP72 site is situated, is now encircled by a separate fenceline, and stock animals are no longer pastured either within or outside of the boundary fence.

A discussion was undertaken on the visual impact of this fencing, its impact on human access to the site, and the potential fire hazard the pine wood fencing poses to the rock shelter. An agreement was made by the group to recommend that this redundant fenceline be removed. Its removal would make visitor access to the site easier and safer, would remove the fire risk posed by the close proximity of the wood to the rock shelter rock surfaces, and would increase the aesthetic quality of the site surrounds.

Dust

Tanietta de Laney, Native Title Liaison Officer, noted that, based on her periodic inspections of the site, the dust deposits within the site looked darker than corresponding images in the 2006 baseline record. This was confirmed by comparisons in the field with the hard copy of the baseline study.

A general consensus amongst the stakeholder group was reached that the current dust deposits in the rock shelter were darker in colour, and that there appeared to be more dust in the site. A discussion occurred regarding the potential reasons for the colour change. It was speculated that the cause may be a:

1. Change in the source and therefore composition of the dust, such as dust from the adjacent open cut mine;
2. Change in the nature of the *in situ* dust, such as the presence of fungus, mould or lichen growing within it;
3. Change in humidity or other environmental factors, changing the appearance of the dust.

A discussion occurred about the potential impact of the darker dust on the site. Close inspection suggested that the dark dust is deposited in the same locations and rock surfaces as the lighter brown dust recorded in 2006. As such there may not be increased damage to the site or to the rock art, however the dark colour is visually intrusive and effects the visibility of the rock art and visitor appreciation of the site. The impacts were summarised by the group as being both cultural and aesthetic. One stakeholder noted that the impaired visibility of the rock art reduced the value of the site as a teaching resource for children.

A consensus was reached amongst the group to recommend that a sample of the dust deposits be analysed to determine its composition and the reason for the colour change. It was suggested that the dust sample could be compared with surrounding potential dust sources such as mining overburden, coal, and the dung on the shelter floor.

The dung layer on the base of the shelter floor, present in 2006, was discussed, both as a possible source of the dust and as a hazard to the site itself. The layer is at least 150 mm thick and would be a potential fire hazard in a wild fire. If the layer were to burn, the radiant heat and smoke may impact the adjacent rock art panels. A discussion occurred about the possible removal of the dung layer, particularly if it was the source of the dust. Removal issues include the practicalities of taking it away, as well as the potential that the layer has incorporated Aboriginal artefacts from the site, so some form of sieving would need to be undertaken to recover any Aboriginal objects.

The possible removal of the dust from the rock surfaces was also discussed. It was queried whether it could be washed off, however the impacts of water on the art were raised and this option dismissed by the group. The possibility of brushing or vacuuming the dust was discussed, as it was noted that the dark dust, when lightly blown, created a cloud, suggesting it hasn't firmly bonded to the surface. It was decided to recommend that further research be undertaken on dust removal before any direct action was taken.



A discussion was then undertaken on the prevention of more dust entering the site. The possible deployment of a dust barrier was raised, however the size of the site, as well as the potential negative impacts (e.g. increased vegetation growth inside the shelter, change in humidity and micro-climate), were discussed and on balance it was decided by the group that the deployment of some form of physical dust barrier was not a preferred option at this stage. An alternate idea was to plant more vegetation away from, but around, the shelter, to act as a natural filter for wind born dust. It was noted that this shelter, in comparison with WCP 152 and 153 is not surrounded by much vegetation. This would be a long-term approach for management of the site.

4.3 WCP152

Following the conduct of the baseline recording in 2006, a vibration monitor has been installed on the rock floor of this shelter using a polymer glue (Figures 4.31-33).



Figure 4.31 Supporting infrastructure for monitoring equipment, erected a short distance from WCP152.



Figures 4.32 and 4.33 Location of vibration monitor at the base and right end of shelter



4.3.1 Impact Assessment

Changes recorded at this site are:

- Small hairline fractures situated at the edge of the bird track motif panel;
- Animal rubbing;
- The vibration monitor has become detached from the rock floor; and
- An accumulation of dead and fallen wood in front of shelter poses a fire hazard.

Immediate action was taken by the client to re-attach the vibration monitor with an appropriate adhesive during the site visit.

A number of small areas of surface exfoliation and cracking noted in 2006 across the rock art panel were reinspected, however no change was noted.



4.3.2 Photo Inventory



Figure 4.34 2006 baseline image (using flash light) of the lower edge of the 'bird print' (or 'trident') motif panel. The edge of this case-hardened panel surface was described as undercut, fragile, and vulnerable to cracking and dislodgement by animals and site visitors (refer Figure 4.38). There is no cracking evident in the 2006 record (WCP152:118).

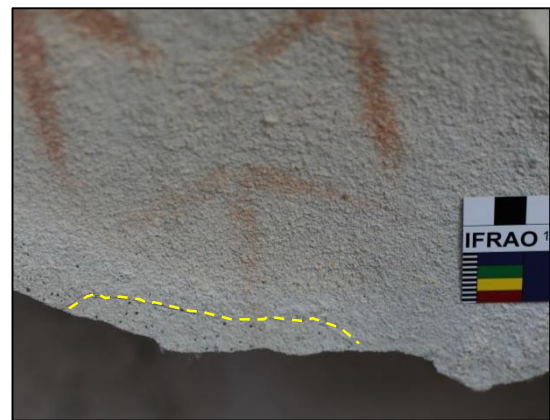


Figure 4.35 and 4.36 2014 image of a post-2006 hairline crack (yellow dashed line) across an undercut section of this panel edge. The creation, cracking, and likely future dislodgement of this fragile and undercut edge are a consequence of natural erosion processes.



Figure 4.37 2014 (flash light) image of the southern end of the WCP152 rock shelter, showing the eroded, protruding, and fragile nature of the lower edge of the remaining art panel support. Scale is 2 m. Note vibration monitor on rock floor.

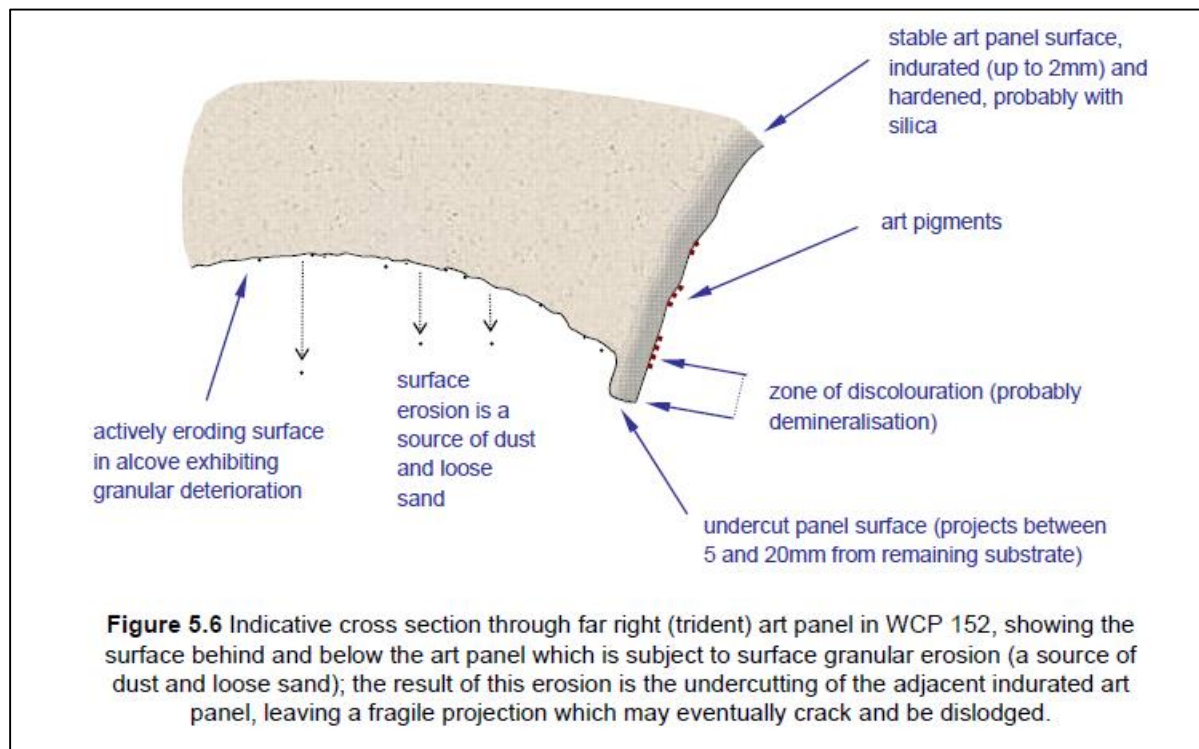


Figure 4.38 Cross section diagram from the 2006 baseline report describing the lower edge of the 'bird print' or 'trident' motif art panel (NOHC 2006:66, Figure 5.6).

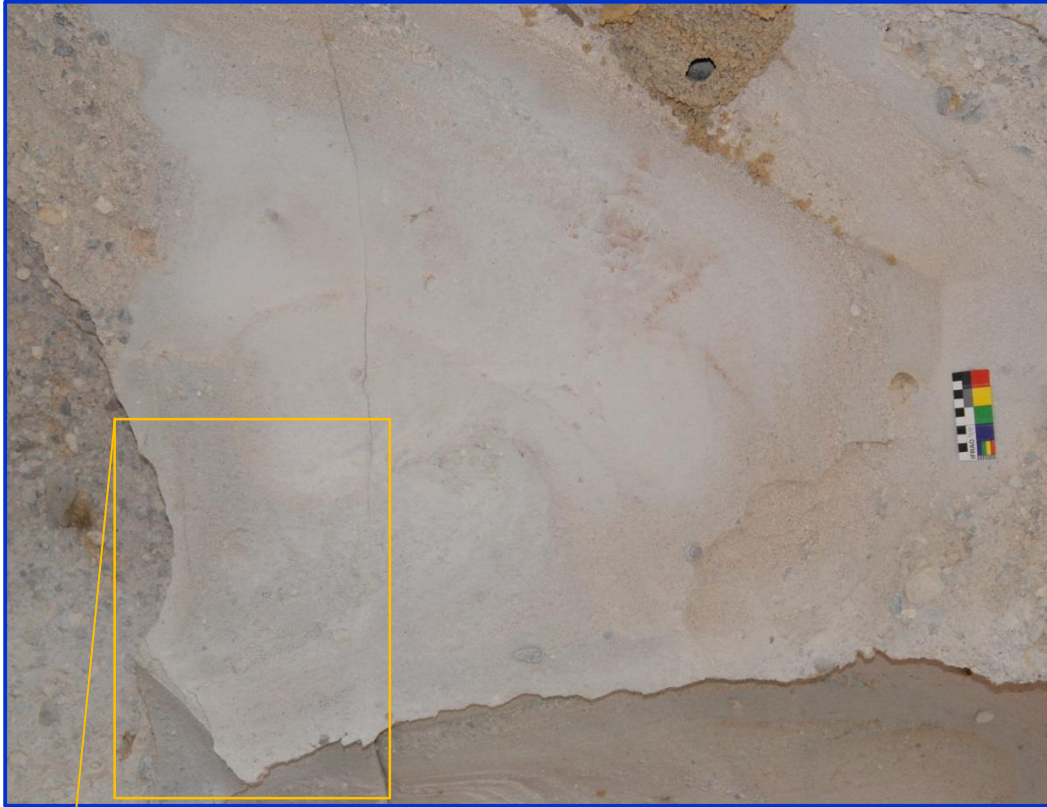


Figure 4.39 2006 baseline (flash light) image of far left end of the art panel in WCP152 (WCP152:80).



Figure 4.40 and 4.41 Area of animal rubbing and associated deposition of material (outlined) (left), and close up (right)

The protruding edge of this rock panel has been rubbed against by animals using the shelter, leaving behind a residue. The impacted area is not directly associated with rock art.



4.3.2 Stakeholder comments and discussion

Fading

Some representatives felt that the rock art motifs were fading at an increasingly fast rate.

A discussion was undertaken which made note of the effect of time of the day, air moisture and other environmental factors that can affect the vividness of motifs. It was also noted that the purpose of the detailed photographic baseline record, both with and without flash lighting, allows for comprehensive comparison of pigmentation where the same techniques and technology are being utilised.

Fencing

The possibility of fencing the site was raised by Carol Williams as a measure to prevent animals from rubbing against rock art motifs, and potentially breaking off the edges of fragile surfaces and ridges.

A discussion was held about the pros and cons of fencing sites. The following points were made:

- Preventing animal access may increase vegetation growth within the shelter, and thus create a fire hazard and change the microclimate of the shelter;
- Given the context of the shelter, to keep animals out, the fence would need to be like a cage across the whole shelter entrance. This in itself would pose a substantial impact to the integrity of the site.
- Securely constructing a fence/cage barrier, without directly impacting the site you are trying to protect can be very difficult and expensive.

Vibration

At this site, vibration from adjacent open cut mining is not a current issue. However a question was raised by Larry Foley in relation to future blasting, as proposed coal pits are to be opened in close proximity to the site. The issue raised was whether future closer blasting will result in large exfoliations of the rock surface.

The current condition of this site suggests that large scale exfoliation would be unlikely however there are many fragile edges and small areas of exfoliation.

A discussion followed about the possible means of protecting fragile surfaces and semi-detached rock surfaces. Some success has been achieved with gluing back detached pieces. However, previous physical interventions by conservators in rock art sites in Australia have sometimes created more damage, via unexpected and poorly understood processes. Thorough study by experienced professionals, such as structural geologists and geo-chemists, is required before physical intervention should be considered.

Dust

The issue of increasing dust deposition on the rock art panels was discussed, again in light of the future planned coal pits adjacent to the site.

A discussion about the deployment of dust shields was held, with points made about the possible benefits of maintaining air flow through the shelter space, and the difficulty of designing animal resistant barriers. Other points raised included distinguishing surrounding and in-site environmental dust from dust generated by mining; and the filtering effect of surrounding vegetation growth. It was agreed that continued dust monitoring, was important at this site, particularly as mining got closer.



Combustible material

A build-up of dead wood was noted outside of the northern end of the shelter (Figure 4.42). It was noted that this can be a fire hazard (the radiant heat from wild fires can cause the exfoliation of rock art surfaces in shelters). There was a consensus to provide a recommendation that the dead wood be removed from the vicinity of the site.



Figure 4.42 Aboriginal stakeholders and Sam Harper at WCP152, looking north.
Note the build-up of dead wood within and just outside of the shelter.



4.4 WCP153

4.4.1 Impact Assessment

No significant or discernible changes affecting the rock art panels were identified:

- Spalling of the rock surface within the zone of surface water wash situated along the ceiling drip zone and between the inside and outside of the shelter space continues. This process is not affecting the rock art nor poses a risk to the stability of the rock art panels;
- Lichen growth continues to be associated with moist areas. This process is not affecting the rock art nor poses a risk to the stability of the rock art panels; and
- Some exfoliation scars on the back wall of the shelter are unchanged from the 2006 record;

However:

- A small amount of burnable forest litter is accumulating outside the shelter on the right;
- One tall tree leaning on the front left of the shelter has died since 2006 (Figure 4.44).

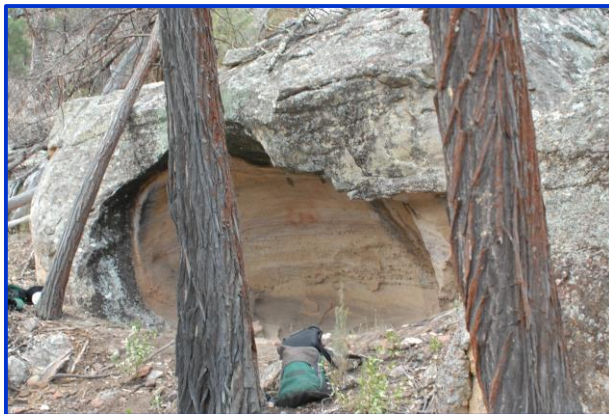


Figure 4.43 2006 baseline image of outside of WCP153 rock shelter.



Figure 4.44 Dead tree near entrance to WCP153 (scale is 2m).



4.4.2 Stakeholder comments and discussion

Compared with WCP152 it was noted that the art is intact and much higher, so at much lower risk of animal rubbing or other interferences.

Fading

It was noted that the stencils appear slightly weathered, or faded, compared to people's memory from previous visits. It was also noted however that they appeared brighter from a lower angle. A discussion was undertaken regarding variables, other than pigment loss, which can affect pigment visibility.

Dust

The potential for dust to impact this site as mining gets closer was raised, with similar issues to WCP152. The need for ongoing dust monitoring in relation to this site was raised and generally agreed upon.

Vegetation

There is a substantial amount of dead foliage around, and on top of, this rock shelter including a tree which leans on the left hand side of the shelter, which has died since 2006 (Figure 4.44).

A discussion was undertaken about the possibility of moving some of this dead foliage which may pose a fire hazard to the rock art panels. Potential issues raised related to micro-habitats associated with this material and effects on wildlife.



5. MANAGEMENT AND MITIGATION RECOMMENDATIONS

5.1 Discussion of identified changes

5.1.1 Cracking

The identification of cracks in rock art panels not evident in the 2006 baseline record was only made at rock shelter WCP152. This related to a hairline crack associated with a natural process of substrate erosion undercutting the edge of the panel. This process appears unrelated to the incidence of ground vibration from mining activities.

Despite some provisional identification of new and/or extended cracks at WCP72 during the field inspection, close inspection of the 2006 baseline digital photographic record indicated that all cracks were evident in 2006 and there was no clear evidence for any significant crack widening. An inspection of numerous cracks with adhering mud daubing wasps did not reveal any fractured or damaged nests that may indicate differential movement across or widening of the underlying cracks.

These results indicate that the open cut mining that has occurred to date, up to 190 m from the WCP72 site (Figure 5.1), has had no discernible visual impact on the existing faults and cracks within the shelter rock panels.

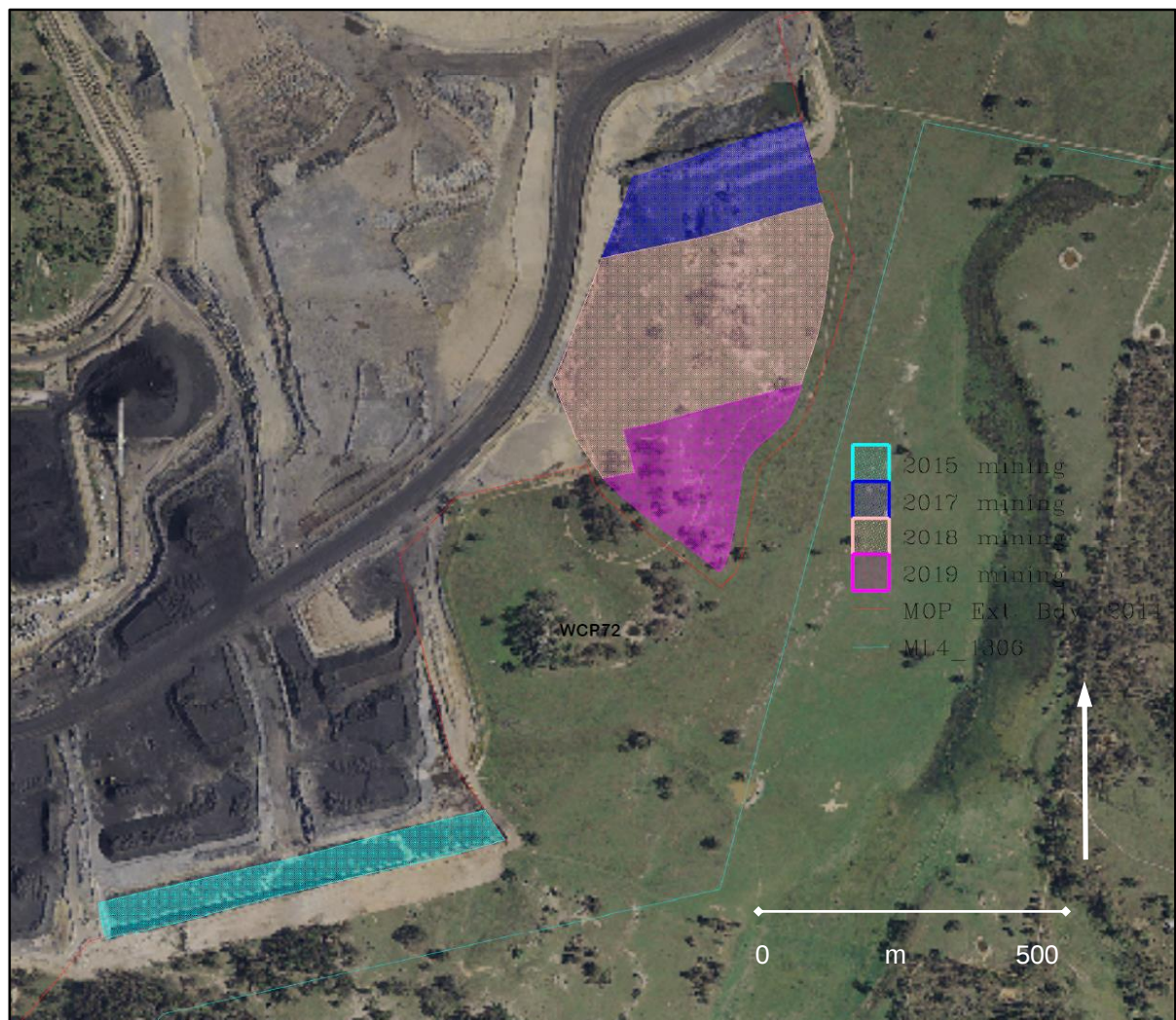


Figure 5.1 Aerial photograph showing the current extent and future planned areas of open cut coal mining in the vicinity of rock art site WCP72 (supplied by Wilpinjong Coal Pty Ltd).



5.1.2 Dust

Dust is identified as a changed condition in site WCP72. A comparison of the 2006 baseline record with the current site condition indicates that the extent and area of rock art panel surfaces subject to dust accumulation has not changed, however the visual appearance of the dust has become darker in colour and hue. There is an easily discernible change in colour from a yellow-brown (recorded in 2006) to a darker brown-grey (now evident in the surface dust accumulations).

The colour change represents material change to the heritage values of the site, due to its visually intrusive nature and the consequential greater difficulty visitors experience in identifying the rock art. It is not known if the change in dust colour represents a current or future risk of physical or chemical impact to the rock art, or is due to natural or man-made processes.

It is not known if the change in dust colour is associated with a change in the rate of dust accumulation.

Wilpinjong Coal records show an initial increase in dust following the commencement of mining, followed by a substantial decrease against baseline environmental dust records collected prior to the operation of the mine. The decrease is thought to be the combined consequence of the introduction of on-going mine strategies to minimise dust generation, and the removal of, or reduction in stock animals on surrounding pastures, and thereby reducing dust from erosion scalds and overgrazed ground.

Potential causes of the change in dust colour include one or more of the following:

1. Change in the dust source or sources, and therefore the composition of the dust, such as dust from the adjacent open cut mine (from the quarrying and/or stockpiling of overburden and coal) or an increased proportion of the visible dust being sourced from the floor deposit, due to changes (e.g. physical or chemical) following the exclusion of domestic stock;
2. Change in the nature of the *in situ* dust, such as the presence of a fungus, mould or lichen growing on it or within it;
3. Change in humidity or other environmental factors, changing the appearance of the dust.

It is not known to what extent the floor deposits in the rock shelter, and particularly the substantial layer of animal dung, may be a contributing or dominant source of dust which is then deposited on the upward sloping rock surfaces of the shelter interior. It is possible that by excluding stock from the shelter site, the nature of the existing animal dung deposits may have changed, and become more susceptible to wind erosion and re-deposition on rock surfaces as a result.

Further information and research is required on the composition, source, vectors and condition of the dust deposits in site WCP72 before effective management and mitigation strategies can be proposed or enacted.

5.1.3 Animal impacts

Animal rubbing and the associated deposition of dirt and residues has been identified in both WCP152 and WCP72. These impacts can be potentially locally intensive, but currently appear to be low in incidence and impact. Past animal impacts including rubbing and physical impact to the shelter walls is extensive along the back wall and ledges of WCP72. This source of impact must be considered to be a natural and long term process.

The most substantial change with regard to animal impacts in site WCP72 is the removal and exclusion of all stock animals from the site area and surrounds. This has halted the use of the overhang as a shelter for stock animals, substantially reduced the rate of dung accumulation, and removed hoof treadage of the deposit. These positive site management outcomes are a result of the change in ownership from pastoral property to coal mine lease.

Other animal impacts include the construction of mud daubing wasp nests on rock art panels. Two examples have been recorded since 2006, both in WCP72. The incidence of new nests on art panels appears therefore to be low and not to pose a major source of deterioration to the rock art.



5.1.4 Lichen

Although new areas of lichen growth have been noted in WCP72, relative to the condition reporting documented in the 2006 baseline recording, inspection of the baseline photographic record suggests that these areas were present in 2006 and were more visible during the conditions of the 2014 field inspection. Lichen growth appears to be a slow and natural process within the rock art sites, and does not pose an immediate risk of impact to the rock art. The potential for the surface dust deposits within WCP72 to be a source of nourishment for organics, such as lichens, remains a possibility which should be flagged for future site inspections and any future research on the dust.

5.1.5 Combustible material

The accumulation of combustible material, such as leaf litter and dead wood within or near to the rock shelters poses a risk to rock art panels in the event of a wildfire or control burn. Radiant heat from nearby fire can cause rock panels to exfoliate due to thermal expansion and contraction, and smoke may be a source of surface residues which can obscure rock art pigments.

It is a sensible and expedient strategy to monitor, manage and periodically remove combustible material from around rock art sites.

5.2 Recommendations

The following recommendations are made on the basis of the site inspection findings presented in this report, the consensus positions arrived at in stakeholder discussions during this assessment, and consideration of the information still required to understand some of the processes posing a risk to the conservation of these sites.

1. A program of research be conducted with the objective of identifying:
 - a. The composition and source of the dust deposits present on rock art panels within WCP72;
 - b. The cause of the change in colour and hue in the dust deposits, noted since 2006;
 - c. The vectors involved in the generation and deposition of dust within WCP72 (for example wind, or animal treadage of the dung deposit);
 - d. An effective method which could be used to remove loose dust deposits with no or minimal impact to the rock surface and rock art pigments.
2. Based on the findings of the program in recommendation one, and in consultation with the Aboriginal stakeholders, develop and conduct a management strategy with the objectives of managing dust deposition in WCP72, and minimising any associated risk to the site's rock art.
3. Continue regular monitoring and recording of dust and vibration levels at each of the three rock art sites.
4. Dismantle and remove the east-west fenceline which extends to the east of the WCP72 rock shelter.
5. Remove combustible material within or near the entrances to WCP72, WCP152 and 153.
6. Regularly monitor and remove any substantial build-up of combustible materials within or near each of the three rock art sites.



6. REFERENCES

- 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. Volumes1: Main Report; and Volume 2: Inventory and Key to the Photographic Record. Report to Wilpinjong Coal Pty Ltd.
- 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.

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APPENDIX 1

PHOTO CATALOGUE